

Instructions

Eagle Quantum Premier®
Fire and Gas Alarm Control System and Automatic
Releasing for Pre-Action and Deluge Systems



Table of Contents

Section 1 – Safety

ALERT MESSAGES	1
----------------------	---

Section 2 – Introduction

EQP SYSTEM DESCRIPTION	2-1
COMMUNICATIONS LOOP	2-1
LON COMMUNICATION HEARTBEAT.....	2-2
THEORY OF OPERATION.....	2-2
EQP CONTROLLER LOGS	2-4
EQP CONTROLLER USER LOGIC	2-4
COMMUNICATION NETWORK FAULT OPERATION	2-5
MULTIPLE WIRING FAULTS.....	2-5
SIL2 CAPABLE SYSTEM.....	2-6
MAJOR COMPONENT DESCRIPTIONS.....	2-6

EQP CONTROLLER (EQ3001, EQ3016, EQ3150)	2-6
EQP Controller Redundancy	2-6
Ethernet Interface Board.....	2-7
Serial Interface Board.....	2-7
EQ2230RSP RS-485 Surge Protector.....	2-7
ControlNet Board or Ethernet DLR Board (Optional).....	2-7
QP Controller-to-Controller Communication (SLC485).....	2-8
EQP Marine Application System	2-8
LOCAL OPERATING NETWORK (LON).....	2-8
EQ24xxNE Network Extender.....	2-8
Port Name.....	2-8
Comm.....	2-8
Function.....	2-8
Port A.....	2-8
ControlNet.....	2-8
ControlNet Communication	2-8
Port B.....	2-8
ControlNet.....	2-8
ControlNet Communication	2-8
Port Name.....	2-8
Comm.....	2-8
Function.....	2-8
Port 1	2-8
Ethernet DLR	2-8
Ethernet DLR Communication	2-8
Port 2	2-8
Ethernet DLR	2-8
Ethernet DLR Communication	2-8
EQ24xxPLR Physical Layer Repeater	2-9
EQ21xxPS Series Power Supplies and EQ2100PSM Power Supply Monitor	2-9
EQP21xxPS(-X) Power Supplies and EQP2410PS(-P) Con- verter	2-9
EQ2220GFM Ground Fault Monitor.....	2-9
FIELD DEVICES	2-10

Flame Detectors	2-10
EQ2200UVHT + C7050 Detector	2-10
Model HD Heat Detector.....	2-10
U5015 Explosion Proof Smoke Detector.....	2-10
X7050 xWatch® Explosion-Proof Camera.....	2-10
EQ3730EDIO Enhanced Discrete Input/Output Module	2-10
EQ3700DCIO Discreet Input/Output Module	2-11
EQ3770 Explosion-Proof I/O (EIO) Module	2-12
EQ3760ASM Addressable Smoke & Heat Module.....	2-12
UD10 DCU Emulator	2-13
PIRECL PointWatch Eclipse	2-13
LS2000 Line-of-Sight	2-13
EQ3900 Series Fire and Gas Alarm Control Panel and Pre- Action System Solutions.....	2-13
EQ3900RPS Explosion-Proof Power Supply.....	2-13
EQ3780HSDM High Speed Deluge Module	2-13
EQ2001 EQP Monitor	2-14

Section 3 – Installation

SAFETY SYSTEM DESIGN REQUIREMENTS.....	3-1
IDENTIFYING THE AREA OF PROTECTION	3-1
IDENTIFYING WIRING, NETWORK (LON), AND EQP SYSTEM POWER REQUIREMENTS	3-1
General Wiring Requirements	3-1
Power Wiring	3-1
EQP System Wiring (ATEX and IECEx).....	3-1
Determining Power Requirements.....	3-3
EQ211xPS, EQ213xPS and EQ217xPS Power Supplies	3-5
Backup Battery	3-5
Battery Charger	3-5
EQP21X0PS(-X) Power Supplies	3-5
Characteristic	3-5
Power Supply	3-5
EQP2410PS(-P) Converter.....	3-6
Shield Grounding.....	3-7
Junction Box Grounding.....	3-7
Response Time vs. EQP System Size	3-7
Moisture Damage Protection.....	3-7
Electrostatic Discharge	3-7
EQ2220GFM INSTALLATION	3-8
MOUNTING	3-8
WIRING.....	3-8
NETWORK AND EQ24XXNE INSTALLATION.....	3-8
MOUNTING	3-8
WIRING.....	3-8
EQP CONTROLLER INSTALLATION	3-10
ENCLOSURE REQUIREMENTS.....	3-10
MOUNTING	3-11
SERIAL INTERFACE BOARD.....	3-11
ETHERNET INTERFACE BOARD.....	3-11

Table of Contents (Cont.)

Power Wiring	3-11	RS-485/RS-232 (Port 1 through Port 4)	3-23
Electrical Connections.....	3-11	ControlNet.....	3-23
Connector P1, Terminals 1 to 4 — 24 Vdc Input Power.....	3-11	Ethernet DLR	3-23
Connector P3, Terminals 13 to 20 — Unsupervised Digital Input Channels 5 to 8.....	3-12	Ethernet	3-23
Connector P4, Terminals 21 to 32 — Unsupervised Relay Output Channels 1 to 4.....	3-12	EQ2001 EQP MONITOR INSTALLATION	3-23
Connector P5, Terminals 33 to 44 — Unsupervised Relay Output Channels 5 to 8	3-12	ENCLOSURE REQUIREMENTS.....	3-23
Connector P6, Terminals 45, 46 & 47 — Trouble Relay.....	3-12	MOUNTING	3-23
Connector P7, Terminals 48 to 53 — LON Signaling Line Circuit Terminals.....	3-12	WIRING.....	3-24
Jumper P24 – RS-485 Termination Jumper.....	3-12	LON WIRING	3-24
Jumper P25 – LON COM 1 Termination	3-12	EQ21XXPS SERIES POWER SUPPLY AND POWER SUPPLY MONITOR INSTALLATION.....	3-24
Jumper P26 – LON COM 2 Termination	3-12	MOUNTING	3-24
Connector P8, Terminals 54, 55 & 56 , Port 1— RS-485 Modbus RTU Master/Slave.....	3-13	WIRING.....	3-24
Connector P9, Terminals 57, 58 & 59 — S' Configuration Port.....	3-14	STARTUP	3-26
Connector P10, Terminals 60, 61 & 62, Port 2— RS-485 Modbus RTU Master/Slave.....	3-16	MEASURING BATTERY VOLTAGE AND CHARGING CUR- RENT.....	3-26
Serial Interface Board Jumpers.....	3-16	EQ22XX0PS(-X) POWER SUPPLIES AND REDUN- DANCY MODULE INSTALLATION.....	3-27
Jumper P25 – RS-485 Termination Jumper, Port 2.....	3-16	MOUNTING	3-27
Jumper P3 – RS-485 Ground Fault Monitor, Port 2.....	3-16	WIRING.....	3-27
Ethernet Interface Board Jumpers Jumper P6 – RS-485 Termination Jumper, Port 2.....	3-16	STARTUP	3-29
Jumper P5 – RS-485 Ground Fault Monitor, Port 2.....	3-16	EQ3730EDIO INSTALLATION.....	3-29
EQP CONTROLLER-TO-CONTROLLER COMMUNICA- TION	3-16	Connector P1, Terminals 1 to 6	3-29
EQP Controller-to-Controller with Fiber Optic Link, Signal Line Circuit Classification Class B or X per NFPA 72.....	3-17	24 Vdc Power Input.....	3-29
Connector P11, Terminals 63, 64 & 65, Port 3 – (Serial Interface Board only) RS-232 Modbus RTU Master/Slave or S' Configuration Port (Non-Isolated).....	3-20	Connector P2, Terminals 1 to 6	3-29
RJ45, Port 3 (Ethernet Interface Board only) Ethernet Modbus TCP Client/Server or S' Configuration Port (Non-Isolated)	3-20	LON/SLC Signaling Circuit Terminals.....	3-29
Connector P12, Terminals 66, 67 & 68, Port 4 – (Serial Interface Board only) RS-232 Modbus RTU Master/Slave (Non-Isolated).....	3-20	Connector P3, Terminals 1 to 12	3-30
RJ45, Port 4 (Ethernet Interface Board only)	3-20	Terminals A,B & C.....	3-30
Connector P13 — RS-232 High Speed Serial Port	3-20	Channels 1 to 4 Input / Output Terminals.....	3-30
CONFIGURATION.....	3-20	Connector P4, Terminals 13 to 24 Terminals A, B & C Channels 5 to 8 Input / Output Terminals.....	3-30
Software Defined Addresses.....	3-20	Unsupervised Input.....	3-30
EQP CONTROLLER INSTALLATION	3-22	Supervised Input (IDC) Open Circuit Supervision.....	3-30
ENCLOSURE REQUIREMENTS.....	3-22	Supervised Input Open and Short Circuit Supervision	3-31
MOUNTING	3-22	Unsupervised Output	3-31
WIRING.....	3-22	Supervised Output— Agent Release (Solenoid Circuit)	3-32
LON WIRING	3-22	Physical Disconnect Switch (HSDM and EDIO).....	3-33
HIGH SPEED SERIAL LINK (HSSL).....	3-23	Supervised Output for Deluge and Pre-action Sprinkler Systems	3-33
CONFIGURATION.....	3-23	CONFIGURATION.....	3-33
S' Configuration	3-23	SETTING EDIO NETWORK ADDRESS	3-33
EQP Controller Addresses.....	3-23	EQ3700DCIO INSTALLATION	3-35
		MOUNTING	3-35
		WIRING.....	3-36
		Power Connector, Terminals 1 to 6 24 Vdc Power Input.....	3-36
		COM Connector, Terminals 1 to 6 LON Terminals.....	3-36

Table of Contents (Cont.)

Unsupervised Input.....	3-36	TEXT DISPLAY.....	4-2
Supervised Input (IDC) Open Circuit Supervision Class B3-36		EQP CONTROLLER MENU OPTIONS.....	4-2
Supervised Input (IDCSC) Open and Short Circuit Supervision		Fault.....	4-5
(Three state – open, switch closure, and short) Class B..	3-37	Lst Flt.....	4-5
Supervised Output Notification (Horns and Strobes) Supervised		Cntr Mode.....	4-5
Outputs for Open & Short Circuits Class B.....	3-37	My Config.....	4-5
Supervised Output for Automatic Release / Supervised		Redun Mem.....	4-5
Output for Open Circuits.....	3-37	HSSL Status.....	4-5
Supervised Output for Deluge and Pre-action.....	3-38	Version Match.....	4-5
Unsupervised Output.....	3-38	SIL Rating.....	4-5
CONFIGURATION.....	3-38	Parser.....	4-5
SETTING DCIO NETWORK ADDRESS.....	3-38	Comm Ack.....	4-5
EQ3720RM INSTALLATION.....	3-39	Lon Comm.....	4-6
MOUNTING.....	3-39	Msg Error.....	4-6
WIRING.....	3-39	Program Flow.....	4-6
Power Connector, Terminals 1 to 6		LON A/B Inf.....	4-6
24 Vdc Power Input.....	3-39	User Logic CS.....	4-6
COM Connector, Terminals 1 to 6		App CS.....	4-6
LON Terminals.....	3-40	User Logic.....	4-6
CONFIGURATION.....	3-40	Config.....	4-6
Setting Relay Module Network Address.....	3-40	Power 2.....	4-6
EQ3710AIM INSTALLATION.....	3-40	Option Bd.....	4-6
MOUNTING.....	3-40	EQP CONTROLLER AUDIBLE ALARM.....	4-6
WIRING.....	3-41	CONTROLNET STATUS INDICATORS	
COM Connector — Terminals 1 to 6		(OPTIONAL).....	4-7
LON Terminals.....	3-41	ETHERNET DLR STATUS INDICATORS (OPTIONAL) ...	4-7
Analog Input Module Channels used as NFPA 72 Approved		SEQUENCE OF EVENTS DURING A CONFIGURATION	
4-20 mA Flame Detector Input.....	3-41	DATA DOWNLOAD.....	4-8
CONFIGURATION.....	3-42	LED State.....	4-8
Setting Analog Input Module		Description.....	4-8
Network Address.....	3-42	Off.....	4-8
GAS DETECTOR LOCATION & INSTALLATION 3-42		No power.....	4-8
ENVIRONMENTS AND SUBSTANCES THAT AFFECT GAS		Green.....	4-8
DETECTOR PERFORMANCE.....	3-42	Controlled by a Scanner in Run state.....	4-8
Examples:.....	3-43	Green, flashing.....	4-8
Examples:.....	3-43	Not configured, or Scanner in idle state.....	4-8
SYSTEM CONFIGURATION.....	3-45	Red.....	4-8
SETTING DEVICE NETWORK ADDRESSES.....	3-45	Major fault (EXCEPTION state, FATAL error, etc.).....	4-8
Overview of Network Addresses.....	3-45	Red, flashing.....	4-8
Setting Field Device Addresses.....	3-45	Recoverable fault(s).....	4-8
ROCKER SWITCH TABLE.....	3-46	LED State.....	4-8
PHYSICAL DISCONNECT SWITCH WIRING.....	3-48	Description.....	4-8
WIRING BETWEEN EDIO & HSDM MODULES.....	3-48	Off.....	4-8
		No power or no IP address.....	4-8
		Green.....	4-8
		Online, one or more connections established (CIP Class 1 or	
		3).....	4-8
		Green, flashing.....	4-8
		Online, no connections established.....	4-8
		Red.....	4-8
		Duplicate IP address, FATAL error.....	4-8
		Red, flashing.....	4-8
		One or More connections timed out (CIP Class 1 or 3).....	4-8
		LED State.....	4-8
		Description.....	4-8
		Off.....	4-8
Section 4 – Operation			
EQP CONTROLLER.....	4-1		
PUSHBUTTONS.....	4-1		
EQP CONTROLLER STATUS INDICATORS.....	4-2		

Table of Contents (Cont.)

REDUNDANCY MODULE QUINT4-DIODE	6-9
EQ2230RSP RS-485 SURGE PROTECTOR	6-9
EQ21XXPSM POWER SUPPLY MONITOR	6-10
EQ2220GFM GROUND FAULT MONITOR	6-10
EQ24XXNE NETWORK EXTENDER/EQ24XXPLR PHYSICAL LEVEL REPEATER	6-11
EQ3760ASM ADDRESSABLE SMOKE MODULE 6-12	
EQ3780HSDM HIGH SPEED DELUGE MODULE 6-12	
COMBUSTIBLE GAS SENSOR.....	6-12
ELECTROCHEMICAL SENSORS	6-12
UD10-DCU UNIVERSAL DISPLAY	6-12
EQ21XXPS POWER SUPPLY	6-12
EQ2001 EQP MONITOR.....	6-12

Section 7 – Ordering Information

EQP CONTROLLER MODEL MATRIX	7-1
EDIO MODEL MATRIX.....	7-1
DCIO MODEL MATRIX	7-2
AIM MODEL MATRIX.....	7-2
RELAY MODULE MODEL MATRIX	7-2
ORDERING INFORMATION.....	7-3

Appendices

APPENDIX A – FM APPROVAL DESCRIPTION ...	A-1
APPENDIX B – CSA INTERNATIONAL CERTIFICA- TION DESCRIPTION.....	B-1
APPENDIX C – ATEX & IECEX CERTIFICATION..	C-1
APPENDIX D – CE MARK.....	D-1

AUTOMATICⁱ*

Eagle Quantum Premier[®] Fire and Gas Alarm Control System and Automatic Releasing for Pre-Action and Deluge Systems

Section 1 – Safety

ALERT MESSAGES

The following Alert Messages, **DANGER**, **WARNING**, **CAUTION**, and **IMPORTANT** are used throughout this manual and on the system to alert the reader and operator to dangerous conditions and/or important operational or maintenance information.



DANGER

*Identifies immediate hazards that **WILL** result in severe personal injury or death.*



WARNING

*Identifies hazards or unsafe practices that **COULD** result in severe personal injury or death.*



CAUTION

*Identifies hazards or unsafe practices that **COULD** result in minor personal injury or damage to equipment or property.*

IMPORTANT

A brief statement of fact, experience, or importance that is given as an aid or explanation.



WARNING

The hazardous area must be de-classified prior to removing a junction box cover or opening a detector assembly with power applied.



CAUTION

1. Be sure to read and understand the entire instruction manual before installing or operating the Eagle Quantum Premier[®] (EQP) System. Only qualified personnel should install, maintain or operate the EQP System.
2. The wiring procedures in this manual are intended to ensure proper functioning of the devices under normal conditions. However, because of the many variations in wiring codes and regulations, total compliance with these ordinances cannot be guaranteed. Be certain that all wiring and equipment installation meets or exceeds the latest revisions of the appropriate National Fire Protection Association (NFPA) Codes, National Electrical Code (NEC), and all local ordinances. If in doubt, consult the Authority Having Jurisdiction (AHJ) before wiring the system.

All wiring shall be installed in accordance with the manufacturer's recommendations.

3. Some EQP devices contain semiconductor devices that are susceptible to damage by electrostatic discharge. An electrostatic charge can build up on the skin and discharge when an object is touched. Always observe the normal precautions for handling electrostatic sensitive devices, i.e., use of a wrist strap (if available) and proper grounding.
4. To prevent unwanted actuation, alarms and extinguishing devices must be secured prior to performing system tests.

Section 2 – Introduction

EQP SYSTEM DESCRIPTION

The EQP System is a combined fire and gas safety system that is globally approved for hazardous locations. It is a distributed releasing system and is certified for annunciation and releasing.

The EQP System consists of an EQP Controller and a number of addressable microprocessor based field devices. The EQP Controller coordinates system device configuration, monitoring, annunciation, and control, while the field devices communicate their status and alarm conditions to the EQP Controller.

The EQP Controller can be arranged in a redundant configuration, thereby increasing the availability of the EQP System. The EQP Controllers work in “Master” and “Hot Standby” mode.

Various combinations of field devices can be configured as part of the system. The actual selection depends on the requirements of the application and the regulations that cover the type of protection required. See Figure 2-1 for a block diagram of the EQP System.

All field devices are tied into a communication loop that starts and ends at the EQP Controller. Each device connected to the communication loop is assigned a unique identity by setting its address switches. All other device operation parameters are configured through Det-Tronics “Safety System Software.” These selections define the type of device and how it is to operate. This system configuration data is then downloaded into the EQP Controller.

A programmed EQP Controller is configured to automatically download the configuration data into the individual devices when they first communicate with the EQP Controller.

In addition to Det-Tronics advanced flame and gas detectors, the EQP System offers the capability of incorporating third party fire and gas protection equipment into the system. These can be either input or output devices. Typical input devices include manual fire alarm “call boxes,” heat detectors, and analog combustible or toxic gas measurement instruments. Typical output equipment includes solenoids, strobes, and horns. All equipment is

monitored for wiring fault conditions.

For complete system integration, the EQP Controller has the capability to communicate with other systems such as PLCs and DCSS. Different communication protocols are supported, allowing the EQP Controller to communicate with other systems either directly or through communication gateways.

NOTE

For specific information relating to the SIL 2 rated EQP System, refer to manual number 95-8599.

COMMUNICATIONS LOOP

EQP utilizes a Det-Tronics Signaling Line Circuit (SLC), a version of Echelon’s Local Operating Network (LON) customized specifically for the EQP System. This network provides several key advantages:

- NFPA Class X performance of SLC
- Peer-to-peer communications
- Short message formats
- Expandability

The EQP Controller utilizes several mechanisms to continuously check the LON loop for fault conditions, thereby providing the highest level of reliable communication.

Every device on the LON loop has the ability to communicate with the EQP Controller at any time. This design allows immediate alarm messages to be sent from the field devices to the EQP Controller.

All messages are kept short in order to maximize network performance. This minimizes network bottlenecks.

The EQP System is easily modified to accommodate design changes or plant expansions. This can involve adding LON sections, repositioning LON sections, or removing LON sections from the loop. There are LON communication implementation details that affect and limit how the LON loop is changed.

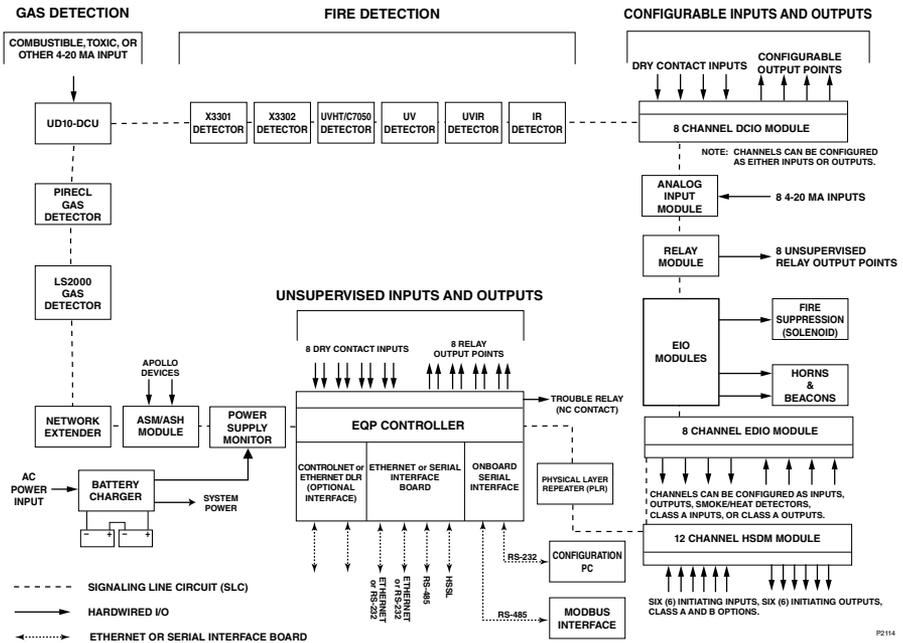


Figure 2-1—Block Diagram of the EQP System

Only devices that have been approved for use with the EQP System can be connected to the LON. All approved devices have been tested and certified to operate properly on the LON.

LON COMMUNICATION HEARTBEAT

The EQP Controller continuously broadcasts a heartbeat signal over the LON loop. This heartbeat is used for verifying the integrity of the LON loop and for keeping the field devices from going into a fault isolation mode. Once every second, the heartbeat contains the current time and date, which are used by the field devices to log status events and calibrations.

The EQP Controller continuously tests LON continuity by sending out a heartbeat on one LON port and then listening for it on the other LON port. The EQP Controller also broadcasts the heartbeat signal in the opposite direction around the loop. This ensures that all field devices, the LON Network Extenders (EQ24xxNE), and communication wiring are correctly passing the digital information around

the loop.

The field devices use the heartbeat as a mechanism to ensure that there is a communication path back to the EQP Controller. If the field device does not receive a heartbeat for a period of time, the device will go into a LON fault isolation. In this situation, the device opens one side of the LON and listens for a heartbeat on the other side. If the device doesn't receive a heartbeat, it listens on the other side of the LON and opens the opposite LON connection.

THEORY OF OPERATION

During normal operation, the EQP Controller continuously checks the system for fault conditions and executes user defined programmed logic that coordinates the control of the field devices. At the same time, the field devices are continuously monitoring for device based fault and alarm conditions.

When a fault condition occurs, the EQP Controller displays the fault condition on the Vacuum Fluorescent Text Display, activates

Table 2-1—EQP Controller Based Faults

EQP Controller Faults Shown on Text Display	Trouble LED	LON Fault LED	Trouble Relay
EQP Controller Fault	X		X
Program Mode	X		X
Wrong Device Type	X		X
LON A Interface Fault	X		X
LON B Interface Fault	X		X
Option Board Fault	X		X
Device Download Active	X		X
Logic Engine Fault	X		X
RS485 Ground Fault	X		X
Comm Option Board Fault	X		X
LON Overload Fault	X		X
LON Pattern Test	X		X
Watch Dog Timer Fault	X		X
Controller Fault	X		X
Standby Power Fault 1*	X		X
Standby Power Fault 2*	X		X
Standby LON Fault*	X		X
Standby Controller Fault*	X		X
HSSL Comm. Fault*	X		X
OS Queue Overflow Fault	X		X
Device Offline	X		X
Extra LON Device	X		X
Invalid Config	X		X
LON Fault	X	X	X
LON Ground Fault	X		X
Power Fail 1	X		X
Power Fail 2	X		X
RTC Fault	X		X
Redundancy Fault*	X		X
Hardware Fault	X		X
Memory Fault	x		x

*Only for EQP Controller pair configured for redundancy.

the appropriate fault LED(s), activates the Trouble signal using the EQP Controller's internal annunciator, and de-energizes the EQP Controller's Trouble Relay. EQP Controller-based fault conditions include the EQP Controller status and LON communications such as the heartbeat being sent around the loop and the field device loss of communications. EQP Controller-based fault conditions are listed in Table 2-1.

Table 2-2—Field Device Based Faults

Field Device Faults Shown on Text Display	Trouble LED	Trouble Relay
290 Volt Fault	X	X
AC Failed	X	X
ADC Saturation	X	X
Battery Fault	X	X
Beam Block	X	X
Blinding IR Fault	X	X
Cal Active at Start	X	X
Calibration Fault	X	X
Channel Open	X	X
Channel Short	X	X
Control Message Fault	X	X
CPU Fault	X	X
Detection Disabled	X	X
Device Offline	X	X
Diminished Detection	X	X
Dirty Optics	X	X
Ground Fault Negative	X	X
Ground Fault Positive	X	X
Hardware Fault	X	X
High Energy Fault	X	X
Internal Comm Fault	X	X
Internal Voltage Fault	X	X
Invalid Configuration	X	X
Invalid Device Parameter	X	X
IR Auto Oi Fault	X	X
IR Fault	X	X
IR Manual Oi Fault	X	X
LON CPU Memory Fault	X	X
LON Diagnostic Fault	X	X
Low Aux Power Fault	X	X
Memory Fault	X	X
Missing IR Sensor Fault	X	X
Missing UV Sensor Fault	X	X
No Oi High Energy Fault	X	X
Noise fault	X	X
Non-Ration Mode Fault	X	X
Open Lamp Fault	X	X
Out of Range High Fault	X	X
Out of Range Low Fault	X	X
Power Supply Fault	X	X
PWM Fault	X	X
Rogue Device	X	X
Sensor Fault	X	X

Table 2-2—Field Device Based Faults (Cont.)

Supply Voltage Fault	X	X
Tx Lamp Fault	X	X
Unable to Configure	X	X
UV Auto Oi Fault	X	X
UV Fault	X	X
UV Manual Oi Fault	X	X
Hardware Fault	X	X
Memory Fault	X	X
Wrong Device Type	X	X
Zero Drift	X	X

Field device-based fault conditions are transmitted to the EQP Controller, where they are then annunciated. Refer to Table 2-2 for a listing of field device faults. Each field device transmits its status to the EQP Controller on a regular basis.

When an alarm condition occurs, the EQP Controller displays the alarm condition on the text display, activates the appropriate Alarm LED(s), and activates the alarm signal using the EQP Controller's internal annunciator.

Each field device must communicate alarm and fault conditions to the EQP Controller. The timing for transmitting alarms and faults to the EQP Controller is displayed in Table 2-3.

NOTE

All fault and alarm conditions are latched

on the EQP Controller. To reset the EQP Controller, conditions indicated on the text display must currently be in the OFF state. Pushing the reset button then initiates an EQP Controller reset. Active alarms will remain through a EQP Controller reset.

EQP CONTROLLER LOGS

The EQP Controller has an internal alarm and event log. The logs can be accessed via the S³ software configuration ports (Configuration Port or Port 3) using a RS-232 serial cable and a Windows™ computer. The EQP Controller can save up to 4,095 alarms and events in the EQP Controller memory.

EQP CONTROLLER USER LOGIC

The EQP Controller continuously executes the user logic programs that are programmed using S³ software. The user logic programs are set up in the same fashion as IEC 6113-3 programmable logic programmed into Programmable Logic Controllers (PLCs). Block diagram logic gates are tied together with inputs, outputs, and other logic gates to perform a specific task. A number of tasks can be tied together to perform a system function.

Typical programmed functions include flame/gas voting, timing delays, timing executions, latching conditions, alarm and trouble

Table 2-3—EQP Status Update Rates

EQP Controller Type	# of Devices	Input – No Exception	Input – With Exception	Input – With Exception
		U-Series (UV & UVIR)	DCIO, EDIO, HSDM AIM Relay Module ASM Module X-Series LS2000	PIRECL
EQ3001	1 to 100	1 Second	1 Second	1 Second
	101 to 200	2 Seconds	2 Seconds	1 Second
	201 to 246	2 Seconds	3 Seconds	1 Second
EQ3150	1 to 50	1 Second	1 Second	1 Second
	51 to 100	2 Seconds	2 Seconds	1 Second
	101 to 150	2 Seconds	3 Seconds	1 Second
EQ3016	1 to 16	1 Second	1 Second	1 Second

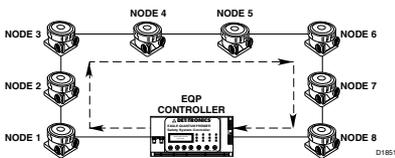


Figure 2-2—Normal Communication over the LON

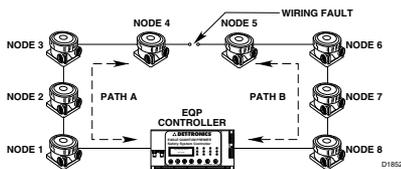


Figure 2-3—Communication over the LON with a Single Wiring Fault

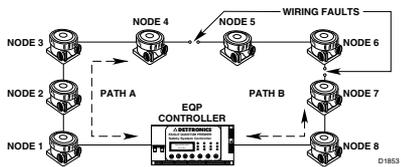


Figure 2-4—Communication over LON with Multiple Wiring Faults

notification, suppression control, condition control, and process shutdown notification.

The EQP Controller executes program logic by starting with the first logic page of the first program and then progressing onto subsequent pages of the same program. In turn, subsequent programs are then executed.

Every one hundred milliseconds (0.1 second), the EQP Controller will start executing the user logic that is programmed into the EQP Controller. Within this logic execution cycle, the EQP Controller will execute as many of the logic pages as possible. If all programmed logic is executed in a cycle, the EQP Controller will start executing program logic with the next cycle. Otherwise, subsequent logic execution cycles are used to finish executing the remaining logic gates. The EQP Controller will start over only when all the logic gates have been executed. At this stage, the EQP Controller will start executing the first logic page of the first program at the beginning of the next logic cycle.

COMMUNICATION NETWORK FAULT OPERATION

During normal operation, the EQP Controller is continuously broadcasting a heartbeat around the communication loop as shown in Figure 2-2. The EQP Controller broadcasts the heartbeat in both directions. At the same time, the field devices are transmitting status information to the EQP Controller over the communication loop.

Every field device except the network extender has two LON fault isolation relays. Each relay is tied to a communication port on the device. When a field device fails to receive the heartbeat from the EQP Controller, the device initiates a LON fault isolation routine. The isolation routine disconnects one of the communication ports via one of the LON fault isolation relays. The device listens for a heartbeat on the communication port that remains connected. If a heartbeat is not found, the routine then disconnects the other communication port and listens for a heartbeat on the connected side. The process is repeated until either a heartbeat is located or a LON fault time out period of two hours is reached.

The LON fault isolation routine is disabled and the LON fault isolation relays are closed when the LON fault timeout period has elapsed. The LON fault isolation routine will be enabled when the device again receives a heartbeat.

For a single wiring fault, the field devices with the fault will isolate the fault by opening LON fault isolation relays. After the field devices isolate the wiring fault, communications will be resumed between the EQP Controller and field devices. Refer to Figure 2-3.

MULTIPLE WIRING FAULTS

In the event of multiple wiring faults on the LON, the devices between the faults will continue to function, but the faults will prevent them from communicating with the EQP Controller. See Figure 2-4. In this example, nodes 1 to 4 communicate using one EQP Controller port (path A) and nodes 7 and 8 use the other EQP Controller port (path B). Nodes 5 and 6 are unable to report to the EQP Controller because they are isolated by the two wiring faults. If a device is prevented from communicating with the EQP Controller, the text display on the EQP Controller will show the message "Device Offline."

IMPORTANT

Since it is impossible to predict where a network fault might occur or exactly what effect it will have on actual system operation, it is important to diagnose and repair any fault as soon as possible after it is detected to ensure continuous, uninterrupted system operation.

SIL2 CAPABLE SYSTEM

The EQP SIL2 capable system uses the following components:

- EQ3XXX - EQP Controller
- EQ3730EDIO - Enhanced Discrete Input/Output Module
- EQ3710AIM - Analog Input Module
- EQ3760ASM - Addressable Smoke & Heat Module
- X3301 - Multispectrum IR Flame Detector
- PIRECL - Infrared Gas Detector
- LS2000 - Line-Of-Sight Infrared Gas Detector
- EQ3780HSDM - High Speed Deluge Module
- UD10-DCU - FlexVu Universal Display

Refer to safety system manual (95-8599) for safety related data.

MAJOR COMPONENT DESCRIPTIONS

The EQP System has three main component groups – the EQP Controller, Local Operating Network (LON), and Intelligent Field Devices.

EQP CONTROLLER (EQ3001, EQ3016, EQ3150)

The EQP Controller (see Figure 2-5) performs all communication, command, and control functions for the EQP System. The EQP Controller supports both “Static” and “Programmable” logic. Other features include:

- Redundant EQP Controller capability
- User pushbutton controls (reset, acknowledge, etc.)
- “Real time” system clock
- Internal alarm sounder
- Vacuum fluorescent text based display that shows current system status

- 8 programmable unsupervised inputs
- 8 programmable unsupervised relay outputs
- RS-485 Modbus RTU communication interface that supports coils, discrete inputs, and holding registers
- Optional ControlNet communication board supports redundant communication channels.
- Optional Ethernet DLR communication board supports Ethernet Device Level Ring communications.
- Ethernet Interface Board supports configuration, Modbus TCP/IP, EQP Controller redundancy, and RS-485 Modbus.
- Serial Interface Board supports configuration, RS-232 Modbus, EQP Controller redundancy, and RS-485 Modbus.



Figure 2-5—EQP Controller

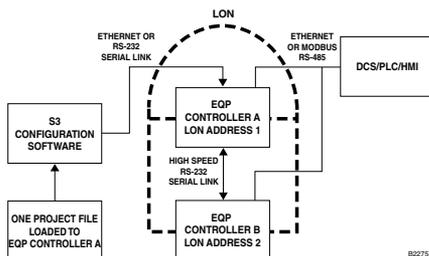


Figure 2-6—Block Diagram of EQP System with Redundant EQP Controllers

EQP Controller Redundancy

The EQP Controllers can be configured as a redundant pair. See Figure 2-6. The redundancy scheme is a hot standby system that offers the following primary features:

- Automatic configuration of the standby EQP Controller
- Bumpless transfer
- Forced and automatic switchover

- No downtime on EQP Controller replacement
- Automatic synchronization between EQP Controllers
- Increased system availability

During normal operation one EQP Controller acts as the “Master” while the other acts as the “Hot Standby.”

Terminology used for redundancy:

Master EQP

Controller:

This is the normal mode for non-redundant and master EQP Controllers. User logic is executed, outputs are being controlled and all serial and/or Ethernet ports are active.

Standby EQP

Controller:

This EQP Controller is receiving all inputs but does not have any control over the outputs and user logic is not executed. The standby EQP Controller receives update information from the master EQP Controller to ensure a bumpless transfer should a controller switchover occur.

Primary EQP

Controller:

The EQP controller assigned address 1.

Secondary EQP

Controller:

The EQP Controller assigned address 2.

Bumpless transfer:

During EQP Controller switchover, no change in output will occur due to the switchover.

Table 2-4—Ports on Ethernet Interface Board

Port Name	Comm	Function
Serial Port 2	RS-485	Modbus (Master/ Slave) Ground Fault Monitored, Isolated
Ethernet Port 3	Ethernet	Modbus TCP/IP (Master/Slave) S ³ Configuration
Ethernet Port 4	Ethernet	ModbusTCP/IP (Master/Slave)
HSSL Redundancy Port	RS-232	Redundant EQP Controller to EQP Controller Only

Ethernet Interface Board

The Ethernet Interface Board supports two additional serial ports and two Ethernet ports. See Table 2-4. Ethernet supports 10/100 Mbs communication. Figure 2-7 shows the Ethernet TCP/IP Server/Client and Modbus RTU Master/ Slave relationship. For a redundant EQP Controller configuration, the board is required in both EQP Controllers.

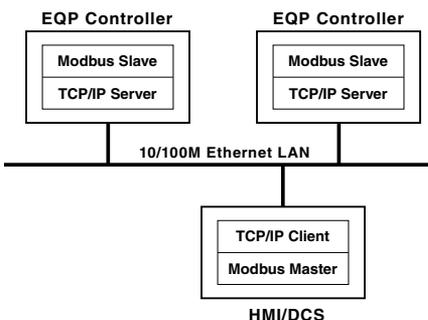


Figure 2-7—Ethernet TCP/IP Server/Client Relationship & Modbus RTU Master/Slave Relationship

Serial Interface Board

The Serial Interface Board supports up to four additional serial ports. See Table 2-5. For a redundant EQP Controller configuration, the board is required in both EQP Controllers.

Table 2-5—Ports on Serial Interface Board

Port Name	Comm	Function
Serial Port 2	RS-485	Modbus (Master/ Slave) Ground Fault Monitored, Isolated
Serial Port 3	RS-232	Modbus (Master/ Slave) S ³ Configuration
Serial Port 4	RS-232	Modbus (Master/ Slave)
HSSL Redundancy Port	RS-232	Redundant EQP Controller to EQP Controller Only

EQ2230RSP RS-485 Surge Protector

The EQ2230 RSP Surge Protector is a device that protects the EQP RS-485 Ports (Ports 1 and 2) from surge transients on the RS-485 cable.

ControlNet Board or Ethernet DLR Board (Optional)

An optional ControlNet Board or Ethernet Device Level Ring (DLR) Board can be

installed to allow ControlNet or Ethernet DLR communication to a compatible PLC. Both interfaces operate in a non-interfering manner. The functionality of the ControlNet and Ethernet DLR boards is not covered by any approval. Both options offer two ports. See Tables 2-6 and Table 2-7. The interfaces must be configured through S³ prior to use. Consult the factory for details. For redundant EQP Controller configurations, identical option boards are required in both EQP Controllers.



Figure 2-8—EQP EQ24xxNE / EQ24xxPLR

Table 2-6—Ports on ControlNet Interface Board

Port Name	Comm	Function
Port A	ControlNet	ControlNet Communication
Port B	ControlNet	ControlNet Communication

Table 2-7—Ports on Ethernet DLR Interface Board

Port Name	Comm	Function
Port 1	Ethernet DLR	Ethernet DLR Communication
Port 2	Ethernet DLR	Ethernet DLR Communication

QP Controller-to-Controller Communication (SLC485)

The EQP Controllers can be configured to communicate with up to 12 EQP Controllers via RS-485 communication. The EQP Controller-to-Controller scheme provides the ability to meet NFPA 72 SLC requirements with the following primary features:

- Modular trouble and alarm configuration
- Multiple zone application with EQP Controller-to-Controller communication
- Multiple media options



IMPORTANT

When using RS-485 communications P8 (Port 1) and P10 (Port 2) wiring must be less than 20 feet and placed into conduit. Or, fiber optic converters (see table 3-9 for performance verified units) shall be used. Or, the EQ2230 RSP can be used to protect against electrical surge and transient EMI. The fiber optic converter and RSP must be placed inside the cabinet with the EQP Controller.

EQP Marine Application System

For information regarding EQP Marine Application Systems, refer to 57-1009 Addendum.

LOCAL OPERATING NETWORK (LON)

The LON is a fault tolerant, two wire, digital communication network. The circuit is arranged in a loop starting and ending at the EQP Controller. The circuit supports up to 246 intelligent field devices spread over a distance of up to 10,000 meters (32,500 feet).

NOTE

All LON devices support NFPA 72 Class X communication with the EQP Controller.

EQP EQ24xxNE / EQ24xxPLR may be necessary to establish network segments for communication integrity within a large system. A network segment is the combination of the number of LON network devices and the length of wire between 2 network extenders or 1 network extender and the EQP Controller. Up to 40 LON network devices may be installed in a network segment, and the LON cable wire segment lengths are dependent upon physical and electrical characteristics of the cable. Refer to the installation section for LON cable wire information.

EQ24xxNE Network Extender

The purpose of the EQ24xxNE is to transmit LON communication signals beyond 2,000 meters of wire length. A network extender (see Figure 2-8) must be installed near or at 2,000 meters of wiring length to re-broadcast the communications into the next network

segment. For every EQ24xxNE added, the length of the communications loop extends up to 2,000 meters. Due to propagation delays around the loop, the maximum loop length is limited to 10,000 meters.

EQ24xxPLR Physical Layer Repeater

The purpose of the EQ24xxPLR is to eliminate communications interference resulting from network wiring opens, caused by a break in the wire or a bad connection. An open wire will result in the reflection of the network signal back along the network wiring segment. This interference has the potential to cause a network device to fault isolate. Depending upon the electrical characteristics of the network cable and quantity of field devices in a network segment, an EQ24xxPLR may be necessary within a network segment to provide optimal performance and NFPA 72 Class X compliance. An EQ24xxPLR should be installed adjacent to any LON network device experiencing fault isolation as indicated by LON diagnostics.

NOTES

EQ24xxNE is required for communication loops greater than 60 nodes or 2000 meters of cable length.

EQP EQ24xxNE/EQ24xxPLR may be needed to divide the network into smaller segments. No more than six EQ24xxNE may be used on the communication loop. Two EQ24xxPLR may be installed within a network segment.

EQ21xxPS Series Power Supplies and EQ2100PSM Power Supply Monitor

The Power Supply, Power Supply Monitor, and backup batteries are used to provide power to the EQP System. The power supply monitor communicates trouble conditions to the EQP Controller. 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), and backup battery current charge levels.

The Power Supply provides main and backup power to the EQP System. The device includes many features such as voltage regulation, high efficiency, and high power factor.

An equalize switch is located on the front panel of the charger for manual activation,

Detector	Manual Number
X3301	95-8704
X3302	95-8768
X5200	95-8546
X2200	95-8549
X9800	95-8554
UVHT	95-8570

Table 2-8—Flame Detector Instruction Manuals

or a multi-mode electronic timer can be used for automatic activation. Steady state output voltage remains within +/- 1/2% of the setting from no load to full load for AC input voltages within +/- 10% of the nominal input voltage.

EQP21xxPS(-X) Power Supplies and EQP2410PS(-P) Converter

The Power Supplies and Converter provide main and backup power to the EQP System in ordinary and marine applications. Refer to Section 3 of this manual for complete information.

EQ2220GFM Ground Fault Monitor

The EQ2220GFM Ground Fault Monitor (see Figure 2-9) provides ground fault monitoring in a system that includes a floating 24 Vdc power source. The device detects ground fault conditions on +/- power and all secondary I/O circuits. A positive or negative ground fault condition is indicated immediately by local LEDs, and by a relay contact after a 10 second time delay. The EQ2220GFM is intended to be mounted in the same enclosure as the EQP Controller.



Figure 2-9—Ground Fault Monitor

FIELD DEVICES

Flame Detectors

For flame detector installation, operation, maintenance, specifications and ordering information, refer to Table 2-8.

For information regarding USCG Approval of the X3301 Flame Detector, refer to 57-1009 Addendum.

EQ2200UVHT + C7050 Detector

The EQ2200UVHT + C7050 UV Flame Detector is used with the EQP System to provide UV flame protection in continuous duty, high temperature applications such as turbine enclosures, generator rooms, etc. where the ambient temperature can continuously exceed +75°C (+167°F). The EQ2200 UVHT is an electronic module assembly that is used in conjunction with a high temperature rated C7050B detector.

Model HD Heat Detector

The Model HD Heat Detector senses the surrounding air temperature and actuates an electrical contact output at a pre-determined temperature. It can be used to sense excessive heat or fire and warn personnel, or it can be used as a signaling device to sense fire and send a signal to an alarm panel for actuation of a fire suppression system.

U5015 Explosion Proof Smoke Detector

The Det-Tronics SmokeWatch™ U5015 Explosion-Proof Smoke Detector has Division and Zone explosion-proof ratings and is suitable for industrial and commercial applications. It is designed to operate effectively with smoldering and rapidly growing fires. Outputs include a localized LED, 0-20 mA, and relays.

X7050 xWatch® Explosion-Proof Camera

The xWatch high resolution color camera operates in an explosion-proof enclosure and can be used to view an area in alarm or to record activity in an area. It can be used as a stand-alone unit or attached to any of the X-series flame detectors. Users have an option to include a digital video recorder (DVR) as part of the solution to capture a digital video of hazard events.

EQ3730EDIO Enhanced Discrete Input/Output Module

The 8 Channel EDIO Module (see Figure 2-10) expands the input and output capability of the EQP System.

The unit is designed to provide continuous and automated fire/gas protection, while ensuring system operation through continuous supervision of system inputs/outputs.

The EDIO module provides eight channels of configurable input or output points that can be programmed for supervised or unsupervised operation. Each input point can accept fire detection devices such as heat, smoke, or unitized flame detectors. Each output point can be configured for signaling or releasing output operation. Each channel on the module is provided with individual indicators for active and fault conditions.



Figure 2-10—EQ3730EDIO Module

IMPORTANT

For Class A wiring, two input/output channels are combined, thereby supporting up to four input/output circuits.

NOTE

An input must be active for at least 750 milliseconds in order to be recognized.

The EDIO module can be mounted directly to a panel, or it can be DIN rail mounted. System status can be determined using the troubleshooting procedures, Eagle Quantum Safety System Software (S³) and the status indicators on the module.

Refer to the Enhanced Discrete Input/Output Module Specification Data sheet (form number 90-1189) for additional information.

NOTE

NFPA 72 requires wire supervision selection for fire detection and notification devices (IDC, NAC, supervisory and releasing devices).

NOTE

The DCIO and EDIO outputs only support equipment that operates on 24 vdc (not to exceed 2 amperes per channel).

EQ3700DCIO Discreet Input/Output Module

The 8 Channel Discrete Input/Output (DCIO) Module (see Figure 2-11) consists of eight individually configured channels. Each channel is configured as either an input or output with the appropriate wiring supervision. Wiring supervision includes none, open circuits, and "open and short" circuits. In addition to defining the type of supervision, an input channel is also configured to generate the appropriate static logic alarm message to the EQP Controller.

Heat, smoke, or unitized flame detectors can be wired into channels defined as inputs. Horns and strobes/beacons can be wired into channels defined as outputs. The DCIO only supports Class B wiring.

The DCIO has two device status LEDs, as well as two LEDs for each channel. On the device level, one green LED indicates power, while the other yellow LED indicates a LON CPU fault. For each channel, one red LED indicates channel activation and the other yellow LED indicates a fault condition when wiring supervision is defined for the channel.

Refer to the DCIO Specification Data sheet (form number 90-1149) for additional information.



Figure 2-11—EQ3700 DCIO Module

EQ3720RM Relay Module

The Relay Module (see Figure 2-12) consists of eight individually configured output channels.

NOTE

The EQ3720RM supports equipment that operates on 24 Vdc (not to exceed 1 amperes)

The EQ3720RM 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 CPU fault. For each channel, one red LED indicates channel activation and the other yellow LED indicates that the module operating voltage is low or that the module has not been configured (all eight channel LEDs blink).

Refer to the Relay Module Specification Data sheet (form number 90-1181) for additional information.



Figure 2-12—EQ3720RM Module

EQ3710AIM Analog Input Module

The Analog Input Module (see Figure 2-13) provides a means of connecting devices with a calibrated 4–20 mA output signal to the EQP System.

The Analog Input Module (AIM) provides 8 configurable channels that can be set for either combustible gas mode or universal mode. The combustible gas mode provides a number of automatically programmed settings, and alarm thresholds that are limited to approval body requirements. The universal mode is used for generic devices where control over all configuration parameters is required. All devices must provided their own calibration facilities.

For fire detector 4–20 mA inputs, the AIM is certified for use as an NFPA 72 Class B Approved input.

Refer to the Analog Input Module Specification Data sheet (form number 90-1183) for additional information.



Figure 2-13—EQ3710AIM Module

EQ3770 Explosion-Proof I/O (EIO) Module

This assembly includes an EDIO/HSDM/AIM/RM/DCIO module in an explosion-proof enclosure (see Figure 2-14). Options include: Window, NTP/Metric ports, and a Ground Fault Monitor (GFM).

Refer to the EQ3770EIO Instruction Manual (form number 95-8761) for additional information.



Figure 2-14—EIO Module

EQ3760ASM Addressable Smoke & Heat Module

The EQ3760ASM Addressable Smoke & Heat Module (see Figure 2-15) is an interface device designed to provide continuous and automated fire protection for the EQP system.

The EQ3760ASM provides a gateway to connect up to 100 addressable smoke and heat devices to the LON. This allows all of the flame, gas, and addressable smoke and heat detectors to run on one system, enabling the EQP Controller to annunciate a fire alarm from either its own LON based I/O, or from the connected addressable smoke and heat detection loops. The EQP Controller can

support up to 10 EQ3760ASM modules.

The EQ3760ASM can support a variety of Apollo Discovery and XP95 devices, including smoke, heat, manual call, sounders, beacons and I/O modules. The addressable devices are configured individually via the S³ software.

To ensure reliable system operation, the EQ3760ASM continuously monitors its input and output circuits for opens and short circuit conditions.

During normal operation, the EQ3760ASM continuously checks the loop for fault conditions and executes user defined programmed logic that coordinates the control of the field devices. The EQ3760ASM reports any device based fault and alarm conditions to the EQP Controller.

The EQP Controller continuously monitors the status of the EQ3760ASM, as well as the status of each device connected to the EQ3760ASM. The EQ3760ASM's alarm and fault status conditions are logged in the EQP Controller.

EQP System status can be determined using S³ software or the status indicators on the EQ3760ASM, where LEDs annunciate power on, faults, or an active device on the loop.

Refer to the EQ3760ASM Instruction Manual (form number 95-8755) for additional information.



Figure 2-15—EQ3760ASM

UD10 DCU Emulator

The FlexVu® Model UD10 DCU Emulator (UD10-DCU) is designed for applications that require a gas detector with digital readout of detected gas levels. Its LON interface board makes the UD10-DCU compatible with EQP Systems by digitizing the 4-20 mA analog signal from the attached sensor/transmitter and transmitting the value as a process variable over the LON to the EQP Controller.

The UD10-DCU is designed for use with most currently available Det-Tronics gas detectors. The UD10-DCU with CGS conditioning board is designed for use with combustible gas, see manual 95-8656 for more information.

For a list of compatible gas detectors, as well as information regarding installation, operation, maintenance, specifications and ordering information, refer to form number 95-8656.

PIRECL PointWatch Eclipse

The Pointwatch Eclipse® Model PIRECL is a diffusion-based, point-type infrared gas detector that provides continuous monitoring of combustible hydrocarbon gas concentrations in the range of 0–100% LFL.

The LON supervision meets Signaling Line Circuit (Class X) requirements per NFPA72: 2010 for the Model PIRECL.

For PIRECL installation, operation, maintenance, specifications and ordering information, refer to form number 95-8526.

NOTE

The low alarm range for the EQP model of the PIRECL is 5–40% LFL (the standard PIRECL is 5–60% LFL).

For information regarding USCG Approval of the PIRECL Detector, refer to 57-1009 Addendum.

LS2000 Line-of-Sight

The FlexSight™ Line-of-Sight Infrared Hydrocarbon Gas Detector Model LS2000 is a gas detection system that provides continuous monitoring of combustible hydrocarbon gas concentrations in the range of 0–5 LFL-meters, over a distance of 5–200 meters.

The LON supervision meets Signaling Line Circuit (Class X) requirements per NFPA 72: 2010 for the Model LS2000.

For LS2000 installation, operation, maintenance, specifications, and ordering information, refer to form number 95-8714.

EQ3900 Series Fire and Gas Alarm Control Panel and Pre-Action System Solutions

As part of providing the total solution to commercial and industrial customers globally, Det-Tronics offers several performance approved hazardous area (EQ3900N and EQ3900E) and non-hazardous area (EQ3900G) enclosure solutions. These are custom solutions that can include 1 or more of the following components: EQP Controller, EDIO, HSDM, AIM, RM, DCIO, PSM, and GFM. Refer to Instruction Manuals (95-8559 and 95-8641) for additional information.

EQ3900RPS Explosion-Proof Power Supply

The EQ3900RPS is an industrial power supply that accepts two independent AC inputs and produces 24 Vdc with up to 18 amps output current. It can be configured with various numbers of 24 Vdc power outputs, ground fault test operator, status indicators, fuse monitoring and window. Ordinary location or Class 1 Division 1 enclosure configurations can be provided. Refer to Instruction Manual 95-8745 for additional information.

EQ3780HSDM High Speed Deluge Module

The EQ3780HSDM High Speed Deluge Module (HSDM) is specifically designed to expand the capability of the EQP System by providing the capability to activate ultra-high speed suppression systems for hazardous applications such as munitions manufacturing (see Figure 2-20).

The HSDM provides up to six configurable input channels and up to six configurable output channels that can be programmed for supervised or unsupervised operation. Typical initiating devices include optical flame detectors, heat detectors, and manual pull stations. Output channels are designed to activate FM-approved solenoids. Solenoids

that are activated by the HSDM are typically used to initiate pilot-actuated deluge valves.

A unique cascade output feature allows the output of the HSDM to be connected to the input of another HSDM, extending the systems capability to activate multiple solenoids with a single input. Refer to instruction manual 95-8782 for more information.



Figure 2-20—EQ3780HSDM

EQ2001 EQP Monitor

The EQ2001 EQP Monitor is a diagnostic device which connects to the LON via a dedicated spur and monitors the LON. The EQP Monitor logs additional diagnostic information related to field devices faults. All outputs are disabled and it does not provide alarm or fire safety functions.

Section 3 – Installation

NOTE

All field wiring must be marked per NFPA 70 Article 760.

SAFETY SYSTEM DESIGN REQUIREMENTS

Many factors need to be considered when determining proper EQP System design. The following paragraphs will discuss these factors and other issues useful in designing, installing and configuring the EQP System.

IDENTIFYING THE AREA OF PROTECTION

In order for the EQP System to provide optimum coverage and protection, it is critical to properly define the required “Area of Protection” (total area being monitored by the system). The area of protection should include all hazard sources requiring monitoring, as well as suitable locations for mounting detection, extinguishing, notification, and manual devices. In order to accurately define the area of protection and provide maximum protection, all potential “Real” and “False” hazard sources must be identified. The number and location of Real Hazards determines the extent of the area of protection, and impacts all subsequent design decisions.



WARNING

When drilling through surfaces in the process of mounting equipment, verify that the location is free of electrical wiring and electrical components.

IDENTIFYING WIRING, NETWORK (LON), AND EQP SYSTEM POWER REQUIREMENTS

General Wiring Requirements



WARNING

DO NOT open any junction box or device enclosure when power is applied without first de-classifying the hazardous area.



CAUTION

Any deviation from the manufacturer’s recommended wiring practices can compromise system operation and effectiveness. ALWAYS consult the factory if different wire types or methods are being considered.

NOTE

Specific installation requirements may differ depending on local installation practices and compliance with third party certifications. For local installation practices, consult the local authority having jurisdiction. For compliance with third party certifications, consult the appropriate appendix in this manual for additional installation requirements.

Power Wiring

IMPORTANT

To ensure proper operation of field devices, the voltage input to the device (measured at the device) must be within the range indicated for that device in the “Specifications” section of this manual.

EQP System Wiring (ATEX and IECEx)

For the interconnection of the modules within the EQP System, use fixed installed wiring. For correct wiring size and type for a specific device, refer to the appropriate section in this manual.

For ambient temperatures below -10°C use field wiring suitable for the expected conditions, and for ambient temperatures above +60°C use field wiring suitable for 20°C above the maximum expected conditions.

The EQP Ex n modules may only be installed, connected, or removed when the area is known to be non-hazardous. The screw terminals are to be tightened with a minimum torque of 0.5 Nm. Equipotential bonding connection facilities on the outside of electrical equipment shall provide effective connection of a conductor with a cross-sectional area of at least 4 mm².

The EQP System utilizes a power supply that provides an isolated 24 Vdc battery backed-up power to the fire protection devices as described in NFPA 72. More than one power supply may be used in a system to provide power to different sets of equipment as part of the system.

The power supply wiring may consist of one or

more daisy-chained wire segments providing power to the devices. For each of the daisy-chained wire segments, the installer must calculate the voltage drops that occur across the devices in order to determine the gauge of the wire that will be installed.

A power supply wiring diagram should contain information describing wire distances and current draws associated with all devices connected to the wire segment. A typical power supply wiring recommendation is that the voltage drop from the power source to the end device should not exceed 10%. Using 24 Vdc as a reference, the maximum voltage drop should not exceed 2.4 Vdc. A wire gauge must be selected to ensure that the end device has at least 21.6 Vdc or higher.

In order to calculate the power supply voltage for the end device, calculate the voltage drops that occur due to each wire segment between the devices. This involves determining the total current draw and the two conductor wire resistance per each wire segment.

Example: Can 18 AWG wire be used to power three devices from the 24 Vdc power supply? Refer to the figure below for wiring and device current draw information along with voltage drop calculations.

Answer: If the Authority Having Jurisdiction (AHJ) requires a voltage loss of 10% or less, only 16 AWG wire could be used, since the end device would require 21.4 Vdc. If there is no local requirement, then 18 AWG wire could be used to provide power to the devices.

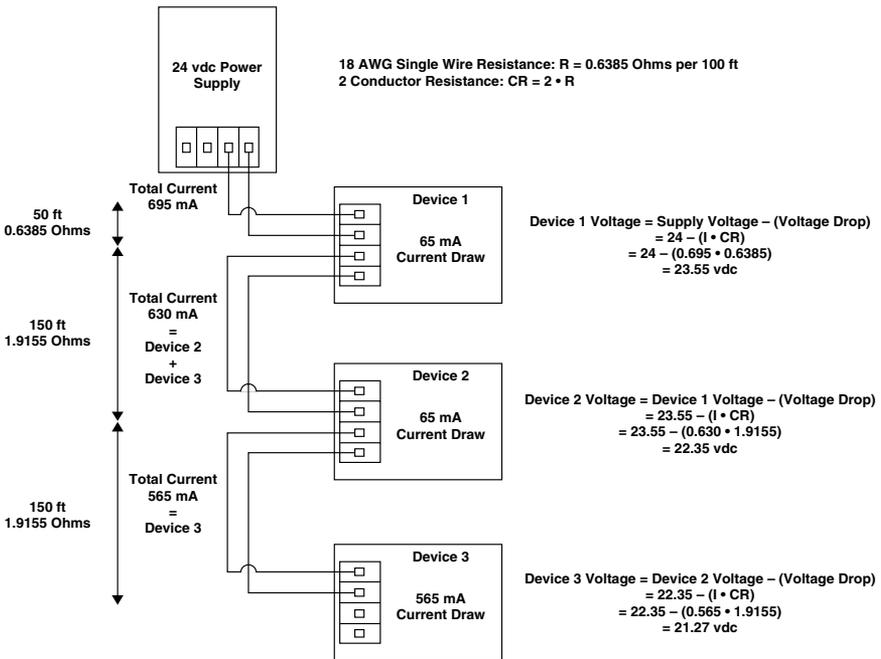


Figure 2-21—EQP System Wiring

Determining Power Requirements

Tables 3-1 and 3-2 are provided for calculating the total current requirements for those parts of the EQP System requiring battery backup.

Table 3-1—**Standby** Current Requirements at 24 Vdc

Device Type	Number of Devices		Standby Current		Total Current for Device Type
EQP Controller		X	0.360	=	
EQ3LTM		X	0.001	=	
EQ3730EDIO		X	0.075	=	
EQ3780HSDM		X	0.075	=	
EQ3700DCIO		X	0.075	=	
EQ2001 EQP Monitor		X	0.360	=	
EQ2100PSM		X	0.060	=	
X3301 - without heater		X	0.160	=	
X3301 - with heater		X	0.565	=	
X3302 - without heater		X	0.160	=	
X3302 - with heater		X	0.565	=	
X2200		X	0.135	=	
X9800 - without heater		X	0.085	=	
X9800 - with heater		X	0.420	=	
X5200 - without heater		X	0.155	=	
X5200 - with heater		X	0.490	=	
EQ3720RM		X	0.120	=	
EQ3710AIM		X	0.160	=	
EQ2220GFM		X	0.018	=	
PIRECL		X	0.270	=	
LS2000 Transmitter without heater		X	0.149	=	
LS2000 Transmitter with heater		X	0.336	=	
LS2000 Receiver without heater		X	0.116	=	
LS2000 Receiver with heater		X	0.258	=	
EQ24xxNE		X	0.030	=	
EQ24xxPLR		X	0.090	=	
EQ3760ASM		X	0.560	=	
EQ21xxPS Power Supply		X	0.350	=	
UD10-DCU - with heater off		X	0.054	=	
UD10-DCU - with heater on		X	0.167	=	
UD10-DCU CGS - w/ heater off		X	0.221	=	
UD10-DCU CGS - w/ heater on		X	0.333	=	
Other		X		=	
Total Standby Current for EQP System (in amperes) =					

Notes: Standby current is the average current draw for the device in normal mode.
 This table is for battery calculations only.
 For OPECL standby current requirements, reference versions 16.1 and earlier of this manual.

Table 3-2—Alarm Current Requirements at 24 Vdc

Device Type	Number of Devices		Alarm Current		Total Current for Device Type
EQP Controller		X	0.430	=	
EQ3LTM		X	0.001	=	
EQ3730EDIO, 8 Inputs		X	0.130	=	
EQ3730EDIO, 8 Outputs		X	0.075	=	
EQ3780HSDM		X	0.100	=	
EQ3700DCIO, 8 Inputs		X	0.130	=	
EQ3700DCIO, 8 Outputs		X	0.075	=	
EQ3720RM		X	0.120	=	
EQ2100PSM		X	0.060	=	
X3301 - w/o heater		X	0.160	=	
X3301 - with heater		X	0.565	=	
X3302 - without heater		X	0.160	=	
X3302 - with heater		X	0.565	=	
X2200		X	0.135	=	
X9800 - without heater		X	0.085	=	
X9800 - with heater		X	0.420	=	
X5200 - without heater		X	0.155	=	
X5200 - with heater		X	0.490	=	
EQ3710AIM		X	0.300	=	
EQ2220GFM		X	0.018	=	
PIRECL		X	0.275	=	
LS2000 Transmitter without heater		X	0.149	=	
LS2000 Transmitter with heater		X	0.336	=	
LS2000 Receiver without heater		X	0.182	=	
LS2000 Receiver with heater		X	0.326	=	
EQ24xxNE		X	0.030	=	
EQ24xxPLR		X	0.090	=	
EQ3760ASM		X	0.560	=	
EQ21xxPS Power Supply		X	0.350	=	
UD10-DCU - with heater off		X	0.054	=	
UD10-DCU - with heater on		X	0.167	=	
UD10-DCU CGS - with heater off		X	0.221	=	
UD10-DCU CGS - with heater on		X	0.333	=	
Other		X		=	
Total Solenoid Load				+	
Total Signaling Load				+	
Total Alarm Current for EQP System (in amperes)				=	

Notes: This table is for battery calculations only.
 For OPECL alarm current requirements, reference versions 16.1 and earlier of this manual.

Table 3-3A—EQ21xxPS Power Supply Specifications

Characteristic	Power Supply		
	EQ2110PS/EQ2111PS	EQ2130PS/EQ2131PS	EQ2175PS/EQ2176PS
Input Voltage	120/208/240 vac - EQ2110PS	120/208/240 vac - EQ2130PS	120/208/240 vac - EQ2175PS
Input Voltage	220/240 vac - EQ2111PS	220/240 vac - EQ2131PS	220/240 vac - EQ2176PS
Input Current	4 Amps	11/6/6 Amps	24/15/12 Amps
Input Frequency	60 Hz - EQ2110PS	60 Hz - EQ2130PS	60 Hz - EQ2175PS
Input Frequency	50 Hz - EQ2111PS	50 Hz - EQ2131PS	50 Hz - EQ2176PS
Supply Rating	10 Amps	30 Amps	75 Amps
Maximum Alarm Current	10 Amps	30 Amps	75 Amps
Maximum Standby Current	3.33 Amps	10 Amps	25 Amps
Recharge Current	6.67 Amps	20 Amps	50 Amps
Minimum Battery Capacity	40 AmpHours	120 AmpHours	300 AmpHours
Maximum Battery Capacity	100 AmpHours	300 AmpHours	750 AmpHours
Maximum Deluge Standby Current*	1 Amp	3 Amps	7.5 Amps

*Only applies to 90 hour back-up applications.

EQ211xPS, EQ213xPS and EQ217xPS Power Supplies

Refer to Table 3-3A for Power Supply ratings.

Backup Battery

Refer to Table 3-4 or 3-5 to calculate the minimum size of the backup battery (in amp hours). Select a sealed lead-acid battery with an adequate amp hour rating.

NOTE

Connect two batteries in series for 24 volts. Batteries must be protected from physical damage. The battery installation shall be adequately ventilated.

Battery Charger

Use the following formula to calculate the minimum battery charger size:

$$\text{Minimum Charge Rate} = \frac{\text{Alarm Current}}{48} + \frac{\text{Total Amp Hours}}{48}$$



CAUTION

Care should be taken when considering the final voltage at the device during AC power loss. With loss of AC power, the device voltage will drop over time as the batteries lose their charge. If extended periods of AC power loss are to be expected, either consider a heavier wire

gauge or specify batteries with higher amp-hour ratings.



WARNING

To avoid battery damage adjust float voltage to battery manufacturer recommendations only. Serious injury may result from battery explosion if improperly adjusted.

EQP21X0PS(–X) Power Supplies

The EQP2120PS(–B) Power Supply is used in pairs where the primary source of input supply is connected to one and the secondary source is connected to the other. Each power supply may be backed up by another power supply of the same model or by a DC-DC converter (see Figures 3-19A, B and C for available configurations). A maximum of eight power supplies operated in parallel can be connected to each input supply. Both the primary and secondary sets must be individually capable of operating the system without the other supply. The secondary source is required to be continuously powered.

The use of these supplies is based upon acceptance of the local AHJ of the secure supply system that provides the secondary supply. These supplies must be used in a redundant configuration, where one bank of supplies is fed from the primary source and the other bank from the secondary source. Both primary and secondary supplies shall be continuously available and both rated for a minimum 100% of load.

Table 3-4—Backup Battery Requirements for Automatic Release of Extinguishing Systems Except Deluge

Standby Current _____	X	Standby Time* 24 Hours	=	Standby Amp Hours _____
Alarm Current _____	X	5 Minute Alarm Time* 0.083 Hours	=	Alarm Amp Hours _____
Sum of Standby and Alarm Amp Hours				=
Multiply by 1.2 (20% Safety Factor)				X

T0014B

Total Battery Amp Hour Requirement

* FM MINIMUM REQUIREMENT FOR EXTINGUISHING SYSTEMS IS 24 HOURS STANDBY TIME AND 5 MINUTES ALARM TIME.

Table 3-5—Backup Battery Requirements for Deluge and Pre-Action Applications

Standby Current _____	X	Standby Time* 90 Hours	=	Standby Amp Hours _____
Alarm Current _____	X	10 Minute Alarm Time* 0.166 Hours	=	Alarm Amp Hours _____
Sum of Standby and Alarm Amp Hours				=
Multiply by 1.2 (20% Safety Factor)				X

T0040B

Total Battery Amp Hour Requirement

* FM MINIMUM REQUIREMENT FOR DELUGE SYSTEMS IS 90 HOURS STANDBY TIME AND 15 MINUTES ALARM TIME.

Refer to Table 3-3B for power supply ratings.



IMPORTANT

The EQP21X0PS(-X) Power Supplies provide EQP System devices with power from input supply 120 to 220 V ac. Use of this power supply does not provide the source of the secondary supply such as secondary source batteries, their supervision or charging, or UPS. Per NFPA 72-2013 requirements, such power supply related requirements must be separately provided for and be accepted by the local Authority Having Jurisdiction (AHJ).

EQP2410PS(-P) Converter

The EQP2410PS(-P) Converter converts the DC input voltage to an adjustable, controlled and galvanically separated 24 Vdc output voltage. The converter is always connected to the secondary source.

Determining Power Requirements

Use of the EQP2120PS(-B) Power Supply provides the primary and secondary supplies.

The EQP2410PS(-P) Converter provides the secondary supply only. It is used in conjunction with the EQP2120PS(-B) Power Supply, which serve as the primary supply (see Figures 3-19A, B and C for available configurations). The customer is responsible for providing adequate secondary power supply source needs. The ac input current requirements for EQP2XX0PS(-X) in relation to EQP System dc current load (power supply output) are calculated using the following formula:

$$\text{Input Current} = [\text{Output Current} \times \text{Output Voltage} \div \text{Input Voltage} \div \text{Efficiency}] + 0.43 \text{ A}$$

Example:

$$[20 \text{ Adc} \times 28 \text{ Vdc} \div 120 \text{ Vac} \div 0.91] + 0.43 = 5.56 \text{ Aac}$$

For Standby Current (amperes ac) requirements, use Total Standby Current (amperes dc) for the EQP System's applicable field devices from Table 3-1.

Table 3-3B – EQP2XX0PS Power Supply and Converter Specifications

Characteristic	EQP2120PS(-B) Power Supply	EQP2410PS(-P) Converter
	Input Frequency	60/50
Input Voltage	120/220 Vac	24 Vdc
Input Current, Max.	6.6 / 3.6 Iac	15.7 Idc
Output Voltage Range	24.5 ... 28.0 Vdc	24.5 ... 28.0 Vdc
Supply Rating	20	10
Maximum Alarm Current	20	10
Maximum Standby Current	20	10
Efficiency	91% for 120 Vac 93% for 220 Vac	88%

For Alarm Current (amperes ac) requirements, use Total Alarm current (amperes dc) for the EQP System's applicable field devices from Table 3-2.

NOTE

The suffix (-P) or (-B) defines the method for mounting the panel mount models:

(-P) = mounting plate

(-B) = mounting brackets.

Shield Grounding

Two shield ground terminals are provided inside the junction box of each device, and also at the EQP Controller. Connect shield ends to the terminals provided (not to each other) inside the junction box.



CAUTION

Insulate the shields to prevent shorting to the device housing or to any other conductor. Refer to Appendix D for EMC Directive requirements.

Junction Box Grounding

All junction boxes must be electrically connected to earth ground.

Response Time vs. EQP System Size

When designing an EQP System, it is important to realize that by increasing the number of nodes (devices) on the communication loop,

the amount of time required for a status change message from a detection device to reach the EQP Controller also increases.

The EQP Controller requires a specific length of time to process each bit of information that is transferred along the communication loop. As the number of nodes increases, so does the amount of data being processed as well as the time required for processing by the EQP Controller.

If the fastest possible communication response time is an important criteria for a large EQP System, it is recommended that the number of nodes on an individual loop be kept as small as possible. Consider using multiple EQP Controllers with fewer nodes per loop.

Moisture Damage Protection

Moisture can adversely affect the performance of electronic devices. It is important to take proper precautions during installation to ensure that moisture will not come in contact with electrical connections or components.

In applications where the network wiring is installed in conduit, the use of watertight conduit seals, drains, breathers, or equivalent is recommended to prevent damage caused by condensation within the conduit.

Electrostatic Discharge

An electrostatic charge can build up on the

skin and discharge when an object is touched. ALWAYS use caution when handling devices, taking care not to touch the terminals or electronic components.



CAUTION

ALWAYS discharge static charges from hands before handling electronic devices or touching device terminals. Many devices contain semiconductors that are susceptible to damage by electrostatic discharge.

NOTE

For more information on proper handling, refer to Det-Tronics Service Memo form 75-1005.

EQ2220GFM INSTALLATION

MOUNTING

The EQ2220GFM is a DIN rail mountable device designed to be mounted in the same enclosure as the EQP Controller.

WIRING

1. Connect power wiring from the EQP Controller power terminals 1 and 2 to the GFM terminals 1 and 2.
2. Connect power wiring from the GFM terminals 3 and 4 to the EQP Controller power terminals 3 and 4.
3. Connect earth ground to terminal 5 or 10.
4. Connect the relay contacts as required.

Refer to Figure 3-1 for terminal block identification.

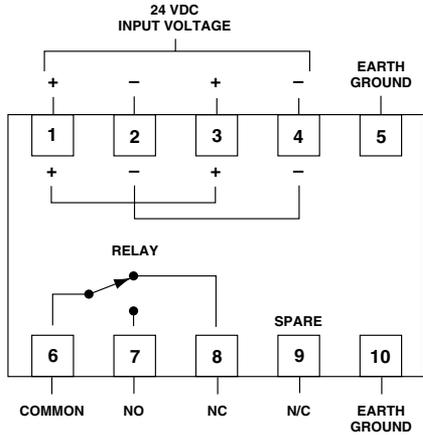
NETWORK AND EQ24XXNE INSTALLATION

MOUNTING

The device should be securely mounted to a vibration free surface. (See the "Specifications" section in this manual for device dimensions.)

WIRING

All devices on the LON are wired in a loop that starts and ends at the EQP Controller. To



NOTE: RELAY CONTACTS ARE SHOWN IN THE REST STATE, NO POWER APPLIED. RELAY IS ENERGIZED WITH POWER APPLIED AND NO GROUND FAULT (TERMINALS 6 & 7 CLOSE, TERMINALS 6 & 8 OPEN).

Figure 3-1—Terminal Configuration for Ground Fault Monitor

ensure proper operation, the LON should be wired using high speed communication grade cable, as specified on the next page.

NOTE

Cable meeting the specifications listed in Table 3-6 is suitable for distances up to 2000 meters.

Any of the cable types listed in Table 3-7 can be used for wiring the LON for the distances indicated.

NOTE

If no network extenders are used, the distances listed are for the entire loop. If network extenders are used, the distances listed are for the wiring length between network extenders or between a network extender and the EQP Controller.

IMPORTANT

Det-Tronics recommends the use of shielded cable (required by ATEX) to prevent external electromagnetic interference from affecting field devices.



WARNING

Be sure that the selected cable meets all job specifications and is rated for the installation per local and national

codes and practices. The use of other cable types can degrade EQP System operation.  necessary, consult factory for further suggested cable types.

IMPORTANT

Shielded cables certified to ISA SP50 Type A or IEC 61158-2 Type A are suitable for use in LON/SLC wiring. For armored version, contact cable manufacturer.

1. Remove the cover from the Network Extender enclosure.
2. Connect 24 Vdc power lead wires and communication network cable to the terminal block. (See Figure 3-2 for terminal location and Figure 3-3 for terminal identification).

See Table 3-8 to determine maximum wiring length.

COM 1 - Communication network connections: Connect to COM 2 terminals of the next device on the loop, A to A and B to B.

COM 2 - Communication network connections: Connect to COM 1 terminals of the previous device on the loop, A to A and B to B.

24 Vdc - Connect the "+" terminal to the positive side of the 24 Vdc power source. (Both "+" terminals are connected internally.)

Connect the "-" terminal to the

LON Cable NPLFA (Manufactured and Part No.)*	Maximum Length**		Voltage
	Feet	Meters	
Belden 3073F (Tray Rated)	6,500	2,000	600 V
Rockbestos Gardex Fieldbus 1 Shield Pair, 16 AWG, Type TC, p/n FB02016-001	6,500	2,000	600 V
1 Shield Pair, 18 AWG, Type TC, p/n FB02018-001	6,500	2,000	600 V

Table 3-7—LON Maximum Cable Lengths

Note: *Use the same type of cable in each wiring segment between network extenders.

**Maximum wire lengths represent the linear wire distance of LON communications wiring between network extenders.

Be sure that selected cable meets all job specifications, indoor, outdoor and direct burial.

If necessary, consult factory for further suggested cable types.

negative side of the 24 Vdc power source. (Both "-" terminals are connected internally.)

Table 3-6—Typical Specification for 16 AWG (1.5 mm²) LON Wiring Cable per Echelon

	Minimum	Typical	Maximum	Units	Condition
DC Resistance, each conductor	14	14.7	15.5	ohm/km	20 C per ASTM D 4566
DC Resistance Unbalanced			5%		20 C per ASTM D 4566
Mutual Capacitance			55.9	nF/km	per ASTM D 4566
Characteristic Impedance	92	100	108	ohm	64 kHz to 1 MHz, per ASTM D 4566
Attenuation	78 kHz		2.2	dB/km	20 C per ASTM D 4566

T0049B

Length: 6,500 feet/2000 meters maximum (basic loop or between Network Extenders).
 Type: Single twisted pair.
 Wire Gauge: 16 AWG, stranded (19 x 29), tinned copper with overall shield.
 Cables meeting these specifications are good for up to 2000 meters.

Table 3-8—Maximum Wiring Length from Nominal 24 Vdc Power Source to Network Extender
(Maximum wire lengths are based upon the cable's physical and electrical characteristics.)

Wire Size	Maximum Wiring Distance	
	Feet	Meters
18 AWG (1.0 mm ²)*	2200	650
16 AWG (1.5 mm ²)*	3500	750
14 AWG (2.5 mm ²)*	5600	1700

*Approximate Metric Equivalent.

- Connect shields to the designated "shield" terminals. The two shield terminals are connected internally to ensure shield continuity.



CAUTION

Do not ground either shield at the network extender enclosure. Insulate the shields to prevent shorting to the device housing or to any other conductor.

- Check ALL wiring to ensure that proper connections have been made.
- Inspect the junction box O-ring to be sure that it is in good condition.

NOTE

Unused conduit entries shall be closed with suitable blanking elements.

- Lubricate the O-ring and the threads of the junction box cover with a thin coat of grease to ease installation and ensure a watertight enclosure.

NOTE

The recommended lubricant is a silicone free grease, available from Det-Tronics.

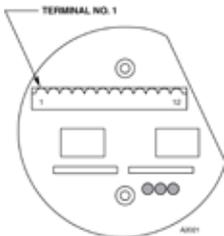


Figure 3-2—Network Extender Wiring Terminal Location

- Place the cover on the enclosure. Tighten only until snug. **Do not overtighten.**

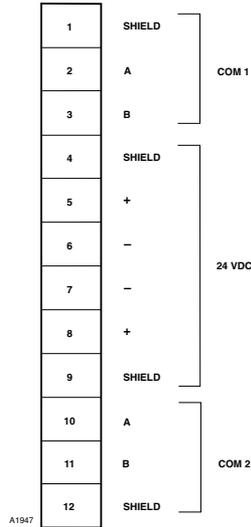


Figure 3-3—Network Extender Wiring Terminal Identification

EQP CONTROLLER INSTALLATION

The following paragraphs describe how to properly install and configure the EQP Controller.

ENCLOSURE REQUIREMENTS

The EQP Controller must be properly installed in a suitable enclosure that is rated for the location. The enclosure must provide space to install and wire the EQP Controller and must also provide for ground wire termination. The enclosure must contain either a keyed lock or a special tool to gain access into the enclosure. The enclosure must be rated for the temperature range of the location plus the temperature rise of all equipment installed inside the enclosure. The enclosure must be rated for electrical equipment that is going to be installed.

NOTE

The EQP Controller and enclosure must be connected to earth ground.

For ordinary locations when entry is required to operate the equipment, the cabinet should be a dead-front construction and 16-gauge cold-rolled steel. The door lock system shall accept different keys for entry. An Authorized

Persons key and a Person-in-charge key will allow entry into the cabinet. The cabinet should contain a window to view the EQP Controller's text display and LED indicators.

NOTE

For any selected enclosure, the enclosure must conform to all applicable regulations and requirements.

NOTE

The Trouble signal must be located in an area where it is likely to be heard.

Classified locations require the appropriate hazardous rated enclosure. It is recommended that operators/switches be installed in the enclosure. This avoids the need to declassify the area in order to operate the EQP Controller. Regulations require that key switches be installed for certain operations. An appropriate window should be part of the enclosure in order to allow an operator to view the text display and LED indicators.

NOTE

If an enclosure does not have a keyed entry, a special tool is required to gain entry into an enclosure.

Det-Tronics offers several approved (FM/CSA/ATEX/CE) hazardous area enclosures that have EQP equipment installed in the enclosure. Contact Det-Tronics for further information.

MOUNTING

The EQP Controller is designed for direct panel mounting or DIN rail mounting. See "Specifications" section of this manual for mounting dimensions.

NOTE

Clips for DIN rail mounting are available, but must be specified at the time of ordering.

NOTE

A minimum clearance of 4 inches between the EQP Controller and nearby equipment is required to provide room for wiring and ventilation.

SERIAL INTERFACE BOARD

A Serial Interface Board is available for the

EQP Controller. See Figures 3-6A, 3-6B, and 3-7 for details on the electrical connections.

ETHERNET INTERFACE BOARD

An Ethernet Interface Board is available for the EQP Controller. See Figures 3-6A, 3-6B and 3-7 for details on the electrical connections.

WIRING

Power Wiring



CAUTION

Input voltage at the EQP Controller must be 18 Vdc minimum to ensure proper operation.

It is important to consider both the wire gauge and the distance from the EQP Controller to the power supply. As the distance between the EQP Controller and the power supply increases, so must the diameter of the power wiring in order to maintain a minimum of 18 Vdc at the EQP Controller.

IMPORTANT

To ensure proper operation of devices, the voltage input to the device (measured at the device) must be within the range indicated for that device in the "Specifications" section of this manual.

Electrical Connections

Figures 3-6A and 3-6B show the location of wiring connectors on the EQP Controller module. Figure 3-7 identifies individual terminals.

Connector P1, Terminals 1 to 4 — 24 Vdc Input Power

Connect the power supply to terminals 1 and 2 of the EQP Controller. Terminals 3 and 4 must also be connected to power.

When EQP Controller and power supplies are installed in separate NRTL cabinets, two power cables from two distribution circuits are required, so that if one is lost, the EQP Controller will continue to operate and signal a trouble condition. The power circuit must be protected against physical damage.

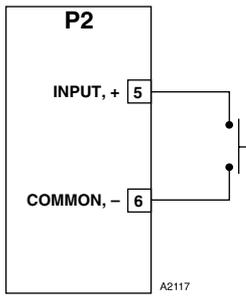


Figure 3-4—Unsupervised Input Wiring

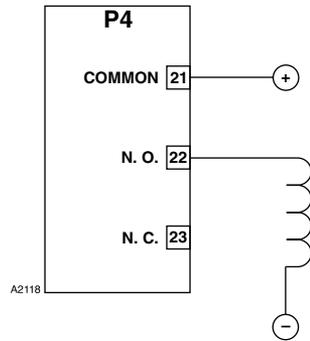


Figure 3-5—Unsupervised Relay Output

Shields on power cables must be connected to chassis ground (earth).

**Connector P2, Terminals 5 to 12 —
Unsupervised Digital Input Channels 1 to 4**

**Connector P3, Terminals 13 to 20 —
Unsupervised Digital Input Channels 5 to 8**

See Figure 3-4 for example. Only channel 1 is shown in Figure 3-4. The information is typical for channels 1-8.

**Connector P4, Terminals 21 to 32 —
Unsupervised Relay Output Channels 1 to 4**

**Connector P5, Terminals 33 to 44 —
Unsupervised Relay Output Channels 5 to 8**

See Figure 3-5 for example. Only channel 1 is shown in Figure 3-5. The information is typical for channels 1-8.

NOTE

Channel software configurations include all panel indicator functions to automatically mimic the EQP Controller front panel indicators.

**Connector P6, Terminals 45, 46 & 47 —
Trouble Relay**

The Trouble relay is not configurable. In the normal condition, the relay coil is energized, closing the N.O. contact (terminals 45-46) and opening the N.C. contact (terminals 45-47). The relay coil is de-energized in the trouble condition.

**Connector P7, Terminals 48 to 53 —
LON Signaling Line Circuit Terminals**

The LON loop is wired so that the EQP

Controller's LON COM 1 is connected to the field device's COM 2 connection. The field device's COM 1 is wired to the next device's COM 2 connection. This continues through the last field device on the loop. The last field device's COM 1 is then wired back to the EQP Controller's COM 2 connection. LON A and B polarities must be maintained throughout the loop (i.e., always wire A to A and B to B between the devices).

- Port Pinout (6-position connection terminal block)
- 48 — COM 1 shield connection
 - 49 — "B" side of signaling circuit for COM 1
 - 50 — "A" side of signaling circuit for COM 1
 - 51 — COM 2 shield connection
 - 52 — "B" side of signaling circuit for COM 2
 - 53 — "A" side of signaling circuit for COM 2

NOTE

Refer to Figures 3-9A and 3-9B for location of termination jumpers.

Jumper P24 – RS-485 Termination Jumper

- 1-2 Underterminated
- 2-3 Terminated 121 ohms (factory setting)
Transceiver input impedance: 68 kohm

Jumper P25 – LON COM 1 Termination

- 1-2 COM 1 Terminated (factory setting)
- 2-3 COM 1 Underterminated (Redundancy)

Jumper P26 – LON COM 2 Termination

- 1-2 COM 2 Terminated (factory setting)
- 2-3 COM 2 Underterminated (Redundancy)

**Connector P8, Terminals 54, 55 & 56, Port 1—
RS-485 Modbus RTU Master/Slave**

Port Pinout (3-position terminal block)
 54 — GND
 55 — B
 56 — A

Configuration data downloaded into the EQP Controller configures the serial interface transmission baud rate, parity check for the serial port, and Modbus device address. Software selectable baud rates are 2400, 4800, 9600, 19200, 38400, 57600, and 115200. Software selectable parity is None, Odd, and Even. The EQP Controller uses 8 data bits with 1 stop bit.

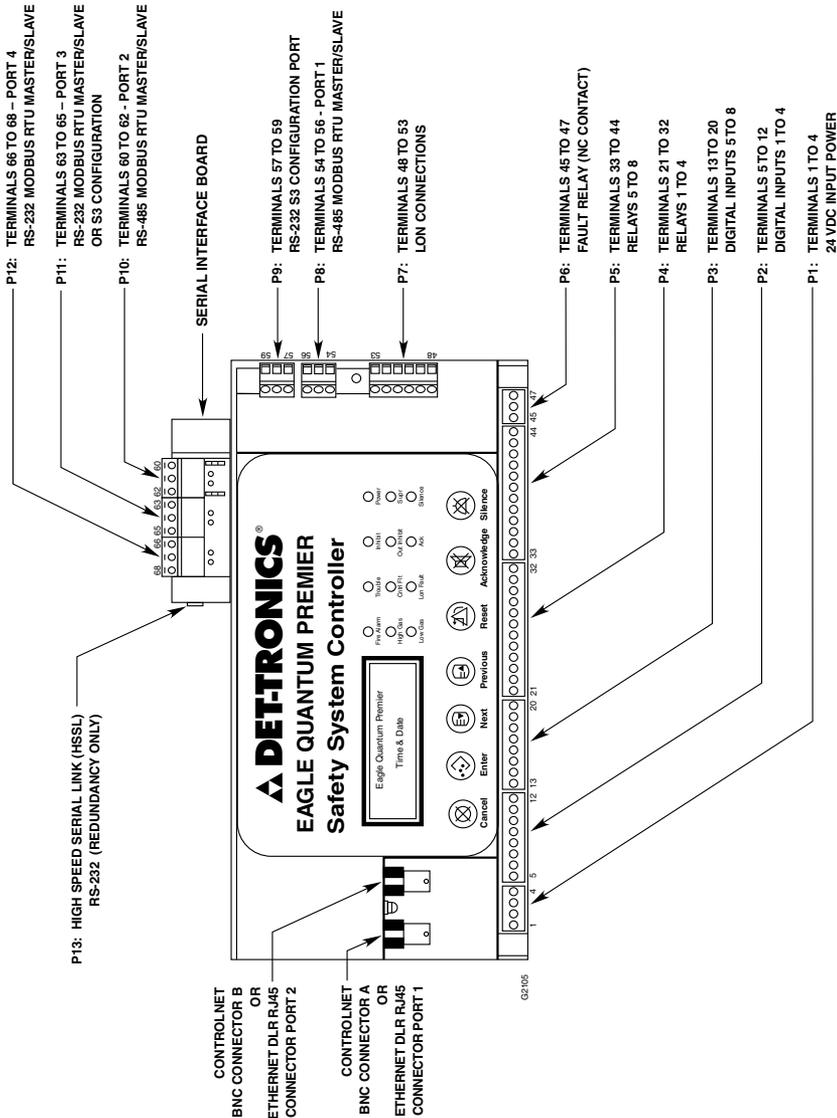


Figure 3-6A—Location of Wiring Terminals on EQP Controller with Serial Interface Board

Connector P9, Terminals 57, 58 & 59 — S' Configuration Port

Port Pinout (3-position terminal block)
 57 — GND
 58 — RXD
 59 — TXD

Configuration data downloaded into the EQP Controller configures the serial interface transmission baud rate and parity check for the serial port. Software selectable baud rates are 2400, 4800, 9600, 19200, 38400, 57600, and 115200 (factory default is 115200). Software selectable parity is None, Odd, and Even.

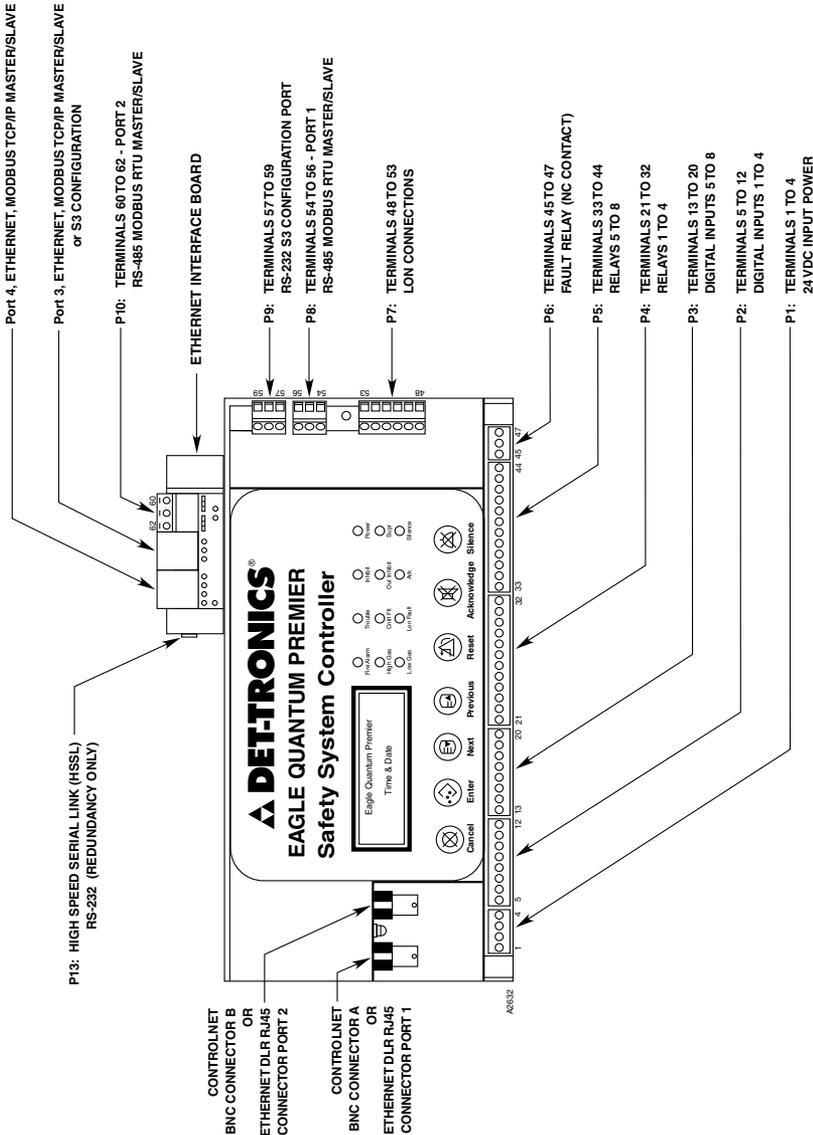


Figure 3-68—Location of Wiring Terminals on EQP Controller with Ethernet Interface Board

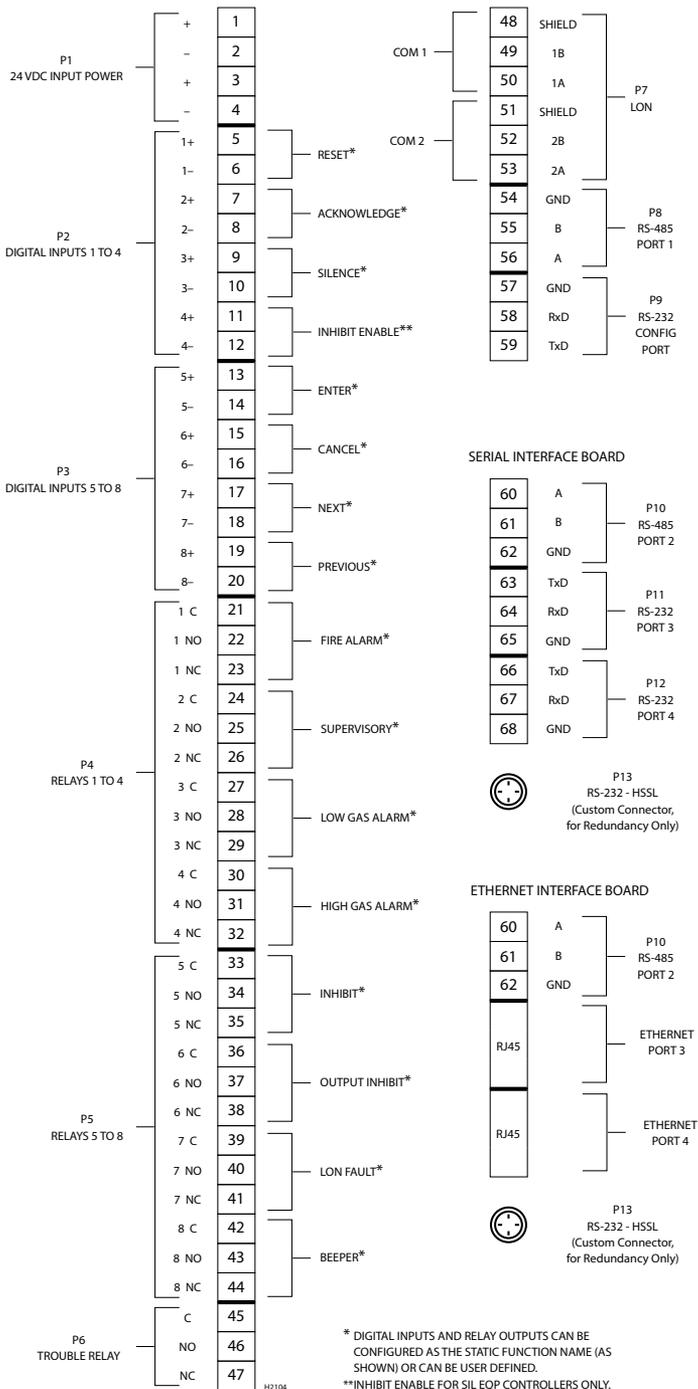


Figure 3-7—EQP Controller Terminal Identification

Connector P10, Terminals 60, 61 & 62, Port 2 – RS-485 Modbus RTU Master/Slave

Configuration data downloaded into the EQP Controller configures the serial interface transmission baud rate, parity check for the serial port, and Modbus device address. Software selectable baud rates are 9600, 19200, 38400, 57600, 115200 and 230400. Software selectable parity is None, Odd, and Even. The EQP Controller uses 8 data bits with 1 stop bit.

Port Pinout (3-position terminal block)

- 60 — A
- 61 — B
- 62 — GND

Serial Interface Board Jumpers

Jumper P25 – RS-485 Termination Jumper, Port 2

- 1-2 Terminated 121 ohms (factory setting)
- 2-3 Unterminated
Transceiver input impedance: 68 kohm

Jumper P3 – RS-485 Ground Fault Monitor, Port 2

- 1-2 Enabled
- 2-3 Disabled (factory setting)

Ethernet Interface Board Jumpers

Jumper P6 – RS-485 Termination Jumper, Port 2

- 1-2 Terminated 121 ohms (factory setting)
- 2-3 Unterminated
Transceiver input impedance: 68 kohm

Jumper P5 – RS-485 Ground Fault Monitor, Port 2

- 1-2 Enabled
- 2-3 Disabled (factory setting)

Use Port 2 to pass safety critical information between EQP Controllers. Ensure that Ground Fault Monitoring is enabled. User logic can pass all alarm, trouble, and supervisory information between the EQP Controllers. Watchdog timers must be implemented in user logic to verify the integrity of the SLC. Consult the local authority having jurisdiction for annunciation requirements.

EQP CONTROLLER-TO-CONTROLLER COMMUNICATION

EQP Controller-to-Controller Communication (SLC485) with Signaling Line Circuit Classification Class B or X, per NFPA 72

To connect up to twelve EQP Controllers together and be able to transfer safety information between the EQP Controllers, the communication link must be classified as a signaling line circuit per NFPA 72. With the Serial Interface Board, Port 2 (plug 10) is a RS-485 serial connection that is ground fault monitored.

To meet the signaling line circuit (Class B or Class X) requirements, the following must be configured for correct operation:

- All EQP Controllers must have the same type Interface Board (Ethernet or Serial) installed.



When using the Ethernet Interface Board, EQP Controllers communicating over P10, Port 2 - RS-485 are required to be located within the same room or be wired in conduit within 20 feet (6 meters) for signalling line transient protection.

- The Termination jumper P28 must be set to Terminate (position 1-2) on all EQP Controllers.
- The Ground Fault Monitor jumper P29 must be set to Enabled (position 1-2) on all EQP Controllers.
- For Class X, Connect terminals A (# 56) and B (# 55) between the EQP Controllers. Connect terminal A (# 60) and B (# 61) between EQP Controllers using a different cable route. Connect GND (# 54) to GND (# 62) on each controller.
- For Class B, connect terminals A (terminal number 60) and B (terminal number 61) between the EQP Controllers. The GND (terminal number 62) must not be connected.

See Figure 3-8B and 3-9B for wiring details.

- Note 1: 56.7 kbps minimum and 115.2 kbps maximum baud rate required for proper communication.
- Note 2: Consult the factory for configuration set-up.
- Note 3: Maximum SLC485 length over copper not to exceed 1000 meters.

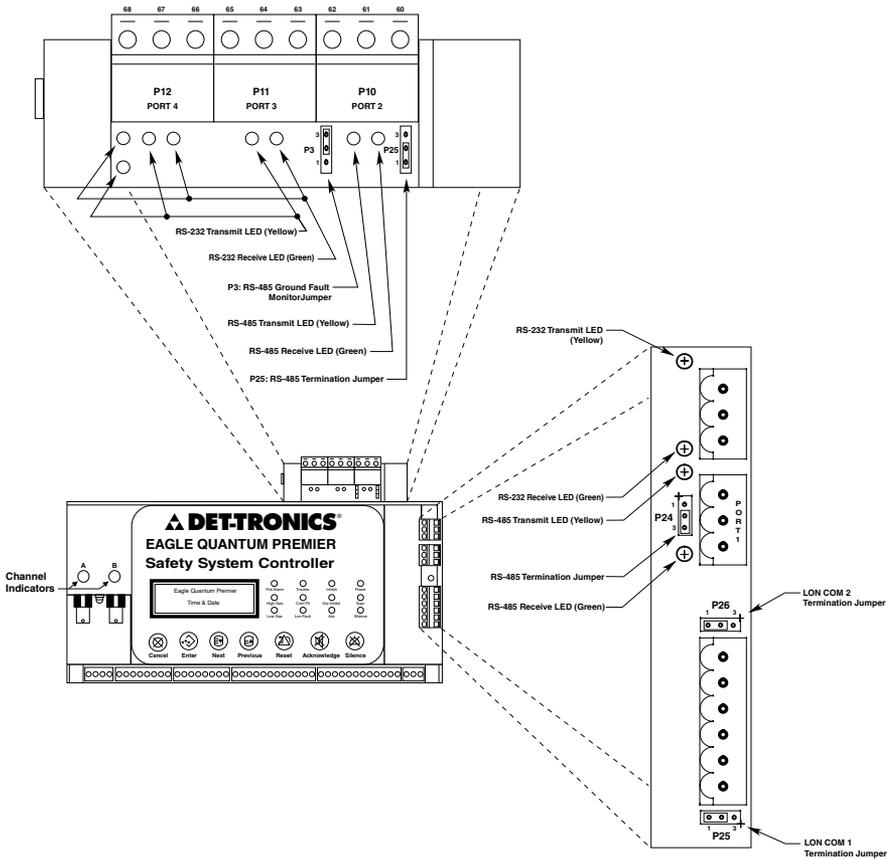


Figure 3-8A—Location of Termination Jumpers, Communication Indicator LEDs, and Communication Ports for EQP Controller with Serial Interface Board

Manufacturer	Model Number	Description
Moxa (www.moxa.com)	TCF-142-S	RS-485 to Single-mode Fiber Optical Converter
Phoenix Contact	PSI-MOS-RS-485W2/FO	RS-485 to Multi-mode Fiber Optical Converter

Table 3-9—Approved Supported Media Converters for Fiber Optical Link

EQP Controller-to-Controller with Fiber Optic Link, Signal Line Circuit Classification Class B or X per NFPA 72

Up to twelve EQP Controllers (single or redundant pair) can be inter-connected via a fiber optic link. This communication link is

classified as a signaling line circuit per NFPA 72 to allow safety information to be transferred between EQP Controllers.

The fiber optic link incorporates media converters to convert from copper to fiber optic cable. The converter must be located in the same cabinet as the EQP Controller and cannot use ground fault monitoring. The approved supported converters are shown in Table 3-9. The link budget for the listed fiber optic converters is 10dB.



The fiber converters must be mounted inside the same enclosure as the EQP Controllers to conform to NFPA 72.

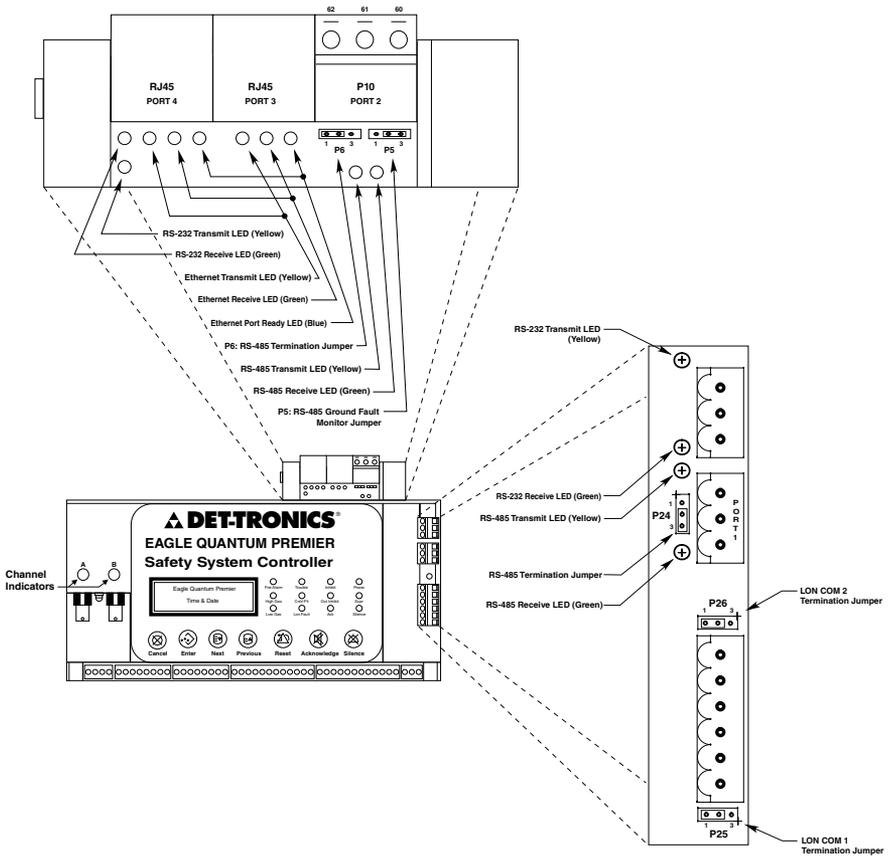


Figure 3-8B—Location of Termination Jumpers, Communication Indicator LEDs, and Communication Ports for EQP Controller with Ethernet Interface Board

The media converter can be connected to either of the EQP Controller RS-485 communication ports (Port 1 or Port 2). Figure 3-10 illustrates a typical Class B wiring connection (single mode) between two EQP Controllers in a redundant configuration using Port 1. Note: If Port 2 is preferred, the Serial Interface Board must be purchased.

Figure 3-11 shows a typical Class X wiring connection (single mode).

Figure 3-12 shows a typical Class X wiring connection for Phoenix (multi mode).

For more information regarding selection and installation of fiber optic media, please contact Det-Tronics customer service.

The maximum distance of a particular optic link given the optical budget is calculated as:

$$\text{Fiber Length} = \frac{[\text{Optical budget}] - [\text{Link Loss}]}{[\text{Fiber Loss / km}]}$$

where link loss includes number of end connectors, splices and safety margin.

Example: 10 db link budget
 Cable Attenuation: 0.4 db / km
 2 connectors: (1 each end) with 0.5 db ea.
 Safety margin: 3.0 db max

$$\text{Max. Distance} = \frac{10 - (2 \times 0.5) - 3.0}{0.4} = 15 \text{ km}$$

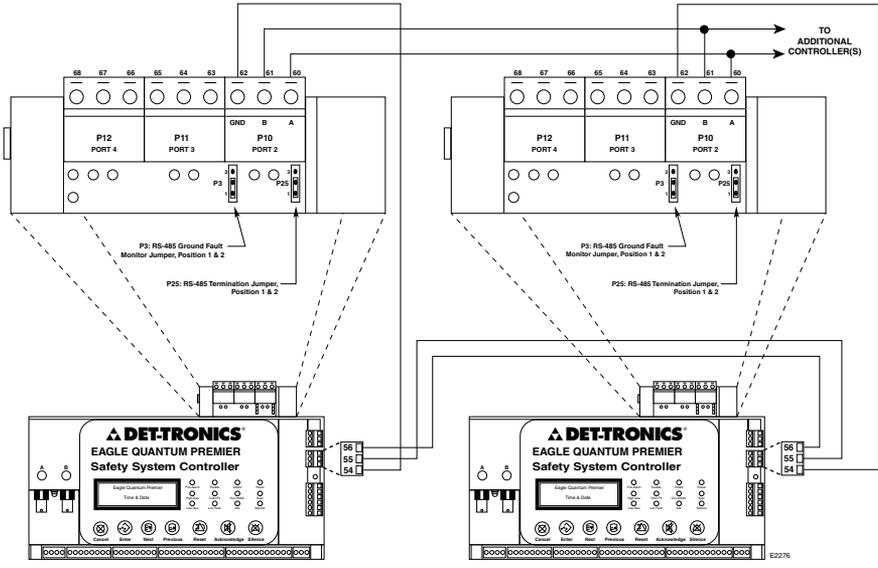


Figure 3-9A—EQP Controller-to-Controller Communication with Class A Signaling Line Circuit Classification per NFPA 72, for EQP Controllers with Serial Interface Board

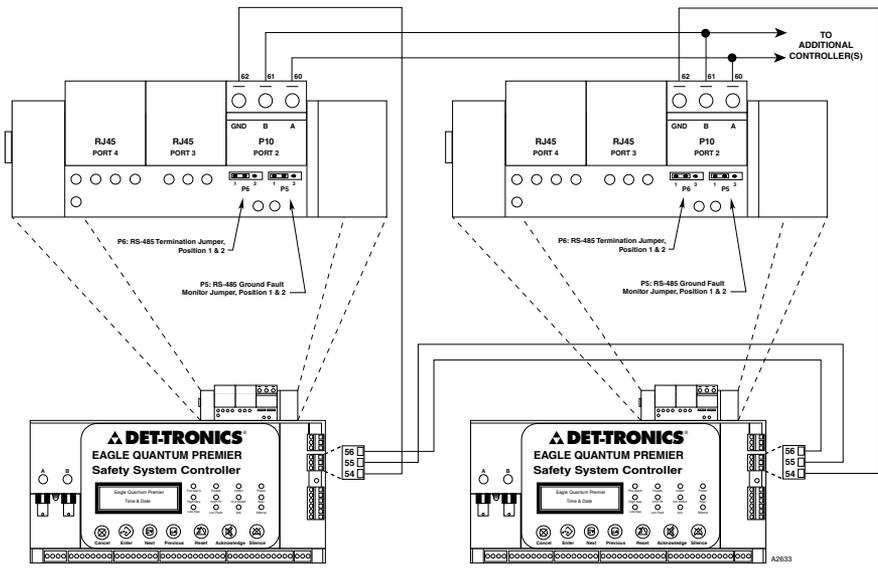


Figure 3-9B—EQP Controller-to-Controller Communication with Class A Signaling Line Circuit Classification per NFPA 72, for EQP Controllers with Ethernet Interface Board

**Connector P11, Terminals 63, 64 & 65,
Port 3 – (Serial Interface Board only)
RS-232 Modbus RTU Master/Slave or S³
Configuration Port (Non-Isolated)**

Configuration data downloaded into the EQP Controller configures the serial interface transmission baud rate, parity check and Modbus device address for the serial port. Software selectable baud rates are 9600, 19200, 38400, 57600, 115200, and 230400. Software selectable parity is None, Odd, and Even. The EQP Controller uses 8 data bits with 1 stop bit.

Port Pinout (3-position terminal block)
63 — TXD
64 — RXD
65 — GND

**RJ45, Port 3
(Ethernet Interface Board only)
Ethernet Modbus TCP Client/Server
or S³ Configuration Port (Non-Isolated)**

Configuration data downloaded into the EQP Controller configures the Ethernet interface IP address, subnet mask, gateway, and local port number. This port may be used as a Modbus TCP Client or a Modbus TCP Server. This port may also be used as an alternate S³ configuration port. EQP Controllers come from the factory with the following default values for Port 3:

Port 3	IP Address	192.168.127.251
Port 3	Subnet Mask	255.255.255.000

NOTE

Maximum Modbus update time per port is 250 mSec.

**Connector P12, Terminals 66, 67 & 68,
Port 4 – (Serial Interface Board only)
RS-232 Modbus RTU Master/Slave (Non-Isolated)**

Configuration data downloaded into the EQP Controller configures the serial interface transmission baud rate, parity check and Modbus device address for the serial port. Software selectable baud rates are 9600, 19200, 38400, 57600, 115200, and 230400. Software selectable parity is None, Odd, and Even. The EQP Controller uses 8 data bits with 1 stop bit.

Port Pinout (3-position terminal block)
66 — TXD
67 — RXD
68 — GND

**RJ45, Port 4
(Ethernet Interface Board only)**

Ethernet Modbus TCP Client/Server
Configuration data downloaded into the EQP Controller configures the Ethernet interface IP address, subnet mask, gateway, and local port number. This port may be used as a Modbus TCP Client or a Modbus TCP Server. EQP Controllers come from the factory with the following default values for Port 4:

Port 4	IP Address	192.168.127.252
Port 4	Subnet Mask	255.255.255.000

NOTE

Maximum Modbus update time per port is 250 mSec.

**Connector P13 —
RS-232 High Speed Serial Port**

This port is dedicated to inter-controller connection required for redundancy, and is not available for any other use. This port is automatically configured. The maximum distance between redundant controllers is 4ft.

CONFIGURATION

Software Defined Addresses

Det-Tronics Safety System Software (S³) is programmed with the addresses that are assigned to the EQP Controller when the configuration file is downloaded into the controller. Addresses define and configure the EQP Controller's LON address, Modbus slave address, ControlNet option board address, and Ethernet DLR option board address. Each device on the LON must be assigned a unique tag number. This tag number must include zone designation, which will be shown on the EQP Controller's display when the device is in alarm.

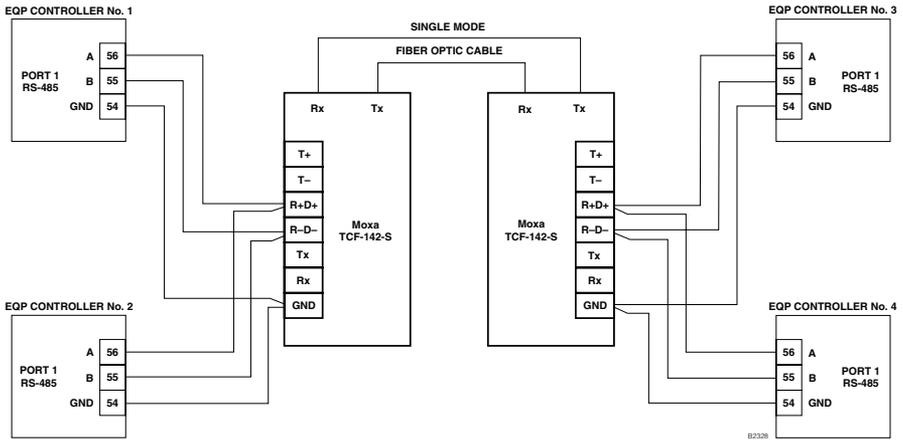


Figure 3-10—EQP Controller-to-Controller NFPA 72 Approved Fiber Optic Link, Class B

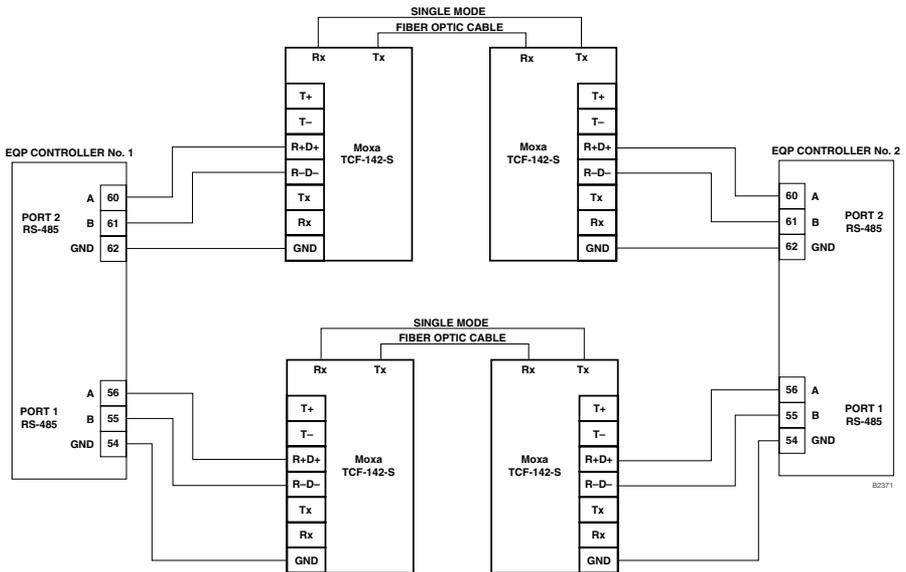


Figure 3-11—Single Mode EQP Controller-to-Controller NFPA 72 Approved Fiber Optic Link, Class X

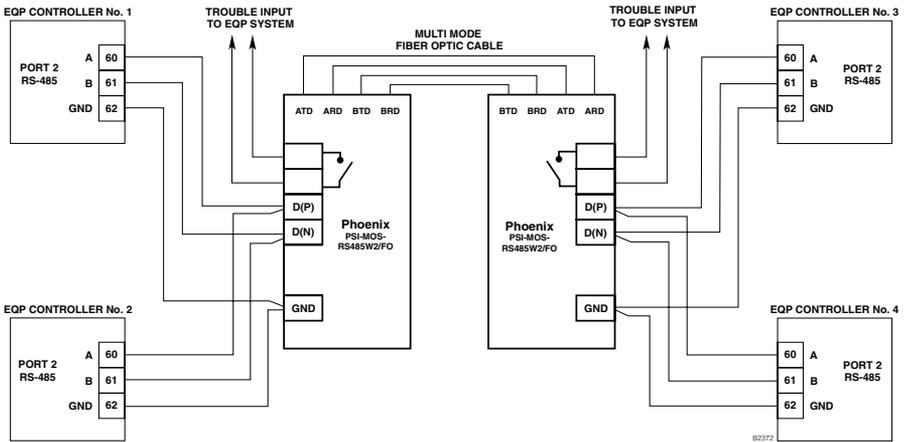


Figure 3-12—Multi-Mode EQP Controller-to-Controller NFPA 72 Approved Fiber Optic Link, Class X

EQP CONTROLLER INSTALLATION

The redundant EQP Controllers must be purchased with the following options for correct installation:

- Either Ethernet or Serial Interface Board
- High-speed serial cable
- Two EQ3LTM LON termination modules.

ENCLOSURE REQUIREMENTS

The redundant EQP Controllers must be located next to each other in the same enclosure (4 ft interconnecting cable).

MOUNTING

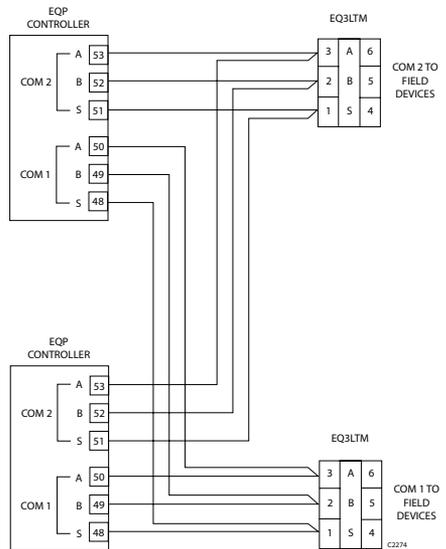
The EQP Controllers are designed for direct panel mounting or DIN rail mounting. See “Specifications” section of this manual for mounting dimensions.

WIRING

Redundant EQP Controllers are wired the same as a simplex EQP Controller except for the LON wiring and the dedicated high-speed serial link, which are defined below. Refer to EQP Controller Installation for general installation details.

LON WIRING

The LON must be connected to both redundant EQP Controllers to ensure correct operation. Two EQ3LTM are required for the installation as shown in Figure 3-13.



NOTE: LON TERMINATION JUMPERS P25 AND P26 (SEE FIGURE 3-12) MUST BE IN POSITION 2 AND 3 FOR REDUNDANT CONFIGURATION (ON BOTH CONTROLLERS).

Figure 3-13—LON Connection for Redundant EQP Controllers

HIGH SPEED SERIAL LINK (HSSL)

Redundant EQP Controllers are connected together by a dedicated high-speed serial link. This link is a pre-fabricated cable that has a custom connector for ease of use. Redundant EQP Controllers are automatically addressed with the HSSL cable. One end of the cable is labeled Primary. The primary EQP Controller takes address 1, while the secondary EQP Controller is address 2. The significance this has for the user is that the primary is the default master when both EQP Controllers are powered-up at the same time.

CONFIGURATION

S³ Configuration

The S³ configuration software is used to configure the redundant EQP Controllers. A check box on the EQP Controller configuration screen must be enabled and downloaded to the EQP Controllers.

IMPORTANT

If the EQP Controllers have not been configured for redundancy via the S³ configuration software, redundancy will not function.

EQP Controller Addresses

The LON addresses are pre-determined and cannot be adjusted. Address 1 and 2 have been reserved for a redundant EQP Controller configuration.

RS-485/RS-232 (Port 1 through Port 4)

RS-485/RS-232 ports 1 through 4 on each EQP Controller share the serial settings including baud rate and address. EQP Controllers in standby mode do not respond to or issue Modbus RTU messages. This allows for transparent switching on a multi-drop network. If RS-232 is used, a relay switching mechanism can be used.

ControlNet

The ControlNet interface on each EQP Controller will have a different address. This allows both EQP Controllers to reside on the same ControlNet network at the same time. The

primary EQP Controller uses the configured address while the standby assumes an address 1 higher than the primary EQP Controller. Application logic in the attached PLC must be used to determine which EQP Controller has the correct output information. Information coming from the PLC should be written to both EQP Controllers.

Ethernet DLR

The Ethernet DLR interface on each EQP Controller will have a different address. This allows both to reside on the same network at the same time. The primary EQP Controller uses the configured address while the standby assumes an address 1 higher than the primary EQP Controller. Application logic in the attached PLC must be used to determine which EQP Controller has the correct output information. Information coming from the PLC should be written to both EQP Controllers.

Ethernet

The Ethernet interface ports on each EQP Controller will all have unique IP addresses. This allows both EQP Controllers to reside on the same Ethernet network at the same time. The primary and secondary EQP Controller IP addresses for ports 3 and 4 are part of the configuration data. During the configuration download, the primary EQP Controller assigns the primary IP address to itself and passes the secondary IP address on to the secondary EQP Controller. EQP Controllers in standby mode do not respond to Modbus TCP/IP messages. Ethernet applications need to redirect to the alternate IP address when EQP Controller switch-overs occur.

EQ2001 EQP MONITOR INSTALLATION

ENCLOSURE REQUIREMENTS

The EQP Monitor must be located in a separate enclosure from the rest of the EQP System. The same requirements for the EQP Controller enclosure apply to the enclosure used to house the EQP Monitor.

MOUNTING

The EQP Monitor is designed for direct panel mounting or DIN rail mounting. See

"Specifications" section of this manual for mounting dimensions.

WIRING

The EQP Monitor has the same wiring requirements as the EQP Controller except for the LON wiring and the lack of a dedicated high-speed serial link. Refer to EQP Controller Installation for general installation details.

LON WIRING

The EQP Monitor is connected to the LON by tying off from one of the LON COM ports on the EQP Controller (or redundant EQP Controller). Only the COM 2 terminals of the EQP Monitor should be used. The EQP Monitor sits on its own spur and is not part of the LON loop. See Figure 3-58 on page 3-54.

EQ21XXPS SERIES POWER SUPPLY AND POWER SUPPLY MONITOR INSTALLATION



WARNING

ALWAYS follow all safety notes and instructions when installing power supply or batteries.



WARNING

Make sure a.c. power is OFF at main a.c. breaker before beginning power supply installation.

IMPORTANT

Power supplies require unrestricted air flow for proper cooling.

MOUNTING

Mount the power supply monitor in a Nationally Recognized Test Laboratory (NRTL) labeled enclosure. Refer to the "Specifications" section for mounting dimensions.

WIRING



CAUTION

The power supply should be properly connected to an earth ground. A ground

wire MUST be connected to the power supply units's case ground.

NOTE

The Power Supply Monitor uses two of the four DIP switches to select an appropriate fault level for the installation. See Figure 3-14. The unit will fault when the batteries source a current level higher than the threshold for 190 seconds. The fault will clear when the current drops to half the level for 190 seconds. The current level selection is based on the minimum current draw of the attached equipment. The selected value must be less than the actual minimum current draw for the EQP System.

1. Verify that the input source is the same voltage and frequency as that marked on the nameplate of the power supply.
2. Verify that transformer taps are set for the correct a.c. input. (Input tap setting is located inside the power supply enclosure.)
3. Verify that the supply power wire size and fusing are adequate for the current indicated on the power supply nameplate.

NOTE

Consult the power supply manufacturer's instruction manual provided with the support documentation received with the EQP System.

NOTE

Required Overload Current is usually equal to 15% of the nominal rating.

4. Connect external wiring to the appropriate points on Power Supply. Refer to Figure 3-14 for terminal block locations and Figures 3-15, 3-16, and 3-18 for terminal identification. Connect the 24 Vdc power wires and the LON network cable to the appropriate points on J1. (Redundant "+," "-", and shield terminals are connected internally.)

NOTE

Do not ground any shield at the monitor / power distribution cabinet. Insulate the shields to prevent shorting to the device housing or to any other conductor.

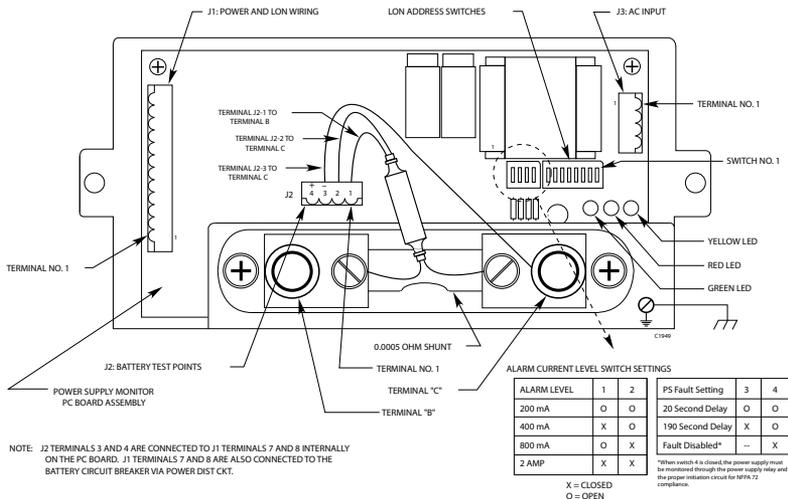


Figure 3-14—Power Supply Monitor Terminal and Switch Location

- Connect a two wire cable between the AC input of the power supply and terminals 1 and 4 on J3, the AC input terminal block on the power supply monitor. See Figure 3-14.
- Connect the “B” terminal on the power supply monitor to the negative (–) side of the backup battery. Connect a correctly sized circuit breaker in the battery circuit as shown in Figure 3-17. The circuit breaker must be rated between 130% and 250% of the total load.
- Connect the “C” terminal on the power supply monitor to the negative (–) side of the power supply.
- Wire the power distribution circuit breakers to the output of the power supply. Circuit breaker ratings must be between 130% and 250% of the full load rating.
- Set the device network address for the power supply monitor.

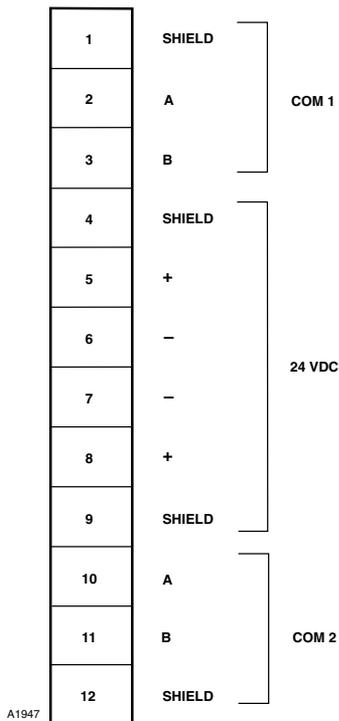


Figure 3-15—J1: Power and LON Wiring Terminal

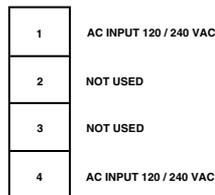
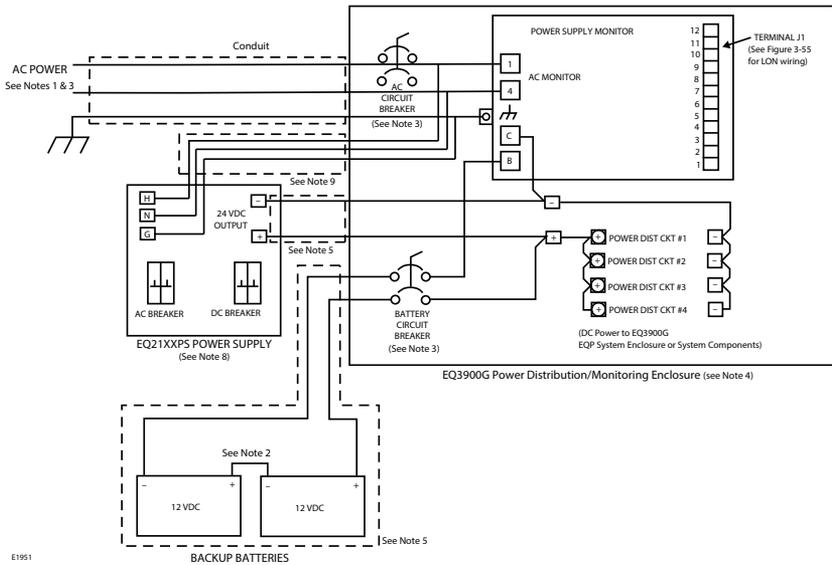


Figure 3-16—J3: AC Input Terminal



E1951

NOTES

1. AC INPUT SELECTABLE (THROUGH THE OIS) FOR 120 / 208 / 240 VAC.
2. BATTERY SIZE CALCULATED BASED ON SYSTEM LOAD.
3. CIRCUIT BREAKER SHALL PROTECT AGAINST EXCESSIVE CURRENT LOAD.
4. NRTL EQ3900G POWER DISTRIBUTION/MONITORING ENCLOSURE IS KEY LOCKED ENCLOSURE.
5. DASH LINES DENOTE PROTECTION AGAINST PHYSICAL DAMAGE.

6. ANY PRIMARY AND SECONDARY POWER SUPPLY UNITS MAY BE INSTALLED EXTERNALLY TO THE NRTL EQ3900G POWER DISTRIBUTION/MONITORING ENCLOSURE, PROVIDED THEY ARE PROTECTED AGAINST PHYSICAL DAMAGE. ALL DEDICATED BRANCH CIRCUITS AND CONNECTIONS BETWEEN PRIMARY AND SECONDARY POWER SUPPLY UNITS AND THE NRTL EQ3900G POWER DISTRIBUTION/MONITORING ENCLOSURE SHALL ALSO BE PROTECTED AGAINST PHYSICAL DAMAGE.
7. SUPERVISION (SINGLE OPENS & GROUNDS) OF THE INTERCONNECTIONS BETWEEN POWER SUPPLY (24 VDC OUTPUT) TO NRTL EQ3900G POWER DISTRIBUTION/MONITORING ENCLOSURE AND BACKUP BATTERIES TO NRTL EQ3900G POWER DISTRIBUTION/MONITORING ENCLOSURE IS PERFORMED BY EQ2100PSM POWER SUPPLY MONITOR.
8. THE CIRCUIT DISCONNECTING MEANS (AC & DC BREAKERS) SHALL BE ACCESSIBLE ONLY TO AUTHORIZED PERSONNEL.
9. AC WIRING CABLE MUST BE ≤ 20 FEET IN CONDUIT.

Figure 3-17— Wiring Connections for a Power Supply Monitor, EQ21XXPS Series Power Supply and Backup Batteries

NOTE

For additional information, refer to the power supply manufacturer's instruction manual provided with the support documentation received with the EQP System.

connect a digital voltmeter to terminals 1 and 2 of terminal block J2. The voltmeter will read 1 millivolt (0.001 volt) for each 2 amperes of current.

Current in Amperes = Meter reading in millivolts x 2

STARTUP

Turn on the power supply and allow the voltage to stabilize at 27 volts before closing the circuit to the battery.

Example: A reading of 50 millivolts indicates a charging current of 100 amperes.

MEASURING BATTERY VOLTAGE AND CHARGING CURRENT

Measure the battery voltage at terminals 3 and 4 of terminal block J2. See Figure 3-14 and 3-18.

To measure the battery charging current,

EQP2XX0PS(-X) POWER SUPPLIES AND REDUNDANCY MODULE INSTALLATION

WIRING



The power supply must be properly connected to an earth ground. A ground wire **MUST** be connected to the power supply unit's ground terminal.



WARNING
ALWAYS follow all safety notes and instructions when installing power supply or module.



WARNING
Make sure a.c. power is OFF at main a.c. breaker before beginning power supply installation.

IMPORTANT

Power supplies require unrestricted air flow for proper cooling.

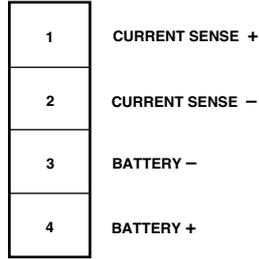


Figure 3-18—J2: Battery Test Points

MOUNTING

Mount the power supply and Redundancy Module in a Nationally Recognized Test Laboratory (NRTL) labeled enclosure. Refer to the "Specifications" section for mounting dimensions. Refer to power supply and module manufacturer's instruction manual provided with support documentation received with the EQP System for additional installation details and instructions.

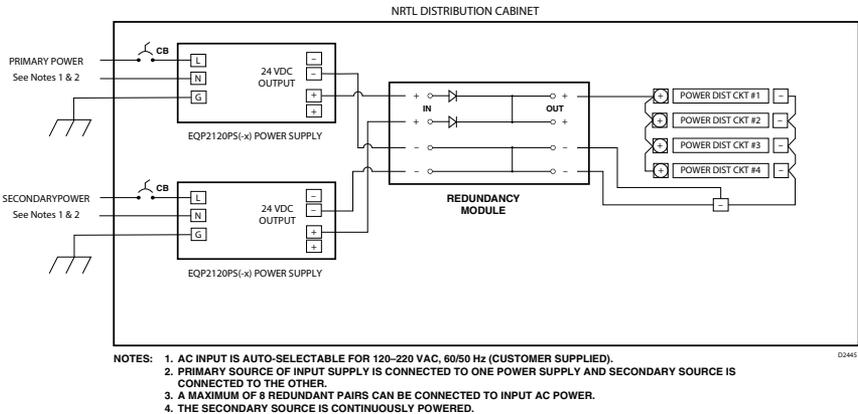


Figure 3-19A—Wiring Connections for a 20 amp DC (Maximum) Power Supply with Primary and Secondary AC Sources

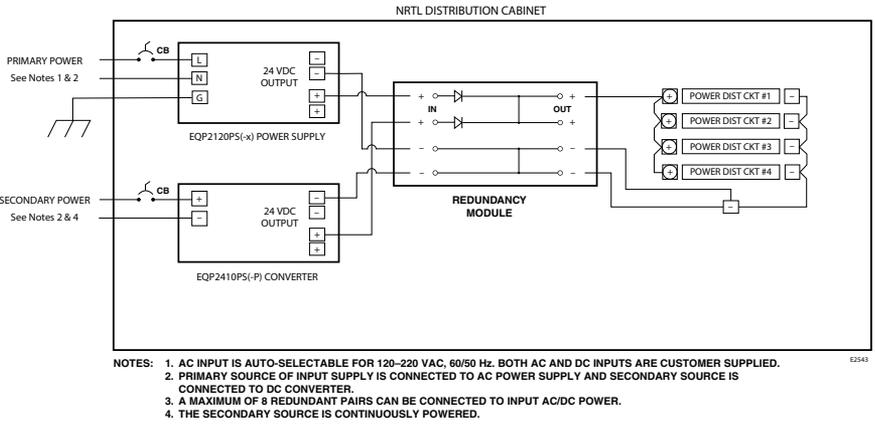


Figure 3-19B—Wiring Connections for a 10amp (Maximum) Power Supply with an AC Primary and DC Secondary Source

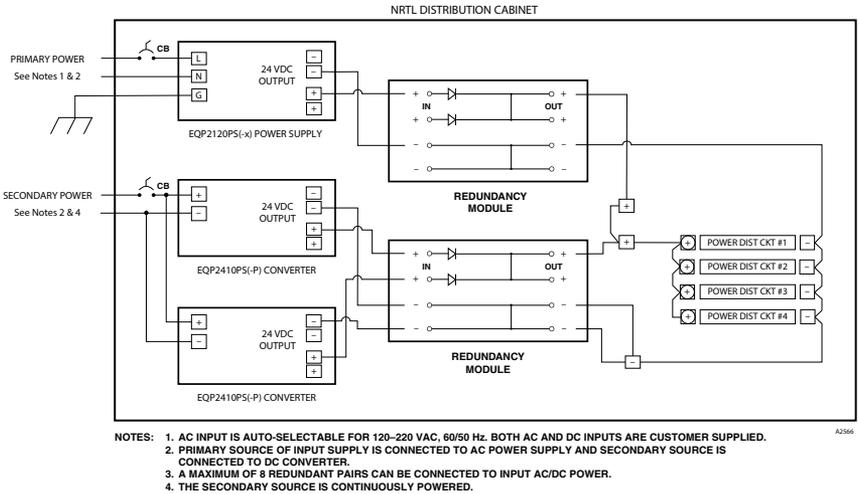


Figure 3-19C—Wiring Connections for a 20amp (Maximum) Power Supply with an AC Primary and DC Secondary Source

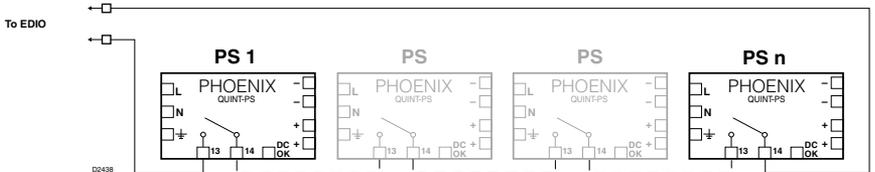


Figure 3-20—Power Supply and Converter Relays Wired in Series for Trouble Monitoring (up to 16 Power Supplies/Converters)

1. Connect external wiring to the appropriate points on Power Supplies.

Refer to Figure 3-19A for terminal locations for EQP2120PS(-X).

Refer to Figure 3-19B for terminal locations for EQP2410PS(-P) Converter.

Refer to Figure 3-19C for terminal locations for EQP2120PS(-X) with EQP2410PS(-P) Converter.

2. Connect the 24 Vdc output to the Redundancy Module. (Redundant "+" and "-" power supply terminals are connected internally.)
3. To ensure compliance with NFPA 72, primary and secondary power supplies shall be monitored for the presence of voltage at the point of connection to the system. Connect the power supply unit for preferred preventive function monitoring. Refer to Figure 3-20 for an example of power supply relays wired in series for power monitoring.

NOTE

Contacts are closed during normal operation. The circuit shall be wired to an input on the EQP System. In Logic, the selected input must be inverted and used to activate an alarm trigger gate, which initiates a fault message on the EQP Controller and activates the fault relay output.

No supervision is necessary, since the EDIO module must be installed in the same cabinet with EQP2120PS and EQP2410PS.

For USCG Approved EQP System monitoring details, refer to the 57-1009 Addendum.

NOTE

For additional information, refer to the power supply manufacturer's documents provided with the support documentation received with the EQP System.

STARTUP

Turn on the power supply and allow the voltage to stabilize. Verify the output voltage and adjust as needed. Refer to "EQP2XX0PS(-X) Power Supplies" in the Specifications section of this manual.

IMPORTANT

The output voltage is adjustable. An even current distribution must be ensured by precisely setting all power supply units that are operated in parallel to the same output voltage ± 10 mV.

IMPORTANT

To ensure symmetrical current distribution it is recommended that all cable connections from all power supply units/diode redundancy modules to the power distribution bus are the same length and have the same cross section.

EQ3730EDIO INSTALLATION

All electrical connections are made to the field wiring connectors furnished with the module. Refer to Figure 3-21 for identification of module wiring terminals.

Connector P1, Terminals 1 to 6

24 Vdc Power Input

Connect the module power supply to terminals 1 and 2. If additional terminals are required for powering other devices, these devices should be connected to terminals 4 and 5. Shields are to be connected to terminals 3 and 6 — chassis (earth) ground terminals. Total output current should be limited to 10 amperes.

Connector P2, Terminals 1 to 6

LON/SLC Signaling Circuit Terminals

Be sure to observe polarity when wiring the LON/SLC.

- 1 — "A" side of signaling circuit for COM 1
- 2 — "B" side of signaling circuit for COM 1
- 4 — "A" side of signaling circuit for COM 2
- 5 — "B" side of signaling circuit for COM 2
- 3, 6 — shield connection

Connector P3, Terminals 1 to 12

Terminals A, B & C

Channels 1 to 4 Input / Output Terminals

Refer to individual wiring configurations for terminal descriptions. Only channel 1 is shown in each diagram. The information is typical for channels 2-8.

Connector P4, Terminals 13 to 24

Terminals A, B & C

Channels 5 to 8 Input / Output Terminals

Refer to individual wiring configurations for terminal descriptions. Only channel 1 is shown in each diagram. The information is typical for channels 2-8.

Unsupervised Input

Connect external system wiring to the appropriate terminals on the terminal block. See Figure 3-22.

The input to the EDIO consists of one or more normally open or normally closed switches. An EOL resistor is not required.

Make no connection to “+ Supply” terminal.

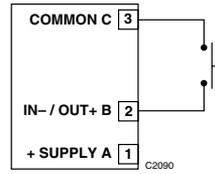


Figure 3-22—Unsupervised Input Configuration

Supervised Input (IDC) Open Circuit Supervision

Connect external system wiring to the appropriate terminals on the terminal block. For Class B wiring, see Figure 3-23. For Class A wiring, see Figure 3-24. Note that two channels are used for one circuit when using Class A wiring.

The input to the EDIO module consists of one or more normally open switches, with a 10 K ohm, 1/4 watt EOL resistor in parallel across the last switch.

Make no connection to “+ Supply” terminal.

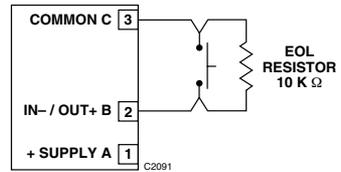


Figure 3-23—Supervised Input Configuration – Class B

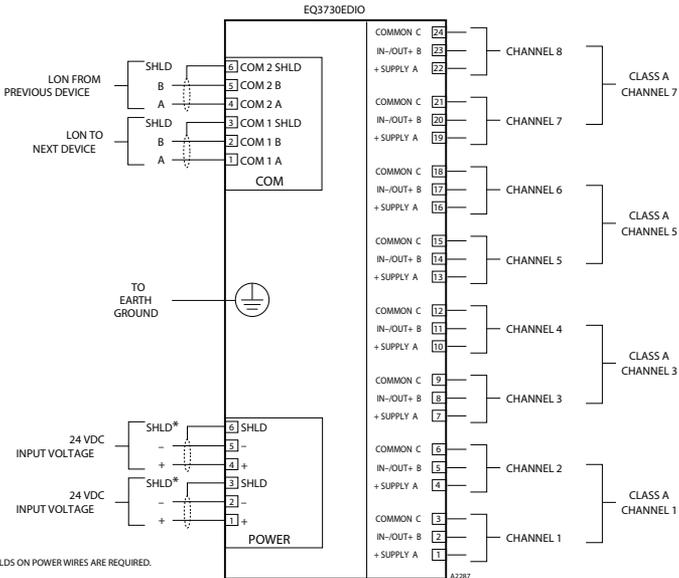


Figure 3-21—EQ3730EDIO Module Wiring Terminals

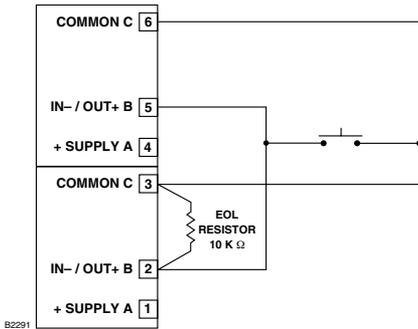


Figure 3-24—Supervised Input Configuration – Class A

Supervised Input Open and Short Circuit Supervision

Connect external system wiring to the appropriate terminals on the terminal block. For Class B wiring, see Figure 3-25. For Class A wiring, see Figure 3-26. Note that two channels are used for one circuit when using Class A wiring. Both wiring configurations provide indication of open and short circuit fault. The input to the EDIO module consists of normally open switches, with a 10 K ohm, 1/4 watt EOL resistor in parallel across the return channel, and a 3.3 K ohm, 1/4 watt resistor in series with each switch.

NOTE

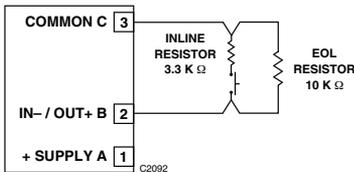


Figure 3-25—Supervised Input Configuration for Opens and Shorts – Class B

If using more than one switch, the first active condition (switch closed) must be latched. Any subsequent closed switch will indicate a short circuit fault condition.

Make no connection to "+ Supply" terminal.

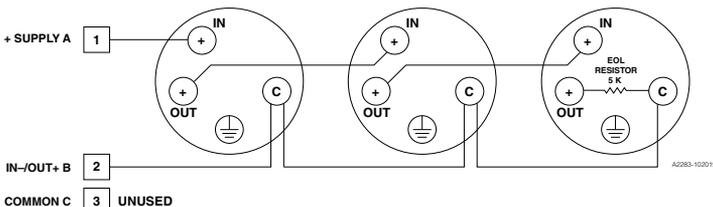


Figure 3-27— 2-Wire Devices (Class B)

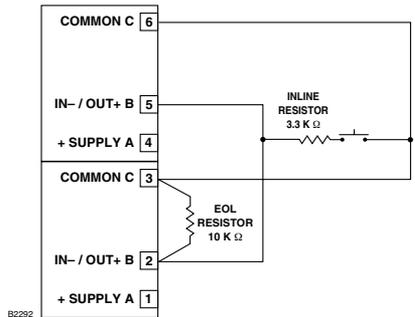


Figure 3-26—Supervised Input Configuration for Opens and Shorts – Class A

Input -- Deluge and Pre-Action Sprinkler Systems

Two-Wire Devices

Figure 3-27 shows the wiring for a 2-wire device connection to an EDIO channel for Class B wiring

Four-Wire Devices

Figure 3-28 shows the wiring for a 4-wire device connection to an EDIO channel for Class A wiring

⚠ IMPORTANT

No more than 15 devices can be connected per channel.

Unsupervised Output

Connect external system wiring to the appropriate terminals on the terminal block. See Figure 3-29.

No connection should be made to "+ Supply" terminal.

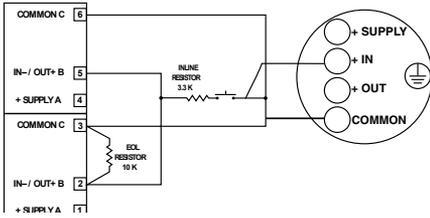
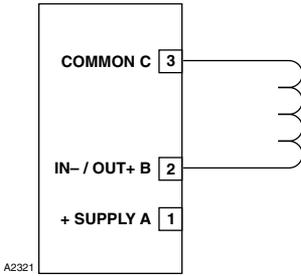


Figure 3-28—4-Wire Devices (Class A)



NOTE: SHUNT/FLYBACK DIODES DO NOT NEED TO BE INSTALLED ON THE FIELD DEVICE. CIRCUIT PROTECTION IS PROVIDED WITHIN THE EDIO MODULE.

Figure 3-29—Unsupervised Output Configuration

Supervised Output—Notification Supervised for Open & Short Circuits

Connect external system wiring to the appropriate terminals on the terminal block. For Class B wiring, refer to Figure 3-30.

For Class A wiring, refer to Figure 3-31. Note that two channels are used for one output circuit.

The output of the EDIO module supervises the notification circuit by reversing the polarity of the monitoring circuit. Polarity must be observed when connecting the notification device. It is essential to utilize a notification device approved for fire alarm notification. These devices are polarized and would not require the use of an external diode for the supervision of the circuit. Wire one or more notification devices to the output, with a 10 K ohm, 1/4 watt EOL resistor in parallel across the last device.

No connection should be made to “+ Supply” terminal.

Each output channel is individually activated for response pattern: supervisory, continuous output, 60 beats per minute, 120 beats per minute, temporal, timed, trouble.

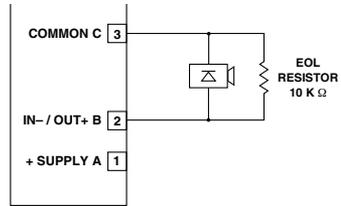


Figure 3-30—Supervised Output Configuration (Notification)— Class B

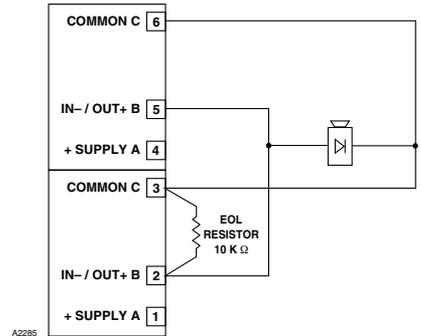
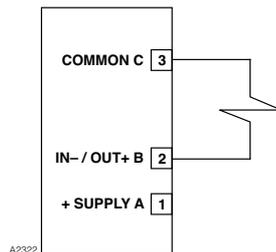


Figure 3-31—Supervised Output Configuration (Notification)— Class A

Supervised Output—Agent Release (Solenoid Circuit)

Connect external system wiring to the appropriate terminals on the terminal block. For Class B wiring, refer to Figure 3-32.



NOTE: SHUNT/FLYBACK DIODES DO NOT NEED TO BE INSTALLED ON THE FIELD DEVICE. CIRCUIT PROTECTION IS PROVIDED WITHIN THE EDIO MODULE.

Figure 3-32—Supervised Output Configuration (Agent Release)

For Class A wiring, refer to Figure 3-33. Note that two channels are used for one output circuit. Trouble indication is provided for any open wire and the output can still be activated with a single open wire.

No connection should be made to "+ Supply" terminal.

The output of the EDIO module supervises the releasing circuit via the coil of the releasing solenoid. It is essential to utilize a releasing device approved for use with this output module. This type of output does not require the use of EOL resistors or diodes to supervise the circuit.

The output can be configured for latching, continuous, supervisory, trouble or timed response.

To ensure adequate operating voltage for the output device, the maximum wiring length from the power source to the output device must not exceed the values shown in Table 3-10 for automatic release applications. (For solenoids, this wire length includes both the wiring from the power supply to the EDIO module and the wiring from the module to the solenoid.)

Physical Disconnect Switch (HSDM and EDIO)

In order to comply with NFPA 72 code requirements for releasing service fire alarm systems, a physical disconnect switch must be provided that opens the field wiring between the HSDM Output(s) and the solenoid(s). The switch must be installed with supervised wiring (see Figures 3-23 and 3-24).

The physical disconnect switch allows the overall system to be tested without actuating the fire suppression system. The physical disconnect switch also provides a means of completely isolating the solenoids from the HSDM outputs to reduce the likelihood of inadvertent discharge during maintenance activities. As part of the EQP System approval, physical disconnect switch (Det-Tronics part number 000128-191) is approved to be installed within the EQ3900G series of enclosures.

When the physical disconnect switch is operated, an open circuit fault will occur on

the affected output channel of the HSDM. The supervisory fault will be annunciated by the EDIO EQP Controller. The open circuit fault is expected and normal under these conditions. The use of a multi-pole switch can provide the physical disconnect function and a signal which can be connected into the EQP System through an Enhanced Discrete Input/Output (EDIO) module so that the use of the disconnect switch can be annunciated via EQP logic.

Additionally, a signal from the switch can be sent to another input module, such as an EDIO, to indicate that the switch has been used to isolate the solenoids from the HSDM outputs. Please consult the factory for details.

Please see the Class A and B drawings on pages 3-53, 54.

Supervised Output for Deluge and Pre-action Sprinkler Systems

The maximum wiring length must not exceed the values shown in Table 3-10 for deluge and pre-action applications. Per FM Approval requirements, the secondary power must provide capacity for a 90 hour minimum standby operation followed by a minimum of 10 minutes of releasing and alarm operation.

NOTE

In EQP Systems with EQP2120PS(-B) Power Supplies, the secondary power is customer supplied and must be accepted by the Authority Having Jurisdiction (AHJ).

CONFIGURATION

Setting EDIO Network Address

One unique network address must be assigned to each EDIO module. The address is set by the 8 switch DIP assembly on the EDIO module.

When using the switches located on the EDIO module, the address is binary coded and is the sum of all switches placed in the "closed" position.

Each discrete point of an EDIO module has a tag number and a descriptor for unique identification. A tag number must include zone designation, which will be shown on the EQP Controller's display when the point is in alarm.

Det-Tronics S³ Safety System Software is used for device configuration. The following shows the minimum software/firmware releases:

EQP Controller Firmware		S ³
Revision	Version	Version
B	4.28	3.1.0.0

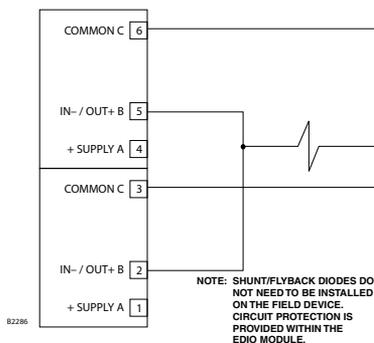


Figure 3-33—Supervised Output Configuration (Agent Release)— Class A Wiring

Table 3-10—Typical Maximum Wire Length for FM Approved Solenoids for Deluge and Pre-Action Applications

I _{sol} Table 3-10		
Manufacturer	PN	I _{sol} (mAdc) @ 20.4 Vdc
Parker (Viking)	11591 NC	365
Parker (Viking)	11592 NC	365
Parker (Viking)	71395SN2ENJ1NOH111C2	340
Parker (Viking)	73218BN4UNLVNOC111C2	320
Parker (Viking)	73212BN4TNLVNOC322C2	600
Parker (Viking)	73212BN4TN00NOC111C2	330
ASCO RedHat	R8210A107	525
ASCO RedHat	8210A107	555
ASCO RedHat	8210G207	365
Viking PN	11601	325
ASCO RedHat Cat#	HV2740607 N.C.	
Viking PN	11602	310
ASCO RedHat Cat #	HV274608 N.C.	
Kidde-Fenwal	897494	130
Cat #	202-749-260563	
Kidde-Fenwal	895630	1500
Cat #	81-895630-000	
Kidde-Fenwal	890181	1500
Det-Tronics PN	00219-209	
Ansul	570537	200
Macron	304.209.001	

*Note: Alternate secondary power source when accept by Local AHJ, may increase permissible wire voltage drops. Actual secondary voltage must be determined. Voltage and current at solenoid must be known and used in the equation.



The following is based on EQ21xxPS (Primary Source) and Battery (Secondary Source)

Total wire voltage drop = 1.2 Vdc (MAX) = $VL_a + VL_b^*$

$$VL_a = I_{EDIO} \times RL_a$$

I_{EDIO} = Total current of EDIO and all active outputs

$$VL_b = I_{sol} \times RL_b$$

I_{sol} see Table 3-10

RL_a & RL_b = wire resistance = Ω per foot $\times 2$ ($\times 2 = B+ \& B-$ wires)

Figure 3-34—Calculation for Field Wiring Distance Requirements for Solenoids

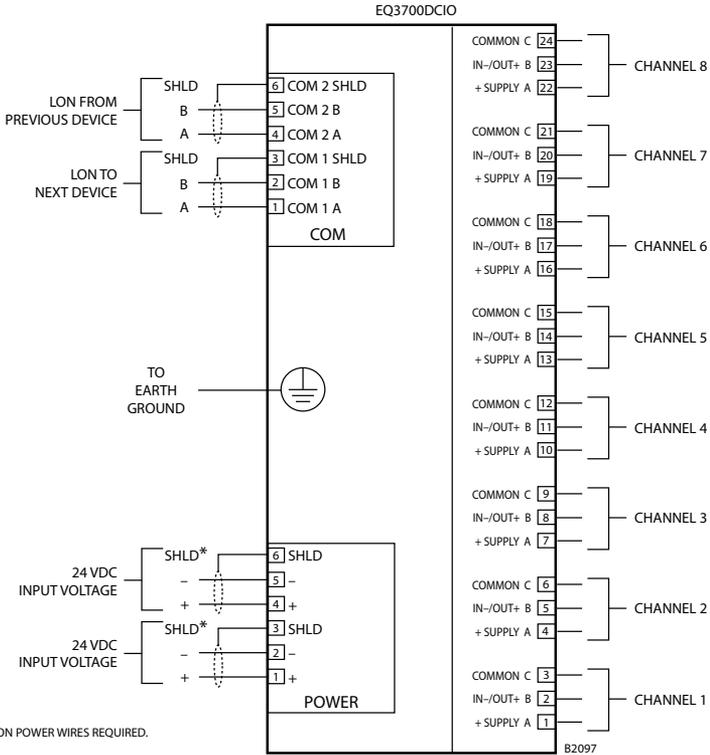


Figure 3-35—EQ3700DCIO Module Wiring Terminal Configuration

EQ3700DCIO INSTALLATION

The following paragraphs describe how to properly install and configure the 8 Channel DCIO Module.

MOUNTING

The DCIO must be properly installed in a suitable enclosure that is rated for the location. The enclosure must provide space to install and wire the DCIO module and must also provide for ground wire termination. Access into the enclosure is gained by using a special tool to

open the enclosure. The enclosure should be rated for the temperature range of the location plus the temperature rise of all equipment installed inside the enclosure. The enclosure must be rated for electrical equipment that is going to be installed. The DCIO can be panel or DIN rail mounted.

NOTE

It is recommended to maintain a minimum of four inches clearance between the module and other equipment to provide adequate room for wiring and ventilation.

WIRING

All electrical connections are made to the field wiring connectors furnished with the module. See Figure 3-35 for terminal identification.

Power Connector, Terminals 1 to 6 24 Vdc Power Input

Power connections to the DCIO depend upon the total current consumption of all the channels in the device. Each output-configured channel can consume up to 2 amperes. Total output current should be limited to 10 amperes

Connect the power supply to terminals 1 and 2 or to terminals 4 and 5. Power wire shielding should be connected to terminals 3 and 6.

- 1 — +
- 2 — -
- 3 — Shield*
- 4 — +
- 5 — -
- 6 — Shield*

*Shields on power wires are required.

Connect the module power supply to terminals 1 and 2. If additional terminals are required for powering other devices, these devices should be connected to terminals 4 and 5. Shields are to be connected to terminals 3 and 6.

COM Connector, Terminals 1 to 6 LON Terminals

Be sure to observe polarity when wiring the LON.

- 1 — "A" side of signaling circuit for COM 1
- 2 — "B" side of signaling circuit for COM 1
- 4 — "A" side of signaling circuit for COM 2
- 5 — "B" side of signaling circuit for COM 2
- 3 & 6 — shield connections.

Channel Connectors, Terminals 1 to 24 Terminals A, B & C

Channels 1 to 8 Input / Output Terminals

Refer to individual wiring configurations for terminal descriptions. Only channel 1 is shown in each diagram. The information is typical for channels 2-8.

Unsupervised Input

Connect external system wiring to the appropriate terminals. See Figure 3-36.

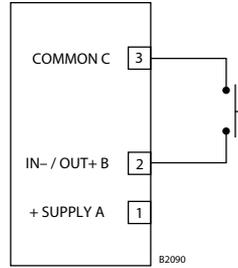


Figure 3-36—Unsupervised Input Configuration

Input to the DCIO consists of one or more normally open or normally closed switches.

NOTE

An EOL resistor is not required.

NOTE

No connection should be made to the "+ Supply" terminal.

Supervised Input (IDC) Open Circuit Supervision Class B

Connect external system wiring to the appropriate terminals on the DCIO terminal block. See Figure 3-37.

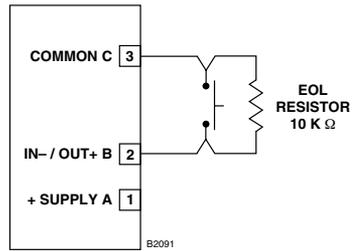


Figure 3-37—Supervised Input Configuration

The input to the DCIO module consists of one or more normally open switches, with a 10K ohm, 1/4 watt EOL resistor in parallel across the last switch.

NOTE

No connection should be made to the "+ Supply" terminal.

Supervised Input (IDCS) Open and Short Circuit Supervision (Three state – open, switch closure, and short) Class B

Connect external wiring to the appropriate terminals on the DCIO terminal block. See Figure 3-38. Indication of short circuit fault is provided.

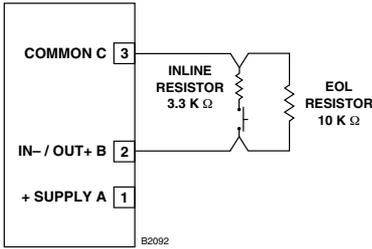


Figure 3-38—Supervised Input Configuration
(Opens and Shorts)

The input to the DCIO module consists of a normally open switch, with a 10 K ohm, 1/4 watt EOL resistor in parallel across the switch, and a 3.3 K ohm, 1/4 watt resistor in series with the switch.

NOTE

No connection should be made to the “+ Supply” terminal. For correct operation, only one input switch can be used per channel.

Supervised Output Notification (Horns and Strobes) Supervised Outputs for Open & Short Circuits Class B

Connect external wiring to the appropriate terminals on the DCIO terminal block. See Figure 3-39.

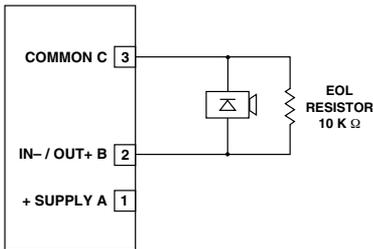


Figure 3-39—Supervised Output Configuration (Notification)

NOTE

Polarity MUST be observed when connecting the notification device.

It is critical to use a notification device approved for fire alarm notification. These devices are polarized and do not require the use of an external diode for the supervision of the circuit. Wire one or more notification devices to the output, with a 10 K ohm, 1/4 watt EOL resistor in parallel across the last device.

NOTE

No connection should be made to the “+ Supply” terminal.

Each output channel is individually activated for response pattern:

- continuous output
- 60 beats per minute
- 120 beats per minute
- temporal
- supervisory
- timed
- trouble

Supervised Output for Automatic Release / Supervised Output for Open Circuits

Connect external wiring to the appropriate terminals on the DCIO terminal block. See Figure 3-40.

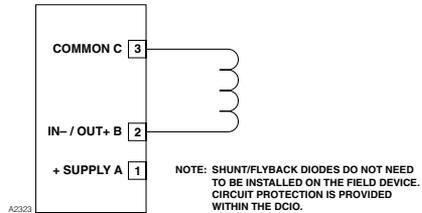


Figure 3-40—Supervised Output Configuration
(Automatic Release)

Wire one or more releasing devices to the module output.

NOTE

Make no connection to the “+ Supply” terminal.

The output of the DCIO module supervises the releasing circuit via the coil of the releasing solenoid. It is essential to use a releasing device approved for use with this output module.

NOTE

This type of output does not require the use of EOL resistors or diodes to supervise the circuit.

The output can be configured for latching, continuous or timed response.

To ensure proper operating voltage, the maximum wiring length from the power source to the DCIO module must not exceed the values shown in Table 3-10 for automatic release applications.

NOTE

For solenoids, this wire length includes both the wiring from the power supply to the DCIO module and the wiring from the module to the solenoid.

Supervised Output for Deluge and Pre-action

Connect external wiring to the appropriate terminals on the DCIO terminal block. See Figure 3-40.

The output of the DCIO module supervises the releasing circuit via the coil of the releasing solenoid. It is essential to use a releasing device approved for use with this output module.

NOTE

This type of output does not require the use of EOL resistors or diodes to supervise the circuit.

NOTE

For new or retrofit installations, any manufacturer's non-water based agent release valves can be wired into the outputs of the DCIO modules as long as the devices utilize 24 Vdc and do not exceed 2 amperes current draw.

NOTE

For FM system approval listing, pre-action and deluge applications require that only FM approved deluge valves be wired into the EDIO or DCIO modules. Table 3-10 lists the supported solenoid groups. Remember that the valves must utilize 24 Vdc and must not exceed 2 amperes current draw.

The output can be configured for latching, continuous or timed response.

The maximum wiring length must not exceed the values shown in Table 3-10 for deluge and pre-action applications. Per FM Approval requirements, the secondary power must provide capacity for a 90 hour minimum standby operation followed by a minimum of 10 minutes of releasing and alarm operation.

For initiating device circuit(s) for use with the deluge and pre-action system configuration, an Enhanced Discrete Input/Output Module (EDIO) must be used.

NOTE

In EQP Systems with EQP2120PS(-B) Power Supplies, the secondary power is customer supplied and must be accepted by the Authority Having Jurisdiction (AHJ).

Unsupervised Output (Unrelated to Fire Detection/Protection)

Connect external wiring to the appropriate terminals on the DCIO terminal block. See Figure 3-41.

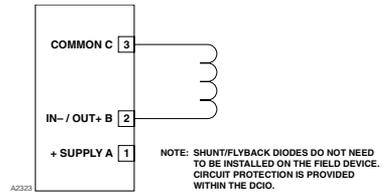


Figure 3-41—Unsupervised Output Configuration

NOTE

No connection should be made to the "+ Supply" terminal.

CONFIGURATION

Setting DCIO Network Address

One unique network address must be assigned to each DCIO module. The address is set by the 8 DIP switch assembly on the DCIO module. The address is binary coded and is the sum of all switches placed in the "closed" position.

Each discrete point of a DCIO module has a tag number and a descriptor for unique identification. A tag number must include zone designation, which will be shown on the EQP Controller's display when the point is in alarm.

Det-Tronics S³ Safety System Software is used for device configuration. The following shows the minimum software/firmware releases:

EQP Controller Firmware		S ³
Revision	Version	Version
A	1.03	2.0.2.0

EQ3720RM INSTALLATION

The following paragraphs describe how to properly install and configure the EQ3720RM Relay Module.

MOUNTING

The Relay Module must be properly installed in a suitable enclosure that is rated for the location. The enclosure must provide space to install and wire the relay module and must also provide for ground wire termination. Access into the enclosure is gained by using a special tool to open the enclosure. The enclosure must be rated for the temperature range of the location plus the temperature rise of all equipment installed inside the enclosure. The enclosure must be rated for electrical equipment that is going to be installed. The device can be panel or DIN rail mounted.

NOTE

It is recommended to maintain a minimum of four inches clearance between the module and other

equipment to provide adequate room for wiring and ventilation.

WIRING

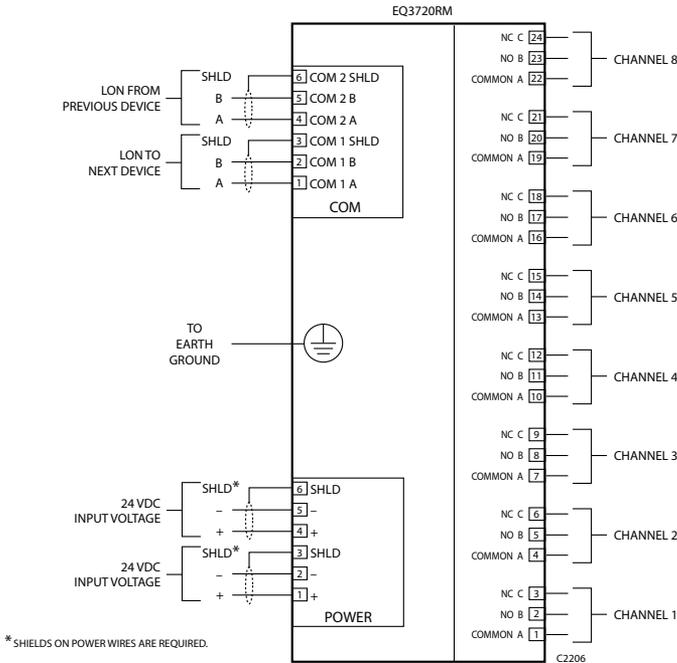
All electrical connections are made to the field wiring connectors furnished with the module. See Figure 3-42 for terminal identification.

Power Connector, Terminals 1 to 6 24 Vdc Power Input

- 1 — +
- 2 — -
- 3 — Shield*
- 4 — +
- 5 — -
- 6 — Shield*

*Shields on power wires required.

Connect the module power supply to terminals 1 and 2. If additional terminals are required for powering other devices, these devices should be connected to terminals 4 and 5. Shields are to be connected to terminals 3 and 6.



NOTE:

RELAY CONTACTS SHOWN IN REST (DE-ENERGIZED) STATE.

Figure 3-42— Relay Module Wiring Terminal Configuration

COM Connector, Terminals 1 to 6 LON Terminals

Be sure to observe polarity when wiring the LON.

- 1 — "A" side of signaling circuit for COM 1
- 2 — "B" side of signaling circuit for COM 1
- 3 — "A" side of signaling circuit for COM 2
- 4 — "B" side of signaling circuit for COM 2
- 5 — "B" side of signaling circuit for COM 2
- 3 & 6 — shield connections.

Channel Connectors, Terminals 1 to 24 Unsupervised Output (Unrelated to Fire Detection/Protection)

Connect external wiring to the appropriate terminals on the relay module terminal block. See Figure 3-42.

CONFIGURATION

Setting Relay Module Network Address

One unique network address must be assigned to each relay module. The address is set by the 8 DIP switch assembly on the relay module. The address is binary coded and is

the sum of all switches placed in the "closed" position.

Each discrete point of a relay module has a tag number and a descriptor for unique identification.

Det-Tronics S³ Safety System Software is used for device configuration. The following shows the minimum software/firmware releases:

EQP Controller Firmware		S ³
Revision	Version	Version
A	2.01	2.0.8.0

EQ3710AIM INSTALLATION

MOUNTING

The Analog Input Module must be properly installed in a suitable enclosure that is rated for the location. The enclosure must provide space to install and wire the device and must also provide for ground wire termination.

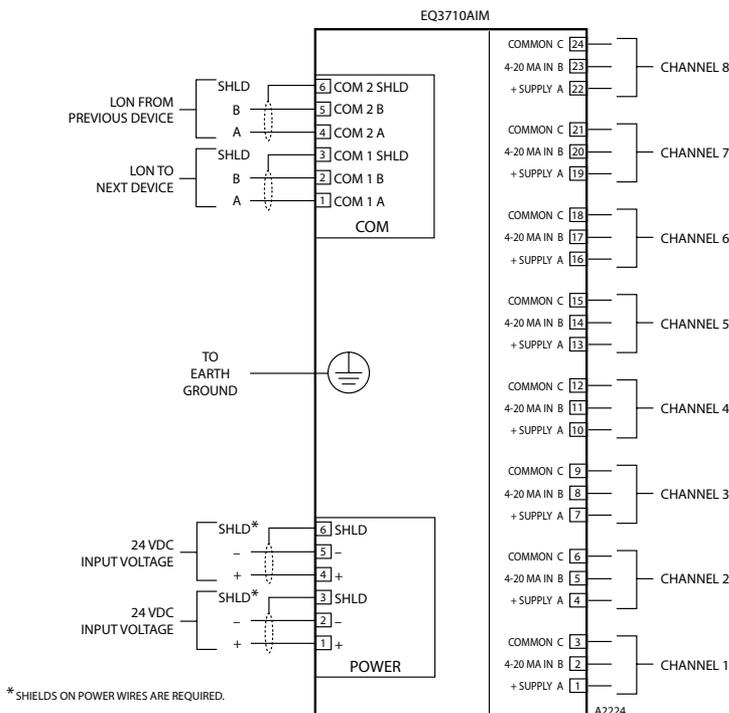


Figure 3-43—EQ3710AIM Wiring Terminal Configuration

Access into the enclosure must be gained by using a special tool to open the enclosure.

The enclosure must be rated for the temperature range of the location plus the temperature rise of all equipment installed inside the enclosure. The enclosure must be rated for electrical equipment that is going to be installed.

NOTE

It is recommended to maintain a minimum of four inches clearance between the module and other equipment to provide adequate room for wiring and ventilation.

WIRING

All electrical connections are made to the field wiring connectors furnished with the module. (Connectors accept wires 30-12 AWG (0.2-2.5mm²)). Refer to Figure 3-43 for identification of module wiring terminals.

Power Connector — Terminals 1 to 6 24 Vdc Power Input

- 1 — +
- 2 — -
- 3 — Shield*
- 4 — +
- 5 — -
- 6 — Shield*

*Shields on power wires are required.

Connect the module power supply to terminals 1 and 2. If additional terminals are required for powering other devices, these devices should be connected to terminals 4 and 5. Shields are to be connected to terminals 3 and 6.

COM Connector — Terminals 1 to 6 LON Terminals

Be sure to observe polarity when wiring the LON.

- 1 — "A" side of signaling circuit for COM 1
- 2 — "B" side of signaling circuit for COM 1
- 4 — "A" side of signaling circuit for COM 2
- 5 — "B" side of signaling circuit for COM 2
- 3 & 6 — shield connections (shields required).

Channel Connectors — Terminals 1 to 24 4-20 mA Input Devices

Connect external wiring to the appropriate terminals on the analog input module terminal block. See Figure 3-44 for an example of a 2-wire input. See Figure 3-45 for a 2-wire input with HART interface module. See Figure 3-46 for a 3-wire input, where the transmitter must

source a 4-20 mA signal. See Figure 3-47 for a 3-wire input with HART interface module.

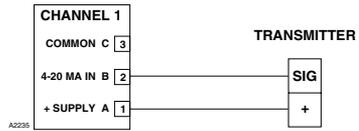


Figure 3-44—Two-Wire Transmitter — Non-Isolated 4 to 20 mA Current Output (Sourcing)

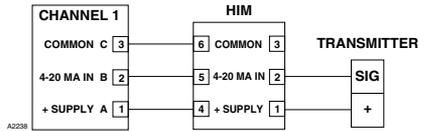


Figure 3-45—Two-Wire Transmitter with HART Interface Module — Non-Isolated 4 to 20 mA Current Output (Sourcing)

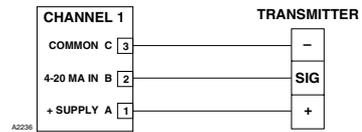


Figure 3-46—Three-Wire Transmitter — Non-Isolated 4 to 20 mA Current Output (Sourcing)

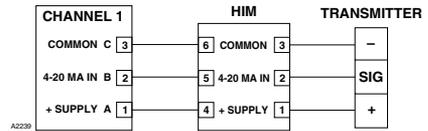


Figure 3-47—Three-Wire Transmitter with HART Interface Module — Non-Isolated 4 to 20 mA Current Output (Sourcing)

Only channel 1 is shown in each diagram. The information is typical for channels 2-8.

Analog Input Module Channels used as NFPA 72 Approved 4-20 mA Flame Detector Input

Configure the High Alarm setpoint at 19 mA via the S³ configuration screen, and use the High Alarm to trigger the Fire Alarm in S³ logic. The AIM sends an exception message for the High Alarm so there is no delay in transmitting the Fire Alarm.

Fault indications and other status information must be decoded in logic from the analog process variable. A five second delay should be used to avoid indicating an incorrect status condition while the analog value is changing between two values. See Table 3-11.

Table 3-11—

Analog Values (in mA) for Fault and Status Indications when the AIM is Used as a 4-20 mA Flame Detector Input

Status	X3301/2	X5200	X9800	X2200
Fault	0-3.5	0-3.5	0-3.5	0-3.5
IR Pre-Alarm		7.0-9.0		
UV Alarm		11.0-12.99		
IR Alarm		13.0-14.99		
Pre-Alarm		15.0-16.99	15.0-16.99	15.0-16.99

CONFIGURATION

Setting Analog Input Module Network Address

One unique network address must be assigned to each analog input module. The address is set by the 8 DIP switch assembly on the analog input module.

When using the switches located on the analog input module, the address is binary coded and is the sum of all switches placed in the “closed” position.

Each point of an analog input module has a tag number and a descriptor for unique identification. A tag number must include zone designation, which will be shown on the EQP Controller's display when the point is in alarm.

Det-Tronics S³ Safety System Software is used for device configuration. The following tables show the minimum software/firmware releases:

For Gas Applications

EQP Controller Firmware*		AIM		S ³
Rev.	Version	Rev.	Version	Version
B	3.06	B	1.02	2.9.1.1

*for part number 007606-002

For Flame Applications

EQP Controller Firmware*		AIM		S ³
Rev.	Version	Rev.	Version	Version
C	5.52	D	1.07	4.0.0.0

*for part number 008983-001

GAS DETECTOR LOCATION & INSTALLATION

Gas detection devices must be properly located to provide maximum protection. Determining the proper number of devices and placement varies depending on the specific requirements of the area of protection.

The following should be considered when locating a gas detection device:

1. Gas type. If it is lighter than air (acetylene, hydrogen, methane, etc.), place the sensor above the potential source. Place the sensor close to the floor for gases that are heavier than air (benzene, butane, butylene, propane, hexane, pentane, etc.) or for vapors resulting from flammable liquid spills.

NOTE

Air currents can cause a gas that is heavier than air to rise. Also, if the gas is hotter than ambient air, it could also rise.

2. How rapidly will the gas diffuse into the air? Select a location for the sensor as close as possible to the anticipated source of a gas leak.
3. Ventilation characteristics. Air movement will cause gas to accumulate more heavily in one area than another. The devices should be placed in areas where the most concentrated accumulation of gas is anticipated.
4. Devices should be pointed down to prevent the buildup of moisture or contaminants on the filter.
5. Devices must be accessible for testing and calibration.

NOTE

The use of the Sensor Separation Kit will be required in some installations.

ENVIRONMENTS AND SUBSTANCES THAT AFFECT GAS DETECTOR PERFORMANCE

Catalytic sensors should be located where they are safe from potential sources of contamination that can cause a decrease in the sensitivity of the device including:

- A. Substances that can clog the pores of the flame arrestor and reduce the gas diffusion rate to the sensor including:

Dirt and oil, corrosive substances such as Cl₂ (Chlorine) or HCl, paint overspray, or residue from cleaning solutions that can clog the flame arrester.

NOTE

A dust cover should be installed to protect the flame arrester whenever these conditions exist.

- B. Substances that cover or tie up the active sites on the catalytic surface of the active sensing element such as volatile metal organics, gases, or vapors of hydrides, and volatile compounds containing phosphorous, boron, silicone, etc.

Examples:

RTV silicone sealants
Silicone oils and greases
Tetraethyl lead
Phosphine
Diborane
Silane
Trimethyl chlorosilane
Hydrogen fluoride
Boron trifluoride
Phosphate esters

- C. Materials that remove the catalytic metals from the active element of the sensor. Some substances react with the catalytic metal forming a volatile compound that can erode the metal from the surface of the sensor's active element.

Halogens and compounds containing halogen are materials of this nature and others include:

Examples:

Chlorine
Bromine
Iodine
Hydrogen Chloride, Bromide or Iodide
Organic halides:
Trichloroethylene
Dichlorobenzene
Vinyl chloride
Freons
Halon 1301
(Bromotrifluoromethane).

NOTE

Brief exposure to these materials can temporarily increase sensor sensitivity due

to the surface of the active element being etched. Prolonged exposure continues this process until the sensitivity of the sensor is degraded, resulting in shortened sensor life.

- D. Exposure to high concentrations of combustible gases for extended periods of time can stress the sensing element and seriously affect its performance.

The degree of damage to the sensor is determined by a combination of contaminant type, contaminant concentration in the atmosphere, and the length of time the sensor is exposed.

NOTE

If a sensor has been exposed to a contaminant or a high level of combustible gas, it should be calibrated at the time of exposure. An additional calibration a few days later should be performed to determine whether a significant shift in sensitivity has occurred. If necessary, sensor should be replaced.

NOTE

A combination of accessories such as rain shields and dust covers is not recommended and can result in slow response to a gas leak.

TYPICAL APPLICATIONS

Figure 3-55 is a simplified drawing of a typical EQP System. This EQP System includes an EQP Controller, DCIO, and various LON field devices.

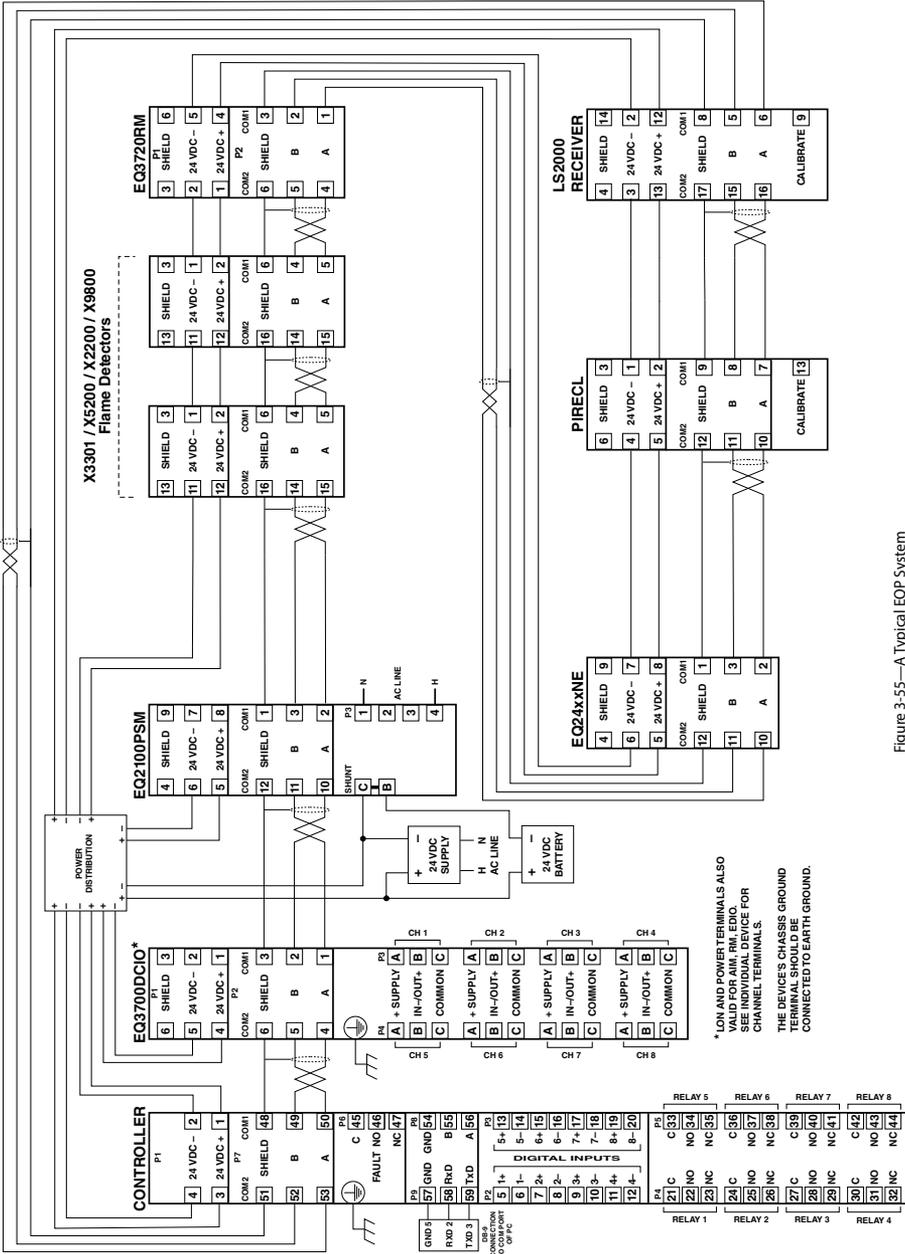


Figure 3-55—A Typical EQP System

* LON AND POWER TERMINALS ALSO VALID FOR AIM, RIM, EDC, AND OTHER CHANNELS. THESE TERMINALS ARE COMMON TO ALL CHANNELS.
THE DEVICE'S CHASSIS GROUND TERMINAL SHOULD BE CONNECTED TO EARTH GROUND.

SYSTEM CONFIGURATION

SETTING DEVICE NETWORK ADDRESSES

Overview of Network Addresses

Each device on the LON must be assigned a unique address. Addresses 1 to 4 are reserved for the EQP Controller. Valid addresses for field devices are from 5 to 250.

IMPORTANT

If the address is set to zero or an address above 250, the communication module will ignore the switch setting.

Duplicated addresses are not automatically detected. Modules given the same address will use the number given and report to the EQP Controller using that address. A "Rogue Device" message will be displayed when two LON devices have duplicate addresses assigned to them. The status word will show the latest update, which could be from any of the reporting modules using that address.

Setting Field Device Addresses

Selection of the node address for field devices is done by setting rocker switches on an 8 switch "DIP Switch" within each device's housing.

NOTE

Only the first eight of the 12 switches are used for selecting the device address.

The address number is binary encoded with each switch having a specific binary value with switch 1 being the LSB (Least Significant Bit). (See Figure 3-56) The device's LON address is equal to the added value of all closed rocker switches. All "Open" switches are ignored.

NOTE

The address switches in the DCIO module and relay module appear slightly different than those in other devices. Refer to Figure 3-57.

Example: for node No. 5, close rocker switches 1 and 3 (binary values 1 + 4); for node No. 25, close rocker switches 1, 4 and 5 (binary values 1 + 8 + 16).

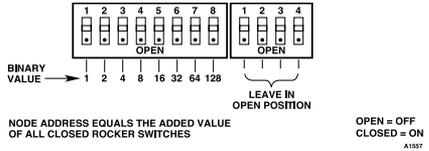


Figure 3-56—Field Device Address Switches for ARM, SAM, DCU and IDC

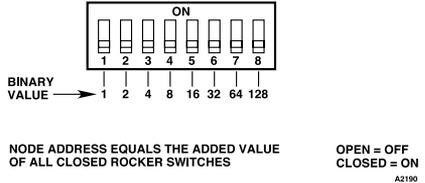


Figure 3-57—Address Switch for AIM, EDIO, DCIO, and Relay Module

NOTE

*The field device sets the LON address only when power is applied to the device. Therefore, it is important to set the switches **before** applying power. If an address is ever changed, device power must be cycled before the new address will take effect.*

After setting address switches, record the address number and device type on the "Address Identification Chart" provided with this manual. Post the chart in a convenient location near the EQP Controller for future reference.

ROCKER SWITCH TABLE

Node Address	Rocker Switch								Node Address	Rocker Switch							
	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
1	X	O	O	O	O	O	O	O	61	X	O	X	X	X	X	O	O
2	O	X	O	O	O	O	O	O	62	O	X	X	X	X	X	O	O
3	X	X	O	O	O	O	O	O	63	X	X	X	X	X	X	O	O
4	O	O	X	O	O	O	O	O	64	O	O	O	O	O	O	X	O
5	X	O	X	O	O	O	O	O	65	X	O	O	O	O	O	X	O
6	O	X	X	O	O	O	O	O	66	O	X	O	O	O	O	X	O
7	X	X	X	O	O	O	O	O	67	X	X	O	O	O	O	X	O
8	O	O	O	X	O	O	O	O	68	O	O	X	O	O	O	X	O
9	X	O	O	X	O	O	O	O	69	X	O	X	O	O	O	X	O
10	O	X	O	X	O	O	O	O	70	O	X	X	O	O	O	X	O
11	X	X	O	X	O	O	O	O	71	X	X	X	O	O	O	X	O
12	O	O	X	X	O	O	O	O	72	O	O	O	X	O	O	X	O
13	X	O	X	X	O	O	O	O	73	X	O	O	X	O	O	X	O
14	O	X	X	X	O	O	O	O	74	O	X	O	X	O	O	X	O
15	X	X	X	X	O	O	O	O	75	X	X	O	X	O	O	X	O
16	O	O	O	O	X	O	O	O	76	O	O	X	X	O	O	X	O
17	X	O	O	O	X	O	O	O	77	X	O	X	X	O	O	X	O
18	O	X	O	O	X	O	O	O	78	O	X	X	X	O	O	X	O
19	X	X	O	O	X	O	O	O	79	X	X	X	X	O	O	X	O
20	O	O	X	O	X	O	O	O	80	O	O	O	O	X	O	X	O
21	X	O	X	O	X	O	O	O	81	X	O	O	O	X	O	X	O
22	O	X	X	O	X	O	O	O	82	O	X	O	O	X	O	X	O
23	X	X	X	O	X	O	O	O	83	X	X	O	O	X	O	X	O
24	O	O	O	X	X	O	O	O	84	O	O	X	O	X	O	X	O
25	X	O	O	X	X	O	O	O	85	X	O	X	O	X	O	X	O
26	O	X	O	X	X	O	O	O	86	O	X	X	O	X	O	X	O
27	X	X	O	X	X	O	O	O	87	X	X	X	O	X	O	X	O
28	O	O	X	X	X	O	O	O	88	O	O	O	X	X	O	X	O
29	X	O	X	X	X	O	O	O	89	X	O	O	X	X	O	X	O
30	O	X	X	X	X	O	O	O	90	O	X	O	X	X	O	X	O
31	X	X	X	X	X	O	O	O	91	X	X	O	X	X	O	X	O
32	O	O	O	O	O	X	O	O	92	O	O	X	X	X	O	X	O
33	X	O	O	O	O	X	O	O	93	X	O	X	X	X	O	X	O
34	O	X	O	O	O	X	O	O	94	O	X	X	X	X	O	X	O
35	X	X	O	O	O	X	O	O	95	X	X	X	X	X	O	X	O
36	O	O	X	O	O	X	O	O	96	O	O	O	O	O	X	X	O
37	X	O	X	O	O	X	O	O	97	X	O	O	O	O	X	X	O
38	O	X	X	O	O	X	O	O	98	O	X	O	O	O	X	X	O
39	X	X	X	O	O	X	O	O	99	X	X	O	O	O	X	X	O
40	O	O	O	X	O	X	O	O	100	O	O	X	O	O	X	X	O
41	X	O	O	X	O	X	O	O	101	X	O	X	O	O	X	X	O
42	O	X	O	X	O	X	O	O	102	O	X	X	O	O	X	X	O
43	X	X	O	X	O	X	O	O	103	X	X	X	O	O	X	X	O
44	O	O	X	X	O	X	O	O	104	O	O	O	X	O	X	X	O
45	X	O	X	X	O	X	O	O	105	X	O	O	X	O	X	X	O
46	O	X	X	X	O	X	O	O	106	O	X	O	X	O	X	X	O
47	X	X	X	X	O	X	O	O	107	X	X	O	X	O	X	X	O
48	O	O	O	O	X	X	O	O	108	O	O	X	X	O	X	X	O
49	X	O	O	O	X	X	O	O	109	X	O	X	X	O	X	X	O
50	O	X	O	O	X	X	O	O	110	O	X	X	X	O	X	X	O
51	X	X	O	O	X	X	O	O	111	X	X	X	X	O	X	X	O
52	O	O	X	O	X	X	O	O	112	O	O	O	O	X	X	X	O
53	X	O	X	O	X	X	O	O	113	X	O	O	O	X	X	X	O
54	O	X	X	O	X	X	O	O	114	O	X	O	O	X	X	X	O
55	X	X	X	O	X	X	O	O	115	X	X	O	O	X	X	X	O
56	O	O	O	X	X	X	O	O	116	O	O	O	X	O	X	X	O
57	X	O	O	X	X	X	O	O	117	X	O	X	O	X	X	X	O
58	O	X	O	X	X	X	O	O	118	O	X	X	O	X	X	X	O
59	X	X	O	X	X	X	O	O	119	X	X	X	O	X	X	X	O
60	O	O	X	X	X	X	O	O	120	O	O	O	X	X	X	X	O

Rocker Switch Table

Node Address	Rocker Switch								Node Address	Rocker Switch							
	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
121	X	O	O	X	X	X	X	O	191	X	X	X	X	X	X	O	X
122	O	X	O	X	X	X	X	O	192	O	O	O	O	O	O	X	X
123	X	X	O	X	X	X	X	O	193	X	O	O	O	O	O	X	X
124	O	O	X	X	X	X	X	O	194	O	X	O	O	O	O	X	X
125	X	O	X	X	X	X	X	O	195	X	X	O	O	O	O	X	X
126	O	X	X	X	X	X	X	O	196	O	O	X	O	O	O	X	X
127	X	X	X	X	X	X	X	O	197	X	O	X	O	O	O	X	X
128	O	O	O	O	O	O	O	X	198	O	X	X	O	O	O	X	X
129	X	O	O	O	O	O	O	X	199	X	X	X	O	O	O	X	X
130	O	X	O	O	O	O	O	X	200	O	O	O	X	O	O	X	X
131	X	X	O	O	O	O	O	X	201	X	O	O	X	O	O	X	X
132	O	O	X	O	O	O	O	X	202	O	X	O	X	O	O	X	X
133	X	O	X	O	O	O	O	X	203	X	X	O	X	O	O	X	X
134	O	X	X	O	O	O	O	X	204	O	O	X	X	O	O	X	X
135	X	X	X	O	O	O	O	X	205	X	O	X	X	O	O	X	X
136	O	O	O	X	O	O	O	X	206	O	X	X	X	O	O	X	X
137	X	O	O	X	O	O	O	X	207	X	X	X	X	O	O	X	X
138	O	X	O	X	O	O	O	X	208	O	O	O	O	X	O	X	X
139	X	X	O	X	O	O	O	X	209	X	O	O	O	X	O	X	X
140	O	O	X	O	O	O	O	X	210	O	X	O	O	X	O	X	X
141	X	O	X	X	O	O	O	X	211	X	X	O	O	X	O	X	X
142	O	X	X	X	O	O	O	X	212	O	O	X	O	X	O	X	X
143	X	X	X	X	O	O	O	X	213	X	O	X	O	X	O	X	X
144	O	O	O	O	X	O	O	X	214	O	X	X	O	X	O	X	X
145	X	O	O	O	X	O	O	X	215	X	X	X	O	X	O	X	X
146	O	X	O	O	X	O	O	X	216	O	O	O	X	X	O	X	X
147	X	X	O	O	X	O	O	X	217	X	O	O	X	X	O	X	X
148	O	O	X	O	X	O	O	X	218	O	X	O	X	X	O	X	X
149	X	O	X	O	X	O	O	X	219	X	X	O	X	X	O	X	X
150	O	X	X	O	X	O	O	X	220	O	O	X	X	X	O	X	X
151	X	X	X	O	X	O	O	X	221	X	O	X	X	X	O	X	X
152	O	O	O	X	X	O	O	X	222	O	X	X	X	X	O	X	X
153	X	O	O	X	X	O	O	X	223	X	X	X	X	X	O	X	X
154	O	X	O	X	X	O	O	X	224	O	O	O	O	O	X	X	X
155	X	X	O	X	X	O	O	X	225	X	O	O	O	O	X	X	X
156	O	O	X	X	X	O	O	X	226	O	X	O	O	O	X	X	X
157	X	O	X	X	X	O	O	X	227	X	X	O	O	O	X	X	X
158	O	X	X	X	X	O	O	X	228	O	O	X	O	O	X	X	X
159	X	X	X	X	X	O	O	X	229	X	O	X	O	O	X	X	X
160	O	O	O	O	O	X	O	X	230	O	X	X	O	O	X	X	X
161	X	O	O	O	O	X	O	X	231	X	X	X	O	O	X	X	X
162	O	X	O	O	O	X	O	X	232	O	O	O	X	O	X	X	X
163	X	X	O	O	O	X	O	X	233	X	O	O	X	O	X	X	X
164	O	O	X	O	O	X	O	X	234	O	X	O	X	O	X	X	X
165	X	O	X	O	O	X	O	X	235	X	X	O	X	O	X	X	X
166	O	X	X	O	O	X	O	X	236	O	O	X	X	O	X	X	X
167	X	X	X	O	O	X	O	X	237	X	O	X	X	O	X	X	X
168	O	O	O	X	O	X	O	X	238	O	X	X	X	O	X	X	X
169	X	O	O	X	O	X	O	X	239	X	X	X	X	O	X	X	X
170	O	X	O	O	X	X	O	X	240	O	O	O	O	X	X	X	X
171	X	X	O	X	O	X	O	X	241	X	O	O	O	X	X	X	X
172	O	O	X	X	O	X	O	X	242	O	X	O	O	X	X	X	X
173	X	O	X	X	O	X	O	X	243	X	X	O	O	X	X	X	X
174	O	X	X	X	O	X	O	X	244	O	O	X	O	X	X	X	X
175	X	X	X	X	O	X	O	X	245	X	O	X	O	X	X	X	X
176	O	O	O	O	X	X	O	X	246	O	X	X	O	X	X	X	X
177	X	O	O	O	X	X	O	X	247	X	X	X	O	X	X	X	X
178	O	X	O	O	X	X	O	X	248	O	O	O	X	X	X	X	X
179	X	X	O	O	X	X	O	X	249	X	O	O	X	X	X	X	X
180	O	O	X	O	X	X	O	X	250	O	X	O	X	X	X	X	X
181	X	O	X	O	X	X	O	X									
182	O	X	X	O	X	X	O	X									
183	X	X	X	O	X	X	O	X									
184	O	O	O	X	X	X	O	X									
185	X	O	O	X	X	X	O	X									
186	O	X	O	X	X	X	O	X									
187	X	X	O	X	X	X	O	X									
188	O	O	X	X	X	X	O	X									
189	X	O	X	X	X	X	O	X									
190	O	X	X	X	X	X	O	X									

PHYSICAL DISCONNECT SWITCH WIRING

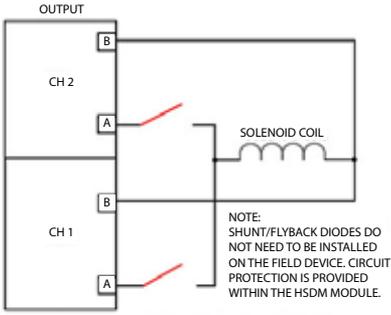


Figure 3-53A - Supervised Output Configuration with Solenoid Disconnect Switch - Class A

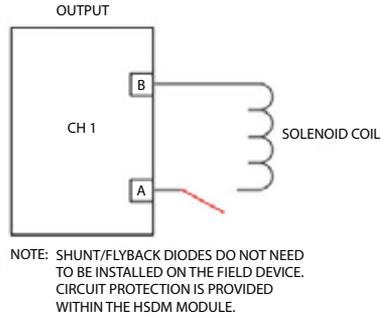


Figure 3-53B - Supervised Output Configuration with Solenoid Disconnect Switch - Class B

WIRING BETWEEN EDIO & HSDM MODULES

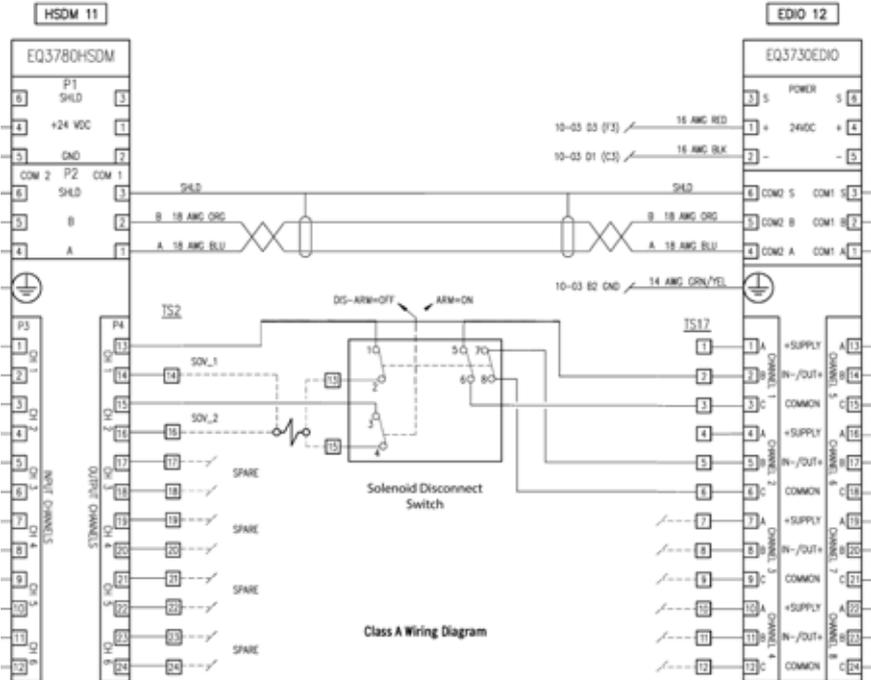


Figure 3-53C - Supervised Output Configuration between EDIO and HSDM modules - Class A

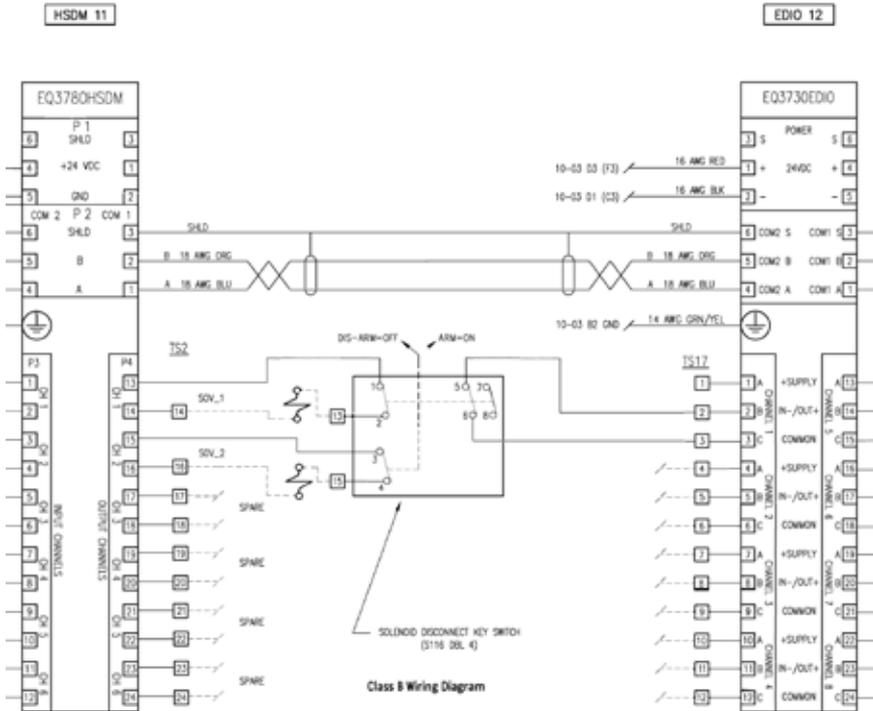


Figure 3-53D - Supervised Output Configuration between EDIO and HSDM modules - Class B

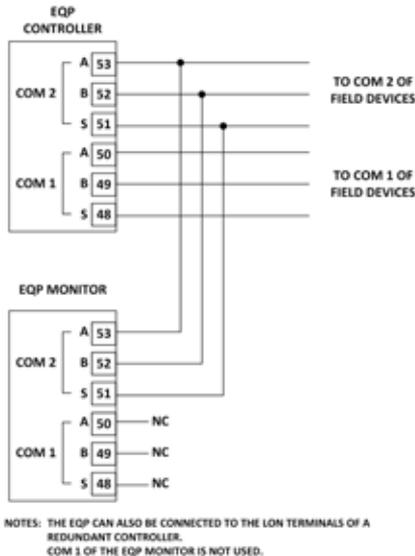


Figure 3-58 - EQP Monitor Spur Wiring Configuration

Section 4 – Operation

NOTE

Pressing Enter while alarms are actively scrolling returns the display to the Main Menu.

EQP CONTROLLER

PUSHBUTTONS

The EQP Controller has seven pushbuttons (located on the front panel) for user interface. These pushbuttons allow the operator to interact with the EQP Controller to respond to alarms and system status conditions, access system status reports, and configure EQP Controller time and date settings.

The following paragraphs describe the function of each pushbutton. Refer to Figure 4-1 for EQP Controller pushbutton locations.

Cancel cancels the selected command, and returns the menu to the last option list displayed.

Enter chooses the menu item selected, and advances the menu to the next options list. (See “EQP Controller Menu Options” in this section for additional information). Pressing the enter button is required when performing a configuration download to the EQP Controller from an Ethernet connected PC running S3.

Next allows the operator to scroll through options listed within each menu. Each time the NEXT pushbutton is pushed, the current options list indexes up one list item (See “EQP Controller Menu Options” in this section for additional information).

Previous allows the operator to scroll through options listed within each menu. Each time the PREVIOUS pushbutton is pushed, the current options list indexes down one list item (See “EQP Controller Menu Options” in this section for additional information).

Reset resets all EQP Controller latched outputs that are no longer active.

Acknowledge silences the internal beeper.

Silence turns on the Silence LED and sets Silence status in user logic.

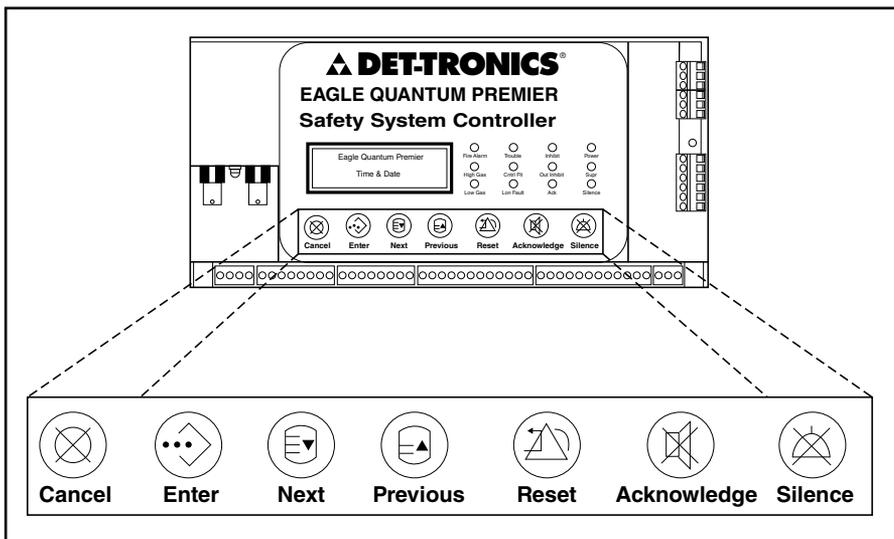


Figure 4-1—EQP Controller Pushbutton Locations

EQP CONTROLLER STATUS INDICATORS

The EQP System status is visually displayed on the EQP Controller in two ways—through the use of a Text Display (see Figure 4-2), and through colored LED's (see Table 4-1). The following paragraphs describe these indicators and the function of each.

TEXT DISPLAY

The EQP Controller uses a text based display to show current system status, active Alarms and Faults.

When an alarm or trouble condition occurs, the display scrolls a detailed message of the condition, including tag number, condition (alarm, trouble, supervisory etc.) and time/date. If multiple alarms or trouble conditions exist, the display scrolls through all active status conditions until they go inactive and are reset using the EQP Controller pushbutton.

EQP CONTROLLER MENU OPTIONS

The EQP Controller is designed to display EQP System status and device related information. The following paragraphs describe how to move around within the EQP Controller's menu structure to access this information and perform minor system settings (see Figure 4-3).

NOTE

During normal operation (no alarms or trouble conditions occurring), the display scrolls current system time and date.

Main Menu displays a list of options to access information types available for display through the EQP Controller. This list also includes access to options used to set system date and time, and diagnostics options.

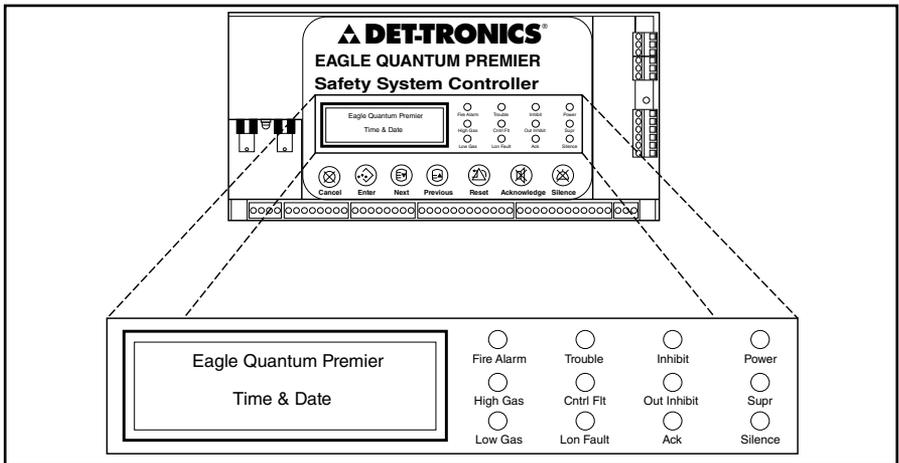


Figure 4-2—EQP Controller Message Display and System Status Indicator Location

Table 4-1—EQP Controller LED System Status Indicators

LED	Function	Status
Green	Power	On when power is applied.
Red	Fire Alarm	On (latched) when any fire alarm is active (Fire detected).
Yellow	Trouble	On (latched) when a fault is detected in the system. (Indicates "Trouble" relay state.)
Yellow	Ack	On when the Acknowledge button is pressed.
Yellow	Silence	On when Silence pushbutton is pressed.
Yellow	Inhibit	On when any input channel is inhibited.
Yellow	Out Inhibit	On when any output is inhibited.
Red	High Gas	On (latched) when any gas detector is at or above the High gas alarm value.
Red	Low Gas	On (latched) when any gas detector is at or above the Low gas alarm value.
Yellow	Supr	On (latched) when any Supervisory input is active.
Yellow	LON Fault	On when a LON fault is detected (open or short).
Yellow	Cntrl Fault	On when a processor fault occurs.

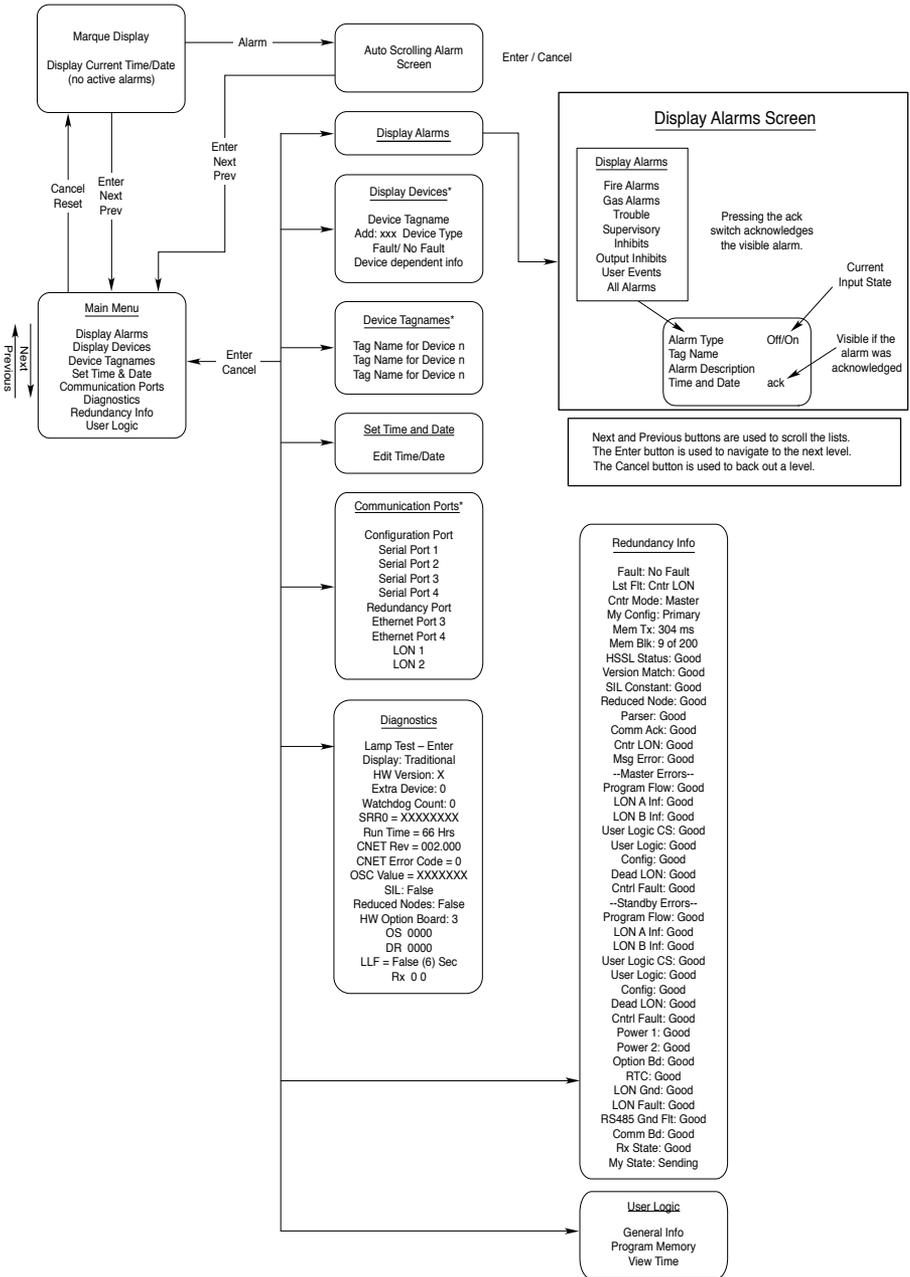


Figure 4-3—EQP Controller Message Display Menu Outline



Moving within the Main Menu is done by using the NEXT or PREVIOUS pushbuttons located on the EQP Controller's front panel. The menu options will scroll upward (NEXT Pushbutton) or downward (Previous Pushbutton) while the Main Menu name remains stationary. When the desired menu option is selected by the ">" indicator, the ENTER pushbutton is pressed to advance the menu display to the desired information set.

NOTE

Pressing the CANCEL pushbutton from within any sub-menu returns the display to the Main Menu. The display will also return to the Main Menu if left unattended for a period of 20 minutes. If an alarm or trouble condition is present after 20 minutes, the display will change to the existing Alarm or Trouble message.

DISPLAY ALARMS displays a list of existing Alarms and Trouble conditions. Moving within this menu is done by using the NEXT or PREVIOUS pushbuttons.



NOTE

Multiple alarm information can be viewed by pressing the NEXT or PREVIOUS pushbuttons. Pressing CANCEL will return the menu to the DISPLAY ALARMS menu.

DISPLAY DEVICES displays device information on all devices on the LON loop. Device tag name, type, and node address are displayed.

Pressing the NEXT or PREVIOUS pushbuttons allows cycling through devices. Pressing the CANCEL pushbutton will return the display to the Main Menu.

DEVICE TAG NAMES displays device tag name information for all devices on the LON loop.



Pressing the NEXT or PREVIOUS pushbutton allows cycling through devices. Pressing the CANCEL pushbutton will return the display to the Main Menu.

SET TIME AND DATE provides access to configuration controls for system clock and date settings.

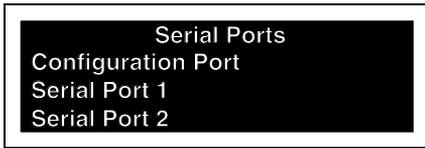


NOTE

When the Set Time and Date menu opens, the current hour will flash.

To move within this menu, press the ENTER pushbutton until the desired property is flashing. To set the desired property value, press the NEXT Pushbutton to increase or PREVIOUS Pushbutton to decrease the value. When the desired value is displayed, press the ENTER pushbutton. This will advance the menu to the next property and it will flash. When all desired properties have been entered, press the ENTER pushbutton until the message "Press ENTER to Save" is displayed. When the ENTER pushbutton is pressed, the settings are saved and the menu changes back to the MAIN MENU.

SERIAL PORTS displays port information on all available ports.



Pressing the NEXT or PREVIOUS pushbutton allows cycling through ports. Pressing the CANCEL pushbutton will return the display to the Main Menu.

DIAGNOSTICS displays information for factory field service.



REDUNDANCY INFO displays the current status of all redundancy related faults. It can be used to monitor the health of the master and standby EQP Controllers. It can also be used for diagnostic purposes.

Redundancy faults originate from three general areas:

- Self detected internal failures of the master EQP Controller
- Inter-controller communications
- A failure in the standby EQP Controller

Any redundancy fault is annunciated by the master EQP Controller, and the redundancy fault code of the highest priority fault is displayed. The EQP Controller also provides a diagnostic menu for more detailed information on the source of a redundancy problem. All redundancy related faults must be cleared to insure proper redundancy operation.

Fault

Displays the current redundancy fault.

Lst Fit

Displays the last redundancy fault that occurred.

Cntr Mode

Indicates whether the EQP Controller is in master or standby mode.

My Config

Indicates whether the EQP Controller is the primary or secondary EQP Controller.

Redun Mem

Displays how long it takes to transfer the local and global memory between EQP Controllers.

HSSL Status

An error is generated when a problem is detected on the high-speed communication link between EQP Controllers. This fault is annunciated when the standby EQP Controller is offline.

Version Match

To ensure proper redundant operation, the firmware versions of redundant EQP Controllers must match. This error is set when a mismatch is detected. Consult the factory for firmware upgrades.

SIL Rating

To ensure proper redundant operation, the SIL rating of redundant EQP Controllers must match. An error is indicated if a SIL EQP Controller is paired with a non-SIL rated EQP Controller. Consult the factory for details.

Parser

As the master EQP Controller configures a standby EQP Controller, configuration information is extracted from non-volatile memory and checked for errors.

Comm Ack

Critical information is exchanged between EQP Controllers on the HSSL using acknowledged messages. The master sends data packets that contain an embedded CRC and a transaction number. The standby validates the message

by calculating and comparing the CRC values. If the CRC is correct the standby saves the data and returns an acknowledge message with the transaction number. If an acknowledge message with the proper transaction number is not received by the master within the allotted time the message is resent. When all retries are used the acknowledge error is indicted and acknowledged communication is terminated.

Lon Comm

Redundant EQP Controllers exchange information across the LON network. This is primarily done to prevent both EQP Controllers from becoming the master in the event that the HSSL fails. The fault is annunciated when an EQP Controller fails to receive any information from the other EQP Controller.

Msg Error

If the standby EQP Controller receives a message from the master that has the correct CRC but invalid data an error message is returned. This master will indicate the error with this fault.

Program Flow

Program flow checking ensures that essential functions execute in the correct sequence. If any functions don't execute properly, or execute in the wrong order, the program flow error is set and control is transferred to the standby EQP Controller.

LON A/B Inf

EQP Controllers utilize neuron co-processors to interface with the field device network. If an error is detected in the operation of the co-processor, a LON interface fault is annunciated.

User Logic CS

EQP Controllers continually conduct a checksum test of the user logic program to ensure that the data remains unchanged. A user checksum fault is annunciated if the result is incorrect.

App CS

When the EQP Controller firmware is generated a checksum of the program is calculated and saved in memory. Each EQP Controller is continually conducting a checksum test of the program to ensure that the data remains unchanged. The application checksum fault is annunciated if the result is incorrect.

User Logic

Many checks are conducted while the EQP Controller interprets and executes the user program. The user logic error is generated if invalid or out of range data is detected.

Config

This fault is annunciated when an EQP Controller has not been configured or the configuration information has been corrupted.

Table 4-2—EQP Controller Alarm Tone Patterns

Priority	EQP Controller Tone	Tone Pattern
1	Fire Alarm	Temporal
2	Supervisory	Supervisory
3	Trouble	Trouble
4	High Gas	Gas
5	Low Gas	Gas
6	Normal	Off

Power 1

Displays the power 1 status on the standby EQP Controller.

Power 2

Displays the power 2 status on the standby EQP Controller.

Option Bd

Indicates whether there is a fault on the ControlNet or Ethernet DLR option board of the standby EQP Controller.

EQP CONTROLLER AUDIBLE ALARM

The EQP Controller features an internal audible alarm for local system status notification (see Table 4-2 and Figure 4-4). When the EQP System is operating in the normal mode (no Alarm or Fault conditions occurring), the alarm is silent (off). If an event (any alarm or trouble condition) occurs, the alarm will remain active until it is acknowledged by pressing the Acknowledge pushbutton or reset by pressing the Reset pushbutton on the EQP Controller front panel.

NOTE

If multiple alarms exist, "Acknowledging" will silence the audible alarms.

Table 4-3—Status of ControlNet LED Indicators

A and B	Cause	Action
Off	No power	None or power up.
Steady red	Faulted unit	Cycle power. If fault persists, contact the factory.
Alternating red/green	Self-test	None
Alternating red/off	Incorrect node configuration	Check network address and other ControlNet configuration parameters.
A or B		
Off	Channel disabled	Program network for redundant media, if required.
Steady green	Normal operation	None
Flashing green/off	Temporary errors	None; unit will self-correct.
	Listen only	Cycle power.
Flashing red/off	Media fault	Check media for broken cables, loose connectors, missing terminators, etc.
	No other nodes present on network	Add other nodes to the network.
Flashing red/green	Incorrect network configuration	Cycle power or reset unit. If fault persists, contact the factory.

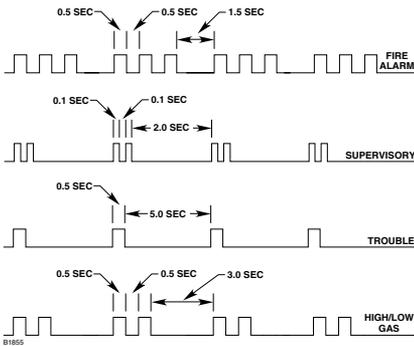


Figure 4-4—Tone Pattern for EQP Controller Buzzer

CONTROLNET STATUS INDICATORS (OPTIONAL)

The optional ControlNet status indicator LEDs function as follows: (see Table 4-3)

Steady - The indicator is on continuously in the defined state.

Alternating - The two indicators alternate between the two defined states at the same time (applies to both indicators viewed together). The two indicators are always in opposite states, out of phase.

Flashing - The indicator alternates between the two defined states (applies to each indicator viewed independent of the other). If both indicators are flashing, they must flash together, in phase.

ETHERNET DLR STATUS INDICATORS (OPTIONAL)

The Ethernet DLR has 4 status indicators: Module Status, Network Status, Link Status 1 and Link Status 2. See Figure 4-5 for location. The status indicator LEDs function as defined in Tables 4-4 through 4-6. A test sequence is performed on the Network Status and Module Status LEDs during startup.

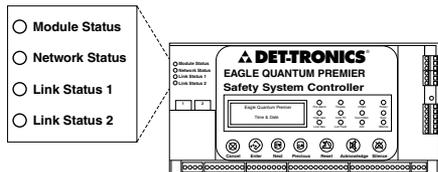


Figure 4-5—Location of Ethernet DLR Status LEDs

Table 4-4—Ethernet DLR Module Status LED

LED State	Description
Off	No power.
Green	Controlled by a Scanner in Run state.
Green, flashing	Not configured, or Scanner in Idle state.
Red	Major fault (EXCEPTION state, FATAL error, etc.)
Red, flashing	Recoverable fault(s)

Table 4-5—Ethernet DLR Network Status LED

LED State	Description
Off	No power or no IP address.
Green	Online, one or more connections established (CIP Class 1 or 3).
Green, flashing	Online, no connections established.
Red	Duplicate IP address, FATAL error.
Red, flashing	One or More connections timed out (CIP Class 1 or 3).

SEQUENCE OF EVENTS DURING A CONFIGURATION DATA DOWNLOAD

During a configuration download, the EQP Controller receives configuration data that is stored into flash memory. During the download process, the EQP Controller halts normal operation and resets a number of EQP Controller functions. Items affected and displayed during a configuration data download are listed in the following steps:

1. Halt the static logic and user logic programs.
2. Ignore field device LON communications. However, the EQP Controller continues to generate the LON heartbeat.
3. Silence the EQP Controller's audible annunciator.
4. Initiate a Trouble condition that is signaled by the yellow Trouble LED and relay.
5. Clear all Alarm and Fault events.
6. De-energize all 8 EQP Controller relays.
7. Ignore Modbus communication.

Table 4-6—Ethernet DLR Link Status 1 and Link Status 2 LEDs

LED State	Description
Off	No link, no activity.
Green	Link (100 Mbit/s) established.
Green, flickering	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established.
Yellow, flickering	Activity (10 Mbit/s)

8. ControlNet communication continues. Ethernet DLR communication goes through reset and configuration. DLR communication remains offline during this sequence (approximately 30 seconds).
9. Text display's first line indicates "**** Program Mode ****"
10. Text display's third line displays download status.
 - a) "Config Download" indicates the serial transfer into memory from the PC to the EQP Controller.
 - b) "Erasing Flash" indicates that the EQP Controller is electronically erasing the contents of the Flash memory.
 - c) "Writing to Flash" indicates that configuration data stored in memory is being written down into Flash memory.
 - d) "Flash Lock" indicates that the EQP Controller is locking the configuration data into the Flash memory.



CAUTION

The EQP Controller's configuration data will be corrupted if power is removed during a download. Contact the factory if this occurs.

11. Initialize the RS-485 and configuration serial ports with new parameters.
12. Initialize the ControlNet or Ethernet DLR option board with new parameters.
13. Enable static logic and user logic programs to operate. The first scan program is run first.
14. Accept field device LON communications.
15. Poll the device type variable from LON field devices.
16. Configure LON field devices.
17. Clear the Trouble condition.

18. Text display shows a normal operation marquee message.

a) Text display's first line indicates "Det-Tronics Eagle Quantum Premier®."

b) Text display's third line displays time (24 hour format) and date (month/day/year).

NOTE

Depending on the condition of the LON devices, faults may persist for a number of minutes.

EQP CONTROLLER REDUNDANCY

Pushbuttons

The pushbuttons are active on the master EQP Controller and inactive on the standby EQP Controller.

EQP Controller Status Indicators

The status indicators are active on the master EQP Controller. All LEDs except the power LED are off and the trouble relay is in the no trouble state.

EQP Controller Relay Operation

The EQP Controller relays are fully functional on the master EQP Controller and the standby EQP Controller.

Text Display

The text display on the master EQP Controller is fully functional as explained in the previous section. The text display on the standby EQP Controller reads ****Standby Mode****, Ready.

EQP Controller Menu Options

The menu options are active on the master EQP Controller and inactive on the standby EQP Controller.

ControlNet or Ethernet DLR Status Indicators

The ControlNet or Ethernet DLR status indicators are active on the master and standby EQP Controllers. See Table 4-3 for status of ControlNet LED indicators and Tables 4-4 through 4-6 for Ethernet DLR LED indicators.

Power-up Sequence

The power-up sequence for a redundant EQP Controller pair is as follows:

1. Make sure the LON and HSSL are connected correctly.
2. Apply power to both EQP Controllers.
3. EQP Controllers perform their boot-up routine.
4. The EQP Controller that is connected with the primary end of the HSSL is identified as the primary EQP Controller and is assigned address 1.
5. The EQP Controller that is connected with the secondary end of the HSSL is assigned address 2.
6. If there are no faults present, the primary EQP Controller defaults to the master EQP Controller and the secondary EQP Controller defaults to the standby EQP Controller.
7. The master EQP Controller executes user logic and communicates with the connected LON devices.
8. The standby EQP Controller indicates that it is in standby mode and monitors the master EQP Controller.
9. The master and standby EQP Controllers perform a synchronization process.
10. The power-up sequence is complete.

Synchronization

When a master EQP Controller detects a standby EQP Controller on the HSSL, it performs the following synchronization process:

1. Compare EQP Controller firmware versions and SIL rating. If they are not an exact match, the process stops and a fault is generated. Consult the factory for details.
2. Standby EQP Controller indicates the synchronization steps.
3. Compare the user application programs. If there is a mismatch, the master will configure the standby EQP Controller via the HSSL.
4. Initiate the data synchronization process.

5. Transfer the status of device inhibits and device removes.
 6. Transfer the complete alarm list, including alarm history.
 7. Transfer the real time clock (RTC) value.
 8. Copy the local and global memory to the standby EQP Controller.
 9. Synchronization is complete and the standby EQP Controller indicates "Ready."
1. Verify that HSSL communication is good and there are no internal faults in the standby EQP Controller.
 2. Verify that the synchronization process is complete.
 3. The master requests the standby to take control.
 4. The standby takes control and becomes the master.
 5. The EQP Controller indicates "Device Download Active" until the LON devices have been successfully updated.

Sequence of Events During a Configuration Download



WARNING

The EQP System is inactive and not executing logic/alarm functions during a program download (in both single and redundant EQP Controller configurations).

When downloading a new configuration to the master EQP Controller, the following sequence is executed:

1. The S³ software must be connected to the master EQP Controller.
2. Alter the configuration and execute the download command from S³.
3. The master EQP Controller goes into 'Program' mode and passes mastership to the standby EQP Controller.
4. The updated configuration file is loaded into the EQP Controller.
5. The EQP Controllers are automatically forced to switch over.
6. The master EQP Controller puts the standby EQP Controller into 'Program' mode and downloads the configuration.
7. The EQP Controller indicates "Device Download Active" until the LON devices have been successfully updated.
8. The configuration download is now complete.

Manual Switchover

The user can request a manual switchover from an externally wired switch. The request executes the following sequence:

Automatic Switchover

An automatic transfer will be initiated if the master EQP Controller goes into an error (self detected internal EQP Controller failure, program flow error in the EQP Controller, user logic checksum error or application checksum error). An automatic switchover executes the following sequence:

1. Check that the standby EQP Controller is online by verifying that HSSL communication is good and there are no internal faults in the standby EQP Controller.
2. Verify that the synchronization process is complete.
3. The master requests the standby to take control.
4. The standby takes control and becomes the master.

Replacing a Faulty EQP Controller

If the master EQP Controller fails and the standby EQP Controller is healthy, an automatic switchover will occur. To replace the failed EQP Controller, perform the following steps:

1. Remove power. Disconnect plugs and remove the failed EQP Controller.
2. Mount the new EQP Controller.
3. Connect the LON to the new EQP Controller.
4. Connect the HSSL.
5. Connect any other I/O used.
6. Apply power to the EQP Controller.

- An EQP Controller synchronization occurs and the new controller is configured and indicates "Ready" as the standby EQP Controller.
- If preferred, perform a manual switchover to return the primary EQP Controller to the master status.

EQ3730EDIO MODULE

The EDIO Module (see Figure 4-6) has 18 LED status indicators, two for the device and two for each channel, located on the front panel. Refer to Tables 4-7 and 4-8 for a description of the

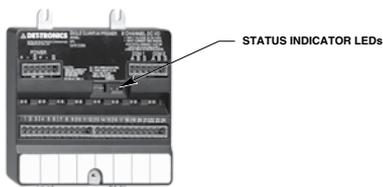


Figure 4-6—EDIO Module Status Indicator Location

LED indicators.

POWER-UP SEQUENCE

Set the module address switch prior to applying power.

EDIO module power-up sequence illuminates the LEDs for the device and all of its channels. First the power and fault LEDs are illuminated, indicating that the device is in a power-up mode. Next the LEDs are illuminated in the following sequences:

- Sequentially each channel active red LED is illuminated, starting with channel 1 and continuing through channel 8.
- When the red LED for channel 8 is illuminated, sequentially each channel active red LED is turned off, starting with channel 1 and continuing through channel 8.
- Next, the channel fault yellow LEDs are tested in the same manner as the channel active red LEDs.

When all the LEDs have been illuminated, the EDIO module displays the device's LON address by illuminating the channel active red LED. LON dip switches 1 through 8 will be displayed on channels 1 through 8. When a dip switch is set to the ON position, the

channel active red LED will be illuminated. The address is displayed for two seconds.

Once the address has been displayed, the device's fault LED will turn off. After the power-up sequence, the device will either display an unconfigured state or normal operation state. In the unconfigured state, the channel fault yellow LEDs flash ON and OFF at the same rate for all channels.

If a channel is configured for supervision and it has a fault, the corresponding yellow LED and status parameter are activated. The positive and negative drivers on each channel are tested. If any driver test fails, the corresponding yellow LED and status parameter are activated.

Table 4-7—EDIO Module - Device Status Indicators

LED	Device Status
Green	On when power is present.
Yellow	When On steady indicates device is disabled or must be replaced. Possible Watchdog Timer problem.
NOTE <i>Blinks one time at power-up.</i>	

Table 4-8—EDIO Module - Channel Status Indicators

LED	Channel Status
Red	When On steady indicates the input circuit is closed or the output circuit is active
Yellow	When Blinking indicates a low power condition is present or channel is not properly configured. Steady indicates a channel fault.

CAUTION

In some cases, a ground fault on one of the EDIO channels may also result in the indication of a hardware fault. This may be a false indication.

EQ3700DCIO MODULE

The DCIO Module (see Figure 4-7) has 18 LED status indicators, two for the device and two for each channel, located on the front panel. Refer to Tables 4-9 and 4-10 for a description of the LED indicators.

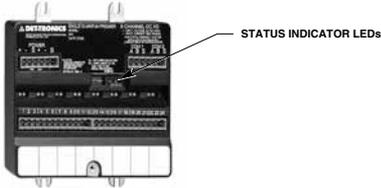


Figure 4-7—DCIO Module Status Indicator Location

Table 4-9—DCIO Module - Device Status Indicators

LED	Device Status
Green	On when power is present.
Yellow	When On steady indicates device is disabled or must be replaced. Possible Watchdog Timer problem. NOTE <i>Blinks one time at power-up.</i>

Table 4-10—DCIO Module - Channel Status Indicators

LED	Channel Status
Red	When On steady indicates the input circuit is closed or the output circuit is active
Yellow	When Blinking indicates a low power condition is present or channel is not properly configured. Steady indicates a channel fault.

POWER-UP SEQUENCE

Set the module address switch prior to applying power.

DCIO module power-up sequence illuminates the LEDs for the device and all of its channels. First the power and fault LEDs are illuminated, indicating that the device is in a power-up mode. Next the LEDs are illuminated in the following sequences:

- Sequentially each channel active red LED is illuminated, starting with channel 1 and continuing through channel 8.

- When the red LED for channel 8 is illuminated, sequentially each channel active red LED is turned off, starting with channel 1 and continuing through channel 8.
- Next, the channel fault yellow LEDs are tested in the same manner as the channel active red LEDs.

When all the LEDs have been illuminated, the DCIO module displays the device's LON address by illuminating the channel active red LED. LON dip switches 1 through 8 will be displayed on channels 1 through 8. When a dip switch is set to the ON position, the channel active red LED will be illuminated. The address is displayed for two seconds.

Once the address has been displayed, the device's fault LED will turn off.

After the power-up sequence, the device will either display an unconfigured state or normal operation state. In the unconfigured state, the channel fault yellow LEDs flash ON and OFF at the same rate for all channels.

EQ3720RM MODULE

The Relay Module (see Figure 4-8) has 18 LED status indicators, two for the device and two for each channel, located on the front panel. Refer to Tables 4-11 and 4-12 for a description of the LED indicators.

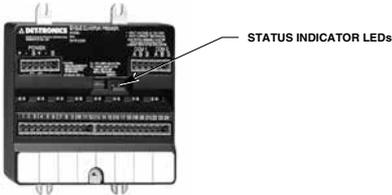


Figure 4-8—Relay Module Status Indicator Location

Table 4-11—Relay Module - Device Status Indicators

LED	Device Status
Green	On when power is present.
Yellow	When On steady indicates device is disabled or must be replaced. Possible Watchdog Timer problem. <i>NOTE</i> <i>Blinks one time at power-up.</i>

Table 4-12—Relay Module - Channel Status Indicators

LED	Channel Status
Red	When On steady indicates the input circuit is active
Yellow	When Blinking indicates a low power condition is present or channel is not properly configured.

POWER-UP SEQUENCE

Set the module address switch prior to applying power.

Relay module power-up sequence illuminates the LEDs for the device and all of its channels. First the power and fault LEDs are illuminated, indicating that the device is in a power-up mode. Next the LEDs are illuminated in the following sequences:

- Sequentially each channel active red LED is illuminated, starting with channel 1 and continuing through channel 8.

- When the red LED for channel 8 is illuminated, sequentially each channel active red LED is turned off, starting with channel 1 and continuing through channel 8.
- Next, the channel fault yellow LEDs are tested in the same manner as the channel active red LEDs.

When all the LEDs have been illuminated, the relay module displays the device's LON address by illuminating the channel active red LED. LON dip switches 1 through 8 will be displayed on channels 1 through 8. When a dip switch is set to the ON position, the channel active red LED will be illuminated. The address is displayed for two seconds.

Once the address has been displayed, the device's fault LED will turn off.

After the power-up sequence, the device will either display an unconfigured state or normal operation state. In the unconfigured state, the channel fault yellow LEDs flash ON and OFF at the same rate for all channels.

If a channel is configured for supervision and it has a fault, the corresponding yellow LED and status parameter are activated. The positive and negative drivers on each channel are tested. If any driver test fails, the corresponding yellow LED and status parameter are activated.

EQ3710AIM MODULE

The Analog Input Module (see Figure 4-9) has 18 LED status indicators, two for the device and two for each channel, located on the front panel. Refer to Tables 4-13 and 4-14 for a description of the LED indicators.

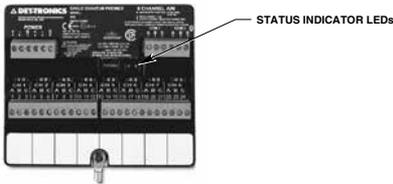


Figure 4-9—AIM Status Indicator Location

Table 4-13—Analog Input Module - Device Status Indicators

LED	Device Status
Green	On when power is present.
Yellow	When On steady indicates device is disabled or must be replaced. Possible Watchdog Timer problem. <i>NOTE</i> <i>Blinks one time at power-up.</i>

Table 4-14—Analog Input Module - Channel Status Indicators

LED	Channel Status
Red	When Blinking indicates a low alarm. When On Steady indicates a high alarm.
Yellow	When Blinking indicates a low power condition is present or channel is not properly configured. On steady indicates out of range condition

POWER-UP SEQUENCE

Set the module address switch prior to applying power.

The Analog Input Module power-up sequence illuminates the LEDs for the device and all of its channels. First the power and fault LEDs are illuminated, indicating that the device is in a power-up mode. Next the LEDs are illuminated in the following sequences:

- Sequentially each channel active red LED is illuminated, starting with channel 1 and continuing through channel 8.

- When the red LED for channel 8 is illuminated, sequentially each channel active red LED is turned off, starting with channel 1 and continuing through channel 8.
- Next, the channel fault yellow LEDs are tested in the same manner as the channel active red LEDs.

When all the LEDs have been illuminated, the analog input module displays the device's LON address by illuminating the channel active red LED. LON dip switches 1 through 8 will be displayed on channels 1 through 8. When a dip switch is set to the ON position, the channel active red LED will be illuminated. The address is displayed for two seconds.

Once the address has been displayed, the device's fault LED will turn off.

After the power-up sequence, the device will either display an unconfigured state or normal operation state. In the unconfigured state, the channel fault yellow LEDs flash ON and OFF at the same rate for all channels.

EQ21XXPSM POWER SUPPLY MONITOR

The power supply monitor (see Figure 4-10) has three LEDs used to provide a visual indication of device status:

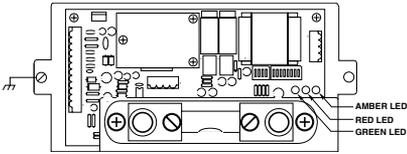


Figure 4-10—EQ21xxPSM Status Indicator Location

Table 4-15—Power Supply Monitor Status Indicators

LED	Device Status
Green	When On indicates power is supplied to device
Red	When Flashing indicates an alarm or fault condition is present.
Yellow	When On indicates device is disabled. Module must be replaced.

EQ2220GFM GROUND FAULT MONITOR

The ground fault monitor (see Figure 4-11) has three LEDs used to provide a visual indication of device status:

NOTE

The Ground Fault Monitor LED will respond immediately to a ground fault condition. The relay contact requires the condition to exist for 10 seconds before it activates.

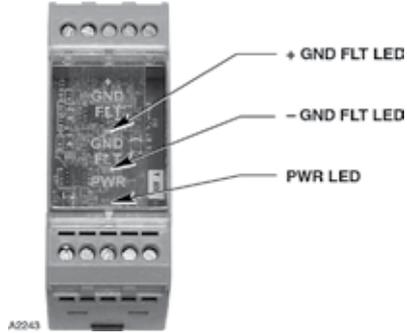


Figure 4-11—Ground Fault Monitor Status Indicator Location

Table 4-16—Ground Fault Monitor Status Indicators

LED	Device Status
+ GND FLT LED	Indicates Yellow in the presence of a "+" ground fault.
- GND FLT LED	Indicates Yellow in the presence of a "-" ground fault.
POWER LED	Indicates Green when the unit is powered.

EQ24XXNE NETWORK EXTENDER

The EQ24xxNE has three LEDs (one green, two yellow) for indicating device status.

Table 4-19—Network Extender Status Indicators

LED	Device Status
Green	When On, indicates device has power. Flashes to indicate messages are being transferred over the LON.
Yellow	When On, indicates a malfunction in the electronic circuitry. Module replacement is required. NOTE <i>When a network extender has an internal fault, the message display will only indicate that a LON fault condition exists somewhere on the LON.</i>

EQP SYSTEM STARTUP

PRE-OPERATION CHECKS

General

Insulate all shields to prevent shorts to device housing or to any other conductor.

Place alarm/release output in "Bypass/Isolate" when servicing devices.

Maintain a log book containing the type and serial numbers of devices as well as the location and date of installation.

Maintain a log of maintenance activities.

Observe normal precautions for handling electrostatic sensitive devices.

LON

Rocker switches for each LON device must be set to the desired address prior to power-up.

Test the loop with no power applied. DC resistance should be equal on A and B.

Check polarity on A and B (no rolls). COM 1 connects to COM 2; COM 2 connects to COM 1. A connects to A and B to B.

Measure voltage. A to chassis ground measures approximately +7.5 Vdc. B to ground measures approximately -7.5 Vdc.

Measure signal (400 mv P-P min.). (Use oscilloscope if possible.)

Check fault tolerance by introducing a short.

EQP Controller

The I/O and LON wiring is correctly installed, observing polarity. All cable shields are properly terminated and insulated.

Power wiring is installed and power source is operational.

Chassis ground stud must be connected to earth ground.

Redundant EQP Controller

The I/O and LON wiring is correctly installed, observing polarity. All cable shields are properly terminated and insulated.

Power wiring is installed and power source is operational.

Chassis ground stud must be connected to earth ground.

The HSSL cable is connected between the two EQP Controllers.

EQ3730EDIO/EQ3700DCIO Module

Verify correct address setting.

Check signal circuits for correct polarity.

Check for correct installation of EOL resistors.

EQ3720RM Module

Verify correct address setting.

Check for correct output connections.

EQ3710AIM Module

Verify correct address setting.

Check for correct input connections.

Check each channel with a loop current input.

Power Supplies and Power Monitors

Verify all earth ground connections as specified in the wiring instructions.

Verify correct ac power to supply.

Check power distribution to ensure that all devices are receiving power.

Check power trouble indicator by introducing an open to the battery.

Ground Fault Monitor

Verify earth ground connections as specified in the wiring instructions.

Check power distribution to ensure that all devices are receiving power.

GENERAL START-UP PROCEDURES

1. Output loads that are controlled by the EQP System should be secured (remove power from all output devices) to prevent actuation.
2. Check all system wiring for proper connection.
3. Inspect all devices to verify that they have not been physically damaged in shipment.
4. Apply power to the system.

NOTE

To prevent the network modules from going into a fault isolation condition, apply power to the EQP Controller prior to applying power to the network devices.

5. Program the EQP System for the desired operation using Det-Tronics Safety System Software (S³). Download configuration data to all devices.

NOTE

After EQP System configuration has been completed, the entire system should be tested for proper operation to ensure that configuration was performed properly.

6. Calibrate the sensors.
7. Ensure that all trouble and alarm conditions have been cleared and the EQP Controller is reset, then remove mechanical blocking devices (if used) and restore power to the output loads.

START-UP PROCEDURE FOR EQP CONTROLLER

The EQP Controller is powered-up when the Power Supply is turned on. When the Power Supply has been powered-up, verify power at the EQP Controller by confirming that the Green LED indicator is on. This indicator is located on the front of the EQP Controller.

To verify that the EQP Controller is powered-up and operating properly, ensure that:

1. When power is first applied, all LEDs are on. The ACK LED flashes while the memory test is running. When initialization is complete, only the green power LED remains lit.
2. The Ethernet/Serial communication indicators continuously flash (if active).

NOTE

For the Ethernet Interface Board, the blue LEDs associated with ports 3 and 4 will remain on when the ports are ready for communication. Flashing green and yellow LEDs indicate active transmit and receive. The yellow indicator on the front of the RJ45 connector indicates a 10 Mb/s link is established. The green indicator on the front of the RJ45 connector indicates a 100 Mb/s link is established.

3. The Text display runs an initialization routine. When initialization is complete and if all alarms and trouble conditions are cleared, the text display shows the current time and date. If the EQP Controller has been unpowered for more than 12 hours, the time and date may have to be set. If an alarm or trouble condition exists, it will be displayed until the condition is corrected and the Reset button is pressed.

If the EQP Controller has not been software configured, unconfigured devices will be displayed. Configuration must be done using S³ Safety System Software before proceeding.

4. The LEDs on the front panel provide an indication of the EQP System status.
5. Ensure configuration was performed properly.

6. After any modifications have been made either to the installation or to configuration software, always check the entire EQP System for proper operation in order to ensure that the changes were performed properly.

STARTUP PROCEDURE FOR EQ3730EDIO MODULE

Configuration

The EDIO Module is an eight-channel device. Each channel is capable of being configured as an input or output, independent of any other channel.

NOTE

The module is configured using Det-Tronics Safety System Software.

Activation Time

Timers are made available for output circuits only. Timers are used primarily to set the timing of output release in a suppression system. Timers provide a pulse timed output for the time period specified in the configuration of the channel. The channel output goes active when commanded by the system logic and remains on until the timer expires.

Static Logic Mode

Each input channel can be configured as a Fire Alarm, Trouble, Low Gas Alarm, High Gas Alarm, Supervisory, or Other type of channel, independent of any other channel configuration. The type selected determines the logic the system uses to configure Indicators, Alarms and Messages.

For example: When an input is selected as Fire type, the Fire LED on the EQP Controller and Audible alarm will automatically actuate when that input channel is active.

EDIO Startup

1. The Power-on LED should be illuminated. The Fault LED should blink once on power up, then remain off.
2. The input circuits should indicate the proper state of the input device (channel active LED illuminates when the circuit is closed). Check the input power supply and associated wiring. Verify proper voltage per the Troubleshooting matrix.
3. The output circuits should indicate the proper state for the programmed device (channel active LED illuminates when the circuit is active). Check the power supply and associated wiring. Verify proper voltage per the Troubleshooting matrix.
4. The circuits should not indicate a fault condition (channel fault LED illuminates when the circuit is in fault). Check the end-of-line devices and associated wiring. Verify proper voltage per the Troubleshooting matrix.
5. Test the entire system for proper operation to ensure that the configuration was performed properly.

STARTUP PROCEDURE FOR EQ3700DCIO MODULE

Configuration

The DCIO Module is an eight-channel device. Each channel is capable of being configured as an input or output, independent of any other channel.

NOTE

The module is configured using Det-Tronics Safety System Software.

Activation Time

Timers are made available for output circuits only. Timers are used primarily to set the timing of output release in a suppression system. Timers provide a pulse timed output for the time period specified in the configuration of the channel. The channel output goes active when commanded by the system logic and remains on until the timer expires.

Static Logic Mode

Each input channel can be configured as a Fire Alarm, Trouble, Low Gas Alarm, High Gas Alarm, Supervisory, or Other type of channel, independent of any other channel configuration. The type selected determines the logic the system uses to configure Indicators, Alarms, and Messages.

For example: When an input is selected as Fire type, the Fire LED on the EQP Controller and Audible alarm will automatically actuate when that input channel is active.

DCIO Startup

1. The Power-on LED should be illuminated. The Fault LED should blink once on power up, then remain off.
2. The input circuits should indicate the proper state of the input device (channel active LED illuminates when the circuit is closed). Check the input power supply and associated wiring. Verify proper voltage per the Troubleshooting matrix.
3. The output circuits should indicate the proper state for the programmed device (channel active LED illuminates when the circuit is active). Check the power supply and associated wiring. Verify proper voltage per the Troubleshooting matrix.
4. The circuits should not indicate a fault condition (channel fault LED illuminates when the circuit is in fault). Check the end-of-line devices and associated wiring. Verify proper voltage per the Troubleshooting matrix.
5. Test the entire system for proper operation to ensure that the configuration was performed properly.

Relay Module Startup

1. The Power-on LED should be illuminated. The Fault LED should blink once on power up, then remain off.
2. The output circuits should indicate the proper state for the programmed device (channel active LED illuminates when the circuit is active).
3. Test the entire system for proper operation to ensure that the configuration was performed properly.

AIM Startup

1. The Power-on LED should be illuminated. The Fault LED should blink once on power up, then remain off.
2. The input circuits should indicate the proper state for the programmed device (channel active LED illuminates when the circuit is active).
3. The circuits should not indicate a fault condition (channel fault LED illuminates when the circuit is in fault).
4. Test the entire system for proper operation to ensure that the configuration was performed properly.

Section 5 – Maintenance

NOTE

Refer to the EQP System Safety Manual (number 95-8599) for specific requirements and recommendations applicable to the proper installation, operation, and maintenance of all SIL-Certified EQP Systems.

ROUTINE MAINTENANCE

To ensure reliable protection, it is important to check and calibrate the EQP System on a regularly scheduled basis. The frequency of checks is determined by the requirements of the particular installation.

BATTERIES

Batteries **must** be replaced every 48 months, or sooner if required by local codes.

IMPORTANT

Only sealed batteries are to be used.

MANUAL CHECK OF OUTPUT DEVICES

It is important that response devices be checked initially when the EQP System is installed, as well as periodically during an on-going maintenance program.



CAUTION

Be sure to secure all output devices that are actuated by the EQP System to prevent unwanted activation of equipment, and remember to place these output devices back into service when the checkout is complete.

O-RING MAINTENANCE



WARNING

The hazardous area must be de-classified prior to removing a junction box cover with power applied.

An O-ring is used to ensure that the junction box cover will seal tightly and provide protection against water entry. The enclosure should be opened periodically, and the O-ring inspected for breaks, cracks and dryness.

To test O-ring: remove it from the enclosure and stretch it slightly. If cracks are visible, replace it. If it feels dry, a thin coating of lubricant should be applied. When re-installing the O-ring, be sure that it is properly seated in the housing groove. It is imperative that this O-ring be properly installed and in good condition. Failure to properly maintain it can allow water to enter the enclosure and cause premature failure. A coating of lubricant should also be applied to the threads on the cover before re-assembling the enclosure. This will both lubricate the cover threads and help prevent moisture from entering the enclosure.



CAUTION

The O-rings should be lubricated with a silicone free grease. The use of other lubricants is not recommended, since they can adversely affect the performance of some sensors. Under no circumstances should a lubricant or compound containing silicone be used with catalytic type combustible gas sensors.

GAS SENSOR MAINTENANCE

All gas sensors must be calibrated on a regular basis. Calibration should typically be performed every 90 days for catalytic and electrochemical sensors.

Catalytic sensors have a finite lifespan. If a successful calibration cannot be performed, replace the sensor and recalibrate following the procedure described in the “Calibration” section below. **Always compare part numbers to be sure that the correct replacement sensor is being used.**



CAUTION

Exposure of the sensor to high concentrations of combustible gases for extended periods of time can introduce stress to the sensing element and seriously affect its performance.

After exposure, recalibration should immediately be performed, and the sensor should be replaced if necessary.

NOTE

Electrochemical sensors have a finite lifespan. If a successful calibration cannot be performed, inspect the hydrophobic filter. If the filter is plugged, replace it and recalibrate the sensor. If the filter is in good condition, replace the sensor. Recalibrate following the procedure described in the "Calibration" section.

CALIBRATION AND ADJUSTMENTS

To ensure optimum performance, calibration must be performed on a regularly scheduled basis. Since each application is different, the length of time between regularly scheduled recalibrations can vary from one installation to the next. In general, the more frequently a system is checked, the greater the reliability. See each gas field device's manual referenced in the "Field Devices" section of this manual for details on calibration for each device.

IMPORTANT

4–20 mA devices not manufactured by Det-Tronics must be pre-calibrated. To ensure adequate protection, calibration must be performed on a regularly scheduled basis.

DEVICE CALIBRATION LOGS AND RECORDS

Each gas field device that utilizes the LON contains an internal log of calibration and alarm events. See each device's manual referenced in the "Field Devices" section in this manual for details.

TROUBLESHOOTING

Tables 5-1 and 5-2 are provided to assist in locating the source of a system problem.

REPLACEMENT PARTS

EQP devices are not designed to be repaired in the field. If a problem should develop, first carefully check for proper wiring, programming and calibration. If it is determined that the problem is caused by an electronic defect, the device must be returned to the factory for repair.

NOTE

When replacing a device, be sure that all rocker switches on the replacement are set the same as the original device. Consult the settings documented during system installation and setup to determine proper settings for the new device. Remove power before removing a device or plugging in a replacement unit. When a device is replaced, configuration is done automatically.

Table 5-1—Troubleshooting Guide - DCIO/EDIO Module

I/O Type	Normal (Off)	Normal (On)	Open (Off)	Open (On)	Short (Off)	Short (On)
Unsupervised Input	-15.4	0	-15.4	-15.4	0	0
Supervised Input (EOL Resistor)	-14.4	0	-15.4	-15.4	0	0
Supervised Input (EOL/Inline Resistors)	-15.4	-15	-15.4	-15.4	0	0
Unsupervised Output	-15.4	23.9	-15.4	23.9	0	0
Supervised Output (Agent Release)	0 to 2.1 Note 2	23.9	-15.4	23.9	0	0
Supervised Output (Notification)	-14.4	23.9	-15.4	23.9	0	0

Notes:

1. All measurements are in Volts and are measured in reference to the common terminal and 24.0 Vdc is the module's input.
2. Value is dependent on the resistance of the solenoid attached.

Table 5-2—System EQP Controller Troubleshooting Guide

Symptom	Possible Cause	Corrective Action
EQP Controller Power LED/ Text Display OFF	No Power to Input.	<ul style="list-style-type: none"> – Measure input voltage (18 to 30 Vdc). – Check that P1 is fully inserted. If voltage is present and P1 is fully inserted, replace EQP Controller.
LON Fault – LED lit	LON wiring is shorted or open.	<ul style="list-style-type: none"> – Check that P7 is fully inserted. – Using the EQ Safety System Software, determine the location of open or short via LON Diagnostics screen. – Use a multimeter to determine wiring fault.
Trouble - LED lit and relay is active.	Any monitored device in the system including ground fault in fault condition.	<ul style="list-style-type: none"> – Using the front panel display/controls, view all points in alarm/fault and identify faulted device. – Repair or replace faulted device as necessary.
Digital inputs are not responding	<ul style="list-style-type: none"> – Bad input switch. – Faulty input channel. – Faulty wiring. – Configuration error. 	<ul style="list-style-type: none"> – Check that P2 and P3 are fully inserted. – Using a voltmeter, measure input terminals with contact closed to the input (measures 0 vdc when input contact is closed, measures approximately 23 Vdc with circuit open and 24 vdc input at the EQP Controller). – If input does not respond to a contact closure, replace module (verify response with EQ Safety System Software/textual display). – Verify configuration.
Relay Outputs are not respond to an output command	<ul style="list-style-type: none"> – Bad relay channel. – Faulty output wiring. – User logic. 	<ul style="list-style-type: none"> – Check that P4 and P5 are fully inserted. – When output should be energized, measure contact resistance using an ohm meter. – Verify that wiring from output is not open. – Using EQ Safety System Software, verify that logic is trying to operate the channel.
Serial links are not responding	<ul style="list-style-type: none"> – Faulty wiring. – Incorrect serial link configuration. – Text display shows "Invalid Configuration" 	<ul style="list-style-type: none"> – Check that P8 and P9 are fully inserted. – Verify that communication LEDs are flashing. – Verify that serial link configuration matches the host device. – Verify that wiring is not open or shorted.
Ethernet link are not responding	<ul style="list-style-type: none"> – Faulty wiring. – Incorrect Ethernet link configuration. – Text display shows "Invalid Configuration" 	<ul style="list-style-type: none"> – Check that P3 and P4 are fully inserted. – Verify that communication LEDs are flashing. – Verify that Ethernet link configuration is correct. – Verify that wiring is not open or shorted.
Front panel push buttons are not working	<ul style="list-style-type: none"> – Power OFF. – EQP Controller is faulted. 	<ul style="list-style-type: none"> – Verify that power is present and P1 is fully inserted. – Cycle power to EQP Controller.
Text display indicates a RTC Fault	Power loss for more than 12 hours	<ul style="list-style-type: none"> – Using the Safety System Software, execute "Set RTC", which downloads the current time into the EQP Controller's real time clock. Alternatively, use the "Set Time and Date" menu in the EQP Controller.
Hardware memory fault	Device on the LON with a ground fault	<ul style="list-style-type: none"> – This condition indicates a wiring issue in which the alarm will override status. Requires an EQP Controller reset.

DEVICE REPAIR AND RETURN

Prior to returning devices or components, contact the nearest local sales representative so that a Return Material Authorization (RMA) number can be assigned. A written statement describing the malfunction must accompany the returned device or component to expedite finding the cause of the failure. This information is captured using the RMA form.

Pack the unit or component properly. Use sufficient packing material in addition to an antistatic bag or aluminum-backed cardboard as protection from electrostatic discharge.

Return all equipment transportation prepaid to the factory in Minneapolis with the RMA number clearly displayed. Materials received without an RMA number will be refused.

ORDERING INFORMATION

When ordering, please specify:

Refer to the appropriate model matrix in Section 7 for the following devices:

EQ3XXX EQP Controller
EQ3700DCIO Discrete I/O Module
EQ3710AIM Analog Input Module
EQ3720RM Relay Module
EQ3730EDIO Enhanced Discrete I/O Module

POWER SUPPLIES

Part Number	Description
006979-001	EQ21xxPSM Power Supply Monitor
000604-013	EQ2110PS Power Supply (10 A / 60 Hz)
000604-014	EQ2130PS Power Supply (30 A / 60 Hz)
000604-015	EQ2175PS Power Supply (75 A / 60 Hz)
000604-035	EQ2131PS Power Supply (30 A / 50 Hz)
000604-036	EQ2176PS Power Supply (75 A / 50 Hz)
007941-001	EQ2220GFM Ground Fault Monitor
010988-001	EQP2120PS-B Power Supply, 20A/50-60 Hz, Panel Mount

010988-002	EQP2120PS Power Supply, 20A/50-60 Hz, DIN Rail Mount
010892-001	EQ2410PS-P Converter, 10A/24 Vdc, Panel Mount
010892-002	EQ2410PS Converter, 10A/24 Vdc, DIN Rail Mount
009934-003	Diode Redundancy Module, with Mounting Bracket
009934-004	Diode Redundancy Module, DIN Rail Mount

LON DEVICES

Part Number	Description
006941-xxx	EQ24xxNE Network Extender
009183-xxx	EQ24XXPLR Physical Layer Repeater
008056-001	HART Interface Module
008982-001	EQ3LTM LON Termination Module
UD10A5M28XX	UD10-DCU Universal Display with LON interface board

REDUNDANCY

Part Number	Description
008981-001	Controller to Controller High-Speed Serial Link Cable (4 ft)
008982-001	EQ3LTM LON Termination Module

EQP CONTROLLER COMMUNICATION CABLES

Part Number	Description
007633-001	Controller RS-232 Cable, DB9 Female PC Connection, 15 ft. (4.57 m)
007633-002	Controller RS-232 Cable, DB9 Female PC Connection, 30 ft. (9.14 m)
007633-003	Controller RS-232 Cable, DB9 Female PC Connection, 50 ft. (15.24 m)

Section 6 – Specifications

NOTE

For USCG Approved System specifications, refer to 57-1009 Addendum.

EQP CONTROLLER

INPUT VOLTAGE—

24 vdc nominal, 18 to 30 Vdc. 10% overvoltage will not cause damage to the equipment.

INPUT POWER—

9 watts nominal, 12 watts maximum.

LON COMMUNICATION—

Digital communication, transformer isolated (78.5 kbps).

RS-485 COMMUNICATION—

Modbus Master/Slave capability.
Digital communication, transformer isolated (up to 115 kbps).

RS-232 COMMUNICATION—

S³ configuration only.
Digital communication, optically isolated.

CONTROLNET—

Digital communication, transformer isolated (5 Mbps).

ETHERNET DLR—

10/100 Mbps Ethernet DLR capability.

ETHERNET INTERFACE BOARD—

RS-485 Communication: Modbus master/slave capability, ground fault monitored.
Digital communication, transformer isolated (up to 230 kbps).

10/100 Mbps BASE-T Ethernet Communication:

Modbus TCP master/slave or S³ configuration capability.

10/100 Mbps BASE-T Ethernet Communication:

Modbus TCP master/slave capability.

High Speed Serial Link (HSSL): Port used only for redundant EQP Controller-to-Controller communication.

SERIAL INTERFACE BOARD—

RS-485 Communication: Modbus master/slave capability, ground fault monitored.
Digital communication, transformer isolated (up to 230 kbps).

RS-232 Communication: Modbus master/slave or S³ configuration capability.
Digital communication, non-isolated (up to 230 kbps).

RS-232 Communication: Modbus master/slave capability.
Digital communication, non-isolated (up to 230 kbps).

High Speed Serial Link (HSSL): Port used only for redundant EQP Controller-to-Controller communication.

UNSUPERVISED OUTPUTS—

Dry Contact Rating: 1 ampere at 30 Vdc maximum. SPDT normally open/normally closed contact, configurable for normally energized or de-energized (de-energized is the default mode).

UNSUPERVISED INPUTS—

Two State input (on/off). User selectable normally open or normally closed contact (N.O. is the default).

TROUBLE OUTPUT—

SPDT normally open/normally closed contact, Non-Configurable, normally energized only.

TEMPERATURE RANGE—

Operating (Certified Rating):
See Certification section below.
Storage: -40°F to +185°F (-40°C to +85°C).
Excluding communication port optional modules.

HUMIDITY RANGE—

5 to 95% RH, non-condensing.

VIBRATION—

FM 3260, FM 6310/6320.

DIMENSIONS—

See Figure 6-1.

SHIPPING WEIGHT—

5 pounds (2.3 kilograms).

CERTIFICATION—

FM / CSA: Class I, Div. 2, Groups A, B, C, D (T4).

Class I, Zone 2, Group IIC (T4).

Tamb = -40°C to +80°C.

Performance verified.

Refer to Appendix A for FM Approval details, including Protected Premises Fire Alarm Systems and EQP Supervising Systems.

Refer to Appendix B for CSA Certification details.

Refer to 57-1009 Addendum for USCG Approval details.

CE: ATEX/EMC Directive Compliant.



ATEX: Ex II 3 G.

Ex nA nC IIC T4 Gc.
EN 60079-29-1 & EN 60079-29-4.
UL 20 ATEX 138864X.

Tamb* = -40°C to +80°C.

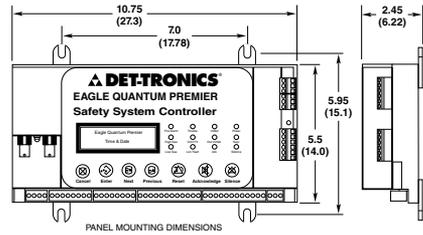
Tamb = -40°C to +70°C.

IECEX: IECEx UL 20.0112X.

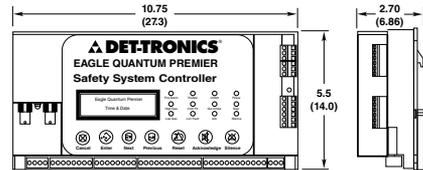
Ex nA nC IIC T4 Gc.
Tamb* = -40°C to +80°C.
Tamb = -40°C to +70°C.

Note: Refer to Appendix C for ATEX and IECEx approval details and Special Conditions for Safe Use.

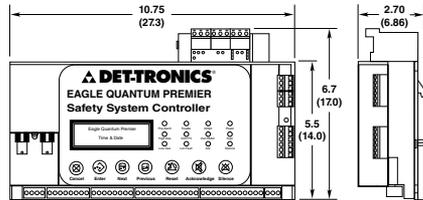
*Applicable only if relays 1-7 (terminals 21-41) are configured such that the relay contacts are normally open and de-energized (refer to Figures 3-8 and 3-9 for relay wiring information).



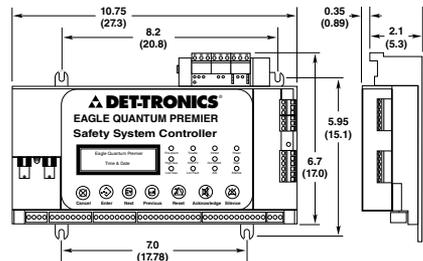
PANEL MOUNTING DIMENSIONS



DIN RAIL MOUNTING DIMENSIONS



DIMENSIONS OF DIN RAIL MOUNT CONTROLLER WITH ETHERNET OR SERIAL INTERFACE BOARD



DIMENSIONS OF PANEL MOUNT CONTROLLER WITH ETHERNET OR SERIAL INTERFACE BOARD

K2103

Figure 6-1—Dimensions of EQP Controller in Inches (Centimeters)

EQ3LTM LON TERMINATION MODULE

INPUT VOLTAGE—

24 Vdc nominal, 18 to 30 Vdc. 10% overvoltage will not cause damage to the equipment.

INPUT POWER—

1 watt maximum.

TEMPERATURE RANGE—

Operating: -40°F to $+185^{\circ}\text{F}$ (-40°C to $+85^{\circ}\text{C}$).
Storage: -67°F to $+185^{\circ}\text{F}$ (-55°C to $+85^{\circ}\text{C}$).

HUMIDITY RANGE—

5 to 95% RH, non-condensing.

DIMENSIONS—

See Figure 6-2.

SHIPPING WEIGHT—

0.5 pounds (0.2 kilograms)

CERTIFICATION—

FM / CSA: Class I, Div. 2, Groups A, B, C, D (T4).
Class I, Zone 2, Group IIC (T4).

Refer to Appendix A for FM Approval details.

Refer to Appendix B for CSA Approval details.

CE: ATEX/EMC Directive Compliant.



ATEX:  II 3 G.



Ex nA IIC T4 Gc.
UL 20 ATEX 138864X.
Tamb = -40°C to $+85^{\circ}\text{C}$.

IECEX: IECEx UL 20.0112X.



Ex nA IIC T4 Gc.
Tamb = -40°C to $+85^{\circ}\text{C}$.

Note: Refer to Appendix C for ATEX and IECEX approval details and Special Conditions for Safe Use.

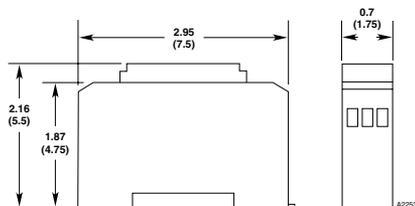


Figure 6-2—Dimensions of LON Termination Module and HART Interface Module in Inches (Centimeters)

EQ3730EDIO ENHANCED DISCRETE I/O MODULE

POWER REQUIREMENTS—

Module Power Consumption: 3 watts nominal, 11 watts maximum.

INPUT/OUTPUT VOLTAGE—

24 Vdc nominal, 18 to 30 Vdc. 10% overvoltage will not cause damage to the equipment.

Note: Pre-action and deluge applications further limit the lower operating voltage range, refer to EDIO installation instructions in section 3.

OUTPUT CURRENT—

10.0 amperes maximum total current, 2.0 amperes maximum per channel.

SLC OUTPUT—

Digital communication, transformer isolated (78.5 kbps).

TEMPERATURE RANGE—

Operating: -40°F to $+185^{\circ}\text{F}$ (-40°C to $+85^{\circ}\text{C}$).
Storage: -67°F to $+185^{\circ}\text{F}$ (-55°C to $+85^{\circ}\text{C}$).

HUMIDITY RANGE—

5% to 95% RH, non-condensing.

VIBRATION—

FM 3260-2000 (clause 4.9).

DIMENSIONS—

Refer to Figure 6-3.

SHIPPING WEIGHT—

1 pound (0.45 kilograms).

CERTIFICATION—

FM / CSA: Class I, Div. 2, Groups A, B, C, D (T4).
Class I, Zone 2, Group IIC (T4).

Refer to Appendix A for FM Approval details.

Refer to Appendix B for CSA Approval details.

CE: ATEX/EMC Directive Compliant.



ATEX:  II 3 G.



Ex nA nC IIC T4 GC EN 60079-29-1.
UL 20 ATEX 138864X.
Tamb = -40°C to $+85^{\circ}\text{C}$.

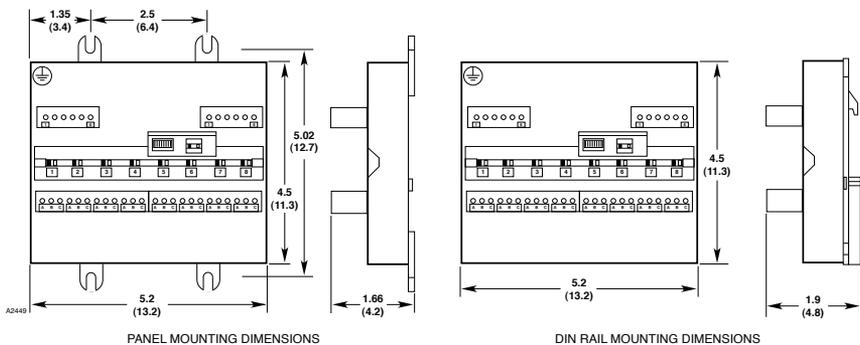


Figure 6-3—Dimensions of the EDIO / DCIO / Relay Module / AIM in Inches (Centimeters)

IECEX: IECEx UL 20.0112X.
 Ex nA nC IIC T4 Gc.
 Tamb = -40°C to +85°C.

Note: Refer to Appendix C for ATEX and IECEx approval details and Special Conditions for Safe Use, and refer to 57-1009 Addendum for USCG Approval details.

INPUT / INITIATING DEVICE CIRCUITS

UNSUPERVISED INPUT—

Two state input (on/off).
 Normally open contact.

SUPERVISED INPUT (OPEN CIRCUIT)—

For Class A and Class B wiring.

Two state input (active/trouble):

- End of Line Resistor 10 K ohms nominal
- Open Circuit > 11 K ohms
- Active Circuit < 5 K ohms.

SUPERVISED INPUT

(OPEN AND SHORT CIRCUIT)—

For Class A and Class B wiring.

Three State input (active/short/open):

- End of Line Resistor 10 K ohms nominal
- In Line Resistor 3.3 K ohms nominal
- Open Circuit > 11 K ohms
- Short Circuit < 250 ohms
- Active Circuit 2.5 K ohms to 5 K ohms.

INPUT, TYPES—

Configurable for static logic applications:

- Fire Alarm
- Supervisory
- Trouble
- High Gas Alarm
- Low Gas Alarm
- Other.

For Class A wiring on inputs, configure adjacent channels for Class A wiring and connect both channels to single contact device(s).

INPUT CIRCUITS - TWO WIRE SMOKE/HEAT TYPE—

Supervised Input, Class B:

Up to 15 two wire detectors per circuit.

Maximum line resistance 50 ohms.

5K ohm EOL.

Open circuit fault impedance 22k ohms.

OUTPUT / NOTIFICATION / RELEASING OR UNSUPERVISED DEVICE CIRCUITS

UNSUPERVISED OUTPUT RATING

(Per Channel)—

2 amperes at 30 Vdc maximum.

Automatic short circuit protection provided.

Instantaneous short circuit current < 15 amperes.

Note: Voltage available at outputs is dependent on input voltage ($V_{out} \approx V_{in} - 0.5 \text{ Vdc}$).

OUTPUT STYLE—

Form "A" normally off.

RESPONSE TIME—

Output actuates in <0.15 second after acknowledging an alarm command message.

SUPERVISED OUTPUT RATING-SIGNALING CIRCUIT

MAXIMUM OUTPUT CURRENT (Per Channel)—

2 amperes at 30 Vdc maximum.
Automatic short circuit protection provided.
Instantaneous short circuit current < 15 amperes.

SUPERVISORY CURRENT (Per Channel)—
Reverse current monitored at 1.5 mA, \pm 0.5 mA.

RESPONSE TIME—
Output actuates in <0.15 second after acknowledging an alarm command message.

EOL RESISTORS—
10 K ohms \pm 2 K ohms. Each circuit must have an EOL resistor.

SIGNALING OUTPUT, TYPES—
Configurable for device applications:
– Continuous
– 60 beats per minute
– 120 beats per minute
– Temporal Pattern.
Note: All eight channels are synchronized when programmed as a signaling output.

SUPERVISED OUTPUT RATING-Releasing CIRCUIT

MAXIMUM OUTPUT CURRENT (Per Channel)—

2 amperes at 30 Vdc maximum.
Automatic short circuit protection provided.
Instantaneous short circuit current < 15 amperes.

SUPERVISORY CURRENT (Per Channel)—
Monitored at 1.3 mA \pm 0.2 mA.

RESPONSE TIME—
Output actuates in <0.15 second after acknowledging an alarm command message.

RELEASING OUTPUT, TYPES—
Configurable for device applications:
– Continuous
– Timed.

For Class A wiring on outputs, configure adjacent channels for Class A wiring and connect both channels to single output device(s).

NOTE

EDIO SIL has the capability of monitoring solenoid circuits for shorts. The minimum solenoid inductance for correct operation is 100 mH. See Table 3-10 for a list of recommended solenoids.

EQ3700DCIO DISCRETE I/O MODULE

POWER REQUIREMENTS—
3 watts nominal, 11 watts maximum.

INPUT VOLTAGE—
24 vdc nominal, 18 to 30 Vdc. 10% overvoltage will not cause damage to the equipment.

NOTE: Pre-action and deluge applications further limit the lower operating voltage range, refer to DCIO installation instructions in section 3.

OUTPUT VOLTAGE—
(Input voltage – 0.5 Vdc) @ 2 amperes.

OUTPUT CURRENT—
10.0 amperes maximum total current, 2.0 amperes maximum per channel.

LON COMMUNICATION—
Digital communication, transformer isolated (78.5 kbps).

TEMPERATURE RANGE—
Operating: –40°F to +185°F (–40°C to +85°C).
Storage: –67°F to +185°F (–55°C to +85°C).

HUMIDITY RANGE—
5 to 95% RH, non-condensing.

DIMENSIONS—
Refer to Figure 6-3.

SHIPPING WEIGHT—
1 pound (0.45 kilograms).

CERTIFICATION—
FM / CSA: Class I, Div. 2, Groups A, B, C, D (T4).
  Class I, Zone 2, Group IIC (T4).

Refer to Appendix A for FM Approval details.

Refer to Appendix B for CSA Approval details.

CE: ATEX/EMC Directive Compliant.



ATEX:  II 3 G.
Ex nA nC IIC T4 Gc.
 UL 20 ATEX 138864X.
Tamb = -40°C to +85°C.

IECEX:  IECEx UL 20.0112X.
Ex nA nC IIC T4 Gc.
Tamb = -40°C to +85°C.

Note: Refer to Appendix C for ATEX and IECEx approval details and Special Conditions for Safe Use.

INPUT / INITIATING DEVICE CIRCUITS

UNSUPERVISED INPUT—

Two state input (on/off).
Normally open contact.

SUPERVISED INPUT, CLASS B—

Two state input (active/trouble):

- End of Line Resistor 10 K ohms nominal
- Open Circuit > 11 K ohms
- Active Circuit < 5 K ohms.

SUPERVISED INPUT, CLASS B—

Three State input (active/short/open):

- End of Line Resistor 10 K ohms nominal
- In Line Resistor 3.3 K ohms nominal
- Open Circuit > 11 K ohms
- Short Circuit < 1.4 K ohms
- Active Circuit 2.5 K ohms to 5 K ohms.

INPUT, TYPES—

Configurable for fixed logic applications:

- Fire Alarm
- Supervisory
- Trouble
- High Gas Alarm
- Low Gas Alarm
- Other.

OUTPUT / NOTIFICATION / RELEASING CIRCUITS

UNSUPERVISED OUTPUT RATING—

Short circuit protected: 2 amperes at 30 Vdc maximum.

SUPERVISED OUTPUT RATING— SIGNALING CIRCUIT

MAXIMUM OUTPUT CURRENT—

2 amperes maximum.
Automatic short circuit protection provided.

SUPERVISORY CURRENT—

Reverse current monitored at 3.0 mA, \pm 2.0 mA.

RESPONSE TIME—

Output actuates in <0.15 second after acknowledging an alarm command message.

EOL RESISTORS—

10 K ohms \pm 2 K ohms.

SIGNALING OUTPUT, TYPES—

Configurable for device applications:

- Continuous
- 60 beats per second
- 120 beats per second
- Temporal Pattern.

NOTE

All eight channels are synchronized when programmed as a signaling output.

SUPERVISED OUTPUT RATING— RELEASING CIRCUIT

MAXIMUM OUTPUT CURRENT

(Per Channel)—

2 amperes maximum, 15 Amp inrush.
Automatic short circuit protection provided.

SUPERVISORY CURRENT—

Monitored at 3.0 mA \pm 2.0 mA.

RESPONSE TIME—

Output actuates in <0.15 second after acknowledging an alarm command message.

RELEASING OUTPUT, TYPES—

Configurable for device applications:

- Continuous
- Timed.

EQ3720RM RELAY MODULE

POWER REQUIREMENTS—

3 watts nominal, 4 watts maximum.

INPUT VOLTAGE—

24 Vdc nominal, 18 to 30 Vdc. 10% overvoltage will not cause damage to the equipment.

RELAY CONTACTS—

30 Vdc, 1 amps resistive.

LON COMMUNICATION—

Digital communication, transformer isolated (78.5 kbps).

TEMPERATURE RANGE—

Operating: -40°F to $+185^{\circ}\text{F}$ (-40°C to $+85^{\circ}\text{C}$).
Storage: -67°F to $+185^{\circ}\text{F}$ (-55°C to $+85^{\circ}\text{C}$).

HUMIDITY RANGE—

5 to 95% RH, non-condensing.

DIMENSIONS—

Refer to Figure 6-3.

SHIPPING WEIGHT—

1 pound (0.45 kilograms).

CERTIFICATION—

FM / CSA: Class I, Div. 2, Groups A, B, C, D (T3C),
Class I, Zone 2, Group IIC (T3C).

Refer to Appendix A for FM Approval details.
Refer to Appendix B for CSA Approval details.
Refer to 57-1009 Addendum for USCG Approval details.

CE: ATEX/EMC Directive Compliant.



ATEX:  II 3 G.



Ex nA nC IIC T4 Gc.
UL 20 ATEX 138864X.
 $T_{amb} = -40^{\circ}\text{C}$ to $+75^{\circ}\text{C}$.

IECEX: IECEx UL 20.0112X.



Ex nA nC IIC T4 Gc.
 $T_{amb} = -40^{\circ}\text{C}$ to $+75^{\circ}\text{C}$.

Note: Refer to Appendix C for ATEX and IECEx approval details and Special Conditions for Safe Use.

RESPONSE TIME—

Actuates in <0.15 second after acknowledging an alarm command message.

EQ3710AIM ANALOG INPUT MODULE

POWER REQUIREMENTS—

6 watts nominal, 8 watts maximum.

INPUT/OUTPUT VOLTAGE—

24 Vdc nominal, 18 to 30 Vdc. 10% overvoltage will not cause damage to the equipment.

TEMPERATURE RANGE—

Operating: -40°F to $+185^{\circ}\text{F}$ (-40°C to $+85^{\circ}\text{C}$).
Storage: -67°F to $+185^{\circ}\text{F}$ (-55°C to $+85^{\circ}\text{C}$).

HUMIDITY RANGE—

0 to 95% RH, non-condensing.

CHANNEL ACCURACY—

See accuracy specification of connected product.

RESPONSE TIME—

1 to 100 LON devices:	< 2 seconds
101 to 200 LON devices:	< 3 seconds
201 to 246 LON devices:	< 4 seconds

LON COMMUNICATION—

Digital communication, transformer isolated (78.5 kbps).

DIMENSIONS—

Refer to Figure 6-3.

SHIPPING WEIGHT—

1 pound (0.45 kilograms).

CERTIFICATION—

FM / CSA: Class I, Div. 2, Groups A, B, C, D (T4),
Class I, Zone 2, Group IIC (T4).

Refer to Appendix A for FM Approval details.
Refer to Appendix B for CSA Approval details.

CE: ATEX/EMC Directive Compliant.



ATEX:  II 3 G.



Ex nA nC IIC T4 Gc EN60079-29-1.
UL 20 ATEX 138864X.
 $T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$.

IECEX: IECEx UL 20.0112X.



Ex nA nC IIC T4 Gc.
 $T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$.

Note: Refer to Appendix C for ATEX and IECEx approval details and Special Conditions for Safe Use. Refer to 57-1009 Addendum for USCG Approval details.

HART INTERFACE MODULE (HIM)

INPUT VOLTAGE—

24 vdc nominal, 18 to 30 Vdc. 10% overvoltage will not cause damage to the equipment.

INPUT POWER—

1.0 watt maximum.

INPUT/OUTPUT CURRENT—

Operating: 4 -20 mA.

Maximum: 0-30 mA.

TEMPERATURE RANGE—

Operating: -40°F to +185°F (-40°C to +85°C).

Storage: -67°F to +185°F (-55°C to +85°C).

HUMIDITY RANGE—

5 to 95% RH, non-condensing.

DIMENSIONS—

See Figure 6-2.

SHIPPING WEIGHT—

0.5 pounds (0.2 kilograms)

CERTIFICATION—

FM / CSA: Class I, Div. 2, Groups A, B, C, D (T4).



Class I, Zone 2, Group IIC (T4).

CE: ATEX/EMC Directive Compliant.



ATEX

Ex II 3 G.

Ex nA IIC T4 Gc.

UL 20 ATEX 138864X.

Tamb = -40°C to +85°C.

IECEX: IECEX UL 20.0112X.

Ex nA IIC T4 Gc.

Tamb = -40°C to +85°C.



Note: Refer to Appendix C for ATEX and IECEx approval details and Special Conditions for Safe Use.

EQ21XXPS POWER SUPPLIES

INPUT VOLTAGE—

Selectable for 120, 208 or 240 vac input power, ±10%.

INPUT CURRENT—

60 Hz Models:

EQ2110PS: 4 amps at 120 VAC

EQ2130PS: 11 / 6 / 6 amps at 120 / 208 / 240 VAC

EQ2175PS: 24 / 15 / 12 amps at 120 / 208 / 240 VAC.

50 Hz Models:

EQ2111PS: 4 amps at 120 VAC

EQ2131PS: 6 amps at 240 VAC

EQ2176PS: 12 amps at 240 VAC

OUTPUT CURRENT—

EQ2110PS / EQ2111PS: 10 amperes at 24 Vdc

EQ2130PS / EQ2131PS: 30 amperes at 24 Vdc

EQ2175PS / EQ2176PS: 75 amperes at 24 Vdc

POWER CONSUMPTION—

EQ2110PS / EQ2111PS: 46 Watts

EQ2130PS / EQ2131PS: 140 Watts

EQ2175PS / EQ2176PS: 349 Watts

TEMPERATURE RANGE—

Operating: +32°F to +122°F (0°C to +50°C)

Storage: -40°F to +185°F (-40°C to +85°C)

HUMIDITY RANGE—

5 to 95% RH, non-condensing.

DIMENSIONS—

in Inches (Centimeters)

	Width	Height	Depth
EQ211xPS:	19 (48.3)	7 (17.8)	15 (38.1)
EQ213xPS:	19 (48.3)	14 (35.6)	15 (38.1)
EQ217xPS:	19 (48.3)	14 (35.6)	15 (38.1)

NOTE: Power supplies are designed for mounting in a standard 19 inch rack. Optional mounting hardware is available for floor or wall mount applications.

CERTIFICATION—

FM / CSA: Ordinary locations.

EQP2XX0PS(-X) POWER SUPPLIES

INPUT VOLTAGE—

EQP2120PS(-B): Auto selectable for 120/220 Vac, -15%, +10%; 60/50 Hz, single phase;
EQP2410PS(-P) Converter: 24 Vdc, -15%, +10%.

INPUT CURRENT—

EQP2120PS(-B): 6.6 A max @ 120 Vac
3.6 A max @ 220 Vac
EQP2410PS(-P): 15.7 A @ max @ 24 Vdc

OUTPUT VOLTAGE—

24.5 Vdc nominal, 24.5 to 28.0 Vdc.

OUTPUT CURRENT—

EQP2120PS(-B): 20 A
EQP2410PS(-P): 10 A

TEMPERATURE RANGE (ALL MODELS)—

Operating: -13°F to +131°F (-25°C to +55°C)
(All Applications)
Storage: -40°F to +185°F (-40°C to +85°C)

HUMIDITY RANGE—

5 to 95% RH at 25°C, non-condensing.

DIMENSIONS—

In Inches (Centimeters)

	Width	Height	Depth
EQP2120PS(-B):	3.54(9)	5.2(13.0)	5.0(12.5)
EQP2410PS(-P):	3.2(8.0)	5.2(13.0)	5.0(12.5)

NOTE

Power supplies are designed for DIN rail or panel mounting (-B or -P suffix).

CERTIFICATION—

FM / CSA: Ordinary locations.
USCG: Refer to 57-1009 Addendum for details.

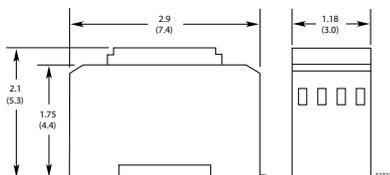


Figure 6-4—Dimensions of EQ2230RSP Module in Inches (CM)

REDUNDANCY MODULE QUINT4-DIODE

TEMPERATURE RANGE—

Operating: -13°F to +131°F (-25°C to +55°C)
(All Applications)
Storage: -40°F to +185°F (-40°C to +85°C).

HUMIDITY RANGE—

5 to 95% RH, non-condensing.

DIMENSIONS—

in Inches (Centimeters)

Width	Height	Depth
1.97 (5.0)	5.1 (18)	4.9 (12.5)

EQ2230RSP RS-485 SURGE PROTECTOR

INPUT VOLTAGE—

24 Vdc nominal, 18 to 30 Vdc. 10% overvoltage will not cause damage to the equipment.

TEMPERATURE RANGE—

Operating: -40°F to +185°F (-40°C to +85°C).
Storage: -67°F to +185°F (-55°C to +85°C).

HUMIDITY RANGE—

5 to 95% RH, non-condensing.

DIMENSIONS—

See Figure 6-4.

SHIPPING WEIGHT—

0.5 pounds (0.2 kilograms)

CERTIFICATION—

FM / CSA: Class I, Div. 2, Groups A, B, C, D (T4).

 Class I, Zone 2, Group IIC (T4).

CE: ATEX/EMC Directive Compliant.



ATEX



Ex II 3 G.
Ex nA IIC T4 Gc.
UL 20 ATEX 138864X.
T_{amb} = -40°C to +85°C.

IECEX:



IECEX UL 20.0112X.
Ex nA IIC T4 Gc.
T_{amb} = -40°C to +85°C.

Note: Refer to Appendix C for ATEX and IECEX approval details and Special Conditions for Safe Use.

EQ21XXPSM POWER SUPPLY MONITOR

INPUT VOLTAGE—

24 Vdc nominal, 18 to 30 Vdc.

POWER CONSUMPTION—

2.0 watts maximum.

MEASUREMENT RANGE—

AC Voltage: 240 vac maximum.

DC Battery Charging Current: 75 amperes maximum.

OUTPUT—

Digital communication, transformer isolated (78.5 k bps).

TEMPERATURE RANGE—

Operating: +32°F to +122°F (0°C to +50°C)

Storage: -67°F to +185°F (-55°C to +85°C).

HUMIDITY RANGE—

5 to 95% RH, non-condensing.

DIMENSIONS—

See Figure 6-5.

CERTIFICATION—

FM / CSA: Ordinary locations.

EQ2220GFM GROUND FAULT MONITOR

INPUT VOLTAGE—

24 Vdc nominal, 18 to 30 Vdc. 10% overvoltage will not cause damage to the equipment.

INPUT POWER—

1.0 watt maximum.

OUTPUT—

Form C NO/NC relay contact rated 1 ampere (resistive) at 30 Vdc maximum.

TEMPERATURE RANGE—

Operating: -40°F to +185°F (-40°C to +85°C).

Storage: -67°F to +185°F (-55°C to +85°C).

HUMIDITY RANGE—

5 to 95% RH, non-condensing.

DIMENSIONS—

See Figure 6-6.

SHIPPING WEIGHT—

0.5 pounds (0.2 kilograms)

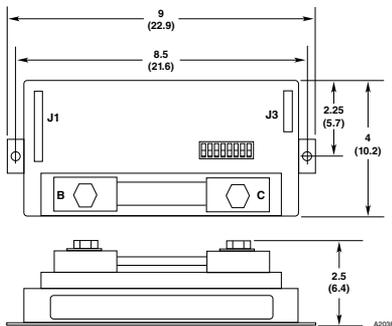


Figure 6-5—Dimensions of Power Supply Monitor in Inches (CM)

CERTIFICATION—

FM / CSA: Class I, Div. 2, Groups A, B, C, D (T4).
 Class I, Zone 2, Group IIC (T4).



Refer to Appendix A for FM Approval details.
 Refer to Appendix B for CSA Approval details.

CE: ATEX/EMC Directive Compliant.



ATEX: Ex II 3 G
 Ex nA nC IIC T4 Gc
 UL 20 ATEX 138864X.
 Tamb = -40°C to +85°C



IECEX: IECEx UL 20.0112X
 Ex nA nC IIC T4 Gc
 Tamb = -40°C to +85°C



Note: Refer to Appendix C for ATEX Approval and Appendix D for CE Mark details and Special Conditions for Safe Use.

Refer to 57-1009 Addendum for USCG Approval details.

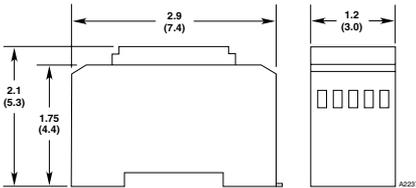


Figure 6-6—Dimensions of Ground Fault Monitor in Inches (Centimeters)

EQ24XXNE NETWORK EXTENDER/EQ24XXPLR PHYSICAL LEVEL REPEATER

INPUT VOLTAGE—
 24 Vdc nominal, 18 to 30 Vdc. 10% overvoltage will not cause damage to the equipment.

POWER CONSUMPTION—
 2.2 watts nominal at 24 Vdc, 2.7 watts maximum.

INPUTS/OUTPUTS—
 Digital, transformer isolated (78.5k Baud).

TEMPERATURE RANGE—
 Operating: -40°F to +167°F (-40°C to +75°C)
 Storage: -67°F to +185°F (-55°C to +85°C).

HUMIDITY—
 5 to 95% RH at 70°C.

DIMENSIONS—

See Figure 6-7.

CERTIFICATION—

FM / CSA: Class I, Div. 1, Groups B, C, D.
 Class II/III, Div. 1, Groups E, F, G.
 Class I, Div. 2, Groups A, B, C, D (T4).
 Class II/III, Div. 2, Groups F & G (T4).
 Type 4X.



Refer to Appendix A for FM Approval details.
 Refer to Appendix B for CSA Approval details.

CE: (EQ24xxNE ONLY)
 ATEX/EMC Directive Compliant.



ATEX: Ex 0539 II 2 G.
 Ex db IIC T6...T4 Gb EN 60079-29-1
 DEMKO 02 ATEX 131321X
 T6 (Tamb = -55°C to +50°C)
 T5 (Tamb = -55°C to +65°C)
 T4 (Tamb = -55°C to +75°C)
 IP66



Refer to Appendix C for ATEX Approval details.

IEC: IECEx ULD 10.0010X
 Ex db IIC T6...T4 Gb
 T6 (Tamb = -55°C to +50°C)
 T5 (Tamb = -55°C to +65°C)
 T4 (Tamb = -55°C to +75°C)



Refer to 57-1009 Addendum for USCG Approval details. Refer to Appendix D for CE Mark details.

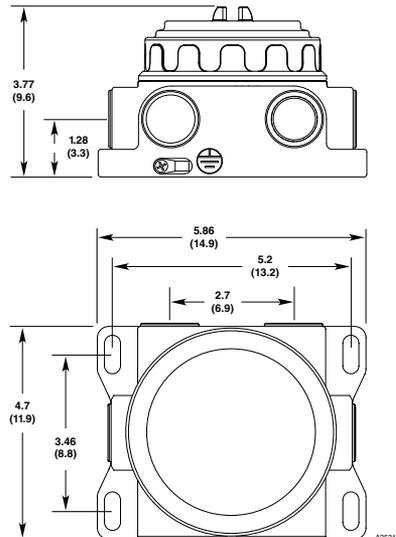


Figure 6-7—Dimensions of Short Cover Junction Box in Inches (Centimeters)

EQ3760ASM ADDRESSABLE SMOKE MODULE

For complete information regarding the ASM Module, refer to instruction manual number 95-8755.

EQ3780HSDM HIGH SPEED DELUGE MODULE

For complete information regarding the HSDM Module, refer to instruction manual number 95-8782.

COMBUSTIBLE GAS SENSOR

Refer to the Combustible Gas Sensor (CGS) Specification Data Sheet, form 90-1041, for specifications.

ELECTROCHEMICAL SENSORS

Refer to the Electrochemical Gas Sensor Specifications in the UD10-DCU manual 95-8656 for additional information.

UD10-DCU UNIVERSAL DISPLAY

For complete information regarding the UD10-DCU, refer to Specification Data Sheet 90-1200 and instruction manual number 95-8656.

EQ21XXPS POWER SUPPLY

The EQ21xxPS Rectifier / Power Supply has many inherent advantages such as voltage regulation, high efficiency, high power factor and short circuit protection.

These chargers provide separate adjustable voltages for floating or equalizing lead or nickel-cadmium cells. An equalize switch is located on the front panel of the charger for manual activation or a multi-mode electronic timer can be used for automatic activation.

Steady state output voltage remains within +/- 1/2% of the setting from no load to full load and for AC input voltages within +/- 10% of the nominal input voltage. The power supply is internally filtered to be no greater than 32dBrn ("C" message weighting) and 30 millivolts RMS for all conditions on input voltage and output load with or without batteries connected. This allows the A36D to be used as a battery eliminator.

EQ2001 EQP MONITOR

INPUT VOLTAGE—
24 vdc nominal, 18 to 30 Vdc. 10% overvoltage will not cause damage to the equipment.

INPUT POWER—
9 watts nominal, 12 watts maximum.

LON COMMUNICATION—
Digital communication, transformer isolated (78.5 kbps).

RS-232 COMMUNICATION—
S³ configuration only.
Digital communication, optically isolated

TEMPERATURE RANGE—
Operating (Certified Rating):
See Certification section below.
Storage: -40°F to +185°F (-40°C to +85°C).
Excluding communication port optional modules.

HUMIDITY RANGE—
5 to 95% RH, non-condensing.

DIMENSIONS—
See Figure 6-1. The EQ2001 EQP Monitor has the same physical characteristics as the EQP Controller.

SHIPPING WEIGHT—
5 pounds (2.3 kilograms)

CERTIFICATION—
FM Class I, Div. 2, Groups A, B, C, D (T4)
 Class I, Zone 2, Group IIC (T4)
Tamb = -40°C to +80°C

Refer to Appendix A for FM Approval details

Section 7 – Ordering Information

EQP CONTROLLER MODEL MATRIX

MODEL	DESCRIPTION	
EQ3001	EQP Controller - 246 Nodes	
EQ3016	EQP Controller - 16 Nodes	
EQ2001	EQP Monitor	
	TYPE	MOUNTING OPTION
	D	Din Rail
	P	Panel Mount
	TYPE	COM BOARD 1
	N	None
	C	ControlNet
	D	Ethernet DLR
	TYPE	COM BOARD 2
	N	None
	E	Ethernet Port Expansion
	S	Serial Port Expansion
	TYPE	APPROVALS*
	F	FM
	S	SIL
	T	SIL/FM/CSA/ATEX/IECEX
	T-C	T plus US Coast Guard
	W	FM/CSA/ATEX/IECEX
	W-C	W plus US Coast Guard

*Type "APPROVALS" can use one or more letters to designate the approvals of the product. Some configurations are not available. Check with factory for additional information.

For USCG approved EQP Controller models, refer to 57-1009 Addendum.

Note: Contact Customer Service when ordering replacement EQP Controllers for redundant EQP Systems.

EDIO MODEL MATRIX

MODEL	DESCRIPTION	
EQ3730	8 Channel Enhanced Discrete Input/Output (EDIO) Module	
	TYPE	MOUNTING OPTION
	D	DIN Rail
	P	Panel
	TYPE	APPROVALS*
	S	SIL
	T	SIL/FM/CSA/ATEX/IECEX
	W	FM/CSA/ATEX*/IECEX

*Type "APPROVALS" can use one or more letters to designate the approvals of the product. Some configurations are not available. Check with factory for additional information.

DCIO MODEL MATRIX

MODEL	DESCRIPTION	
EQ3700	8 Channel Discrete Input/Output (DCIO) Module	
	TYPE	MOUNTING OPTION
	D	DIN Rail
	P	Panel
	TYPE	APPROVALS*
W	FM/CSA/ATEX/IECEX	

*Type "APPROVALS" can use one or more letters to designate the approvals of the product. Some configurations are not available. Check with factory for additional information.

AIM MODEL MATRIX

MODEL	DESCRIPTION	
EQ3710	8 Channel Analog Input (AIM) Module	
	TYPE	MOUNTING OPTION
	D	Din Rail
	P	Panel
	TYPE	APPROVALS*
	S	SIL
T	SIL/FM/CSA/ATEX/IECEX	
W	FM/CSA/ATEX/IECEX	

*Type "APPROVALS" can use one or more letters to designate the approvals of the product. Some configurations are not available. Check with factory for additional information.

RELAY MODULE MODEL MATRIX

MODEL	DESCRIPTION	
EQ3720	8 Channel Relay Module (RM)	
	TYPE	MOUNTING OPTION
	D	Din Rail
	P	Panel
	TYPE	APPROVALS*
W	FM/CSA/ATEX/IECEX	

*Type "APPROVALS" can use one or more letters to designate the approvals of the product. Some configurations are not available. Check with factory for additional information.

ORDERING INFORMATION

POWER SUPPLY, DIODE, EQP CONTROLLER, DUCT MOUNT KIT		
DEC Part Number	Model	Description
010988-001	EQP2120PS-B (Replacement)	Phoenix Contact QUINT-PS-1AC/24DC/20 Panel Mount
010892-001	EQP2410PS-P	Phoenix Contact QUINT-PS-24DC/24DC/10 Panel Mount
009934-003	Diode Redundancy Module	Phoenix Contact QUINT4-DIODE/12-24DC/2X20/1X40 Panel Mount
007609-269	EQ3XXXPCSW-C	EQP Controller, panel mount
009931-001	Q900C1001	Duct Mount Kit
000523-009	000523-009	See description in 57-1009 Addendum
000523-010	000523-010	See description in 57-1009 Addendum

For other USCG Approved EQP System components, refer to 57-1009 Addendum or contact Det-Tronics Customer Service.

Refer to Section 3 of this manual for determining power requirements.

Appendices

APPENDIX A – FM APPROVAL DESCRIPTION

FIRE DETECTION & RELEASING

- National Fire Alarm Code performance verified per NFPA 72®-2013. Refer to Table A-1 for device and circuit supervision characteristics.
- See section 2 "Field Devices Flame Detectors" for information regarding Det-Tronics approved flame detectors and associated manuals. Additional two second response time applied for system communication.
- I/O Modules EQ3700 DCIO series (Class B IDC/NAC), EQ3730 EDIO series (Class A or B IDC/NAC) and EQ3780HSDM series. Reference Table 3-10 for compatible solenoids used for automatic release of pre-action and deluge sprinkler and extinguishing systems.

GAS DETECTION

FM Certificate No. FM17US0258X

- Combustible Gas Performance verified for 0 to 100% LFL methane-in-air atmospheres per FM 6320. Accuracy: $\pm 3\%$ LFL from 0 to 50% LFL, $\pm 5\%$ LFL from 51% to 100% LFL. For the Model PIRECL, refer to the PIRECL manual (form number 95-8526) for further FM gas performance details.

NOTE: *Detector Electronics combustible gas detection K factors are not FM verified.*

- H₂S Toxic Gas Performance verified 0 to 20, 50 or 100 ppm per FM requirements. Accuracy: ± 2 ppm from 0 to 20 ppm, $\pm 10\%$ of concentration from 21 to 100 ppm. Models C7064E4012 and C7064E5012 Hydrogen Sulfide (H₂S) Sensors Explosion-proof for Class I, Div. 1, Groups C and D Hazardous (Classified) Locations per FM 3615. Model C7064E5014 Hydrogen Sulfide (H₂S) Sensors Explosion-proof for Class I, Div. 1, Groups B, C and D Hazardous (Classified) Locations per FM 3615. Operating temperature limits are -40°C to $+40^{\circ}\text{C}$.

NOTE: *Sensor cross-sensitivity has not been verified by FM.*

- Calibration of the above listed sensors has been FM verified using the respective UD10-DCU and PIRECL with the Det-Tronics 225130-001 (50% LFL methane) and/or 227115-001 H₂S Calibration Kits.
- The UD10-DCU Series can be used with any FM Approved 4–20 mA device.

NOTE

FM Approval of the 4–20 mA input does not include or imply approval of the gas detection apparatus such as sensors, transmitters, or devices connected to the system. In order to maintain FM Approval of the system, all 4–20 mA gas detection instruments connected to the input must also be FM Approved.

NOTE

FM Approval allows the presence and operation of serial/Ethernet communications software in the EQP Controller (Modbus TCP/IP, Allen Bradley protocols, etc.); however, the communications functions are not included in the Approval.

EAGLE QUANTUM PREMIER® FIRE AND GAS ALARM CONTROL PANELS

Hazardous Locations:

Non-Incendive Solutions (Class 1, Div 2):
EQ3900N - See Manual 95-8559

Explosion Proof Solution (Class 1, Div 1):
EQ3900E - See Manual 95-8763
EQ3900RPSE Remote Power Supply Enclosure - See Manual 95-8745
EQ3770EIO - Remote I/O Module Enclosure - See Manual 95-8761

Ordinary Locations:

EQ3900G - See Manual 95-8641
EQ3900RPSG - See Manual 95-8745

EQ2001 EQP MONITOR MODULE

The EQ2001 is suitable for installation in:

Class I, Division 2, Groups A, B, C and D;
T4 Ta = 80°C; Class I, Zone 2 IIC;
T4 Ta = 80°C hazardous (classified) indoor locations.

The module has is Non-Incendive (Class 1, Div 2) hazardous location approved.

The EQ2001 must be installed in a separate cabinet.

The EQ2001 is non-interfering and provides no alarm functions. It provides access to system diagnostics and does not provide functionality as part of the fire safety system.

NOTE

The EQ2001 EQP Monitor spur must come off of either the primary or redundant (if there is one) EQP Controller.

Table A-1—Circuit Classifications

Signaling Path	NFPA 72 Supervision
Local Operating Network (LON)	Signaling Line Circuit (SLC): Class X
Power Distribution Module, Input Power	Supervised. Loss of power per NFPA 72, Cl. 10.6.9
Power Distribution Module, Controller Power Output	Supervised. Loss of power per NFPA 72, Cl. 10.6.9
Power Distribution Module, Field Device Power Output	Class B
Power Distribution Module, Local Field Device Power Output	Unsupervised per NFPA 72, Cl. 12.6.9
Power Supply Monitor, Input Power	Supervised. Loss of power per NFPA 72, Cl. 10.6.9
Power Supply Monitor, Output Power	Supervised (via Controller for opens). Class B
Power Supply Monitor, Charger	Supervised. Loss of charger per NFPA 72 Cl. 10.6.10.6
Power Supply Monitor, Battery	Supervised. Loss of battery per NFPA 72 Cl. 10.6.9
EQP Controller, Digital Input	Unsupervised per NFPA 72, Cl. 12.6.9
EQP Controller, Relay Output	Unsupervised per NFPA 72, Cl. 12.6.9
EQP Controller, Trouble Relay Output	Unsupervised per NFPA 72, Cl. 12.6.9
EQP Controller, 232 Expansion Output (SIL or Non-SIL)	Unsupervised per NFPA 72, Cl. 12.6.9
EQP Controller, Ethernet Expansion Output (SIL or Non-SIL)	Unsupervised per NFPA 72, Cl. 12.6.9
EQP Controller, SLC485 Expansion Output, including optional fiber optic equipment (SIL or Non-SIL)	Class B (Single Channel Single-Mode Fiber) Class X (Multi-Mode Fiber or Dual Channel Single-Mode Fiber or Dual Channel Wire)
Redundant EQP Controller Connector, RS-232 (SIL or Non-SIL)	Unsupervised per NFPA 72, Cl. 12.6.9
Relay Module, Output	Unsupervised per NFPA 72, Cl. 12.6.9
Enhanced Discrete I/O, Input (software configurable, SIL or Non-SIL)	Unsupervised per NFPA 72, Cl. 12.6.9
	Initiating Device Circuit (IDC): Class A or Class B
Enhanced Discrete I/O, Output (software configurable, SIL or Non-SIL)	Unsupervised per NFPA 72, Cl. 12.6.9
	Notification Appliance Circuit (NAC): Class A or Class B
	Supervised Solenoids (Class A or Class B): Parker (Viking): 11591 NC, 11592 NC, 71395SN2#NJ1N0H111C2, 73218BN4TNLVN0C322C2, 73212BN4TNLVN0C322C2, and 73212BN4TN00N0C111C2 ASCO RedHat: R8210A107, 8210A107, 8210G207, HV274608 NC, HV2740607 NC Viking PN: 11601, 11602 Kidde-Fenwal: 897494, 895630, 890181 Cat #: 202-749-260563, 202-749-260563 Det-Tronics PN: 00219-209 Ansul: 570537 Macron: 304.209.001

Table A-1—Circuit Classifications-Continued

Signaling Path	NFPA 72 Supervision
Discrete I/O, Input (software configurable)	Unsupervised per NFPA 72, Cl. 12.6.9
	Initiating Device Circuit (IDC): Class B
Discrete I/O, Output (software configurable)	Unsupervised per NFPA 72, Cl. 12.6.9
	Notification Appliance Circuit (NAC): Class B
	Supervised Solenoids (Class B): Group B: ASCO T8210A107 Group D: ASCO 8210G207 Group E: Skinner 73218BN4UNLVNOC111C2 Group F: Skinner 73212BN4TNLVNOC322C2 Group G: Skinner 71395SN2ENJ1NOH111C2 Group H: Viking 11601
Analog Input Module (SIL or Non-SIL)	Initiating Device Circuit (IDC): Class B
ASM Loop (Smoke & Heat Loop)	Signaling Line Circuit (SLC): Class A or Class B (single spur)
ASM Loop (Smoke & Heat Loop) with Isolators	Signaling Line Circuit (SLC): Class X
ASM Loop (Smoke & Heat Loop) with Isolators	Signaling Line Circuit (SLC): Class B (single spur)
ASM - Addressable Smoke and Heat Module Input (software configurable)	Unsupervised per NFPA 72, Cl. 12.6.9
	Initiating Device Circuit (IDC): Class A
ASM - Addressable Smoke and Heat Module Input - Smoke detector inputs	Initiating Device Circuit (IDC): Class A (Apollo)
ASM - Addressable Smoke and Heat Module Output (software configurable)	Unsupervised per NFPA 72, Cl. 12.6.9
	Notification Appliance Circuit (Apollo): Class A
High Speed Deluge Module, Input (software configurable)	Unsupervised per NFPA 72, Cl. 12.6.9
	Initiating Device Circuit (IDC): Class A or Class B
High Speed Deluge Module, Output (software configurable)	Unsupervised per NFPA 72, Cl. 12.6.9
	Notification Appliance Circuit (NAC): Class A or Class B
	Supervised Solenoids (Class A or Class B): Parker (Viking): 11591 NC, 11592 NC, 71395SN2ENJ1NOH111C2, 73218BN4UNLVNOC111C2, 73212BN4TNLVNOC322C2, and 73212BN4TN00NOC111C2 ASCO RedHat: R8210A107, 8210A107, 8210G207, HV2740607 NC (Viking 11601), HV274608 NC (Viking 11602) Kidde-Fenwal: 897494 (Cat #: 202-749-260563), 895630 (Cat #:81-895630-000), 890181 (Det-Tronics PN: 00219-209) Ansul: 570537 (Macron: 304.209.001) ASCO Redhat: EF8210G002
High Speed Deluge Module, Cascade (software configurable)	Initiating Device Circuit (IDC): Class B (via Cascade Input Channel)

APPENDIX B – CSA INTERNATIONAL CERTIFICATION DESCRIPTION

CLASS – 4818 04 – Signal Appliances – System – For Hazardous Locations

CLASS – 4828 01 – Signal Appliances – Combustible Gas Detection Instruments for Hazardous Locations

CLASS – 4828 02 – Signal Appliances – Toxic Gas Detection Instruments for Hazardous Locations

HAZARDOUS LOCATIONS

Eagle Quantum Premier® (EQP) System and Components

Class I Division 2 Groups A, B, C & D, T4

Class I Zone 2 IIC, T4, When installed in a suitable CSA Certified labeled Type rated enclosure:

EQ3xxx Controller Series, EQ3700DCIO Series, EQ3710AIM Series, EQ3730EDIO Series, HIM, EQ2220GFM, EQ2230RSP, EQ3750ASH Series, EQ3760ASM Series, EQ3LTM, EQ3780HSDM series.

Class I Division 2, Groups A, B, C & D, T3C

Class I Zone 2 IIC, T3, When installed in a suitable CSA Certified labeled Type rated enclosure:

EQ3720RM Series

Class I Division 1 Groups B, C & D, T4

Class I Division 2 Groups A, B, C & D, T4

Class II Division 1 Groups E, F & G, T4

Class II Division 2 Groups F & G, T4

Class III Division 1, T4

Class III Division 2, T4, TYPE 4X:

EQ24xxNE Series, EQ24abPLR Series

EQP System Power Supply(s) and Components

Class I Division 2 Groups A, B, C & D (UL & ULC), When installed in a suitable CSA Certified labeled Type rated enclosure:

EQP2120PS(-B), EQP2410PS(-P), Diode Redundancy Module

Class I Division 2 Groups A, B, C & D, T3A

Class I Zone 2 IIC, T3, When installed in a suitable CSA Certified labeled Type rated enclosure:

EQ3800PDM

Ordinary Location:

EQ21xxPS, EQ2100PSM

EQP System Enclosure Solutions:

Ordinary Locations (for indoor use only):

EQ3900G - See Manual 95-8641

EQ3900RPSG - See Manual 95-8745

EQP System Gas Detector / Sensors Class 4828-01 & 4828-02 (See individual Certificates)

PIRECL® Series, PIR9400 Series, PIRDUCT Series, LS2000 Series, GT3000 Series, NTM Series, C7064E Series, CGS Series (Note: UD10xxxxC is required for use with CGS catalytic sensor), PIRTB Series, STB Series, UD10 Series.

EQP System Flame Detectors Equipment Class 4818 04 (See individual Certificates)

X3301 Series, X3302 Series, X2200 Series, X9800 Series, X5200 Series

Notes:

Note 1: Any CSA certified Combustible or Toxic Gas Sensor / detector with 4-20mA

(industry standard) output may be used with EQ3710AIM and UD10.

Note 2: Detector Electronics combustible gas detection K factors are not CSA verified.

Note 3: CSA Certification of the 4-20mA input does not include or imply approval of the gas detection apparatus such as sensors, transmitters, or devices connected to the system. In order to maintain CSA Certification of the system, all 4-20mA gas detection instruments connected to the input must also be CSA Certified.

Note 4: CSA Certification allows the presence and operation of serial/Ethernet communications software in the EQP Controller (Modbus TCP/IP, Allen Bradley protocols, etc.); however, the communications functions are not included in the Certification.

APPENDIX C – ATEX & IECEX CERTIFICATION

ATEX AND IECEX CERTIFICATION DETAILS

The Eagle Quantum Premier® Fire and Gas Detection / Releasing System was tested and certified to hazardous location and combustible gas performance standards.

The ATEX/IECEX certified EQP System field devices EQ24xx are in compliance with the following standards, as applicable:

- IEC 60079-0: 7th Edition
- IEC 60079-1: 7th Edition
- EN IEC 60079-0: 2018
- EN 60079-1: 2014

The ATEX/IECEX certified Ex n modules of the EQP system are in compliance with the following standards, as applicable:

- IEC 60079-0: 7th Edition
- EN IEC 60079-0:2018
- IEC 60079-15: 4th Edition
- IEC 60079-29-1: 2.1 Edition
- IEC 60079-29-4: 1st Edition
- EN 60079-15: 2010
- EN 60079-29-1: 2016/A1:2022/A11:2022
- EN 60079-29-4: 2010

SPECIAL CONDITIONS FOR SAFE USE

1. The equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC/EN 60664-1.
2. The equipment shall be installed in an enclosure that provides a degree of protection not less than IP 54 in accordance with IEC/EN 60079-15. The equipment shall only be accessible with use of a tool. This provision applies only to Ex n devices.
3. Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value at the supply terminals to the equipment.
4. The flameproof joints are not intended to be repaired.

FOR ALL ATEX/IECEX CERTIFIED EX N MODULES IN THE EQP SYSTEM, THE FOLLOWING SPECIAL CONDITIONS FOR SAFE USE APPLY:

The ambient temperature range is limited for EQ3XXX (EQP Controller):

- From -40°C to +70°C if any of the output relays 1-7 (terminals 21-41) is used (energized).
- From -40°C to +80°C if all output relays 1-7 (terminals 21-41) remain open-contacted and de-energized.

For compliance to EN 60079-29-1/-4, the relevant Ex n module must be used with gas detection apparatus that are certified for compliance to EN60079-29-1/-4 and that provide a suitable linear 4-20 mA output, relay contact output or LON communication output relative to the %LFL of the available gas in the area of the gas detection apparatus. See the Manual for details on the required connection parameters.

The EQP Ex n modules shall be used in an area of no more than pollution degree 2 conforming to IEC/EN 60664-1, and in an enclosure with a tool removable cover that complies with all relevant requirements of IEC/EN 60079-15, rated at least IP54, and shall be connected to supply circuits where the rated voltage cannot be exceeded by 140% caused by transient disturbances.

PERFORMANCE TESTING TO EN 60079-29-1: 2016 AND EN 60079-29-4: 2010

The measuring function of the EQ3XXX Controller, according to Annex II to Directive 2014/34/EU, was covered in this Type Examination Certificate in the following configurations:

1. Controller Model EQ3XXX with EQ3710AIM or EQ3700DCIO or EQ3730EDIO (tested as a stand-alone control unit with a calibrated linear 4-20mA simulator input signal or relay contacts (as applicable)).
2. Controller Model EQ3XXX with CTB and PIRECL (tested as a gas detection system with methane applied to the PIRECL).
3. Controller Model EQ3XXX with UD10/DCU Emulator and CGS Conditioning Board, in combination with the Det-Tronics gas sensor Model CGS (tested as a gas detection system with methane applied to the CGS).
4. Controller Model EQ3XXX with LS2000.

IMPORTANT NOTE

All applied gas detectors must be ATEX certified to EN60079-29-1/-4 and the configuration must comply with the gas performance parameters stated in the Installation Manual.

APPENDIX D – CE MARK

EMC DIRECTIVE 2014/30/EU DETAILS

The Eagle Quantum Premier® Fire and Gas Detection/Releasing System was tested and found to be compliant with EN61000-6-2 and EN61000-6-4.

The following considerations must be given for installation of the EQP System:

- For shielded cable installed in conduit, attach the wire shields to the “shield” connections on the terminal blocks, or to the earth ground on the case.
- For installations without conduit, use double shielded cable. Terminate the outer shield to the earth ground on the case. Terminate the inner shield to the “shield” connection on the terminal blocks.

ADDITIONAL DIRECTIVES

- ATEX Directive: 2014/34/EU
Refer to Appendix C for details.



95-8533



FlexSonic[™] Acoustic
Leak Detector



X3301 Multispectrum
IR Flame Detector



PointWatch Eclipse[™] IR
Combustible Gas Detector



FlexVu[™] Universal Display
with GT3000 Toxic Gas Detector



Eagle Quantum Premier[™]
Safety System



Corporate Office
6901 West 110th Street
Minneapolis, MN 55438 USA
www.det-tronics.com

Phone: +1 952.941.5665
Toll-free: +1 800.765.3473
det-tronics@spectrum-safety.com