



EDGE Installer Manual

Models:

074-11793, 074-11794, 074-11795, 074-11796, 074-11797

Installation Manual

890-00688

Version 06

Date: 02-09-21



For more complete information on the product, please refer to the manual on the USB key provided with your EDGE controller or go to the following web sites:

- AP website: <http://www.automatedproduction.com/ap-sales-and-service/ap-manuals.html>
- Cumberland website: <http://www.cumberlandpoultry.com/sales-and-service/manuals.html>

All information, illustrations, photos, and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

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NOTES

1 Introduction

Topics Covered in this Chapter

- Contact information
- General Safety Precautions and Usage
- Terms of Use
- Inspecting Your Received System
- System Overview
- Guidelines on the Ideal Location for Installation
- Correctly Supporting and Routing Cables
- Grounding Recommendations for the System

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Chapter 1: Introduction

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Warranty is void if this product is used in a manner not specified by the manufacturer. Every effort has been made to ensure that this manual is complete, accurate and up to date. The information contained in this manual is subject to change without notice.

General Safety Precautions and Usage

Safety Symbols

	Warning. Read the following text carefully; it contains important information which, if ignored, may cause the controller to operate improperly
	High Voltage. Hazard of electrical shock. Read the message and follow the instructions carefully
	Direct current (DC)
	Alternating current (AC)
	Protective Earth Ground Terminal, Primarily used for protective earth terminals. Terminal connected to conductive parts of a device for the purpose of safety and is intended to be connected to an external system for protective grounding
	Functional Ground Terminal Primarily used for functional earth terminals which are generally associated with test and measurement circuits. These terminals are not for safety earthing purposes but provide an earth reference point.
NOTE:	To emphasize points or remind readers of something, or to indicate minor problems in the outcome of what they are doing
	Failure to follow the instructions can result in damaged equipment or loss of data or potential problems
	Failure to follow the instructions carefully can result in serious or fatal injury
IMPORTANT:	The following information is of great significance and must be read carefully
	Read the following text carefully; it contains important information which, if ignored, may cause the controller to operate improperly
Tip	Shortcut or a faster way of getting to an end result

Safety Messages



Turn off the main electrical disconnect switch prior to servicing any of the boxes. Failure to do so might lead to serious injury or death.

Always use extreme caution when measuring voltage or performing procedures that require a module to be powered on.

Electrostatic Discharge Prevention When Manipulating a Printed Circuit Board (PCB)

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures.

Always follow ESD on a PCB-prevention procedures when you remove and replace components. Ensure that the chassis is electrically connected to earth ground. Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the grounding clip to an unpainted surface of the chassis frame to safely ground unwanted ESD voltages. To guard against ESD damage and shocks, the wrist strap and cord must operate properly. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohm (Mohm).

Terms of Use

Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to the user documentation for complete product specifications. If the product is used in a manner not specified, the protection provided by the product warranty will be void.

Using the Product According to Your Function

A responsible body is an individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.

Operators use the product for its intended function.

Maintenance personnel perform routine procedures on the product to keep it operating properly. At this level, all procedures whose do not touch high voltage. The maintenance personnel can work on high voltage only if they have the competences as an electrician.

Service personnel are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures. (In other words: electricians, Service personnel employed by or active in an organization, business, or service).

General Safety Usage

Follow the guidelines given below for safe usage of the product:

- Installation must only be performed by qualified service personnel
- Carefully read all instructions
- Comply with local and national safety codes
- Repairs must only be performed by qualified service personnel

- When replacing the fuses, use only the same type and same rating as specified
- Make sure the unit is disconnected from AC Power when servicing
- Do not try to operate the system if it is damaged. Disconnect the Power from the units and call your local service representative
- Do not operate while condensation is present
- Use of the system in a manner not specified by these instructions may impair the safety protection provided by the system. Do not operate the system outside its rated supply voltages or environmental range
- Omission to read the installation and user manuals or to comply with the warnings and references contained herein can result in serious bodily injury or damages to the controllers
- Do not insert metal objects into the connectors
- Use the system only as specified, or the protection supplied by the product can be compromised
- Follow all installation and maintenance recommendations and consider all provided information regarding product specifications and limitations
- Do not use the system if it does not operate correctly
- The enclosures must be closed and locked at all times, particularly when operating the system
- Use only specified replacement parts

Inspecting Your Received System

Inspecting your system and making sure you have received all expected parts helps avoid many hassles.

Shipment Contents

Table 1-1 Complete Enclosure Without Modules

EDGE MAIN CONTROLLER G2	One Main Controller; One user and installation manual
EDGE 6-SLOT EXPANSION BOX WITH HEATSINK PRO	One user and installation manual; One 6-Slot Expansion Box with an external Heatsink
EDGE 6-SLOT EXPANSION BOX PRO	One 6-Slot Expansion Box without an external Heatsink; One user and installation manual
EDGE 3-SLOT EXPANSION BOX WITH HEATSINK PRO	One 3-Slot Expansion Box with an external Heatsink; One user and installation manual
EDGE 3-SLOT EXPANSION BOX PRO	One 3-Slot Expansion Box without an external Heatsink; One user and installation manual

Table 1-2 Modules for 3-Slot Expansion Box and 6-Slot Expansion Box

EDGE 8IN-4V-6REL FAILSAFE WITH PLUGIN RELAY PRO	One Failsafe with plug-in relays and its plastic support
EDGE 8IN-4V-6REL FAILSAFE PRO	One Failsafe and its plastic support
EDGE 16IN-6REL WITH PLUGIN RELAY PRO	One 16 inputs, 6 relays with plug-in relays and its plastic support
EDGE 16IN-6REL PRO	One 16 inputs, 6 relays and its plastic support
EDGE 4IN-8REL WITH PLUGIN RELAY PRO	One 4 inputs, 8 relays with plug-in relays and its plastic support

Chapter 1: Introduction

Table 1-2 *Modules for 3-Slot Expansion Box and 6-Slot Expansion Box (cont'd.)*

EDGE 4IN-8REL PRO	One 4 inputs, 8 relays and its plastic support
EDGE 2 VARIABLE OUTPUT KIT	One kit to control two variables
EDGE 1 VARIABLE OUTPUT KIT	One kit to control one variable
EDGE 4IN-12V	One 4 inputs, 12 outputs for Variable Outputs or 0-10V devices and its plastic support
EDGE 4IN-8REL FAILSAFE W/PLUGIN RELAY PRO	One 4 inputs, 8 relays with plug-in relays and its plastic support
EDGE 4IN-8REL FAILSAFE PRO	One 4 inputs, 8 relays and its plastic support

Table 1-3 *External Module*

EDGE 4IN-2V-8DO	One 4 inputs, 2 outputs for Variable Outputs or 0-10V devices, 8 discrete outputs to control relays coils or contactors coils, 8 current sensors inputs to read the relays or the contactors contacts at the loads side, and its plastic support
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Damage Inspection

Your system and its components were carefully inspected both electrically and mechanically before shipment. After unpacking all items, check for any obvious signs of physical damage that may have occurred during transit. Report any damage to the shipping agent immediately. Save the original box for possible future shipment.

Returning the Unit for Repair

If you must return the system for repair, carefully package the system in its original box or an equivalent. Contact your local customer service department to get return instructions. Have on hand the system's serial number and date code found on the system's main board. See Contact Information/Support in this manual.

System Overview

The EDGE system is a complete site management system for agricultural applications. Each system is composed of a main unit and Expansion Boxes into which you can insert plug-in modules according to your site needs.

EDGE Main Controller G2	Consists of the unit with the touchscreen where all information is entered and where the Expansion Box and equipment is configured
6-Slot Expansion Box	Consists of inputs and outputs. This enclosure can contain up to 6 plug-in modules
3-Slot Expansion Box	Consists of inputs and outputs. This enclosure can contain up to 3 plug-in modules

Table 1-4 *Plug-in Modules Used in Expansion Boxes*

EDGE 8IN-4V-6REL FAILSAFE WITH PLUGIN RELAY	Eight sensor inputs (4-20mA, 0-5V, temperature, dry contact), four 0-10V outputs , with a possibility of controlling up to four variable output power modules (SSR). This module can have up to six plug-in relays. Two 24VDC outputs are available for power sensors.
EDGE 8IN-4V-6REL FAILSAFE	Eight sensor inputs (4-20mA, 0-5V, temperature, dry contact), four 0-10V outputs , with a possibility of controlling up to four variable output modules (SSR). This module can have up to six plug-in relays.

Table 1-4 Plug-in Modules Used in Expansion Boxes (cont'd.)

EDGE 16IN-6REL WITH PLUGIN RELAY	16 sensor inputs (4-20mA, 0-5V, temperature, dry contact). This module can have up to six plug-in relays. Two 24VDC outputs are available to power sensors.
EDGE 16 INPUTS, 6 RELAYS	16 sensor inputs (4-20mA, 0-5V, temperature, dry contact). This module can have up to six relays. Two 24VDC outputs are available to power sensors.
EDGE 4IN-8REL WITH PLUGIN RELAY	Four sensor inputs (4-20mA, 0-5V, temperature, dry contact). This module can have up to eight plug-in relays. Two 24VDC outputs are available to power sensors.
EDGE 4IN-8REL	Four sensor inputs (4-20mA, 0-5V, temperature, dry contact). This module can have up to eight relays. Two 24VDC outputs are available to power sensors.
EDGE 4IN-12V	Four sensor inputs (4-20mA, 0-5V, temperature, dry contact). This module can have up to 12 analog outputs to control 0-10Vdc devices or variable output modules.
EDGE 4IN-8REL FAILSAFE W/ PLUGIN RELAY PRO	Four sensor inputs (4-20mA, 0-5V, temperature, dry contact). This module can have up to eight plug-in relays. Two 24VDC outputs are available to power sensors.
EDGE 4IN-8REL FAILSAFE PRO	Four sensor inputs (4-20mA, 0-5V, temperature, dry contact). This module can have up to eight relays. Two 24VDC outputs are available to power sensors.
EDGE Variable Output	The EDGE Variable output is a panel mount Solid State Relay who allows a proportional voltage output according to the 3-10Vdc input.

Table 1-5 External Module

EDGE 4IN-2V-8DO	Four sensor inputs (4-20mA, 0-5V, temperature, dry contact). Two 24VDC outputs are available to power sensors. This module can have up to 8 discrete outputs to control relays or contactors. 8 current sensors to have relay or contactor feedback. Two analog outputs to control 0-10Vdc devices or variable output modules.
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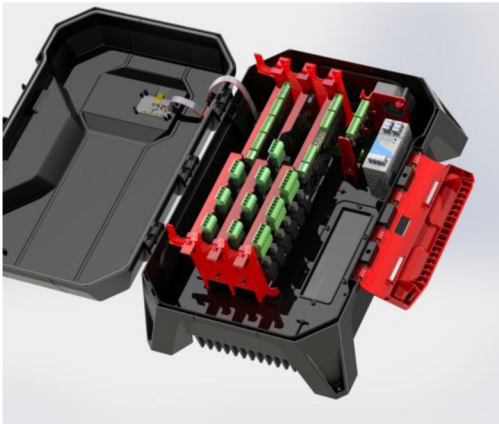
Figure 1-1 Enclosure Identification



Edge Main Controller



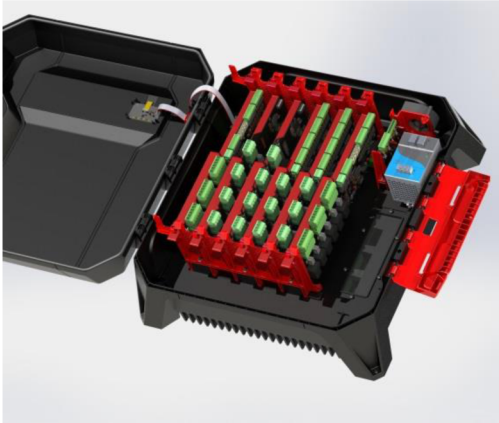
3-Slot Expansion Box



3-Slot Expansion Box (inside view)



6-Slot Expansion Box



6-Slot Expansion Box (inside view)

Expansion Box Nomenclature

Expansion Boxes come with or without variable output modules (SSR). If there are no variable output modules (SSR) in the Expansion Box (3-Slot Expansion Box, 6-Slot Expansion Box), the plastic enclosure does not have an external heat sink on it.

3-Slot Expansion Box model with a Heat sink: EDGE 3-SLOT BOX W/HSK or E3PH-_-____

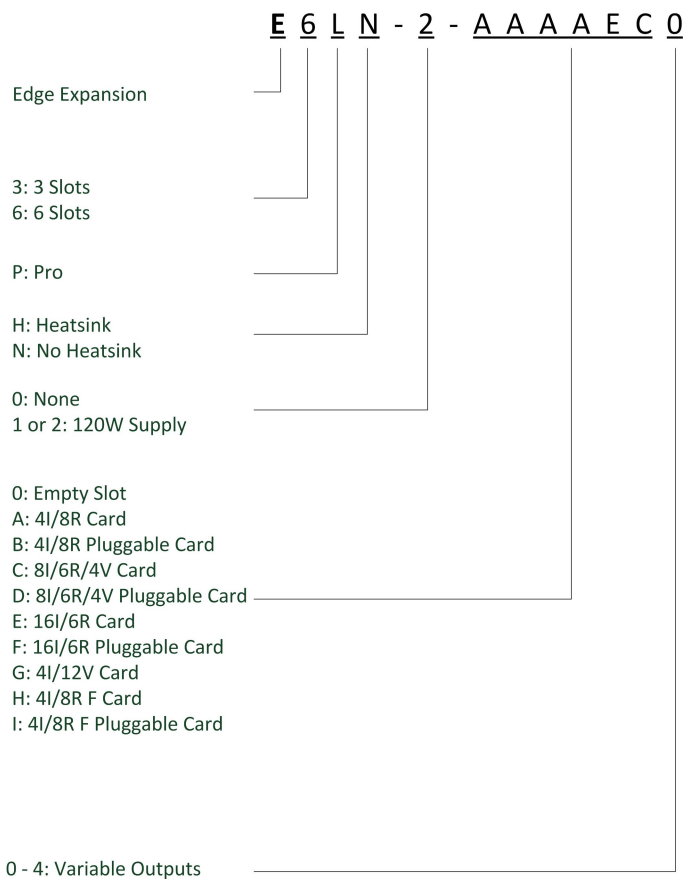
3-Slot Expansion Box model without a Heat sink: EDGE 3-SLOT BOX or E3PN-_-____

6-Slot Expansion Box model with a Heat sink: EDGE 6-SLOT BOX W/HSK or E6PH-_-____

6-Slot Expansion Box model without a Heat sink: EDGE 6-SLOT BOX or E6PN-_-____

The Expansion Box (3-Slot Expansion Box, 6-Slot Expansion Box) part numbering is defined as follows:

Expansion Box Part Numbering



Power supply: On the 3-Slot Expansion Box, the power supply can be the 60W supply or the 120W supply. On the 6-Slot Expansion Box, the power supply can be only the 120W supply

Variable output number is the number of variable output modules (SSR) installed in the Expansion Box

A heatsink comes with a variable output installation

If a 3-Slot Expansion Box is ordered, the number of the plug-in modules is limited to three

The following are two examples of Expansion Box names:

E3PH-1-C004

E6PH-2-AAAACE4

EDGE Variable Output (SSR)

This Variable Output was designed to efficiently and precisely control variable speed fans and multiple dimmable light systems.

Features

- Three variable modes:
 - Default mode
 - Variable 1 Mode: for more accurate speed control of variable speed fans
 - Variable 2 Mode : for enhanced control of dimmable lights.

NOTE: *These modes can be set into the EDGE equipment configuration page with EDGE software version 2.4.3. Mode selection is Default with existing configurations Default variable Mode will be Variable 1 for fans and Variable 2 for light with new configurations.*

- Integration of the current sensing inside the module. No more need for the current sensor board (045-11506).
- This new module needs a new cable harness. This one is not compatible with the previous version (135-00021).

The EDGE variable output activates the output according to the voltage applied on the 0-10V input. The control is done with a voltage between 3V to 10V. The proportion between the voltage input and the AC output may change as per the mode set.

The EDGE variable output can be set in different mode according to the purpose. A voltage must be applied between 2V and 3V during at least one second to activate a mode. Please note that these configurable modes are not yet supported by the EDGE system. By default, if no mode is set, the module will work as a SSR of Crydom (CY7913).

Mode	Command voltage	Description
Default with compensation	N/A	Works like the Crydom SSR CY7913 Use compensation (see below)
Enhanced fan curve with compensation	2.2 ±0.15V	The curve is enhanced to give better control of the fan speed. Use compensation (see below)
Light mode with CRYDOM curve	2.6 ±0.15V	This mode shall be used with light bulb (incandescent, ccfl, cfl and led) control. Use Crydom SSR CY7913 curve.

Compensation

The compensation is used with fan. The compensation is working if the voltage is in the range of 190VAC to 260VAC. A change on the AC supply voltage will be compensated to keep the fan speed (and CFM as well). When compensation is activated, use a 240VAC curve in the EDGE controller.

Current Sensing

The current sensor is integrated in the EDGE Variable output. The current sensor also enables a feature to detect “dead short” (error in wiring, L2 connected in the LOAD terminal per example or shorted LOAD). If this event happens, the EDGE Variable output will shut off (to protect itself). A red LED on the module will go steady ON to indicate the fault. To reset the fault, the 0-10V input must return to 0V.

Guidelines on the Ideal Location for Installation

Consider the environment, mounting recommendations, and clearance space to choose the ideal location for your system.

Operating Environment

- To avoid exposing the system to harmful gases or excessive humidity, install the system and the Expansion Boxes in a corridor or an area dedicated to electronic controllers.
- The ideal ambient temperature is between 20 °C and 25 °C (68 °F - 77 °F). The temperature should not go lower than 0 °C (32 °F) and should not exceed 40 °C (104 °F).
- Ensure there is sufficient ventilation around the unit.
- Install the Expansion Boxes far from sources of vibrations and where they are not likely to get bumped.
- Install the EDGE 4IN-2V-8DO in a cabinet
- The EDGE 4IN-2V-8DO temperature must be lower than 70°C (158°F) in the cabinet

IMPORTANT: *If you are not planning on installing the system immediately, store the units in a cool dry place.*

Requirements for the Mounting Structure

Fix the enclosures into the supporting structure behind a drywall. If this is not possible, consider the addition of a wood frame on which the enclosure could be screwed.

Clearance Around the System Modules

The following minimum clearances must be respected around the EDGE enclosures.







Correctly Supporting and Routing Cables

Properly supporting and routing the cables helps avoid electromagnetic interference and wire damage. Rigid conduits up to 1 inch (25.4mm) can be used for connection to the EDGE Main Controller. Rigid conduits of up to 2 inches (50.8mm) can be used for connection to the EDGE 3-Slot Expansion Box and to the EDGE 6-Slot Expansion Box.

NOTICE

The heat sink on the back of the EDGE controller protrudes out the back of the enclosure. This requires all connections to be at least 2 inches away from the wall in order to connect into the enclosure.

AP/Cumberland recommends two installation possibilities:

- Use a 6 inch by 6 inch electrical trough installed at least 12 inches below the enclosure to pass the connections through before connecting to the EDGE
- Offset the rigid conduits at least 2 inches from the wall with metal fixings



It is important to respect the clearances above and below the enclosure to allow airflow to the heatsink

Cable Connectors

NOTE: Nylon cable glands are permitted for cable or wire fastening.



Use watertight compression cable glands rated IP54 for each cable used.



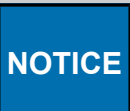
Use silicone to seal the cable gland rated IP54 if more than one cable is use in the same cable gland.



The warranty is void if the product enclosures are not sealed correctly and the installation does not respect the manufacturer recommendations.



Ensure all cables enter through the bottom of the plastic enclosure. Do not make holes on the top or on the sides of the enclosures. Be careful not to damage the electronic cards located inside the enclosure when drilling at the bottom of the enclosure.



The use of flexible tube with water and dust tight connectors at both ends is acceptable.

Cable Support

Support the cables with clips or cable trays whenever possible to avoid damage at the connection points.

Cable Routing



Never run low voltage (24V and less) wires like communication wires, inputs or sensors wires in the same conduit or underground trench as a High Voltage (Power) wire.

When low voltage cables run parallel to high voltage cables (120/230/380 VAC or 24 VDC), place them at a distance of at least 460 mm (18 inches) from each other to avoid electromagnetic interference. This also applies to high and low voltage cables running through an underground trench.

If low voltage cables cross high voltage cables, ensure they cross at an angle of 90° to minimize electromagnetic interference.



Do not use rigid conduits over 1 inch (25.4mm) for the EDGE Main Controller. Do not use rigid conduits over 2 inches (50.8mm) for the EDGE 3-Slot Expansion Box and the EDGE 6-Slot Expansion Box.

Cable Routing and Underground Trench

IMPORTANT: *The same rules are applicable for the underground trench. The distance between the high voltage and the low voltage must be at least 460 mm (18 inches) in the same cable tray or conduit and between two different conduits in parallel.*



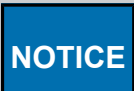
Follow the regulations and electrical code according to your area. Underground trenches must be installed by a qualified contractor.

Grounding Recommendations for the System

A correctly grounded system protects your equipment from electrical surges and spikes.



Each module must have its own ground connection from a common junction box. Do not run the earth ground cable between the modules.



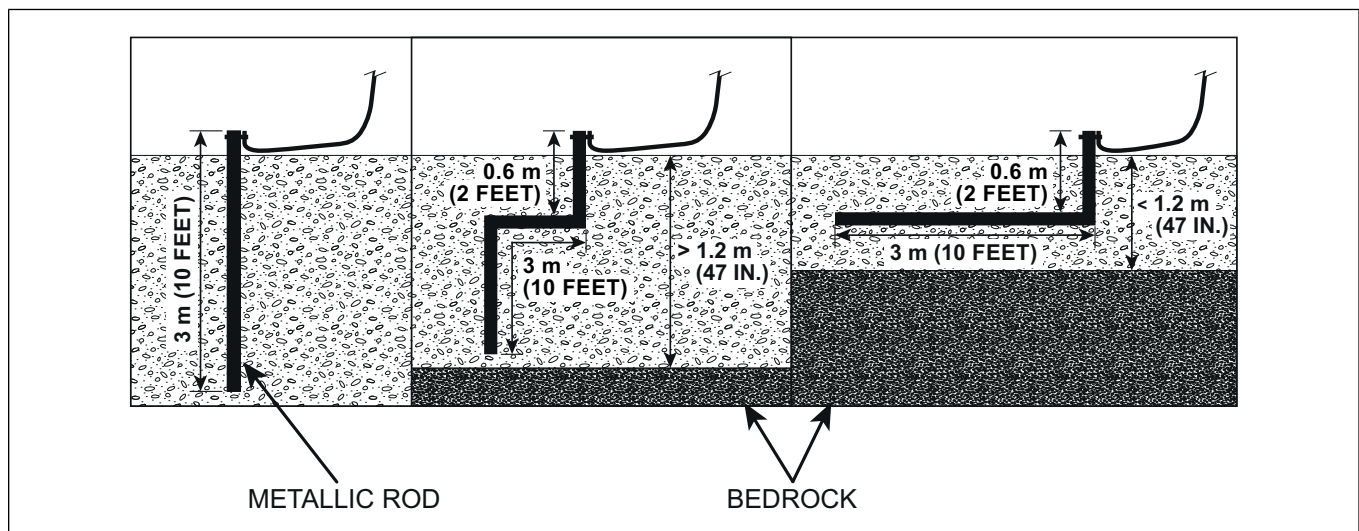
The ground resistance levels must comply with local and national electrical codes.

IMPORTANT: *If outdoor connections are used, mount the enclosure as close as possible to the entry point of the outdoor wiring.*

IMPORTANT: *An improper ground connection voids the system's warranty.*

Insert the rod into the ground until a few inches of the tip is left above ground level. Attach the cable to the rod tip with an appropriate connector. Attach the other end of the cable to a breaker box or a junction box near the main enclosure.

Figure 1-2 *Grounding installation depending on bedrock depth*



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- If the bedrock is more than 3 meters (10 feet) below ground level, drive the grounding rod vertically 3 meters (10 feet) into the ground.
- If the bedrock is more than 1.2 meters (47 inches) below ground level, drive the rod into the ground to bedrock level and bury the remainder horizontally at least 0.6 meters (2 feet) below ground level.
- If the bedrock is less than 1.2 meters (47 inches) deep, bury the rod horizontally at least 0.6 meters (2 feet) below ground level.

NOTE: Refer to your local regulations and practices if an adequate grounding installation isn't possible.

Rod Specifications for Grounding

The rod specifications are guidelines only. Refer to your national and local regulations for compliance criteria.

Table 1-6 Grounding rod specifications

Item	Description
Material	Metallic, normally steel core.
Rod surface	The surface must be clean. It cannot be coated with paint, varnish or any non-conducting substance.
Minimum diameter	16 mm (5/8 inches)
Minimum length	2440 mm (8 feet)

Cable Specifications for Grounding

The cable specifications are guidelines only. Refer to your national and local regulations for compliance criteria.

Table 1-7 Grounding Cable Specifications

Item	Description
Certification and type	CSA, TEW type.
	UL, 1015 type, 12 AWG, 600 V, 105 °C (221 °F), green/yellow insulated wire.
Maximum length	15 meters (50 feet)
Suggested cable	Beldon # 9912, color code 189, or equivalent

2 Wiring Diagrams

Topics Covered in this Chapter

- Wiring Diagram Choice According to the Equipment

Wiring Diagram Choice According to the Equipment

The following pages contain tables with the wiring diagrams available for your equipment followed by the detailed wiring diagrams.

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- [Figure 2-4, SCHEME 2 — COMMUNICATION, POWER SUPPLY and CONTROLLER REDUNDANCY — Odd Number of Expansion Boxes, page 26](#)
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- [Figure 2-6, SCHEME 8 — POWER AND COMMUNICATION — No Redundancy, page 28](#)
- [Figure 2-7, SCHEME 9 — COMMUNICATION, POWER SUPPLY and CONTROLLER REDUNDANCY — Odd Number of Expansion Boxes - Controllers in between - power one side, page 29](#)
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- [Figure 2-9, SCHEME 12 — COMMUNICATION, POWER SUPPLY and CONTROLLER REDUNDANCY — Many Groups of Expansion Boxes with VariFlame in Between, page 31](#)
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- [Figure 2-27, Inlet Wiring, page 45](#)
- [Figure 2-28, Inlet Failsafe Wiring, page 46](#)

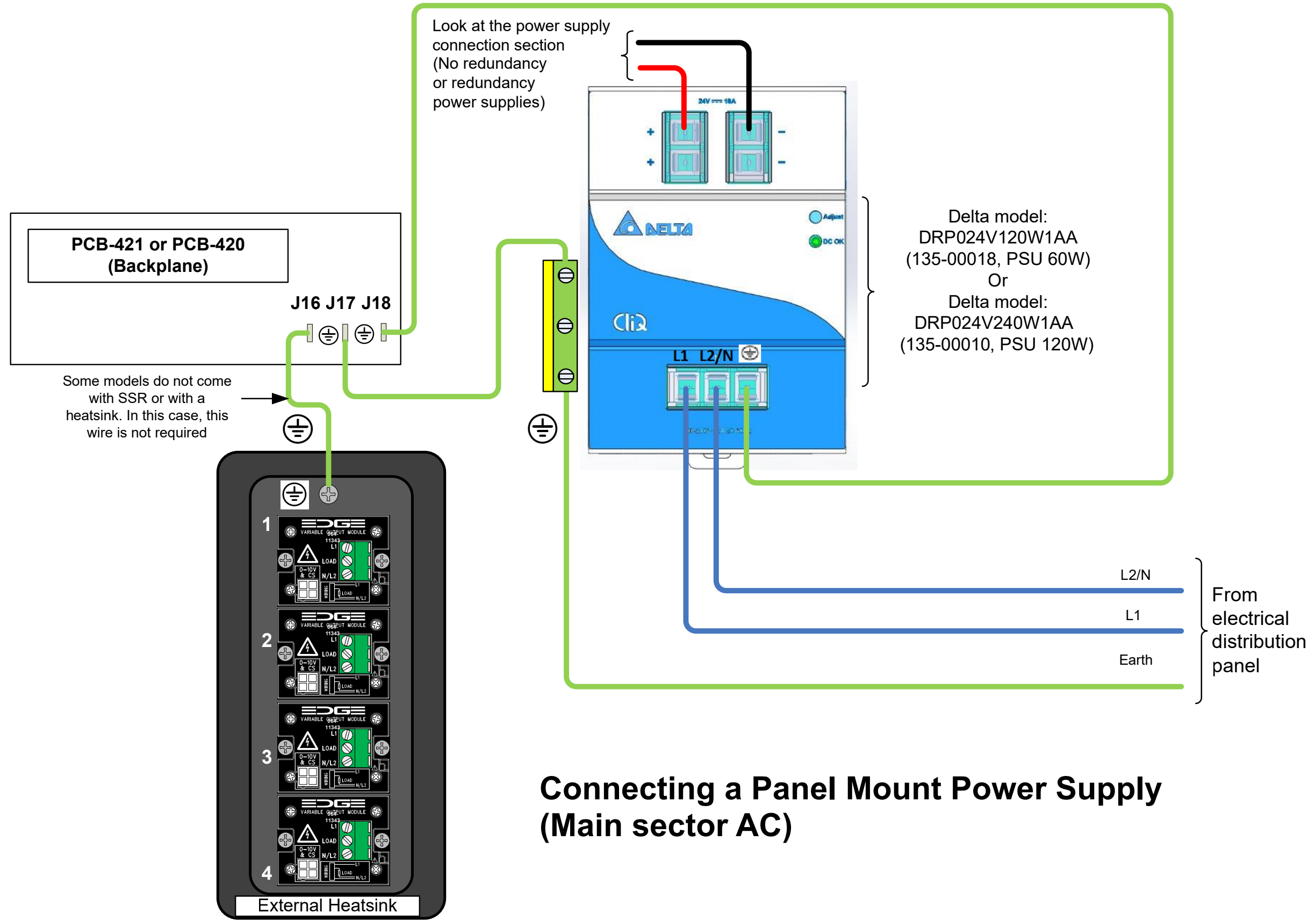
Figure 2-1 Wiring Table

Equipment Name	On/Off with Coil Relay Load (by using parallel capacitor compensation loading)	On/Off	On/Off Failsafe	Variable 0–10 VDC	Variable with SSR	Variable with Relay	Dual Capacity	Inlet	Inlet Failsafe	Inputs Interlock Option	Output Interlock Option
Pit Fans	x	x	x		x						
Sidewall Fans	x	x	x		x						
Stir Fans	x	x	x		x						
Tunnel Fans	x	x	x								
Heaters	x	x		x	x	x	x				
Brooders	x	x			x	x					
Ceiling Inlets								x	x	Potentiometer	
Wall Inlets								x		Potentiometer	
Natural Curtains								x		Pot and whisker	
Tunnel Inlets								x		Pot and whisker	
Natural Chimneys								x	x		
Lights	x	x									
Cool Cells	x	x								Water valves: supply, zone drain	
Mister/Fogger	x	x									
Soaker	x	x									
Water Valves	x	x									

Figure 2-1 Probe Input Types

Probe Name	Analog Input	Analog Input with 24VDC
Temperature Probes	x	
Water Meters	x	
Humidity Probes	x	x
Static Pressure Sensor	x	x
Gas Sensors (CO ² , Ammonia)	x	x
Light Sensors	x	x
Air Speed Sensors	x	x
Pressure Sensors	x	x

Figure 2-2 PCB-421 or PCB-420 Connection



Connecting a Panel Mount Power Supply (Main sector AC)

Figure 2-3 SCHEME 1 — COMMUNICATION, POWER SUPPLY and CONTROLLER REDUNDANCY – Even Number of Expansion Boxes

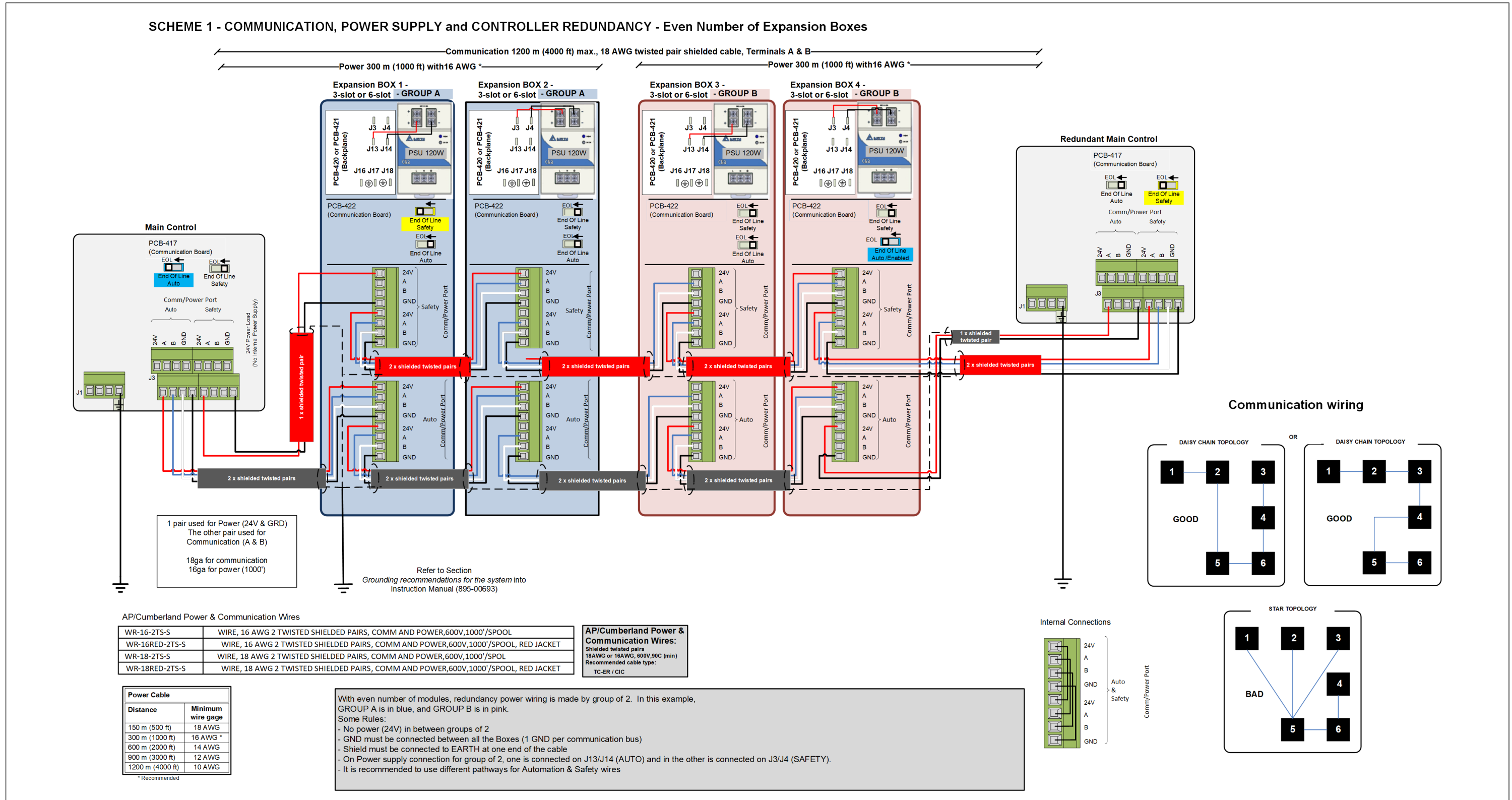


Figure 2-4 SCHEME 2 — COMMUNICATION, POWER SUPPLY and CONTROLLER REDUNDANCY — Odd Number of Expansion Boxes

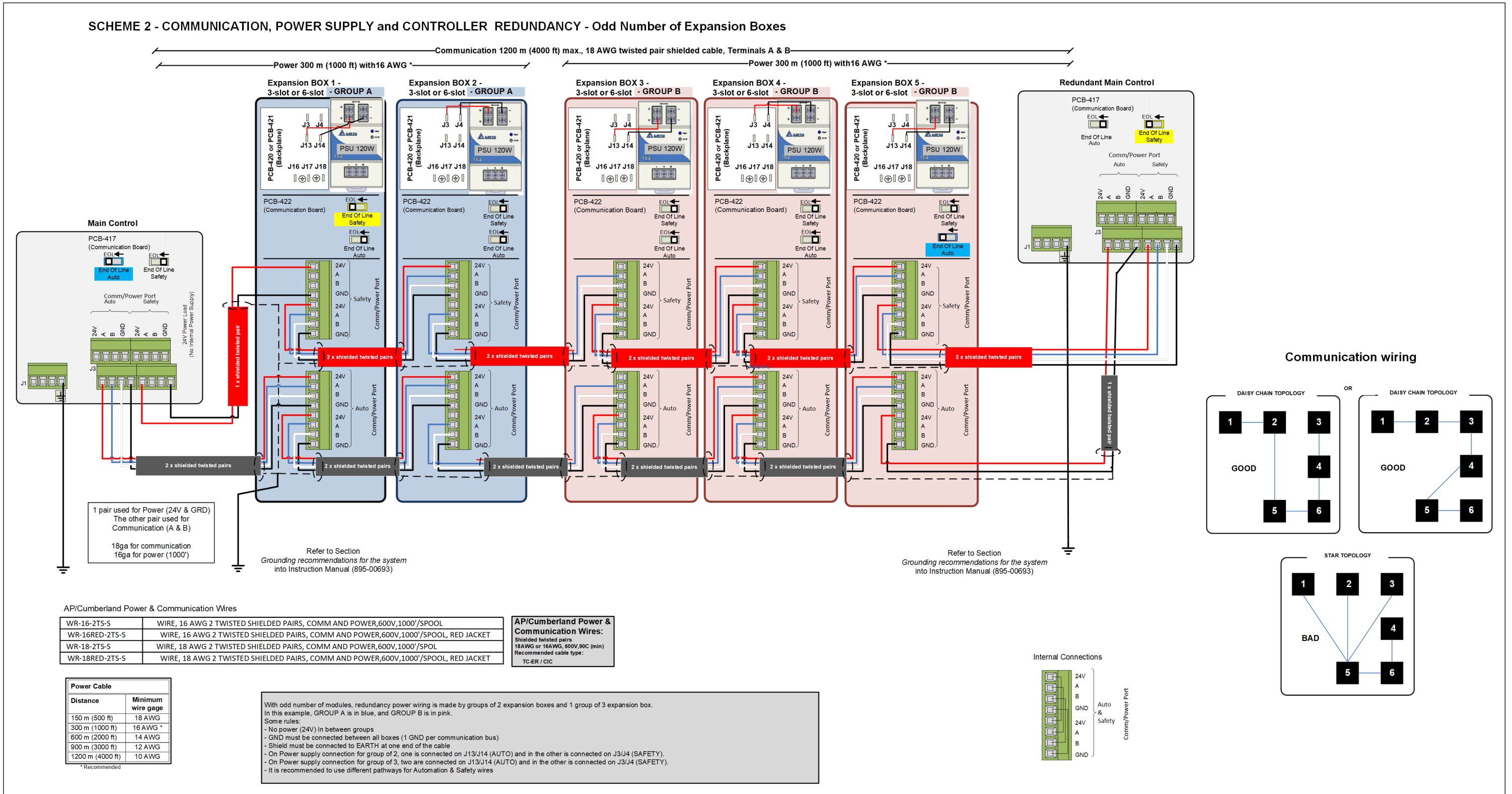
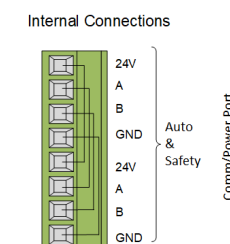
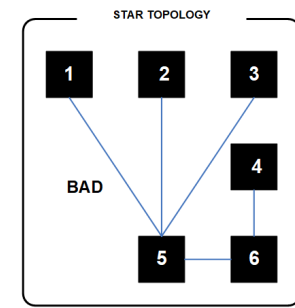
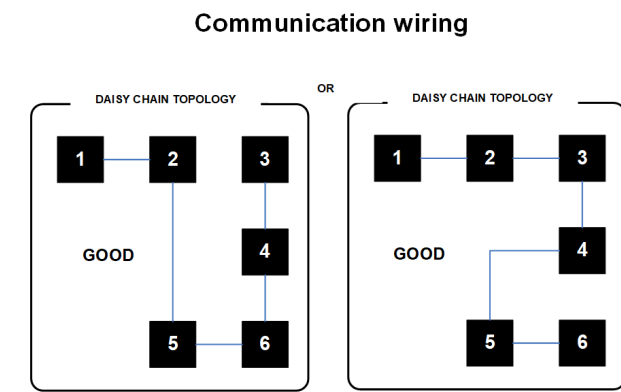
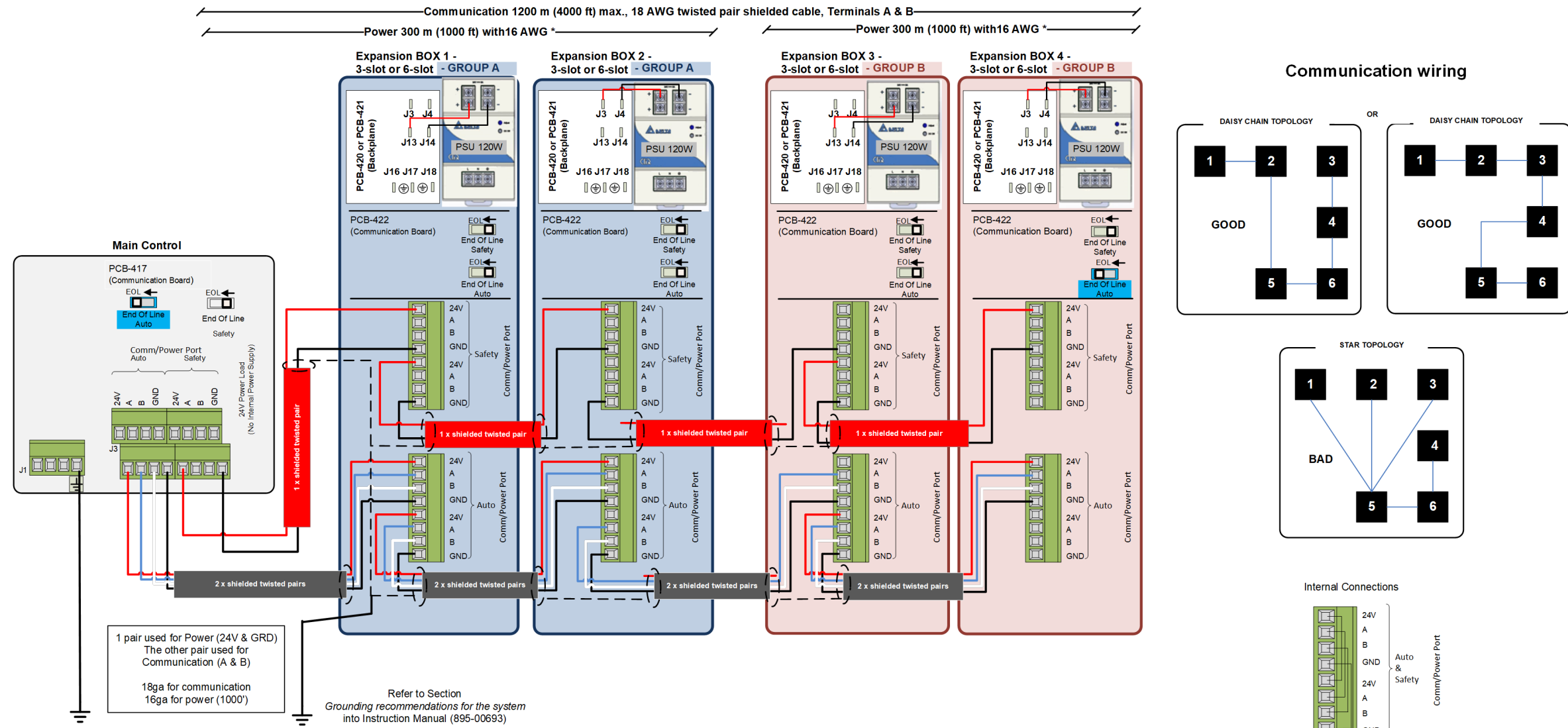


Figure 2-5 SCHEME 3 — POWER SUPPLY REDUNDANCY — Even Number of Expansion Boxes

SCHEME 3 - POWER SUPPLY REDUNDANCY - Even Number of Expansion Boxes

- Refer to Scheme 1 for complete wiring



AP/Cumberland Power & Communication Wires

WR-16-2TS-S	WIRE, 16 AWG 2 TWISTED SHIELDED PAIRS, COMM AND POWER,600V,1000'/SPOOL
WR-16RED-2TS-S	WIRE, 16 AWG 2 TWISTED SHIELDED PAIRS, COMM AND POWER,600V,1000'/SPOOL, RED JACKET
WR-18-2TS-S	WIRE, 18 AWG 2 TWISTED SHIELDED PAIRS, COMM AND POWER,600V,1000'/SPOL
WR-18RED-2TS-S	WIRE, 18 AWG 2 TWISTED SHIELDED PAIRS, COMM AND POWER,600V,1000'/SPOOL, RED JACKET

AP/Cumberland Power & Communication Wires:
 Shielded twisted pairs
 18AWG or 16AWG, 600V,90C (min)
 Recommended cable type:
 TC-ER / CIC

Distance	Minimum wire gage
150 m (500 ft)	18 AWG
300 m (1000 ft)	16 AWG *
600 m (2000 ft)	14 AWG
900 m (3000 ft)	12 AWG
1200 m (4000 ft)	10 AWG

* Recommended

With even number of modules, redundancy power wiring is made by group of 2. In this example GROUP A is in blue, and GROUP B is in pink.
 Some rules:
 - No power (24V) between groups of 2 - GND must be connected between groups of 2 - Shield must be connected to EARTH at one end of the cable
 - Note that the Power supply connection in group of 2, one is connected on J13/J14 (AUTO) and in the other is connected on J3/J4 (SAFETY).
 - It is recommended to use different pathways for Automation & Safety wires

Figure 2-6 SCHEME 8 — POWER AND COMMUNICATION — No Redundancy

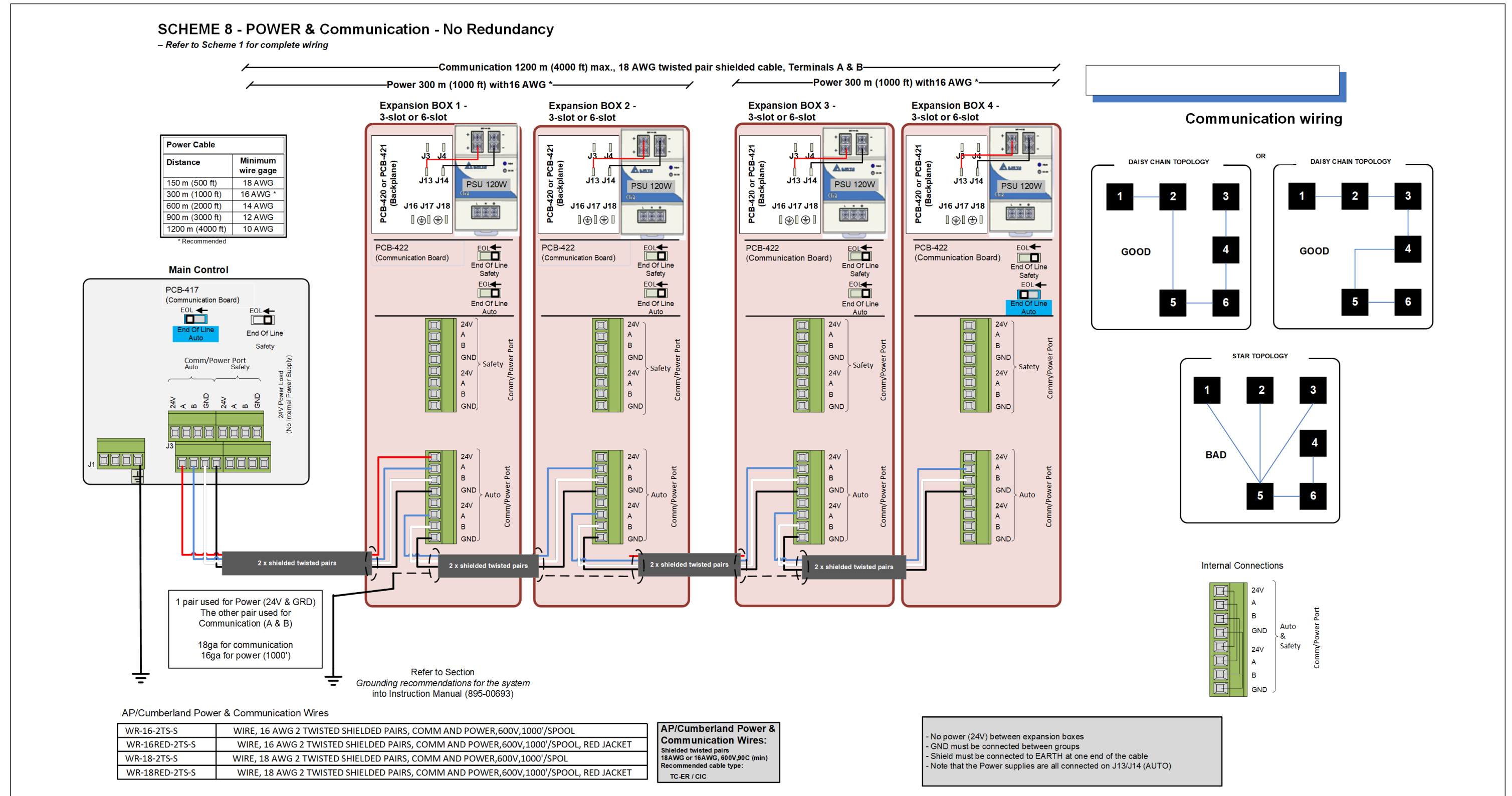
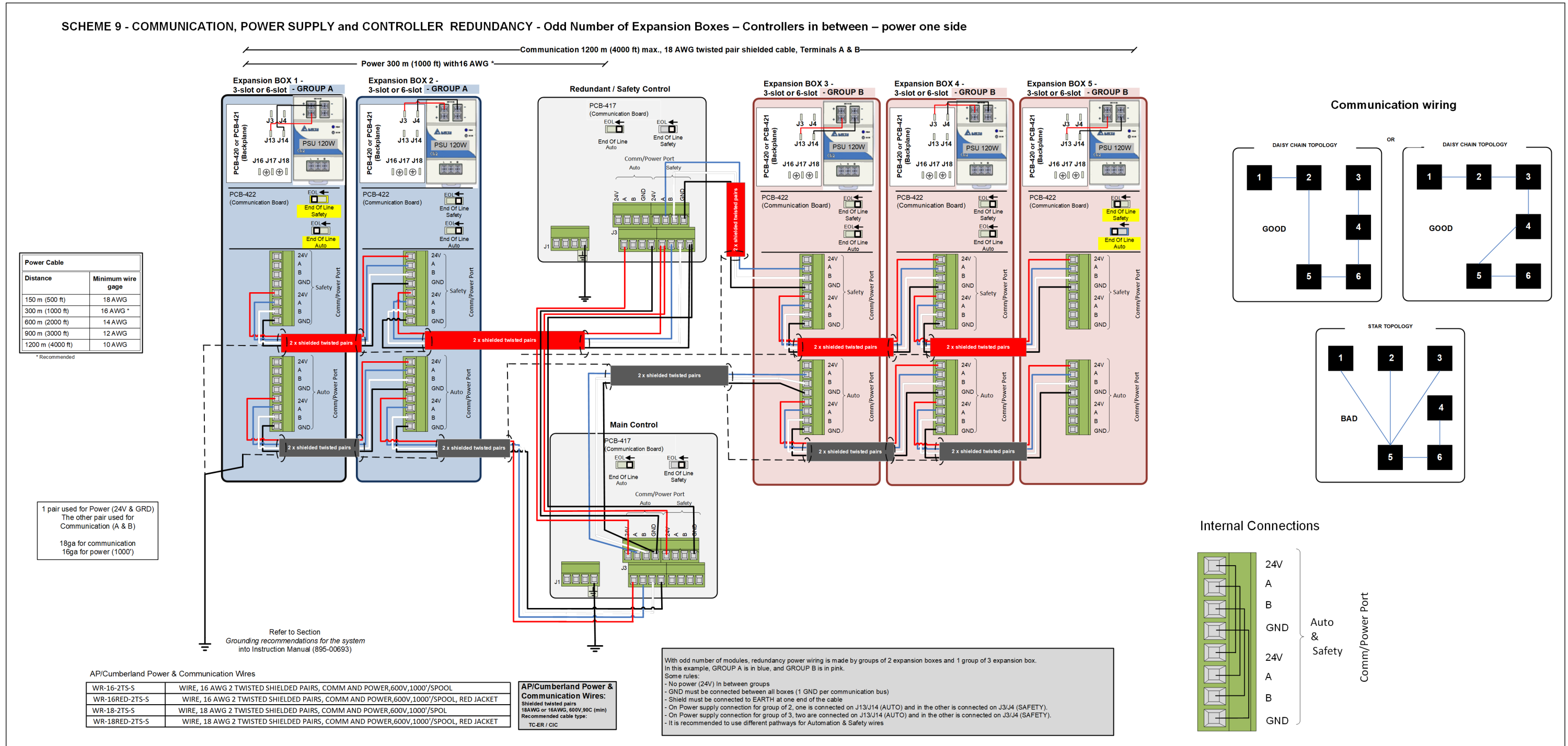


Figure 2-7 SCHEME 9 — COMMUNICATION, POWER SUPPLY and CONTROLLER REDUNDANCY — Odd Number of Expansion Boxes - Controllers in between - power one side



AP/Cumberland Power & Communication Wires

WR-16-2TS-S	WIRE, 16 AWG 2 TWISTED SHIELDED PAIRS, COMM AND POWER,600V,1000'/SPOOL
WR-16RED-2TS-S	WIRE, 16 AWG 2 TWISTED SHIELDED PAIRS, COMM AND POWER,600V,1000'/SPOOL, RED JACKET
WR-18-2TS-S	WIRE, 18 AWG 2 TWISTED SHIELDED PAIRS, COMM AND POWER,600V,1000'/SPOOL
WR-18RED-2TS-S	WIRE, 18 AWG 2 TWISTED SHIELDED PAIRS, COMM AND POWER,600V,1000'/SPOOL, RED JACKET

AP/Cumberland Power & Communication Wires:
 Shielded twisted pairs
 18AWG or 16AWG, 600V,90C (min)
 Recommended cable type:
 TC-ER / CIC

Figure 2-8 SCHEME 9 — COMMUNICATION, POWER SUPPLY and CONTROLLER REDUNDANCY — Odd Number of Expansion Boxes - Controllers in between - power both sides

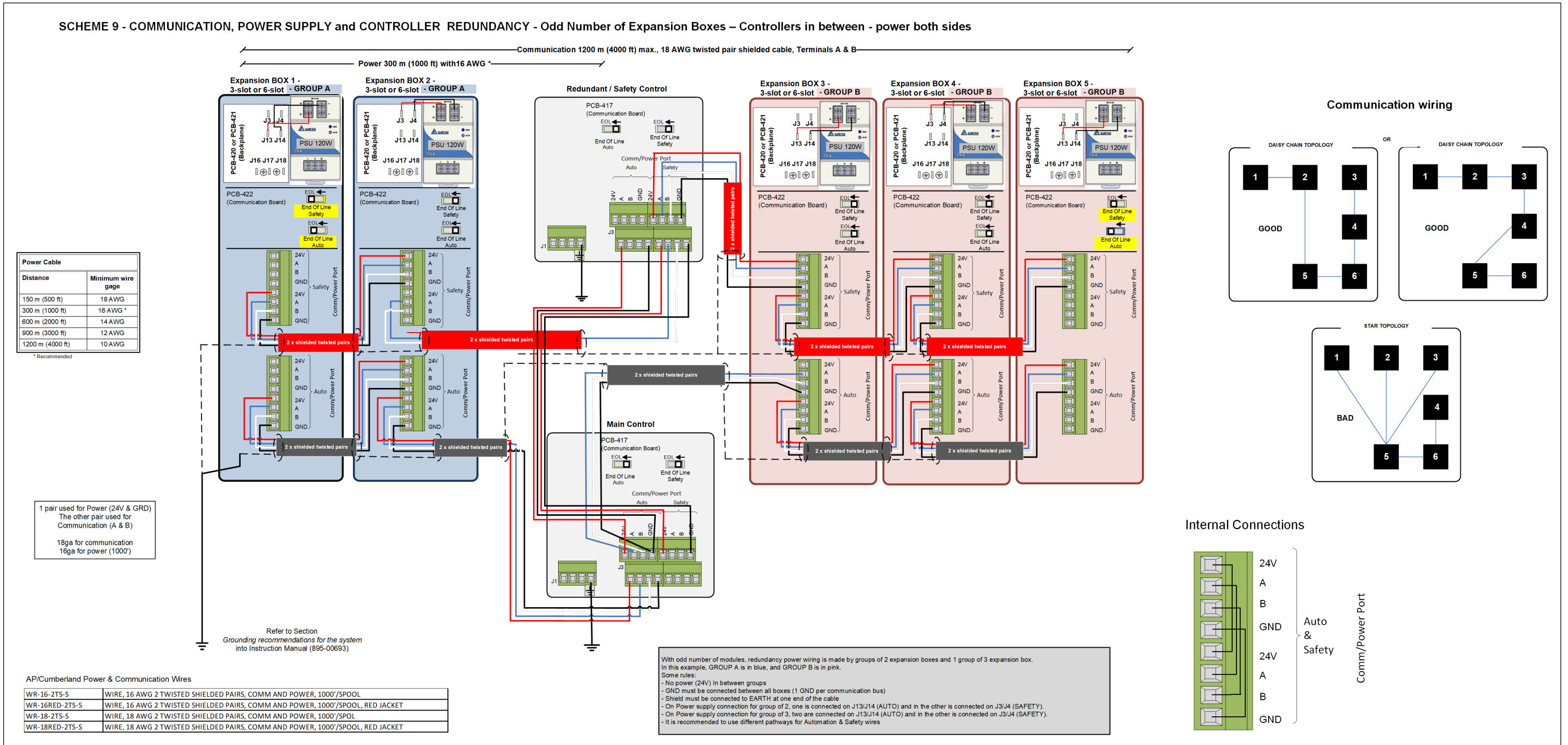


Figure 2-9 SCHEME 12 — COMMUNICATION, POWER SUPPLY and CONTROLLER REDUNDANCY — Many Groups of Expansion Boxes with VariFlame in Between

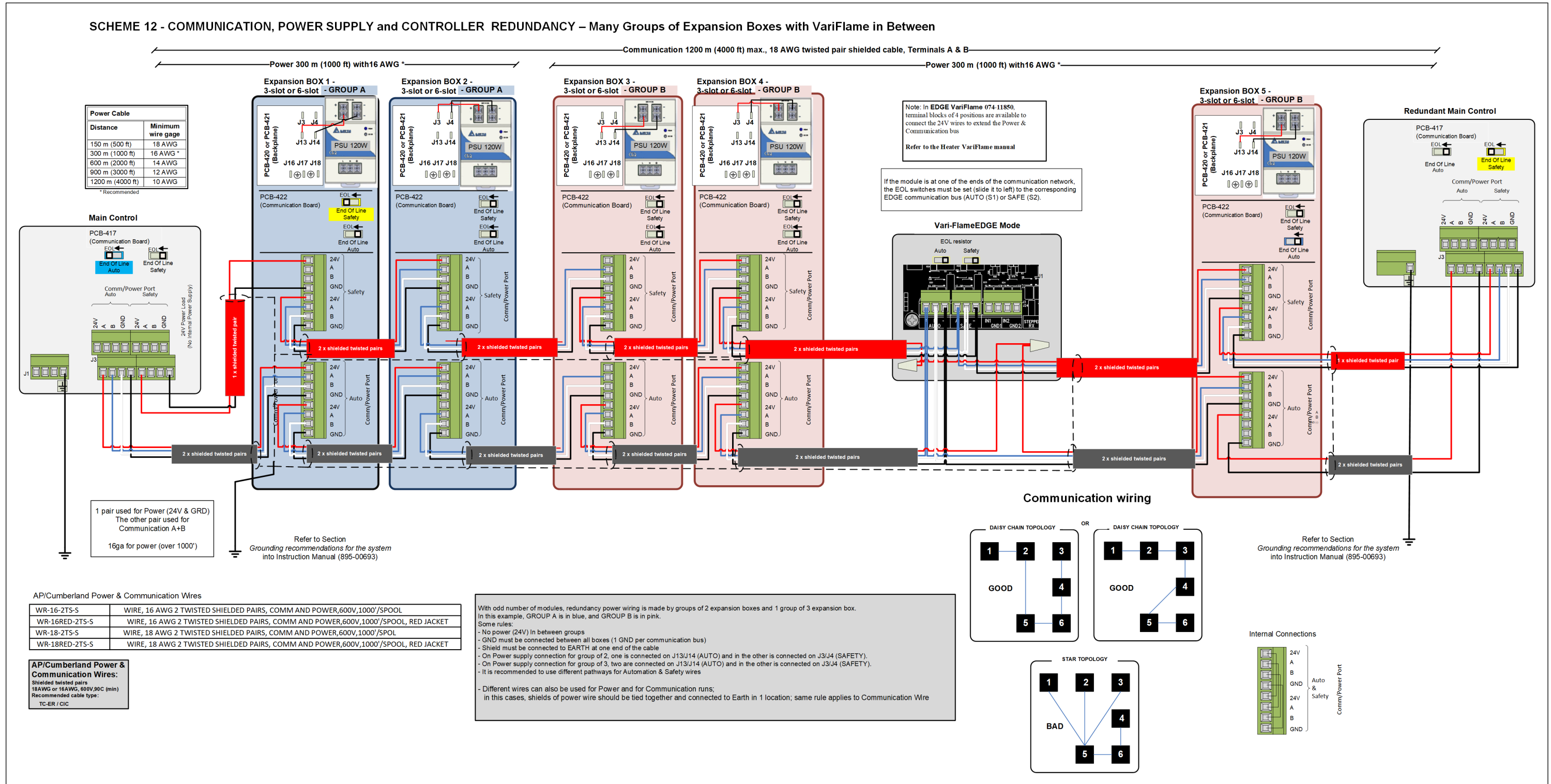


Figure 2-10 SCHEME 13 — COMMUNICATION, POWER SUPPLY and CONTROLLER REDUNDANCY — Many Groups of Expansion Boxes with EDGE Controls in Between

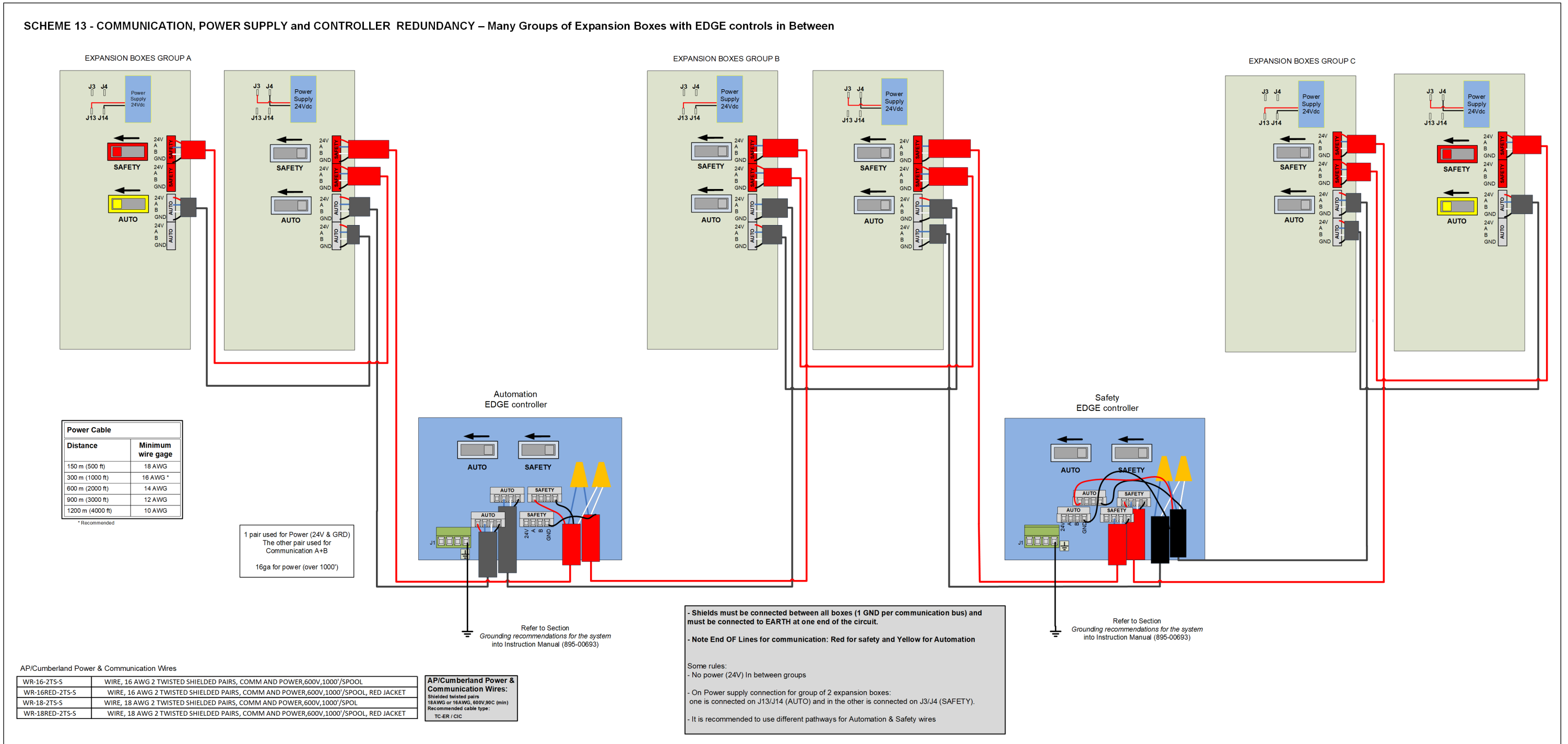


Figure 2-11 SCHEME 1B — COMMUNICATION, POWER SUPPLY and CONTROLLER REDUNDANCY with Ethernet Router — Even Number of Expansion Boxes

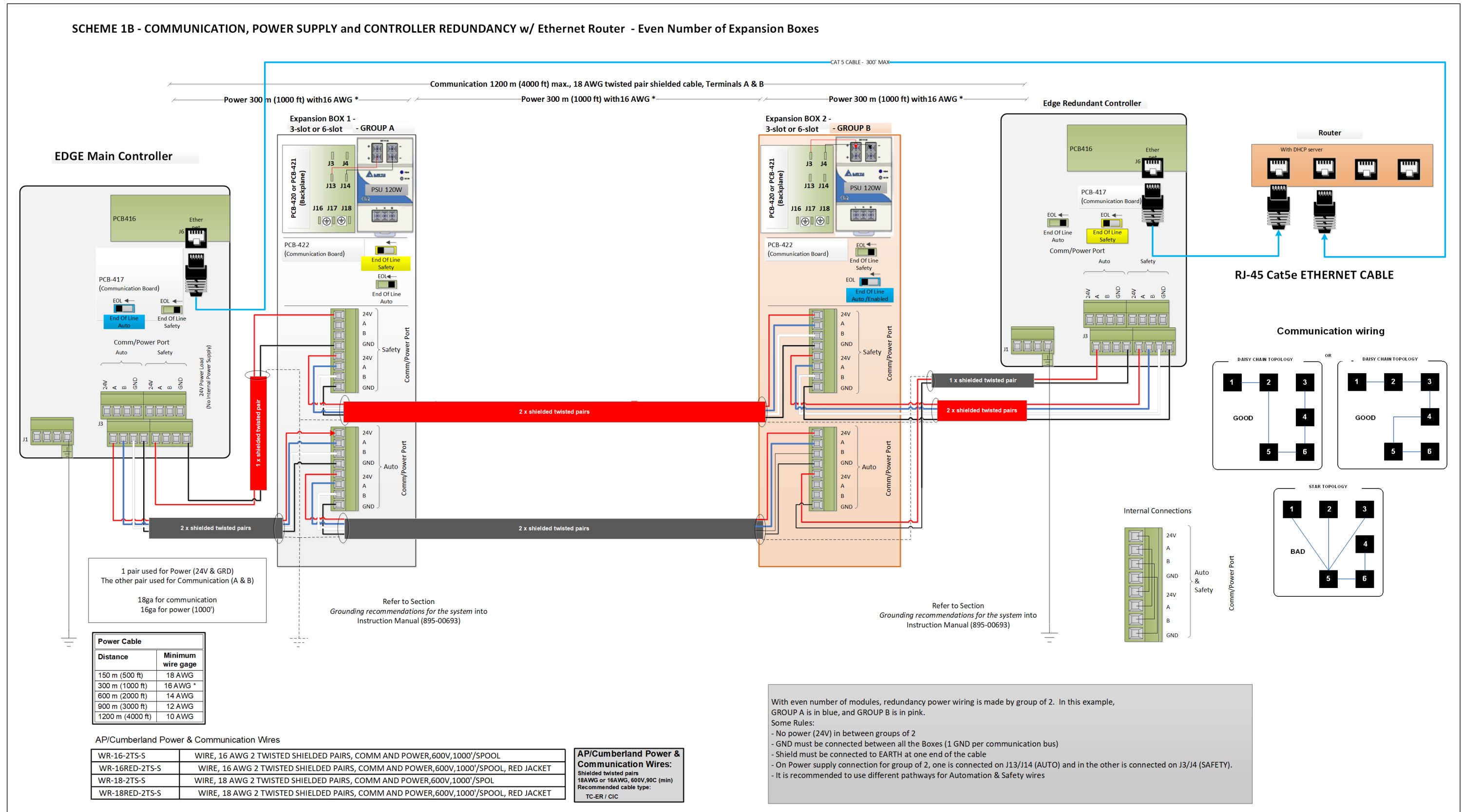


Figure 2-12 Ethernet Networking

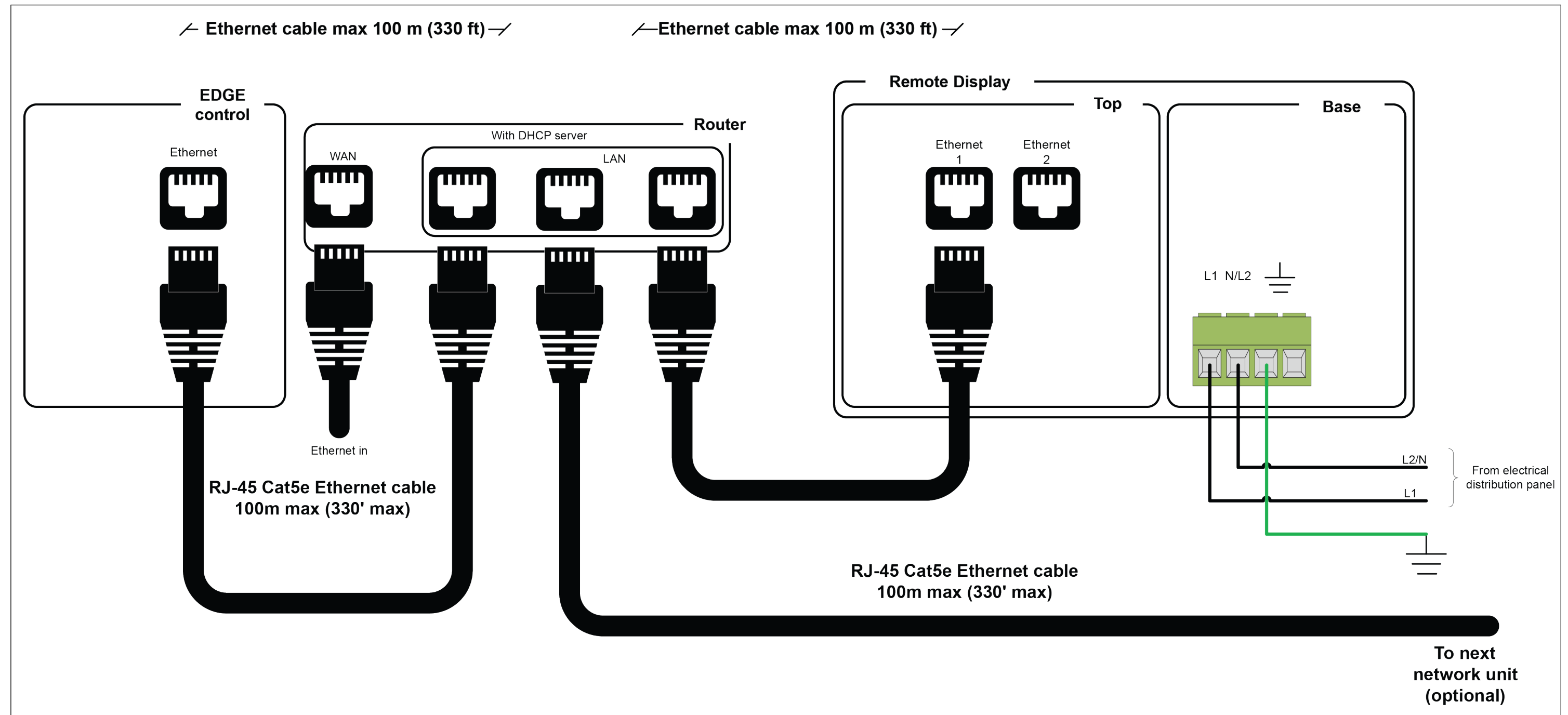


Figure 2-13 Shield Connection

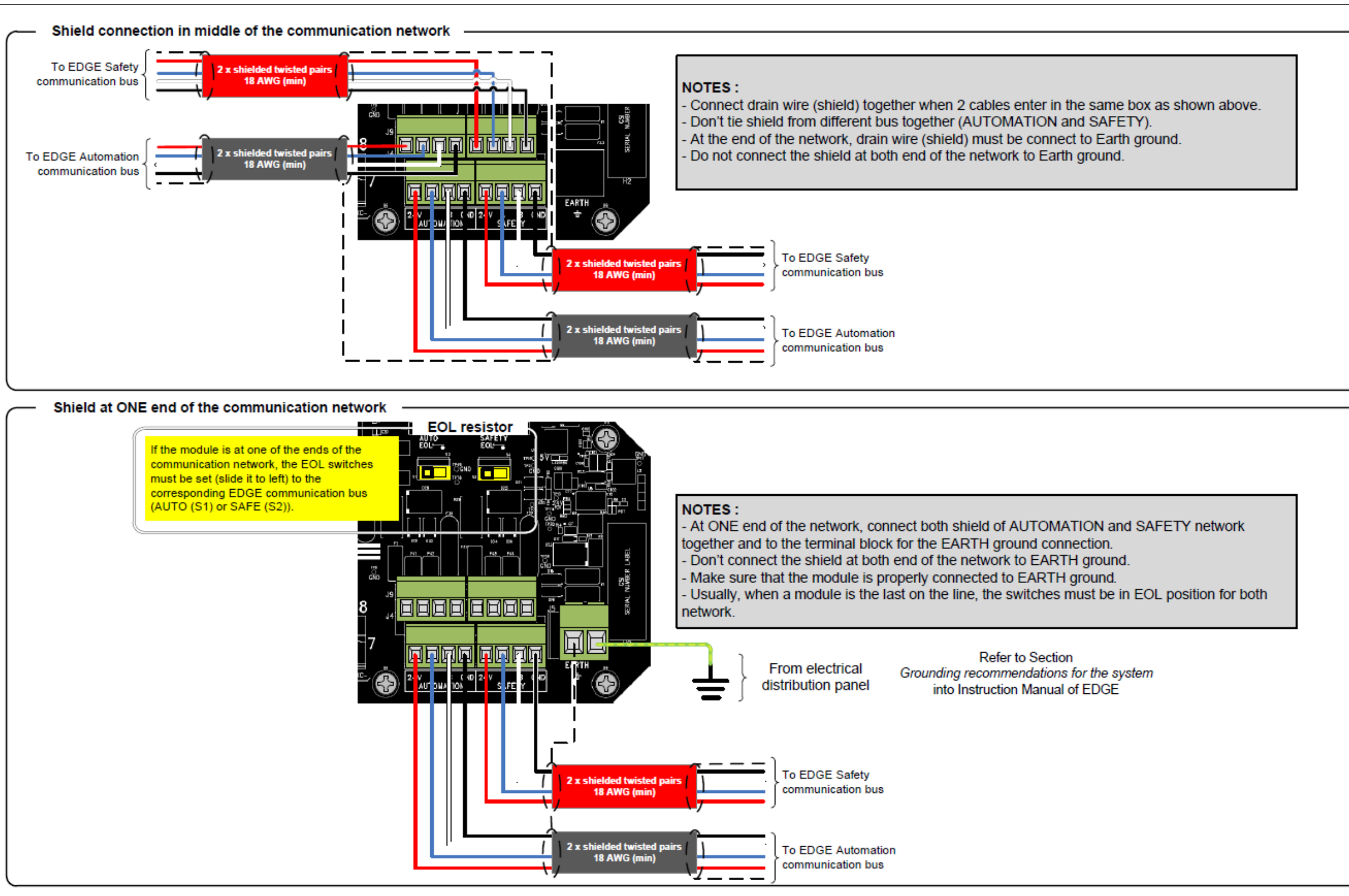


Figure 2-14 Analog Inputs and Analog Inputs with 24Volts

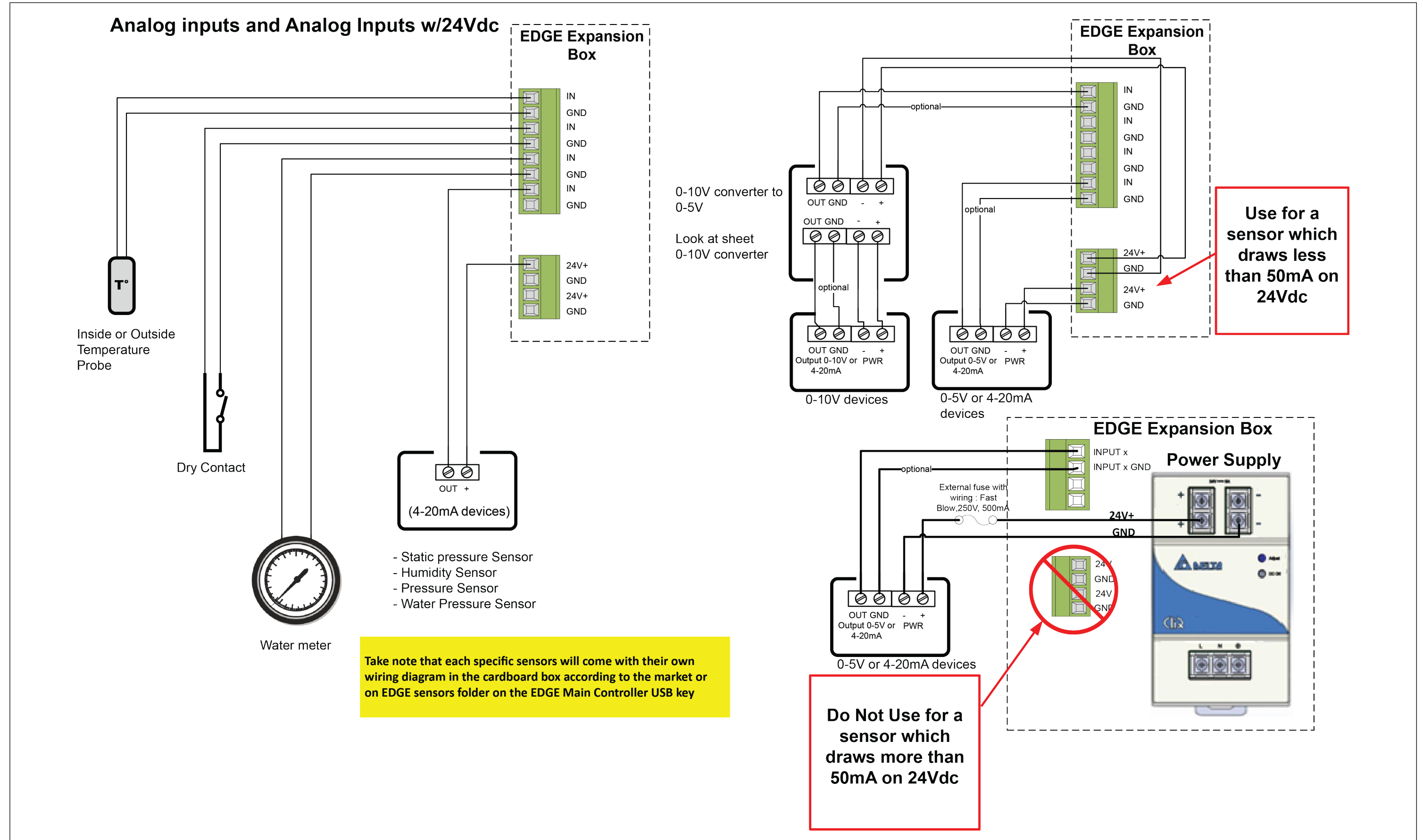


Figure 2-15 0–10V to 0–3.4V Converter Wiring Diagram

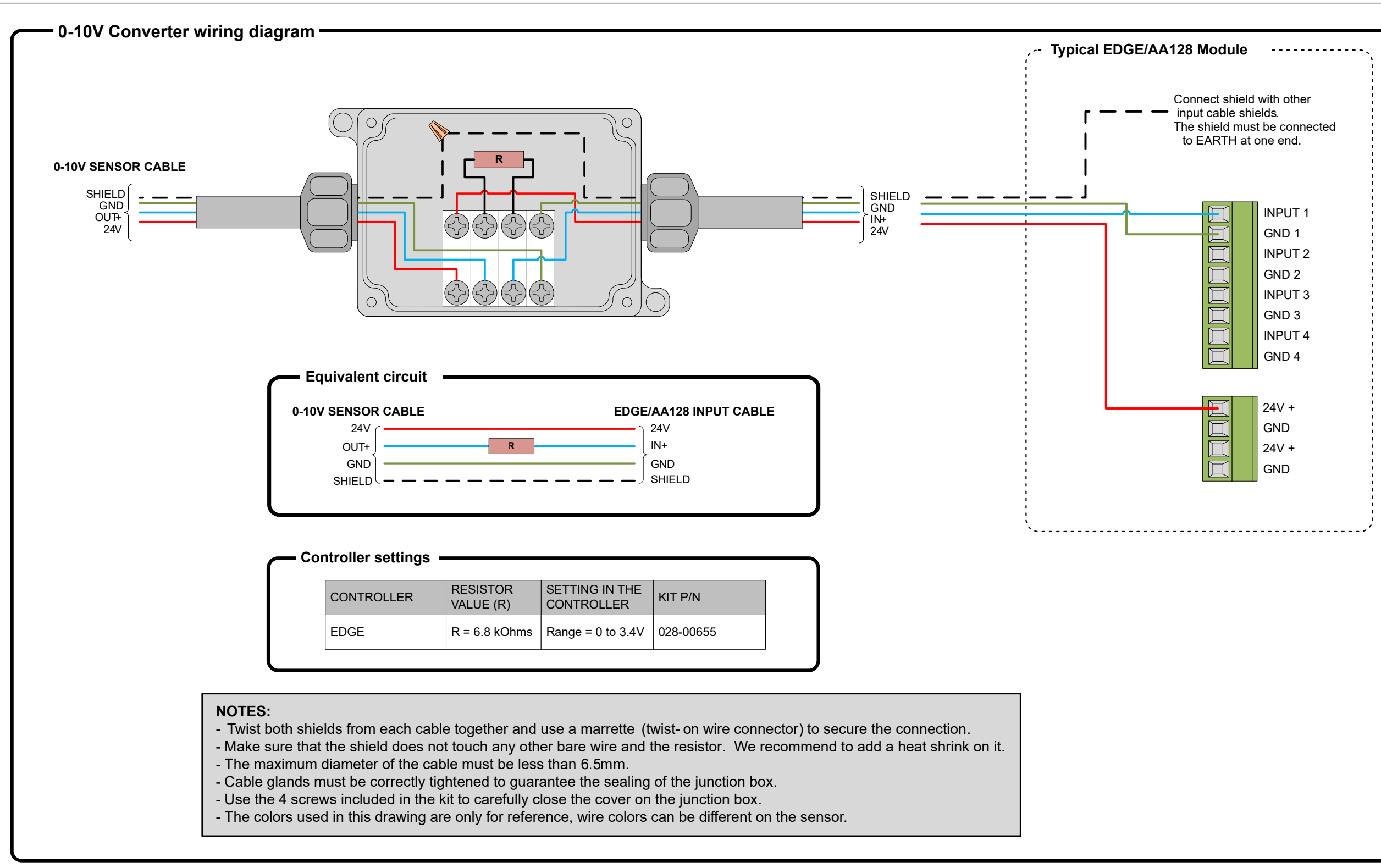


Figure 2-16 Alarm without Redundancy

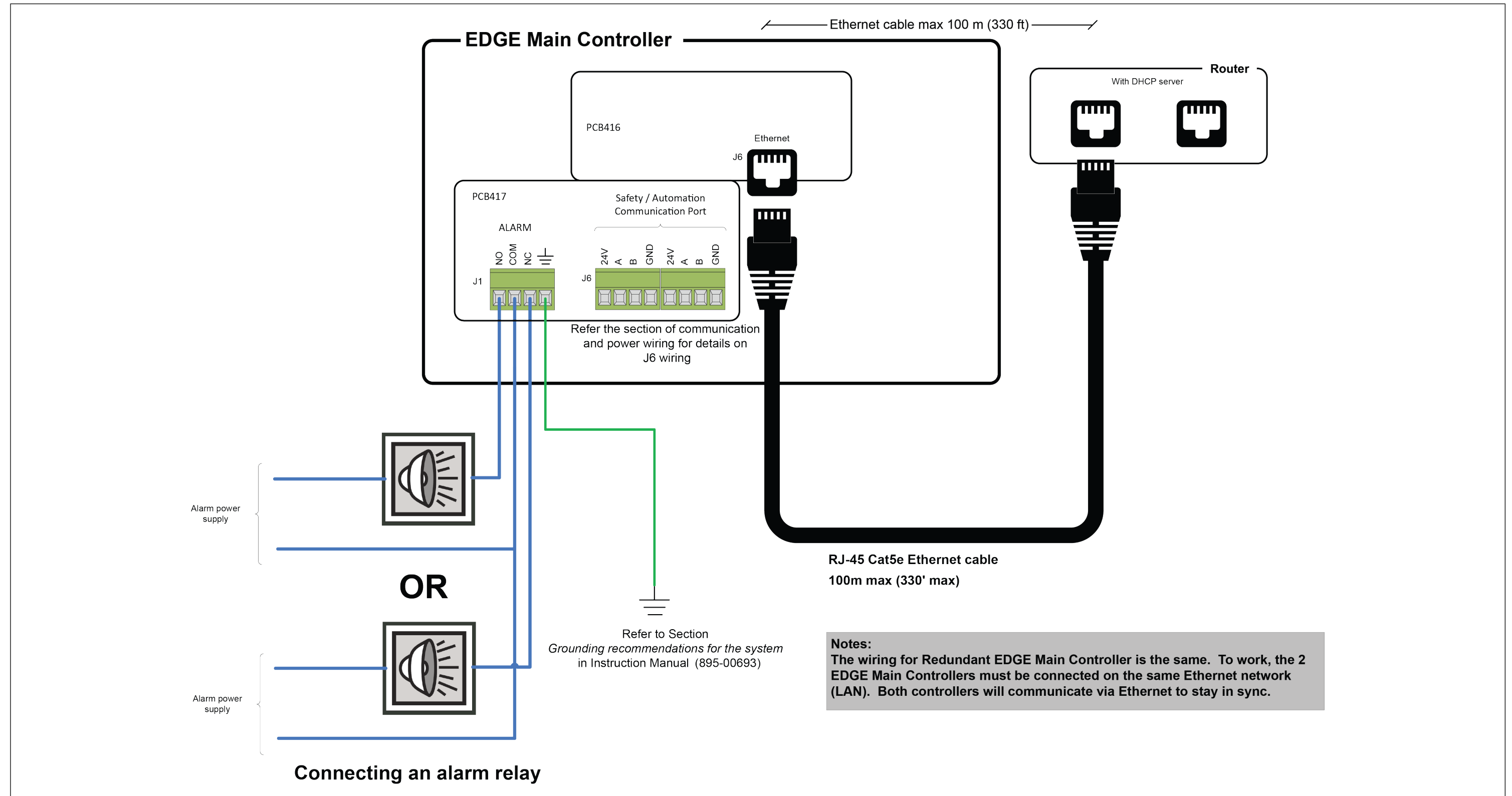
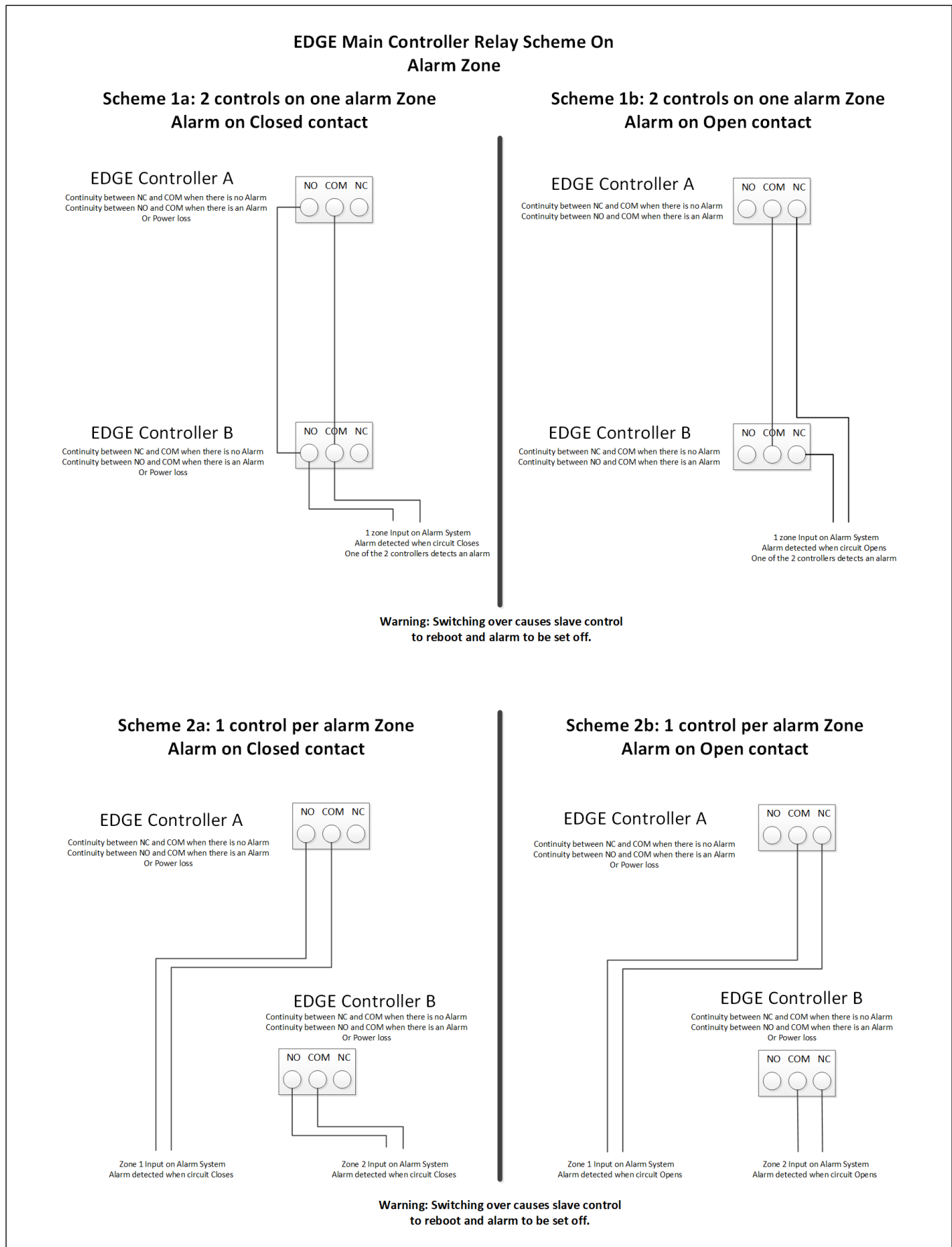


Figure 2-17 Alarm on Redundant Controllers



Chapter 2: Wiring Diagrams

Figure 2-18 Wiring Diagram with a SPST Disconnect Switch

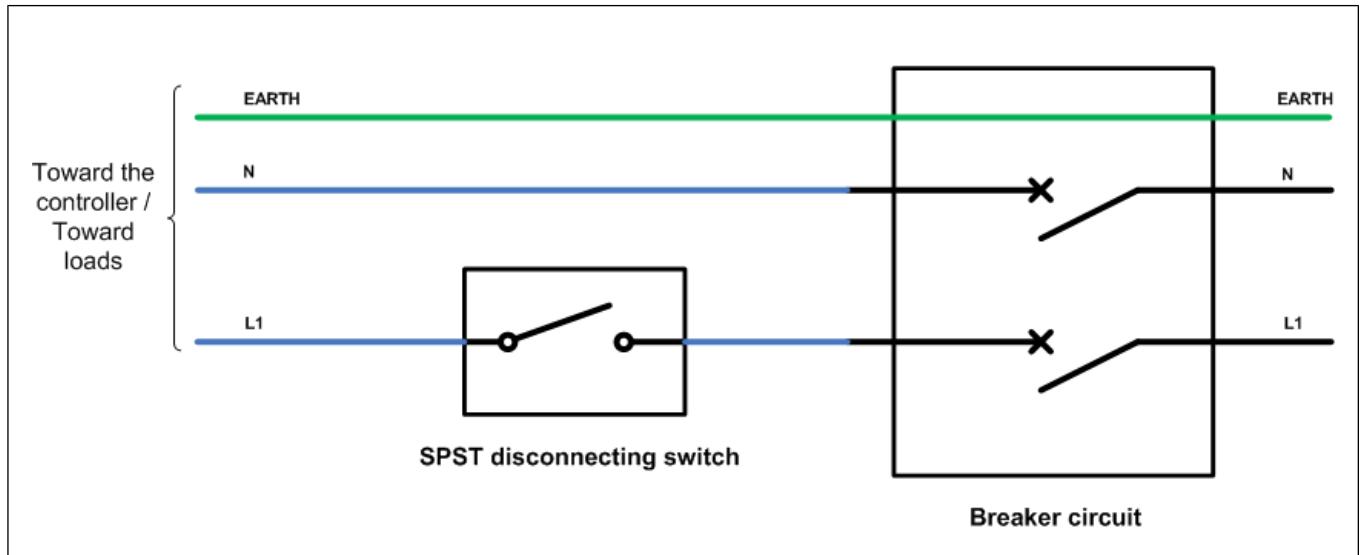


Figure 2-19 Wiring Diagram with a DPST Disconnect Switch

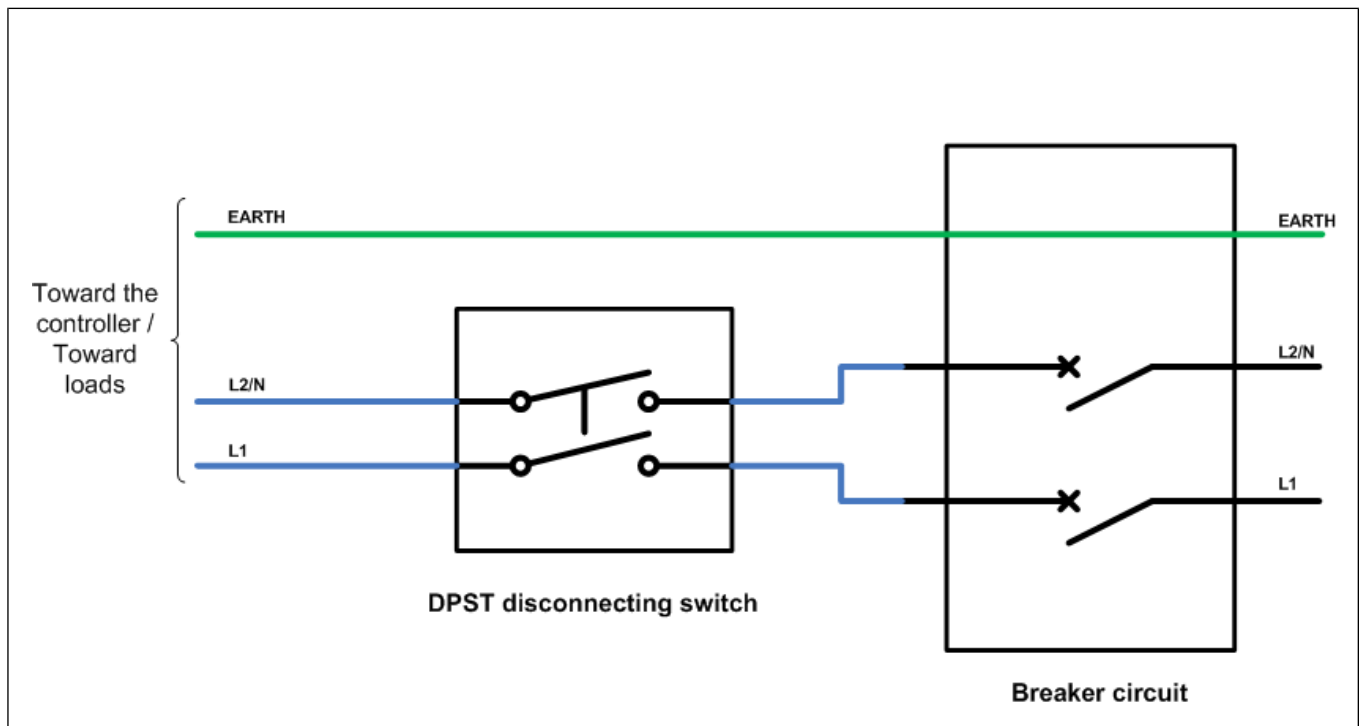


Figure 2-20 ON/OFF Wiring - Load Less than 0.2A

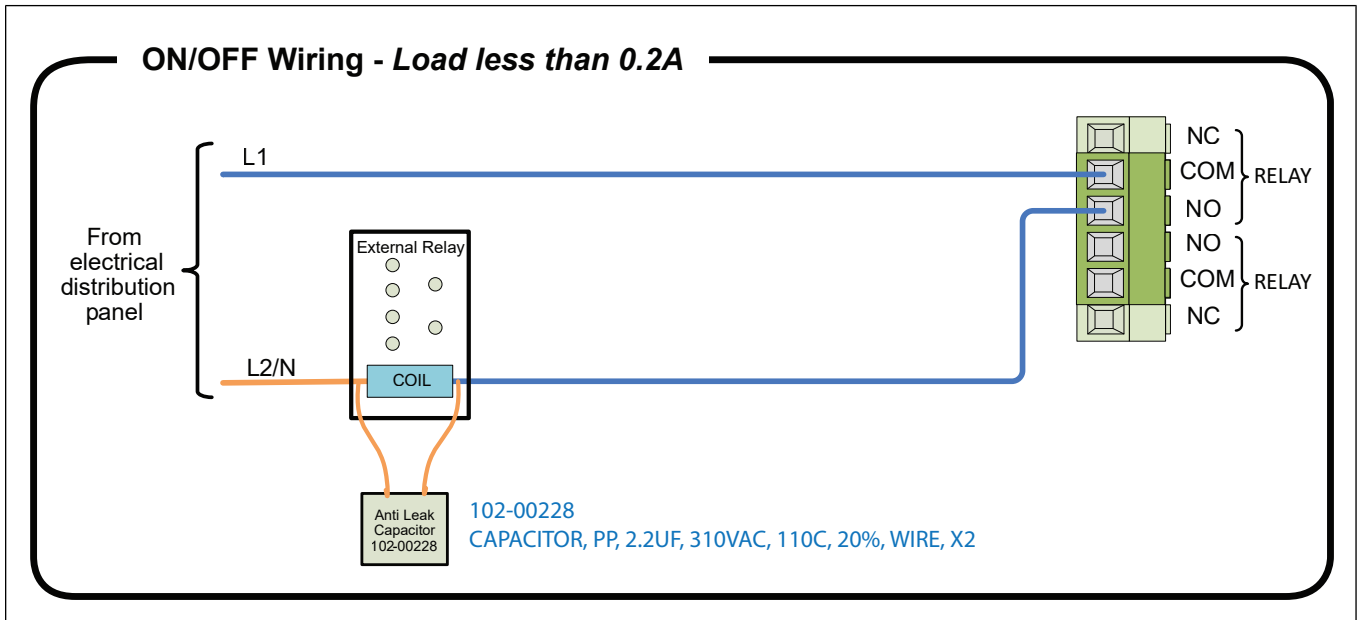


Figure 2-21 ON/OFF Wiring

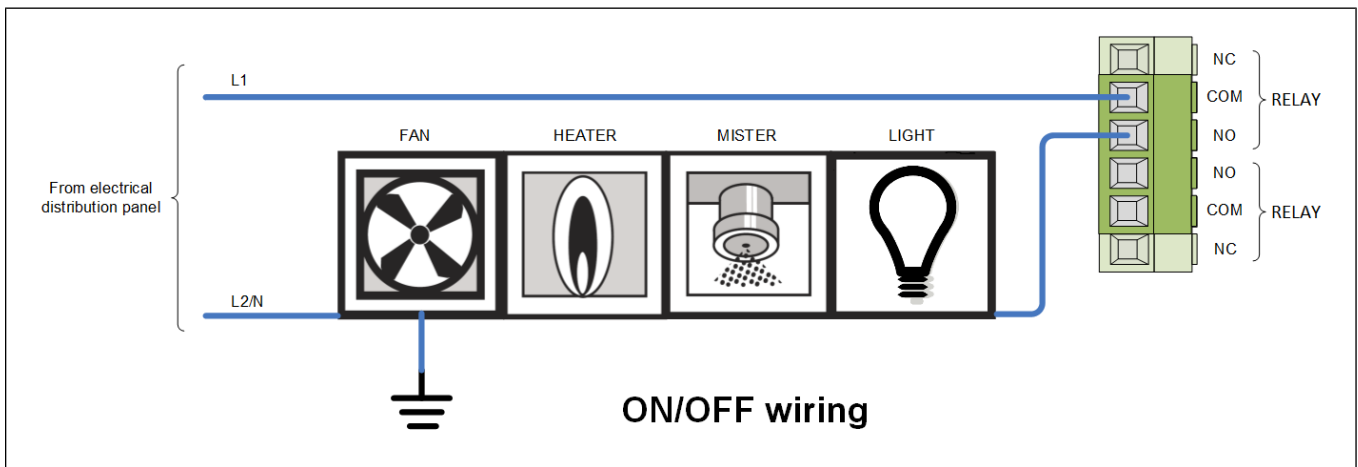


Figure 2-22 On/Off Fail-Safe Wiring

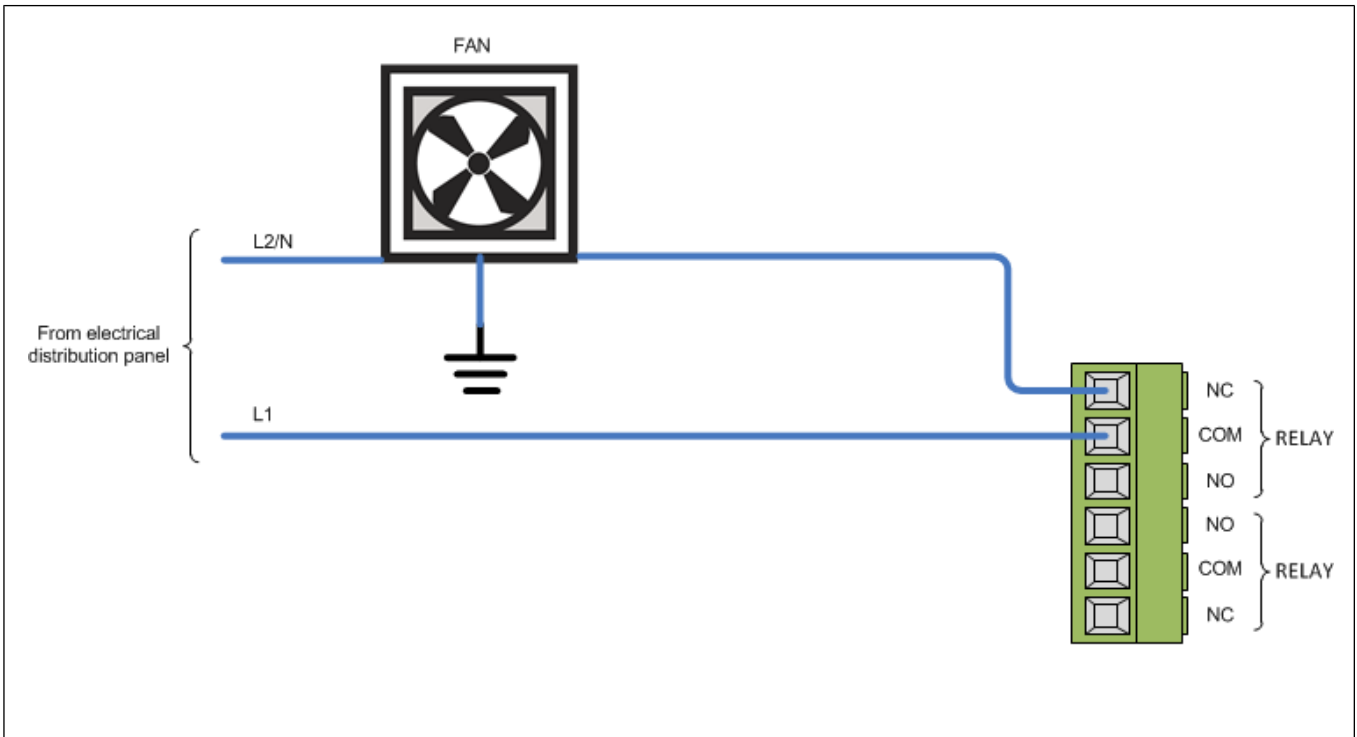


Figure 2-23 Variable 0–10Vdc Wiring

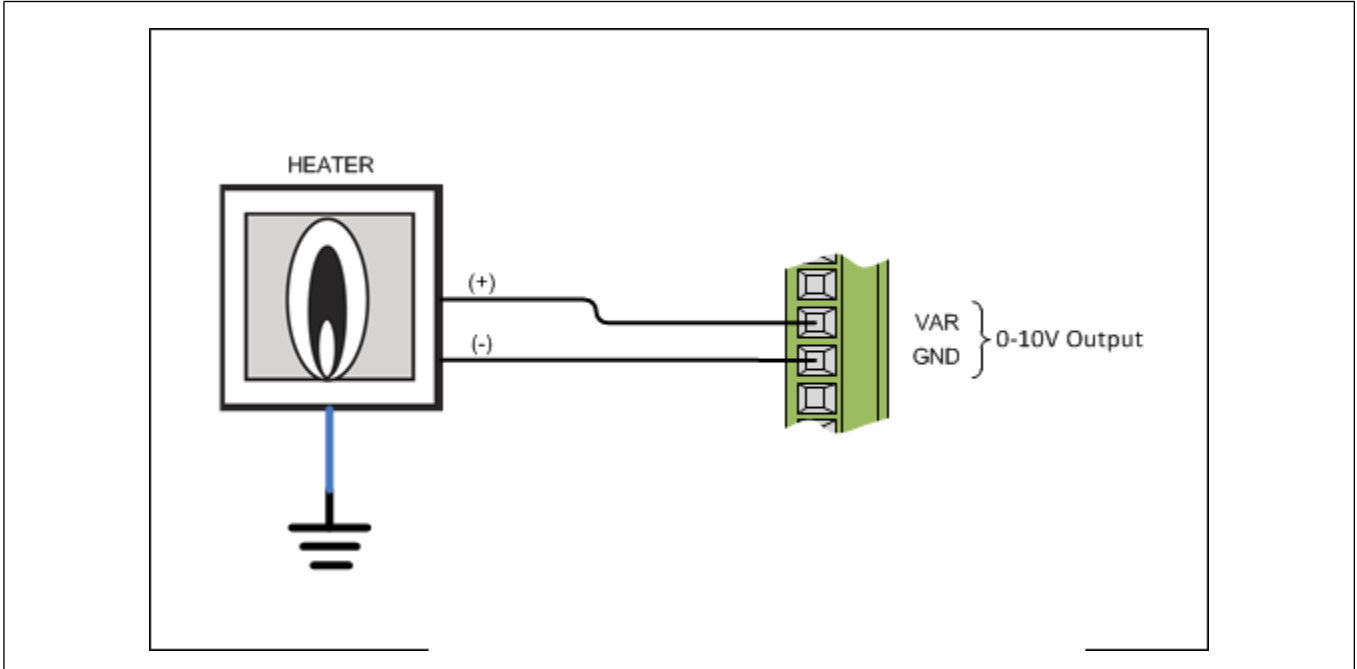


Figure 2-24 EDGE Variable Output (SSR) Wiring

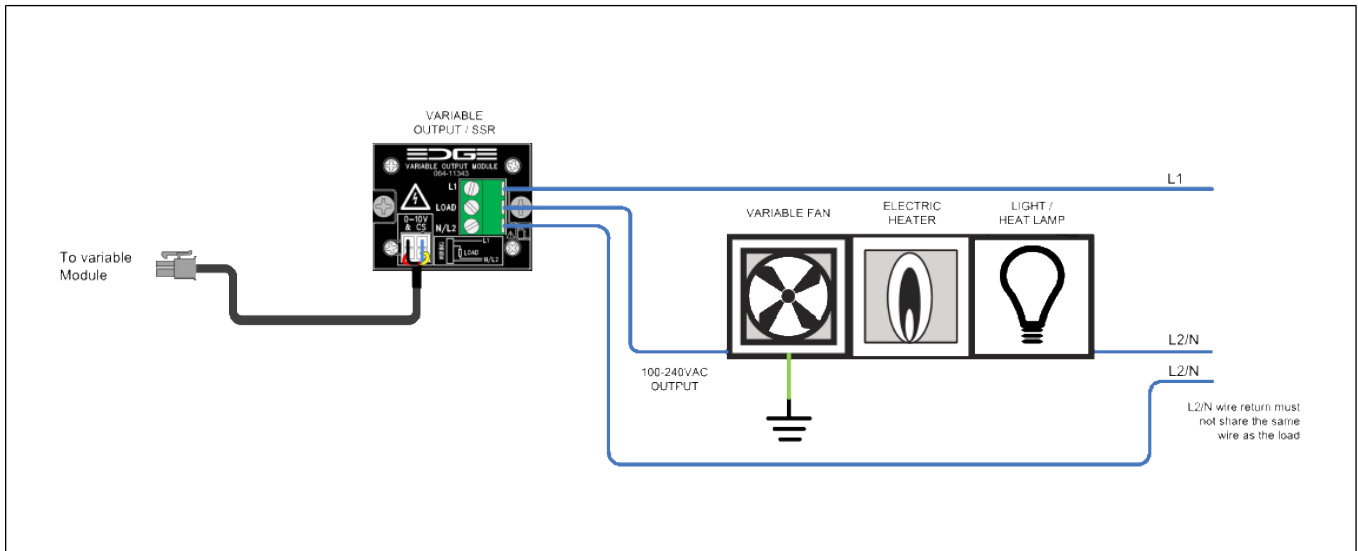


Figure 2-25 Dual Capacity Wiring

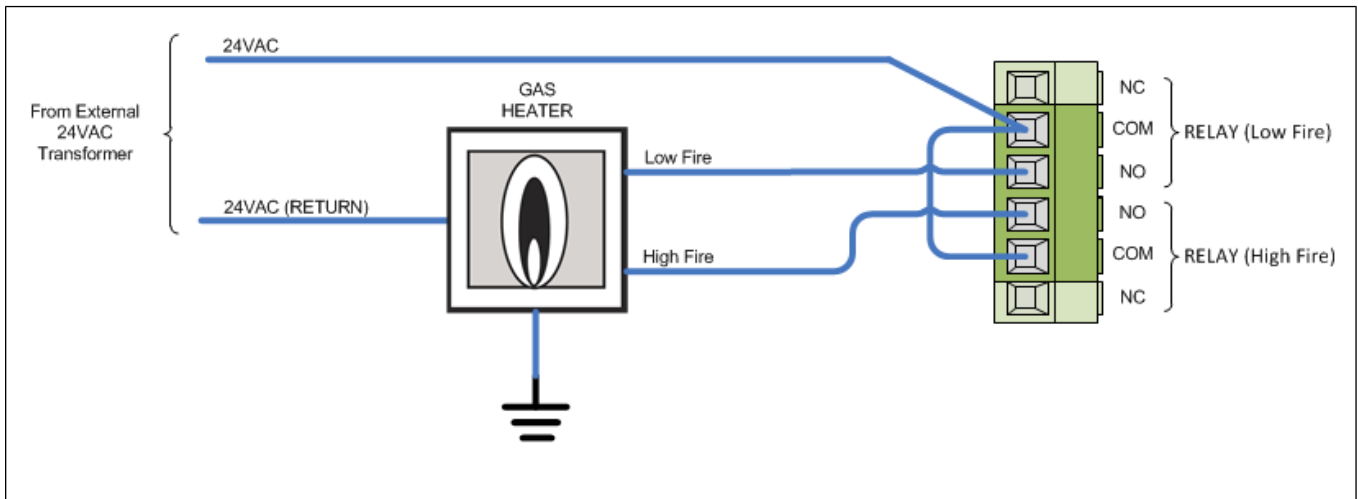


Figure 2-26 Variable with Relay Wiring

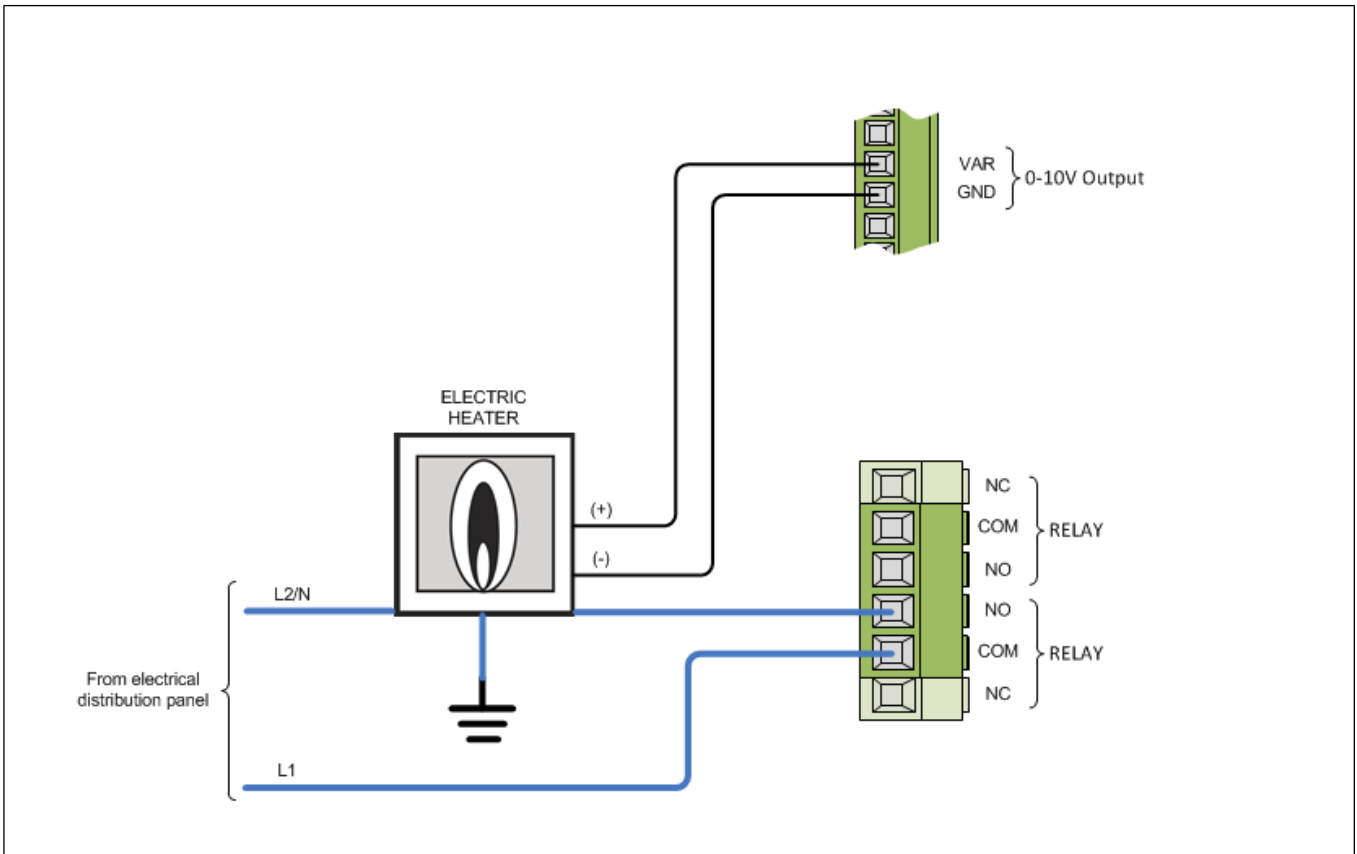


Figure 2-27 Inlet Wiring

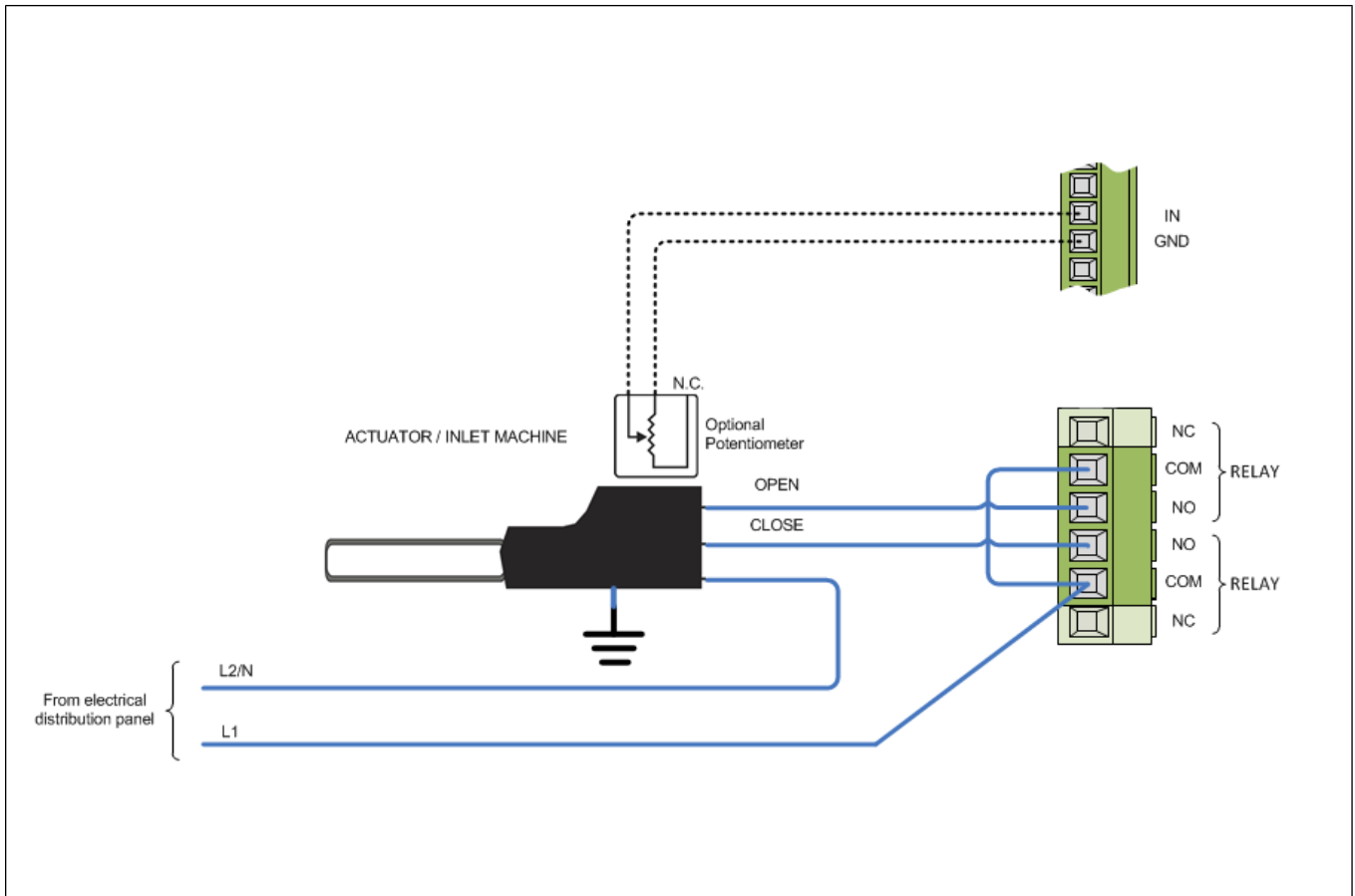
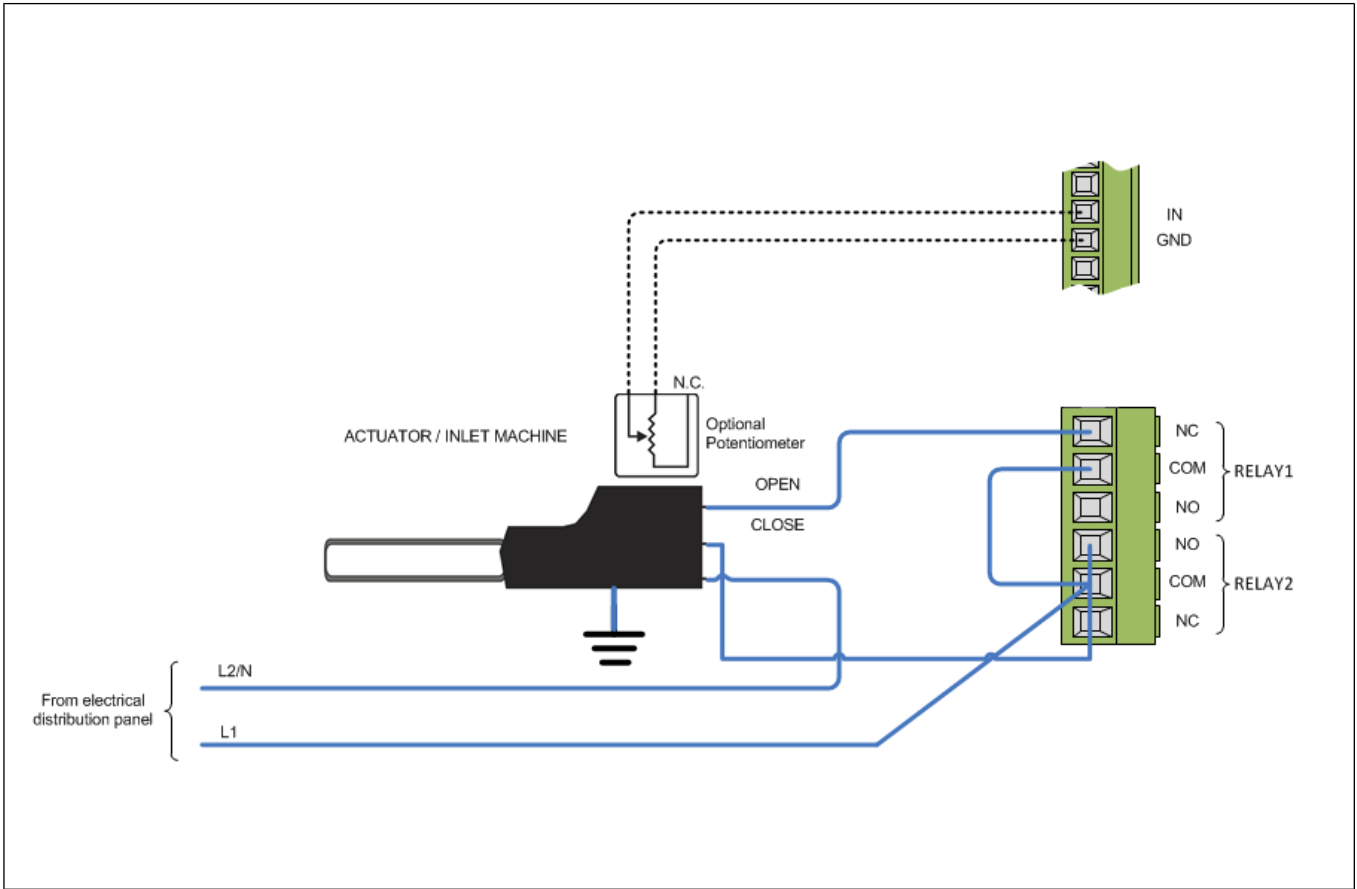


Figure 2-28 Inlet Failsafe Wiring



3 Basic Connections

Topics Covered in this Chapter

- Equipment Wiring Rules for Backup and Failsafe Operation
- Preparing the Enclosures for Installation
- Mounting the Enclosures
- Installing the Plug-In Modules
- Installing the Plug-In Relays
- Installing the EDGE Variable Output
- Installing the EDGE 4IN-2V-8DO Before Wiring
- DC Network and Power Supply Redundancy
- Connecting a Module to the Communication Network
- Connecting the Alarm Relay
- Connecting an Analog Input
- Connecting a Variable 0-10 VDC Output
- Grounding
- Connecting the Power Supply
- Connecting Relay Outputs
- Connecting an EDGE Variable Output module (SSR)
- Connecting Discrete Outputs
- Connecting the Current Sensors of Discrete Outputs

Equipment Wiring Rules for Backup and Failsafe Operation

The EDGE system enters backup mode when communication is lost between the main controller and Expansion Boxes. Once in backup mode, the plug-in modules take over operation of the equipment connected to them. A plug-in module only operate the equipment wired to it, and not equipment on other plug-in cards. When using the EDGE for backup or failsafe operations, there are certain rules you must follow when wiring your equipment.

Wiring for backup operations requiring temperature, static pressure, or relative humidity measurements can be done through the 8I/4V/6R, 16I/6R, 4I/8R and 4I/8REL F modules.

To ensure proper operation of equipment in the event of a main controller malfunction, the following backup operations (in priority order) are recommended.

- Minimum ventilation stage fan outputs
- Minimum ventilation stage inlets
- Intermediate temperature control stage fan outputs (stage 2-3)
- Heater
- Other inlets
- Other fans

- Brooders
- Cooling
- The fan outputs wanted in backup mode must be connected to a module with backup capabilities, and with at least 1 inside temperature probe
- The inlet outputs and potentiometer feedback assigned to backup mode must be connected to a module with backup capabilities, and with the corresponding inlet assigned probes
- The heater outputs wanted in backup mode must be connected to a module with backup capabilities, and with the corresponding heater assigned probes
- The cooling outputs wanted in backup mode must be connected to a module with backup capabilities, and with the corresponding cooling assigned temperature & RH probes
- It is recommended to connect static pressure sensors to the same plug-in module as the controlled inlet machines on a board with backup capabilities to maintain static pressure control mode in backup operation
- The inlet potentiometer must be connected to the same module as the inlet machine
- Do not connect both the opening and the closing of an inlet machine to normally closed (NC) contacts of two different relays
- The open and close outputs of a given inlet must be on the same board
- Heaters must not be connected to the normally closed contact of a relay
- Both outputs on dual capacity heaters (low and high fire) must be connected to the same module
- Both outputs (0-10V and relay) on variable heaters with a starter signal must be connected to the same module
- It is not possible to assign more than one variable output module to a 0-10V output (with their associated current sensor)
- Alarm relays related to temperature should be on the same module as at least 1 of the inside temperature probes
- Alarm relays related to static pressure should be on the same module as static pressure sensors
- Water meter alarm relays used for water shut-off valves should be on the same module as water meters
- Auger run time input and relay should be on same module

Power Supply Redundancy

The EDGE can provide added safety by allowing you to wire the power supplies in a redundant fashion. In this manner, should one supply fail, the others can take over the load for it.

No supply redundancy

- Each Expansion Box must have its own PSU (power supply).
- Only one link is required between controllers
- Only one Expansion Box must supply the Main Controller
- The terminal ground (GND from 24VDC, **Green** color on diagram block) must be connected between controllers

Supply Redundancy

Controllers must be divided by subgroups. Two links are required between controllers

Odd number of Expansion Boxes

- Each Expansion Box must have its own PSU (power supply)
- Each Expansion Box must have the highest PSU (PSU 120W) on it
- Consult the wiring diagrams to know how to connect the 24VDC from PSU
- Controller groups must be divided by subgroups of two Expansion Boxes and the last group must have a subgroup of three Expansion Boxes
- The terminal ground (GND from 24VDC, **Green** color on diagram block) must be connected between controllers on each link

Even number of Expansion Boxes

- Each Expansion Box must have its own PSU (power supply)
- Each Expansion Box must have the highest PSU (PSU 120W) on it
- Consult the wiring diagrams to know how to connect the 24VDC from PSU
- Controller groups must be divided by subgroups of two Expansion Boxes
- The terminal ground (GND from 24VDC, **Green** color on diagram block) must be connected between controllers on each link

See the Quick start guide in document number 895-00692 (891-00516) for more information on both the power supply wired with no supply redundancy and with supply redundancy

Preparing the Enclosures for Installation

Preparing the equipment before mounting it to the wall facilitates manipulation and ensures all parts are ready to be installed.

Before You Begin

The following figures illustrate how to install the wires in the plastic enclosure. Wires are separated into two groups: low voltage and high voltage.

NOTE: *The use of rigid conduits up to 1 inch (25.4 mm) is allowed for the EDGE Main Controller. The use of rigid conduits up to 2 inches (50.8 mm) is allowed for the EDGE 3-Slot Expansion Box and the EDGE 6-Slot Expansion Box.*

Chapter 3: Basic Connections

IMPORTANT: High voltage wires must not be passed through plastic support aeration holes.

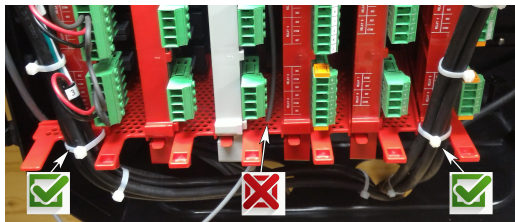


Figure 3-1 EDGE 3-Slot Expansion Box

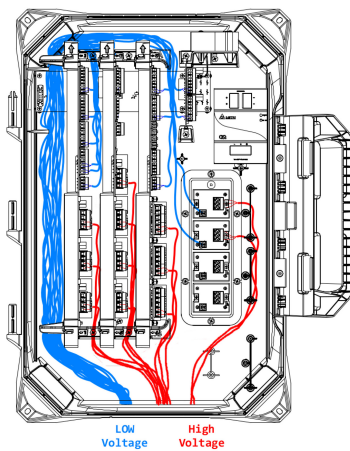
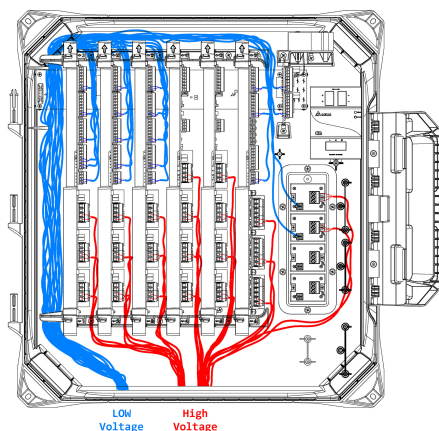


Figure 3-2 EDGE 6-Slot Expansion Box



1. Close the enclosures and lock the latch.
2. Drill a hole the size of the your cable connectors or your rigid conduits at the bottom of enclosure.

3. Open the enclosures and remove the plastic fragments. Remove the cardboards marked "Remove it" from the EDGE 3-Slot and 6-Slot Expansion Boxes.
4. Install the cable connectors or rigid conduit adaptors to the bottom of each enclosure.
5. Close the enclosures and lock the latch.

IMPORTANT: *Leave the rated clearance to allow the cover to be removed for maintenance*

Remember

Do not mount the enclosures directly onto the drywall. If the supporting structure behind the drywall cannot support the enclosures, solidify it by adding a wooden or metal frame.

Mounting the Enclosures

Securely mounting the enclosures to the wall in the ideal location allows for an optimal use of the system when navigating the menus.

Before You Begin

NOTICE

When using outdoor connections, mount the enclosure as close as possible to the entry point of the wiring

IMPORTANT: *The enclosures must be mounted near an AC Power with a disconnecting switch*

IMPORTANT: *Mount the system into a wooden or metal frame. Do not mount the system directly into the drywall*

NOTE: *Install the enclosures (EDGE Main Controller, 3-Slot Expansion Box, 6-Slot Expansion Box) with the hinges on the left hand side when facing the enclosure.*

NOTE: *AP/Cumberland recommends this kind of screw: Flange Head Lag Screw for Wood, Hot-Dipped Galvanized Steel, 1/4" Diameter, 2" Long.*

1. Place the enclosure at a height at which you can properly see the screen.
2. Verify that all enclosures open easily.

IMPORTANT: *Leave a clearance as stated in **Clearance around the system** to allow the cover to be removed for maintenance.*



To avoid injury, ask for help to install the enclosures.

Installing the Plug-In Modules

When you buy a complete Expansion Box, the plug-in modules that come with it are already installed in the Expansion Box. When you buy a new plug-in module and you are ready to start using it, you must install it in the Expansion Box correctly to ensure proper operation.

What You Should Know



Installation must only be performed by qualified service personnel.



Wear appropriate grounding devices such as an anti-static wristband to service the system.

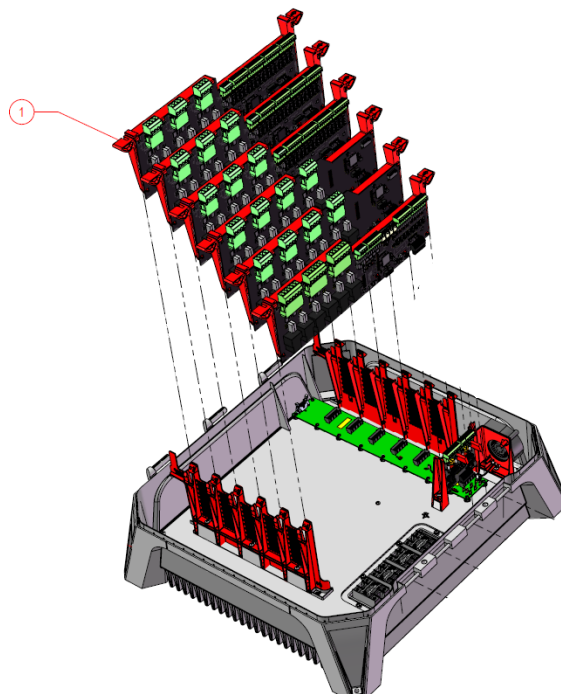


Lock the enclosure once the wiring is completed or when servicing. Use the included nut and bolt or a padlock (not included) to lock the enclosure.



Before servicing the system, disconnect the main voltage supply.

1. Unlock the Expansion Box and open the plastic cover.
2. Disconnect the main voltage supply and ensure the box is completely powered down.
3. Locate the plug-in module slot where you need to add the plug-in module.



4. Position the plug-in card so that it is aligned with the black connector on the backplane, and so the red plastic handle aligns in the slots.
5. When the plug-in module is correctly aligned, press the card into the slot, ensuring the red plastic carrier is locked in place at both the top and bottom.

6. Make all the necessary wiring connections to the plug-in module.
7. Reconnect the main supply voltage, and ensure all equipment turns on correctly.

NOTICE

*For the terminal blocks connected on the power relays, use a tightening torque from 0.7N*m (6.2lbf*in) to 0.8N*m (7lbf*in) to fasten a wire gage from 10AWG to 14AWG. For the small terminal blocks used for inputs and low voltage outputs, use a tightening torque from 0.5N*m (4.43lbf*in) to 0.6 N*m (5.2lbf*in) to fasten a wire gage from 16AWG to 18AWG.*

Installing the Plug-In Relays

When a new Expansion Box is ordered, the plug-in relays are already installed on the plug-in modules that are installed in the enclosure. If you need to either add a plug-in relay or replace an existing one, you must do so correctly in order to ensure the proper functioning of the system.

What You Should Know



Installation must only be performed by qualified service personnel.

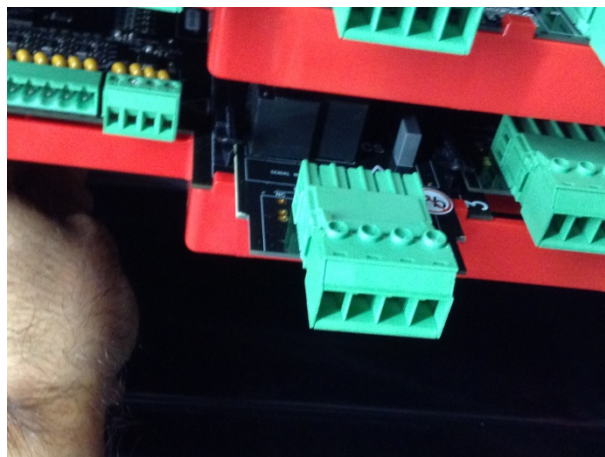


Wear appropriate grounding devices such as an anti-static wristband to service the system.



Before servicing the system, disconnect the main voltage supply.

1. Remove the nut and bolt, and then open the plastic cover on the Expansion Box.
2. Disconnect the main voltage supply and ensure the box is completely powered down.
3. Locate the plug-in relay slot where you need to add the plug-in relay.



4. Align the plug-in relay with the card guide on the main plug-in card

5. When the plug-in relay is correctly aligned, apply pressure on the middle part of the plug-in relay until it is locked in place.
6. Wire the new plug-in relay.
7. Reconnect the main supply voltage, and ensure all equipment turns on correctly.

NOTICE

*For the terminal blocks connected on the power relays, use a tightening torque from 0.7N*m (6.2lbf*in) to 0.8N*m (7lbf*in) to fasten a wire gage from 10AWG to 14AWG. For the small terminal blocks used for inputs and low voltage outputs, use a tightening torque from 0.5N*m (4.43lbf*in) to 0.6 N*m (5.2lbf*in) to fasten a wire gage from 16AWG to 18AWG.*

Installing the EDGE Variable Output

When an EDGE Variable Output kit is ordered, the EDGE Variable Output comes with a low voltage cable control. The EDGE Variable Output kit can be installed in an EDGE 3-Slot Expansion Box, in an EDGE 6-Slot Expansion Box, in an EDGE Power Module.

NOTICE

The EDGE 3-Slot Expansion Box plastic enclosure or an EDGE 6-Slot Expansion Box plastic enclosure or an EDGE Power Module plastic enclosure are not provided when an EDGE Variable Output kit is ordered.

What You Should Know



Installation must only be performed by qualified service personnel.



Wear appropriate grounding devices such as an anti-static wristband to service the system.



Before servicing the system, disconnect the main voltage supply.

1. From the EDGE Variable Output kit packaging, Open and remove the EDGE Variable Output kit from the packaging.
2. Remove the “Post it (item 4)” from the EDGE Variable Output(s).



Take care to not remove the thermal pad when the “Post it” are removing from the thermal pad.

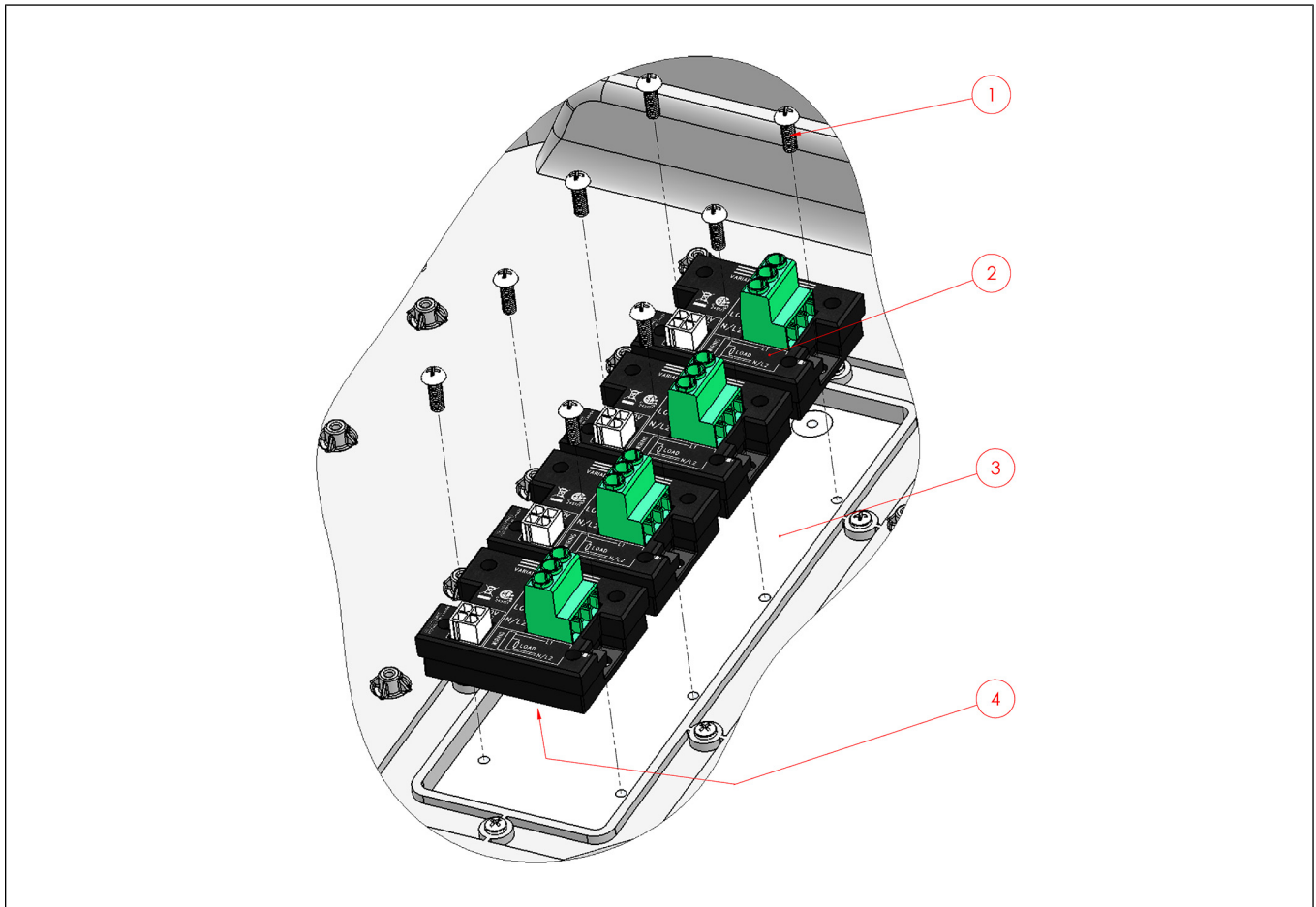


Take care to not damage the thermal pad when the “Post it” are removing from the thermal pad.



Take care to not contaminate the thermal pad when the “Post it” are removing from the thermal pad.

3. Align and place the EDGE Variable Output(s) at the right place. Put the biggest terminal block at the right side when the lock plastic from the finished product is at your right when you are in front of the finished product. Start by placing the first Variable Output(s) front the top.





Take care to not damage the thermal pad when placing the EDGE Variable Output on the heatsink.



Take care to not contaminate the thermal pad when positioning the EDGE Variable Output on the heatsink.

4. After placing the EDGE Variable Output on the heatsink, screw the screws with a Philip screw drivers with the tightening torque at 15.9lbf*in (1.8N*m).
5. Connect the low voltage control cable provided with your kit from the EDGE Variable Output to the Expansion card module.

Installing the EDGE 4IN-2V-8DO Before Wiring

When an EDGE 4IN-2V-8DO is ordered, the EDGE 4IN-2V-8DO is already installed on the Din Rail plastic support. The EDGE 4IN-2V-8DO must be installed in a cabinet with Din Rails.

NOTICE

The cabinet is not provided when an EDGE 4IN-2V-8DO is ordered.

IMPORTANT: *Keep a minimum distance of 4 inches (100mm) from the contactor or the relay at each side of the EDGE 4IN-2V-8DO. Refer to the EDGE 4IN-2V-8DO wiring diagram.*

**WARNING**

Installation must be performed by qualified service personnel.

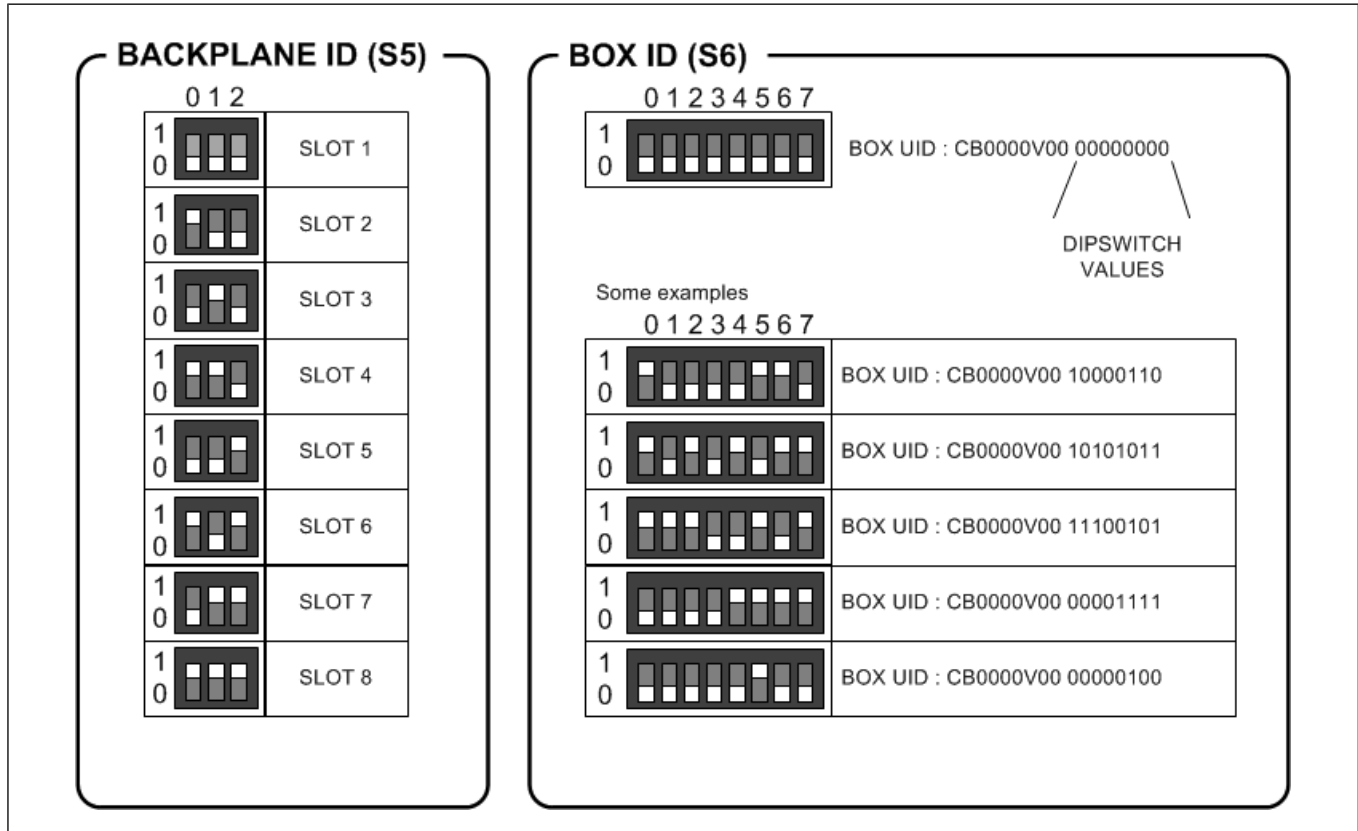
**WARNING**

Wear appropriate grounding devices such as an anti-static wristband to service the system.

**CAUTION**

Before servicing the system, disconnect the main voltage supply.

1. Remove the EDGE 4IN-2V-8DO from its packaging.
2. Align the clips of the din rail plastic support of the EDGE 4IN-2V-8DO with the din rail.
3. Place the top clips first, and then press on the bottom part of the plastic support to fasten the bottom clips.
4. Set the dipswitches of the EDGE 4IN-2V-8DO as follows:



NOTE: We recommend using one box ID per electrical panel where modules are installed. Each module will have the same box ID, but a different slot number.

NOTE: A maximum of 8 modules can have the same box ID. For example, if the electrical panel contains 18 modules, 3 box IDs must be used: one for modules 1 to 8, a second one for modules 9 to 16, and a last one for module 17 and 18.

NOTE: The box IDs of the modules are displayed on the EDGE once they are detected.

NOTE: Consult the cabinet’s manual about how to seal it.

DC Network and Power Supply Redundancy

Three possible configurations are available: No supply redundancy, supply redundancy with an odd number of Expansion Boxes, supply redundancy with an even number of Expansion Boxes. Look at the paragraph [Equipment Wiring Rules for Backup and Failsafe Operation, page 47](#) to understand the supply redundancy concept. In the supply redundancy concept, the subgroup concept is very important. Depending on the DC network chosen, select the right wiring diagram for installation.

EDGE 4IN-2V-8DO NOTE : The same configurations are available on the EDGE 4IN-2V-8DO. The power supply redundancy concept is the same than an Expansion Box.

NOTICE

The recommended installation wire gauge is 16 AWG (diameter of 1.29mm or cross sectional area of 1.30mm²) for the power supply wires at a length of 300 meters (1000 feet). At the minimum gage (18AWG) for the power supply wires, the maximum wires length is 150 meters (500 feet) . The recommended installation wire gauge is 18 AWG (diameter of 1.02mm or cross sectional area of 0.82mm²) for the communication wires at a length of 1200 meters (4000 feet). The cable must be twisted pair and shielded. The EDGE 3-Slot Expansion Box and the 6-Slot Expansion Box can supply up to 5 amperes to the modules.



Insulation on conductors must be rated for 600 Volts and 90°C (194°F).



Installation must only be performed by qualified service personnel.



When choosing the supply redundancy option, only one Expansion Box must supply the Main Controller, and controller groups must be divided by subgroups of two Expansion Boxes plus one group of three Expansion Boxes if the number of controller is odd



When choosing the no supply redundancy option, do not forget to wire the GND (GND from 24VDC, green color on diagram block) between each controller.

NOTICE

EDGE network cables have to use class 1 load type. AP/Cumberland recommends using TC-ER cable type.

NOTICE

Refer to the Wiring Methods and Materials section from the National Electric Code to use the correct wire for the installation.

NOTICE

TC-ER conductors in sizes 18 AWG and 16 AWG shall be type FFH-2, KF-2, KFF-2, PAF, PAFF, PF, PFF, PGF, PGFF, PTF, PTFF, RFH-2, RFHH-2, RFHH-3, SF-2, SFF-2, TF, TFF, TFFN, TFN, ZF, or ZFF. Conductor with other types and thicknesses of insulation shall be listed for Class 1 load circuit use.

NOTICE

For the small terminal blocks used for inputs and low voltage outputs, use a tightening torque from 0.5N*m (4.43lbf*in) to 0.6 N*m (5.2lbf*in) to fasten a wire.

Connecting a Module to the Communication Network

The communication bus enables communication between the EDGE Main Controller and the EDGE modules (terminal A and terminal B on the Automation network or the Safety network). There are two communication networks available. One of them serves as a backup network.

1. Locate the terminals **Automation or Safety** on the module you want to connect to the EDGE 3-Slot or 6-Slot Expansion Box or EDGE 4IN-2V-8DO.

Chapter 3: Basic Connections

NOTE: You should always use the **Automation** network, unless you have redundant main controls.

2. Connect the wires from the module to the EDGE 3-Slot or 6-Slot Expansion Boxes or EDGE 4IN-2V-8DO.

IMPORTANT: Make sure to connect same identifications together and use the same network from one side to the other.

IMPORTANT: The communication network must be installed in a daisy chain topology. Consult the wiring diagrams to see the maximum cable distance according to the wire gauge.

NOTICE

The recommended installation wire gauge is 16 AWG (diameter of 1.29mm or cross sectional area of 1.30mm²) for the power supply wires at a length of 300 meters (1000 feet). The recommended installation wire gauge is 18 AWG (diameter of 1.02mm or cross sectional area of 0.82mm²) for the communication wires at a length of 1200 meters (4000 feet). The cable must be twisted pair and shielded.



Installation must only be performed by qualified service personnel.



Insulation on conductors must be rated for 600 Volts and 90°C (194°F).

NOTICE

For the small terminal blocks used for inputs and low voltage outputs, use a tightening torque from 0.5N*m (4.43lb*in) to 0.6 N*m (5.2lb*in) to fasten a wire.

NOTICE

EDGE network cables have to use class 1 load type. AP/Cumberland recommends using TC-ER cable type.

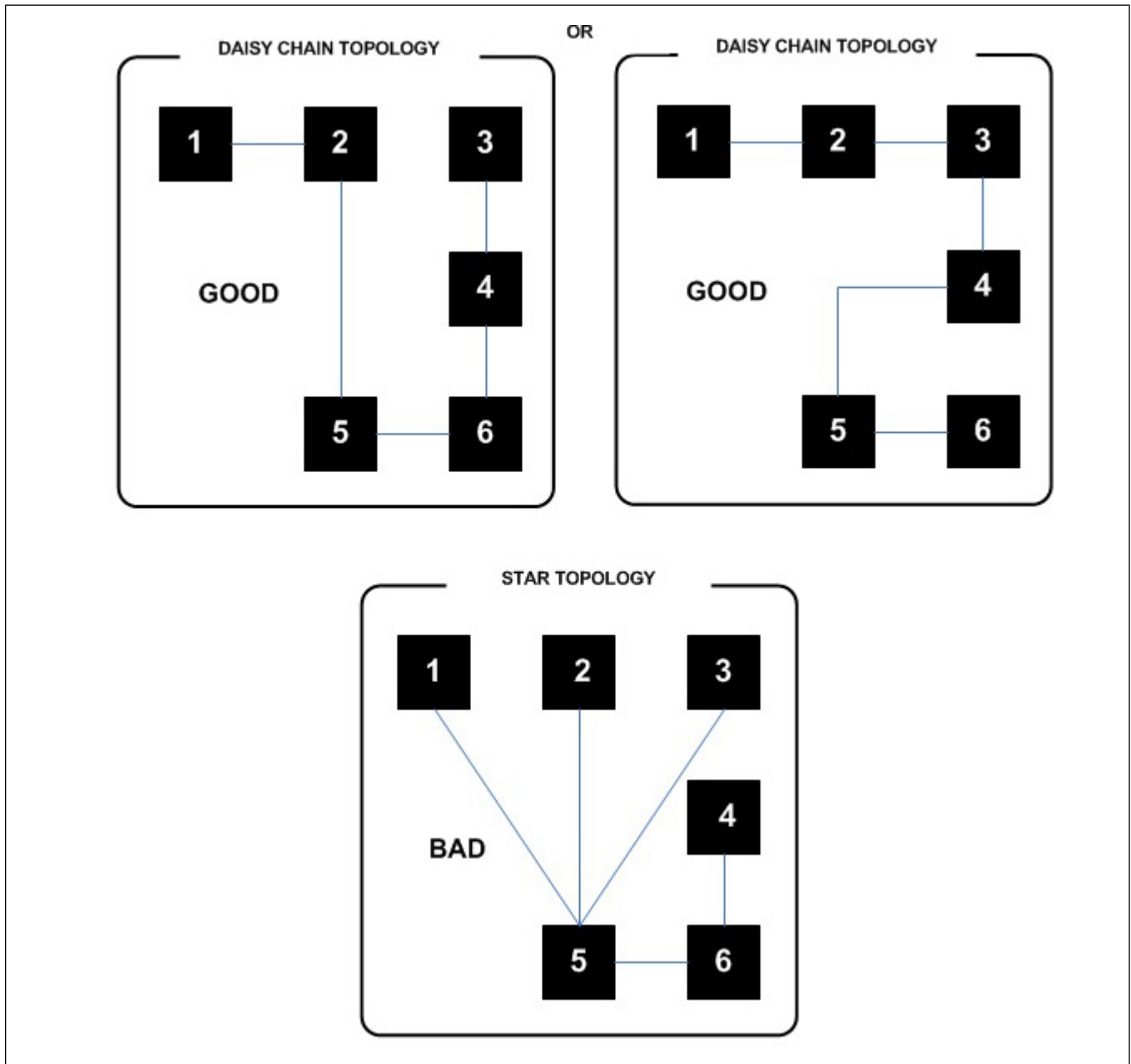
NOTICE

Refer to the Wiring Methods and Materials section from the National Electric Code to use the correct wire for the installation.

NOTICE

TC-ER conductors in sizes 18 AWG and 16 AWG shall be type FFH-2, KF-2, KFF-2, PAF, PAFF, PF, PFF, PGF, PGFF, PTF, PTF, RFH-2, RFHH-2, RFHH-3, SF-2, SFF-2, TF, TFF, TFFN, TFN, ZF, or ZFF. Conductor with other types and thicknesses of insulation shall be listed for Class 1 load circuit use.

The communication network must be installed in a daisy chain topology. The order of the wires is very important. At both ends of network, the End-of-Line must be activated. If the wiring can't be done in a single chain, you might need to deactivate the end-of-line (EOL) resistor to improve communication. AP/Cumberland does not warranty the proper operation if the topology network is not daisy chain.



Connecting the Alarm Relay

1. Locate the **ALARM** terminals on the EDGE Main Controller.
2. Connect the voltage source wire needed to switch in the terminal block named **ALARM – COM**.
3. Connect one load from the Alarm output: terminal **ALARM - NO** or terminal **ALARM – NC**.
4. From the load, connect to the 24 VDC return.

Refer to the wiring diagrams for more information.

IMPORTANT:

- *The maximum voltage on the relay outputs is 24 VDC with a maximum current of 1.5 A.*
- *The minimum permissible load on the relay outputs is 0.1A.*
- *Refer to the local building code to determine the type and quality of cable required.*

NOTICE

If a siren is used, the siren output must not exceed 120 decibels. Use an external power supply to the siren.

NOTICE

*For the small terminal blocks used for inputs and low voltage outputs, use a tightening torque from 0.5N*m (4.43lb*in) to 0.6 N*m (5.2lb*in) to fasten a wire gage from 16AWG to 18AWG.*



Installation must only be performed by qualified service personnel.

Connecting an Analog Input

A variety of different sensors can be hooked up to the system to monitor various inputs. Analog inputs can be set in 0-5V mode, in dry contact mode, in 4-20mA mode, and in temperature mode. Some examples of sensors that you can use with the system: temperature probes, humidity probes, static pressure probes, water meters, dry contacts.

What You Should Know

The most common sensors used in a livestock room/barn (like temperature sensor, relative humidity sensor and static pressure transmitter) are already part of the built-in equipment list. The specifications are automatically set when such a sensor is configured.

NOTE: *A minimum wire gauge of 18 AWG (diameter of 1.02mm or cross sectional area of 0.82mm²) is required for proper operation. The maximum cable length allowed (including cable extensions) is 150 m (500 feet). The cable must be twisted and shielded. Sensors needing a DC supply have the possibility to use 24 VDC outputs. Ensure to use the 24 VDC returns close to each 24 VDC output. The maximum current of each 24 VDC output is 50 mA.*



Installation must only be performed by qualified service personnel.

IMPORTANT: *Make sure each sensor is connected to the proper GND. False alarms can result if the wires are not properly connected.*



Disconnect supply before servicing.



Lock the enclosure when wiring is complete or when servicing. Use the nut and bolt included or a padlock (not included) to lock the enclosure.



For the small terminal blocks used for inputs and low voltage outputs, use a tightening torque from 0.5N*m (4.43lbf*in) to 0.6 N*m (5.2lbf*in) to fasten a wire gage from 16AWG (diameter of 1.29mm or cross sectional area of 1.30mm²) to 18AWG (diameter of 1.02mm or cross sectional area of 0.82mm²).

Refer to the wiring diagrams for more information.

Connecting a Variable 0-10 VDC Output

The terminals used for 0-10 VDC outputs are named VAR (x) on the plug-in module. 0-10 VDC output returns are named GND (x) for outputs VAR (x). The maximum current of each 0-10 VDC output is 20 mA. The output impedance must be at least 50 Ohms. There are only a total of four 0-10V outputs on a card. You can either use these to internally control the EDGE variable modules, or to externally control another device. For each of these four outputs, you can only use the 0-10VDC output terminals OR the white variable output module (SSR) connector, not both.

What You Should Know

NOTE: A minimum wire gauge of 18 AWG (diameter of 1.02mm or cross sectional area of 0.82mm²) is required for proper operation. The maximum cable length allowed (including cable extensions) is 150 m (500 feet). The cable must be twisted and shielded. The maximum current of each 0-10 VDC output is 20 mA. The output impedance must be at least 50 Ohms. The 0-10 VDC output follows the variable output module (SSR). Each 0-10 VDC is in parallel with a 0-10 VDC variable output module (SSR) control output.

NOTE: The maximum current of each 0-10 VDC output is 100 mA on the EDGE 4IN-2V-8DO.

IMPORTANT: Make sure each 0-10 VDC output is connected to the proper GND. False alarms can result if the wires are not properly connected.



Installation must only be performed by qualified service personnel.



Disconnect supply before servicing.



Lock the enclosure when wiring is complete or when servicing. Use the nut and bolt included or a padlock (not included) to lock the enclosure.

NOTICE

*For the small terminal blocks used for inputs and low voltage outputs, use a tightening torque from 0.5N*m (4.43lb*in) to 0.6 N*m (5.2lb*in) to fasten a wire gage from 16AWG to 18AWG.*

Refer to the wiring diagrams for more information.

Grounding

Grounding is installed as a factory default. The protective Earth is only required in the Expansion Boxes. The protective Earth connector is located close to the panel mount power supply inside the Expansion Boxes.

NOTICE

*For the Protective Earth terminal block, use a tightening torque from 0.7N*m (6.2lb*in) to 0.8N*m (7lb*in) to fasten a wire gage from 10AWG (diameter of 2.58mm or cross sectional area of 5.26mm²) to 14AWG (diameter of 1.62mm or cross sectional area of 2.08mm²).*

The Main Controller and the EDGE 4IN-2V-8DO only need a functional Earth.

NOTICE

*For the Earth terminal block on EDGE Main Controller, use a tightening torque from 0.5N*m (4.43lb*in) to 0.6 N*m (5.2lb*in) to fasten a wire gage from 14AWG (diameter of 1.62mm or cross sectional area of 2.08mm²) to 16AWG (diameter of 1.29mm or cross sectional area of 1.30mm²) ..*

NOTICE

*For the Earth terminal block on the EDGE 4IN-2V-8DO, use a tightening torque at 0.8N*m (7lb*in) to fasten a wire.*



If rigid metal tubes are used, ensure the rigid tubes are correctly grounded.

Connecting the Power Supply

Before You Begin

IMPORTANT: *Install a disconnect switch to interrupt Power to L1 and N/L2 electric Power lines before connecting the system's main input on the power supply. It must be in close proximity to the equipment and within easy reach of the operator. It must be marked as the disconnecting device for the equipment.*



If the disconnect switch or the circuit breaker is used as a sectioning device, the device must be correctly identified with which function of the controller opens the circuit. The Off or Stop and On position must be clearly identified on the sectioning device.

AP/Cumberland recommends using a DPST disconnecting switch in series with a breaker. In the case of the use of a SPST disconnecting switch, connect the SPST disconnecting switch to cut the hot line with a neutral circuit case.

IMPORTANT: *The SPST disconnecting switch circuit is allowed only in North America under 120Vac. Over 120Vac in North America and whatever the voltage in International markets, only the DPST disconnecting switch is allowed.*



Installation must only be performed by qualified service personnel.



Disconnect supply before servicing

1. From the Power source, follow the wiring diagram to connect the main voltage supply to the system's main inputs on the power supply.
2. Open the disconnecting switch or breaker before wiring.
3. Plug the wires (L1 to L1, L2/N to L2/N, Earth to Earth) from the power supply into a Power source (main voltage supply).
4. Correctly ground the system by using a protection Earth configuration.
5. Power on the system and make sure it is receiving Power from the Power source.

NOTE: *The working voltage range is between 90 Vac and 264 Vac. The system consumes a Power of 120 W (6-Slot Expansion Box) or 60 W (3-Slot Expansion Box). Size your circuit breaker and the wires in accordance with local and national safety codes. A minimum voltage rating of 300V and a minimum temperature rating of 90°C is used for the wires.*

NOTICE

For the black terminal blocks used on the power supply, use a tightening torque from 0.9N*m (7.96lb*in) to 1.13N*m (10lb*in) to fasten a wire gage from 14 AWG (diameter of 1.62mm or cross sectional area of 2.08mm²) to 16AWG (diameter of 1.29mm or cross sectional area of 1.30mm²).

Connecting Relay Outputs

Before You Begin

IMPORTANT: *A disconnect switch must be installed to interrupt Power to L1 and N/L2 electric Power lines before connecting the system's main inputs on the relay outputs. It must be in close proximity to the equipment and within easy reach of the operator. It must be marked as the disconnecting device for the equipment. From the Power source, follow the wiring diagram to connect the main voltage supply to the relay outputs. AP/Cumberland recommends using a DPST disconnecting switch in series with a breaker. In the case of the use of a SPST disconnecting switch, connect SPST disconnecting switch to cut the hot line with a neutral circuit case.*

IMPORTANT: *The SPST disconnecting switch circuit is allowed only in North America under 120Vac. Over 120Vac in North America and whatever the voltage in International markets, only the DPST disconnecting switch is allowed.*



Installation must only be performed by qualified service personnel.



If the disconnecting switch or the circuit breaker is used as a sectioning device, the device must be correctly identified with which function of the controller opens the circuit. The Off or Stop and On position must be clearly identified on the sectioning device.



Disconnect supply before servicing

1. From the Power source, follow the wiring diagram to connect the main voltage supply to the relay outputs.
2. Locate the “RELAY(x)” terminals on the Module.
3. Connect the voltage source (L1) wire needed to switch in the terminal block named “RELAY – COM”
4. Connect one load from the relay output: terminal - RELAY(x) - NO or terminal RELAY(x) – NC if it is available.
5. From the load, connect to the main voltage supply return (L2/N).

IMPORTANT: *The maximum voltage on the relay outputs is 240Vac. The maximum current allowed is 12A with NO CONTACT. The maximum current allowed is 10A with NC CONTACT. The minimum permissible load on the relay outputs is 0,2A.*

See the *Technical Specifications Appendix* to know the resistive load, motor load, and relay ratings according to the load used and the possible load configuration. Refer to your local building code to determine the type and quality of cable required. A minimum voltage rating of 300V and a minimum temperature rating of 90°C is used for the wires.

AP/Cumberland recommends the use of fuse in series at the output of a relay with a circuit breaker.

NOTICE

For the terminal blocks connected on the power relays, use a tightening torque from 0.7N*m (6.2lbf*in) to 0.8N*m (7lbf*in) to fasten a wire gage from 10AWG (diameter of 2.58mm or cross sectional area of 5.26mm²) to 14AWG (diameter of 1.62mm or cross sectional area of 2.08mm²).

Connecting an EDGE Variable Output module (SSR)

Before You Begin

IMPORTANT: *An external or circuit breaker and a disconnecting switch must be installed to interrupt power to L1 and N/L2 electric power lines before connecting the system’s main sector input on the variable outputs (SSR). It must be in close proximity to the equipment and within easy reach of the operator. It must be marked as the disconnecting device for the equipment.*

From the power source, follow the wiring diagram to connect the main sector to the variable outputs (SSR).

We recommend using a DPST disconnecting switch in series with a breaker. In the case of the use of a SPST disconnecting switch, connect SPST disconnecting switch to cut the Hot line with a Neutral circuit case.

IMPORTANT: *The SPST disconnecting switch circuit is allowed only in North America under 120Vac. Over 120Vac in North America and whatever the voltage in International markets, only the DPST disconnecting switch is allowed.*



Installation must only be performed by qualified service personnel.



Disconnect supply before servicing.



Lock the enclosure when wiring is complete or when servicing. Use the nut and bolt included or a padlock (not included) to lock the enclosure.

1. Locate the terminals “L1” on the EDGE Variable Output (SSR).
2. From the voltage source “L1”, connect a wire to the terminal “L1” on the EDGE Variable Output.
3. Connect a wire from the load to the terminal “LOAD” on the EDGE Variable Output.
4. From the load, connect to the voltage source return “L2/N”.
5. From the voltage source “L2/N”, connect a wire to the terminal “L2/N” on the EDGE Variable Output. Use the same signal than the point 4.

Consult the wiring diagram choice according to the equipment to help you your wiring.

IMPORTANT: *The maximum voltage on the EDGE Variable Output (SSR) is 240Vac. The maximum current allowed is 16.66A at 120Vac.*

Consult Technical Specifications Section to know the EDGE Variable Output (SSR) rating according to the load used and the possible load configuration.

Refer to the local building code to determine the type and quality of cable required.



For the Output terminal block connected on the EDGE variable module (SSR), use a tightening torque from 4.43lb*in (0.5N*m) to 5.31lb*in (0.6N*m) to fasten a wire gage from 12AWG (diameter of 2.05mm or cross sectional area of 3.30mm²) to 14AWG (diameter of 1.62mm or cross sectional area of 2.08mm²).

Connecting Discrete Outputs

The EDGE 4IN-2V-8DO has 8 discrete outputs (OUT-Ax / OUT-Bx and COMM-A / COMM-B) to control relay or contactor coils. The maximum current allowed by these outputs is 0.5A from 24Vac to 240Vac.

IMPORTANT: *This module cannot control DC coils.*

Chapter 3: Basic Connections

IMPORTANT: A disconnect switch must be installed to interrupt Power to L1 and N/L2 electric Power lines before connecting the system's main inputs on the discrete outputs. It must be in close proximity to the equipment and within easy reach of the operator. It must be marked as the disconnecting device for the equipment. From the Power source, follow the wiring diagram to connect the main voltage supply to the EDGE 4IN-2V-8DO. AP/Cumberland recommends using a DPST disconnecting switch in series with a breaker. In the case of the use of a SPST disconnecting switch, connect SPST disconnecting switch to cut the hot line with a neutral circuit case.

IMPORTANT: The SPST disconnecting switch circuit is allowed only in North America under 120Vac. Over 120Vac in North America and whatever the voltage in International markets, only the DPST disconnecting switch is allowed.



Installation must only be performed by qualified service personnel.



If the disconnecting switch or the circuit breaker is used as a sectioning device, the device must be correctly identified with which function of the controller opens the circuit. The Off or Stop and On position must be clearly identified on the sectioning device.



Disconnect supply before servicing



Lock the enclosure when wiring is complete or when servicing.

1. From the Power source, follow the EDGE 4IN-2V-8DO wiring diagram to connect the main voltage supply to the EDGE 4IN-2V-8DO.
2. Locate terminal COMM-A or COMM-B on the EDGE 4IN-2V-8DO.
3. Connect the voltage sources (L1) to each input (COMM-A and COMM-B).
4. From each output OUT-Ax / OUT-Bx, connect one side of the relay or the contactor coil.
5. From the other side of the relay or the contactor coil, connect to the main voltage supply return (L2/N).

IMPORTANT: The maximum voltage on the discrete outputs is 240Vac. The maximum current allowed is 0.5A at 240Vac. For each discrete outputs group, the maximum current is 2A.



High voltage discrete output (OUT-Ax / OUT-Bx and COMM-A / COMM-B) terminal blocks accept a gage range from 12AWG (diameter of 2.05mm or cross sectional area of 3.30mm²) to 16AWG (diameter of 1.29mm or cross sectional area of 1.30mm²). Only copper wire can be used with EDGE 4IN-2V-8DO. The conductor can be stranded or single-stranded.



Do not use stranded wire with the J23A, J24A terminal block plug-in type 1832552: GMVSTBR 2,5/ 5-ST-7,62.

See the Technical Specifications page to know the EDGE 4IN-2V-8DO ratings according to the load used and the possible load configuration. Refer to your local building code to determine the type and quality of cable required. A minimum voltage rating of 300V and a minimum temperature rating of 90°C is used for the wires at 240Vac. See the EDGE 4IN-2V-8DO wiring diagrams to know how to manage the use of many phases from the main voltage supply and how to wire loads in parallel.



For the terminal blocks used for discrete outputs, use a tightening torque from 0.5N*m (4.43lbf*in) to 0.6 N*m (5.2lbf*in) to fasten a wire gage from 12AWG (diameter of 2.05mm or cross sectional area of 3.30mm²) to 16AWG (diameter of 1.29mm or cross sectional area of 1.30mm²).

Connecting the Current Sensors of Discrete Outputs

The EDGE 4IN-2V-8DO has 8 current sensors (CS_Ax, CS_Bx) to read the current on the relay or the contactor contact. The maximum current allowed by these outputs is 16A at 415Vac.

IMPORTANT: *This module cannot read DC voltage*

IMPORTANT: *A disconnect switch must be installed to interrupt Power to L1 and N/L2 electric Power lines before connecting the system's main inputs on the discrete outputs. It must be in close proximity to the equipment and within easy reach of the operator. It must be marked as the disconnecting device for the equipment. From the Power source, follow the wiring diagram to connect the main voltage supply to the EDGE 4IN-2V-8DO. AP/Cumberland recommends using a DPST disconnecting switch in series with a breaker. In the case of the use of a SPST disconnecting switch, connect SPST disconnecting switch to cut the Hot line with a Neutral circuit case.*

IMPORTANT: *The SPST disconnecting switch circuit is allowed only in North America under 120Vac. Over 120Vac in North America and whatever the voltage in International markets, only the DPST disconnecting switch is allowed.*



Installation must only be performed by qualified service personnel.



If the disconnecting switch or the circuit breaker is used as a sectioning device, the device must be correctly identified with which function of the controller opens the circuit. The Off or Stop and On position must be clearly identified on the sectioning device.



Disconnect supply before servicing



Lock the enclosure when wiring is complete or when servicing.

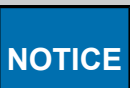
1. From the Power source, follow the EDGE 4IN-2V-8DO wiring diagram to connect the main voltage supply to the EDGE 4IN-2V-8DO.
2. Locate terminal CS_Ax or CS_Bx on the EDGE 4IN-2V-8DO.
3. Connect the voltage sources (L1) at one side of CS_Ax or CS_Bx.
4. From another side CS_Ax or CS_Bx, connect one side of the load.
5. From another side of the load, connect to the main voltage supply return (L2/N).

IMPORTANT: *The maximum voltage on the current sensor is 415Vac. The maximum current allowed is 16A at 415Vac.*



High voltage current sensor (CS_Ax, CS_Bx) terminal blocks accept a gage range from 12AWG (diameter of 2.05mm or cross sectional area of 3.30mm²) to 14AWG (diameter of 1.62mm or cross sectional area of 2.08mm²). Only copper wire can be used with EDGE 4IN-2V-8DO. The conductor can be stranded or single-stranded.

See Technical Specifications page to know the EDGE 4IN-2V-8DO ratings according to the load used and the possible load configuration. Refer to your local building code to determine the type and quality of cable required. A minimum voltage rating of 600V and a minimum temperature rating of 90°C is used for the wires at 415Vac. See the EDGE 4IN-2V-8DO wiring diagrams to know how to manage the use of many phases from the main voltage supply and how to wire loads in parallel.



For the terminal blocks connected on the current sensors, use a tightening torque from 0.7N*m (6.2lbf*in) to 0.8N*m (7lbf*in) to fasten a wire gage from 12AWG (diameter of 2.05mm or cross sectional area of 3.30mm²) to 14AWG (diameter of 1.62mm or cross sectional area of 2.08mm²).

A List of Terminals

EDGE Main Controller

Terminal name	Description
Alarm - COM	Alarm relay input, the COM (Common) is the voltage source needed to switch
Alarm - NO (Normally Opened)	Alarm relay output, When a relay contact is normally open (NO), there is an opened contact when the relay is not energized
Alarm - NC (Normally Closed)	Alarm relay output, When a relay contact is Normally Closed (NC), there is a closed contact when the relay is not energized
Functional earth	Functional Ground Terminal Primarily used for functional earth terminals which are generally associated with test and measurement circuits. These terminals are not for safety earthing purposes but provide an earth reference point
Automation - 24V	Communication bus 1 - power supply 24VDC
Automation - A	Communication bus 1 - Signal A of RS485 communication
Automation - B	Communication bus 1 - Signal B of RS485 communication
Automation - GND	Communication bus 1 - power supply return
Safety - 24V	Communication bus 2 - power supply 24VDC
Safety - A	Communication bus 2 - Signal A of RS485 communication
Safety - B	Communication bus 2 - Signal B of RS485 communication
Safety - GND	Communication bus 2 - power supply return

3-Slot and 6-Slot Expansion Box

Terminal name	Description
IN (x)	Analog inputs can set in 0-5V mode, in dry contact mode, in 4-20mA mode, in temperature mode. Inputs are used for sensors : temperature probes, humidity probes, static pressure probes, water meters, dry contacts.
GND(x) close to IN(x)	Analog inputs returns. Inputs are used for sensors : temperature probes, humidity probes, static pressure probes, water meters, dry contacts.
24V+	24VDC Supply Outputs are used to supply sensors, maximum current per output : 50mA
GND close to 24V+	Returns of 24VDC supply outputs used to supply sensors
RELAY(x) – COM	Relay inputs, the COM (Common) is the voltage source needed to switch.
RELAY (x) – NO	Relay outputs, when a relay contact is normally open (NO), there is an open contact when the relay is not energized.
RELAY(x) – NC	Relay output, when a relay contact is Normally Closed (NC), there is a closed contact when the relay is not energized.
AUTOMATION - 24V	Communication bus 1 - power supply 24VDC
AUTOMATION - A	Communication bus 1 - Signal A of RS485 communication
AUTOMATION - B	Communication bus 1 - Signal B of RS485 communication

Appendix A: List of Terminals

AUTOMATION - GND	Communication bus 1 - power supply return
SAFETY - 24V	Communication bus 2 - power supply 24VDC
SAFETY - A	Communication bus 2 - Signal A of RS485 communication
SAFETY - B	Communication bus 2 - Signal B of RS485 communication
SAFETY - GND	Communication bus 2 - power supply return
CS(x)	Analog inputs for current sensors
VAR(x)	0-10VDC Analog outputs
GND(x) close to VAR (x)	Returns for 0-10VDC analog outputs
SSR(x) Variable output -1	Variable output module (SSR) input, high voltage from the main voltage supply (source)
SSR(x) Variable output -2	Variable output module (SSR) output, high voltage toward the loads
Panel mount power supply - L1	High voltage Input of the panel mount power supply
Panel mount power supply - L2/N	High voltage Input of the panel mount power supply
Panel mount power supply -Protective Earth	Protective Earth Ground Terminal, Primarily used for protective earth terminals. Terminal connected to conductive parts of a device for the purpose of safety and is intended to be connected to an external system for protective grounding

EDGE 4IN-2V-8DO

Terminal name	Description
IN(x)	Analog inputs, it can set in 0-5V mode, in dry contact mode, in 4-20mA mode, in temperature mode
GND(x) close to IN(x)	Analog inputs returns
24V+	24Vdc Supply Outputs are used to supply sensors
GND close to 24V+	Returns of 24Vdc supply outputs used to supply sensors
COMM-A / COMM-B	Voltage Inputs to supply contactors coils or relays coils via outputs OUT-Ax / OUT-Bx
OUT-Ax / OUT-Bx	Voltage outputs to control contactors coils or relays coils
CS_Ax, CS_Bx	Current sensors inputs and outputs to read contactors contacts and relays contacts activation
AUTO- 24V	Communication bus 1 - Power supply 24Vdc
AUTO - A	Communication bus 1 - Signal A of RS485 communication
AUTO - B	Communication bus 1 - Signal B of RS485 communication
AUTO- GND	Communication bus 1 - Power supply return
SAFE- 24V	Communication bus 2 - power supply 24Vdc
SAFE - A	Communication bus 2 - Signal A of RS485 communication
SAFE - B	Communication bus 2 - Signal B of RS485 communication
SAFE-GND	Communication bus 2 - Power supply return

CS(x)	Analog inputs for current sensors
VAR(x)	0-10Vdc Analog outputs
GND(x) close to VAR (x)	Returns for 0-10Vdc analog outputs
Functional Earth	Functional Ground Terminal primarily used for functional earth terminals which are generally associated with test and measurement circuits. These terminals are not for safety earthing purposes but provide an earth reference point.

EDGE Variable Output

Terminal name	Description
L1	SSR high voltage input from the main sector (source)
L2/N	SSR high voltage input from the main sector (source) using for a reference
LOAD	SSR high voltage output using to control the load
0-10V & CS	SSR low voltage input : 0-10Vdc And voltage output proportional to current flowing through
Protective Earth	Protective Earth Ground Terminal, Primarily used for protective earth terminals. Terminal connected to conductive parts of a device for the purpose of safety and is intended to be connected to an external system for protective grounding

NOTES

B Technical Specifications

Table B-1 *EDGE Main Controller safety ratings*

Inputs: Supply Input : 24VDC, 15W	
Outputs: Alarm relay output: 24VDC/AC ; 1.5A MAX	
Operating Temperature	0 to 40°C (32 to 104°F)
Storage Temperature	-20 to 50°C (-4 to 122°F)
Environment Type	Indoor use only
Pollution Degree	2
Installation Category	2
Altitude	2000 Meters Max. (6561 Ft. Max)
Operating Relative Humidity (maximum)	0 to 10°C (32 to 50°F) Non condensing 10 to 30°C (50 to 86°F) 95 % (± 3 %) Non condensing 30 to 40°C (86 to 104°F) 95 % (± 3 %) Non condensing
IP rating (IEC 60529)	54
Nema Rating (Nema 250)	12
Flame Rating (UL94)	5VA V-0
Flame Rating (IEC 60695 or IEC 60707)	FV-0
IK rating (degree of mechanical protection - impact, IEC 62262)	08

Table B-2 *EDGE Main Controller — dimensions and weight*

Enclosure dimensions	Height	355 mm (14 inches)
	Width	482 mm (19 inches)
	Depth	152 mm (6 inches)
Weight	3719 grams (8.20 lbs)	
Touch screen	Size	15 inches, 12 high
	Type	LED
	Resolution	1024 X 768
Clearance around the enclosure	Top	260mm (10 inches)
	Bottom	250mm (10 inches)
	Hinge side	180mm (7 inches)
	Latch side	150mm (6 inches)

Appendix B: Technical Specifications

EDGE 3-Slot Expansion Box - dimensions and weight		
Enclosure dimensions	Height	660 mm (26 inches)
	Width	457 mm (18 inches)
	Depth	279 mm (11 inches)
Weight	11 521 grams (25.4 lbs)	
Clearance	Top	300mm (12 inches)
	Bottom	300mm (12 inches)
	Hinge Side	250mm (10 inches)
	Latch Side	180mm (7 inches)
EDGE 6-Slot Expansion Box - dimensions and weight		
Enclosure dimensions	Height	660 mm (26 inches)
	Width	635 mm (25 inches)
	Depth	279 mm (11 inches)
Weight	15966 grams (35.2 lbs)	
Clearance around the enclosure	Top	300mm (12 inches)
	Bottom	300mm (12 inches)
	Hinge Side	250mm (10 inches)
	Latch Side	180mm (7 inches)

Table B-3 Edge 4IN-2V-8DO dimensions and weight

Dimensions	Height	77.12mm (3.04 inches)
	Width	144.16mm (5.67inches)
	Depth	340.2mm (13.4 inches)
Weight	680.39 grams (1.5 lbs)	

Table B-4 6-Slot Expansion Box and 3-Slot Expansion Box ratings

6-Slot	100Vac-240Vac, ±10%,50-60Hz, 1 phase, 120W
3-Slot	100Vac-240Vac ±10%; 50-60Hz, 1 phase, 120W
On/Off outputs	
NO (normally open) contact - motor/inductive load	12A MAX (Nb of Units = Max current rating divided by the max current of the fan multiplied by its service factor) Ex.: 12A /(2.5 A * 1.5 SF) = 3.2, relay can drive 3 fans Minimum load of 0.2A
NO (Normally Opened) contact - resistive load (electric heating element)	120/208/240Vac: 12A MAX Minimum load of 0.2A
NO (Normally Opened) contact - Tungsten load (incandescent and heat lamp)	120Vac; 5A MAX 208Vac; 5A MAX

Table B-4 6-Slot Expansion Box and 3-Slot Expansion Box ratings (cont'd.)

		240Vac; 5A MAX Minimum load of 0.2A
NO (Normally Opened) contact - DC load		24Vdc; 5A MAX. (Current reading not available in DC). Minimum load of 0.2A
NO (normally opened) contact - LED and CCFL loads		120/208/240Vac, 750W; 920VA MAX Minimum load of 0.2A / 25W
NO (normally opened) contact – Ballast loads		120/208/240Vac, 6A MAX Minimum load of 0.2A
NC (Normally Closed) contact - Motor/inductive load	Cycle Timer Mode	5A MAX Minimum load of 0.2A (Nb of Units = Max current rating divided by the max current of the fan multiplied by its service factor) For example, 5A / (2.5 A * 1.5 SF) = 1.333; relay can drive up 1 fans
	No Timer Mode	10A MAX Minimum load of 0.2A (Nb of Units = Max current rating divided by the max current of the fan multiplied by its service factor) For example, 10A / (2.5 A * 1.5 SF) = 2.7; relay can drive up 2 fans
NC (normally closed) contact - Resistive loads (electric heating element)		120/208/240Vac, 10A MAX
NC (normally closed) contact - Tungsten load		120/208/240Vac; 3A MAX Minimum load of 0.2A
NC (normally closed) contact - DC load		24Vdc; 5A MAX (Current reading is not available in DC) Minimum load of 0.2A
NC (normally closed) contact - LED and CCFL loads		120/208/240Vac; 750W; 920VA MAX Minimum load of 0.2A / 25W
NC (normally closed) contact – Ballast load		120/208/240Vac; 3A MAX Minimum load of 0.2A
Variable outputs modules (SSR)		
Resistive loads (heat lamps, heat mats, incandescent light)		120 VAC; 2000W; 16.66A; 50/60Hz 208 VAC; 2000W; 9.61A; 50/60Hz 240 VAC; 2000W ; 8.33A; 50/60Hz Minimum load of 0.2A
Motor/inductive load		10,5 A MAX

Appendix B: Technical Specifications

Table B-4 6-Slot Expansion Box and 3-Slot Expansion Box ratings (cont'd.)

		<p>Minimum load of 0.2A</p> <p>Full Load amperage on the motor nameplate is not the maximum amp. When varying, the amperage might be higher.</p> <p>(Nb of Units = Max current rating divided by the max current of the fan)</p>
LED and CCFL loads		<p>120/208/240Vac; 50/60Hz, 750W/ 920VA MAX</p> <p>Minimum load of 0.2A / 25W</p>
Ballast load		<p>120Vac; 50/60Hz; 1200W; 10 MAX</p> <p>208 Vac; 50/60Hz; 1040W; 5A MAX</p> <p>240Vac; 50/60Hz; 720W; 3A MAX</p> <p>Minimum load of 0.2A</p>

Table B-5 EDGE 4IN-2V-8DO ratings

DC Supply Input	18-24Vdc, 7.2W
Coils contactors/relays outputs	24Vac-240Vac, 0.5A max, 50/60Hz, PF max: 0 There is no security high temperature opening feature for natural inlets..35
Current sensors	
Motor load current sensing	
1 phase, 50/60Hz, PF max: 0.5	100-120Vac : 16FLA, 1HP
	200-240Vac : 12FLA, 2HP
3 phases, 50/60Hz, PF max: 0.5	L-L : 208Vac : 10.56FLA, 3HP
	L-L : 380Vac : 15.4FLA, 10HP
	L-L : 415Vac : 15.4FLA, 10HP
General use load current sensing	120/208/240/380/415Vac, 16A, PF max: 0.75
Heating Load current sensing	120/208/240/380/415Vac, 16A, PF max: 1

Inputs	
Temperature	<p>Compliant to GSIE temperature probes</p> <p>Accuracy of $\pm 0.1^{\circ}\text{C}$ in a normal operation</p> <p>Allowable loss of performance in a noisy environment:</p> <p>Accuracy of $\pm 0.65^{\circ}\text{C}$ from initial reading with a fixed resistor of 1% precision used for testing purpose.</p>
Analog 0-5 Volts	<p>Sensor must be able to drive a 2k Ohms load, which means the sensor must drive at least 2.5mA to ensure correct readings.</p> <p>Accuracy of $\pm 30\text{mV}$ in a normal operation.</p> <p>Allowable loss of performance in a noisy environment:</p>

Appendix B: Technical Specifications

	Accuracy of $\pm 80\text{mV}$ from initial reading with a voltage source of 1% precision used for testing purpose.
Analog 4-20mA	Sensor must be able to drive a 120 Ohms load Maximum rating: 20.8mA, 2.5V Accuracy of $\pm 0.2\text{mA}$ in a normal operation. Allowable loss of performance in a noisy environment: Accuracy of $\pm 0.4\text{mA}$ from initial reading with a current source of 1% precision used for testing purpose.
Dry contact	Close contact resistance must be lower than 200 Ohms Open contact resistance must be higher than 100k Ohms
Water meter, Pulse speed	Max 100Hz, pulse width minimum of 3.2ms Max 100 Ohms (close contact) and min. 100k Ohms (open contact) including the value of the wire resistance
Variable output module (SSR) current sensor	Frequencies range : 40-70 Hz. Accuracy of $\pm 0.6\text{A}$ for AC load $< 20\text{A}$ in a normal environment. Allowable loss of performance in a noisy environment: Accuracy of $\pm 0.8\text{A}$ from initial reading with a load of 1% precision used for testing purpose
Relay outputs with current sensing input	Accuracy of $\pm 0.5\text{A}$ for AC load $< 20\text{A}$ in a normal environment. Allowable loss of performance in a noisy environment: Accuracy of $\pm 0.75\text{A}$ from initial reading with a load of 1% precision used for testing purpose
Current sensing input	Accuracy of $\pm 0.5\text{A}$ for AC load $< 20\text{A}$ in a normal environment Allowable loss of performance in a noisy environment: Accuracy of $\pm 0.75\text{A}$ from initial reading with a load of 1% precision used for testing purpose
Auxiliary outputs	
0-10 VDC outputs	0-10VDC, accuracy : 1% (means, 0.1V), output impedance : 50 Ohms, Max current per output : 20mA for each output
0-10Vdc outputs on EDGE 4IN-2V-8DO	0-10Vdc, accuracy : 1% (means, 0.1V), output impedance : 50 Ohms, Max current per output : 100mA
24 VDC outputs	24 VDC, 50 mA for each output
Operational specifications	
Operating Temperature	0 to 40°C (32 to 104°F)
Storage Temperature	-20 to 50°C (-4 to 122°F)
Environment Type	Indoor use only
Pollution Degree	2

Appendix B: Technical Specifications

Installation Category	2
Altitude	2000 Meters Max. (6561 Ft. Max)
Operating Relative Humidity (maximum)	0 to 10°C (32 to 50°F) Non condensing 10 to 30°C (50 to 86°F) 95 % (± 3 %) Non condensing 30 to 40°C (86 to 104°F) 95 % (± 3 %) Non condensing
IP rating (IEC 60529)	54
Nema Rating (Nema 250)	12
Flame Rating (UL94)	5VA V-0
Flame Rating (IEC 60695 or IEC 60707)	FV-0
IK rating (degree of mechanical protection - impact, IEC 62262)	08

Table B-6 Operational specifications of EDGE 4IN-2V-8DO

Operating Temperature in the cabinet	0 to 70°C (32 to 158°F)
Storage Temperature in the cardboard	-20 to 50°C (-4 to 122°F)
Environment Type	Indoor use only
Pollution Degree	2
Installation Category	2
Altitude	2000 Meters Max. (6561 Ft. Max)
Operating Relative Humidity (maximum)	0 to 10°C (32 to 50°F) Non condensing 10 to 30°C (50 to 86°F) 95 % (± 3 %) Non condensing 30 to 70°C (86 to 158°F) 95 % (± 3 %) Non condensing
IP rating (IEC 60529)	00
Flame Rating (UL94)	5VA V-0
Flame Rating (IEC 60695 or IEC 60707)	FV-0

C Replacement Parts Specifications

Replacement fuses are supplied with your system if ever the need occurs to change them. Two of each model are available.

Table C-1 Fuse replacement on *EDGE Main Controller*

GSI Electronics part number	GSI Electronics part description	Reference	Fuse recommended by the manufacturer	Recommended fuse model
127-00036	FUSE,3.15A, SB,5X20MM,250V	F4-F7	Bel Fuse	5HT 2.5-R

Table C-2 Fuse replacement on *3-Slot Expansion Box or 6-Slot Expansion Box*

GSI Electronics part number	GSI Electronics part description	Reference	Fuse recommended by the manufacturer	Recommended fuse model
127-00035	FUSE,6.3A, FB,5X20MM 250V	F1-F4	Schurter Inc	1,1012

Table C-3 Fuse replacement on *EDGE 4IN-2V-8DO*

GSI Electronics part number	GSI Electronics part description	Reference	Fuse recommended by the manufacturer	Recommended fuse model
127-00033	FUSE,500mA, SB,5X20MM,250V	F18-F28,F38	Bel Fuse	5HT 500-R

Coin battery replacement on **EDGE Main Controller**

GSI Electronics part number	GSI Electronics part description	Reference	Battery recommended by the manufacturer	Recommended battery model
112-00010	Coin Battery 3V	BAT1 from PCB-416	Panasonic	BR-2032

Fan Replacement on **3-Slot Expansion Box or 6-Slot Expansion Box**

GSI Electronics part number	GSI Electronics part description
135-00017	Internal fan

Appendix C: Replacement Parts Specifications

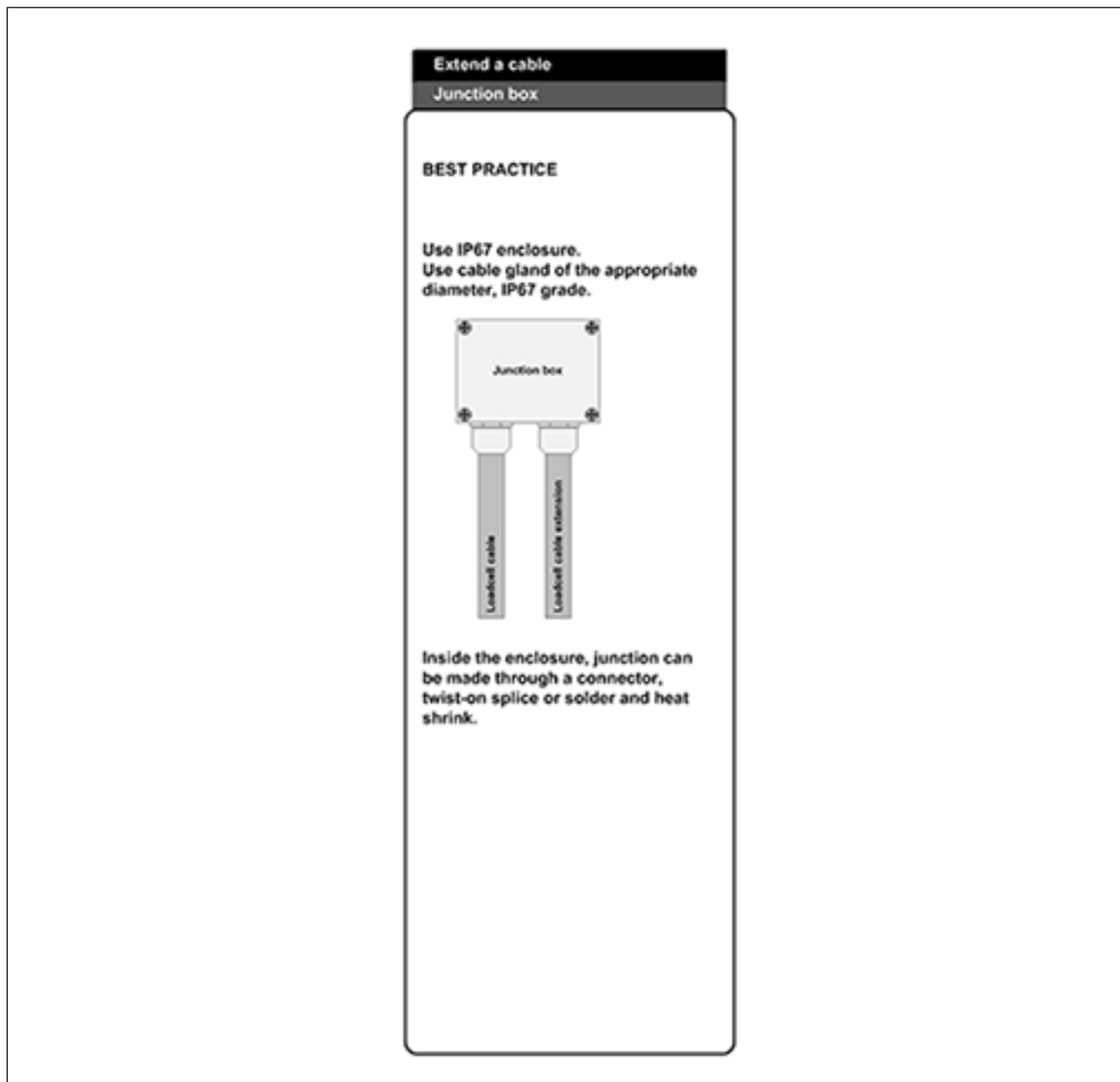
EDGE Variable Output (SSR) (Part# 064-11343, 028-00481, 028-00484)

028-00481: HDW KIT, EDGE VARIABLE OUTPUT REPLACEMENT	VARIABLE OUTPUT replacement Kit for EDGE expansion Box, Includes: <ul style="list-style-type: none">• 064-11343 : FX, EDGE VARIABLE OUTPUT• *511-00133 : CABLE,A,4S,42IN,105C,N,N<ul style="list-style-type: none">— Cable with connector (42 inches (~1 meter) long)• 550-00252 : SCREW,#8-32,5/16IN,CS/ZP,PAN,PHIL<ul style="list-style-type: none">— Holding screws
028-00484: HDW KIT, EDGE VARIABLE OUPUT REPLACEMENT (LONG WIRE)	VARIABLE OUTPUT replacement Kit for EDGE Power Module, Includes: <ul style="list-style-type: none">• 064-11343 : FX, EDGE VARIABLE OUTPUT• *511-00134 : CABLE,A,4S,5M,105C,N,N<ul style="list-style-type: none">— Cable with connector (15 feet (~5 meters) long)• 550-00252 : SCREW,#8-32,5/16IN,CS/ZP,PAN,PHIL<ul style="list-style-type: none">— Holding screws

* Cables are not compatible with previous EDGE SSR

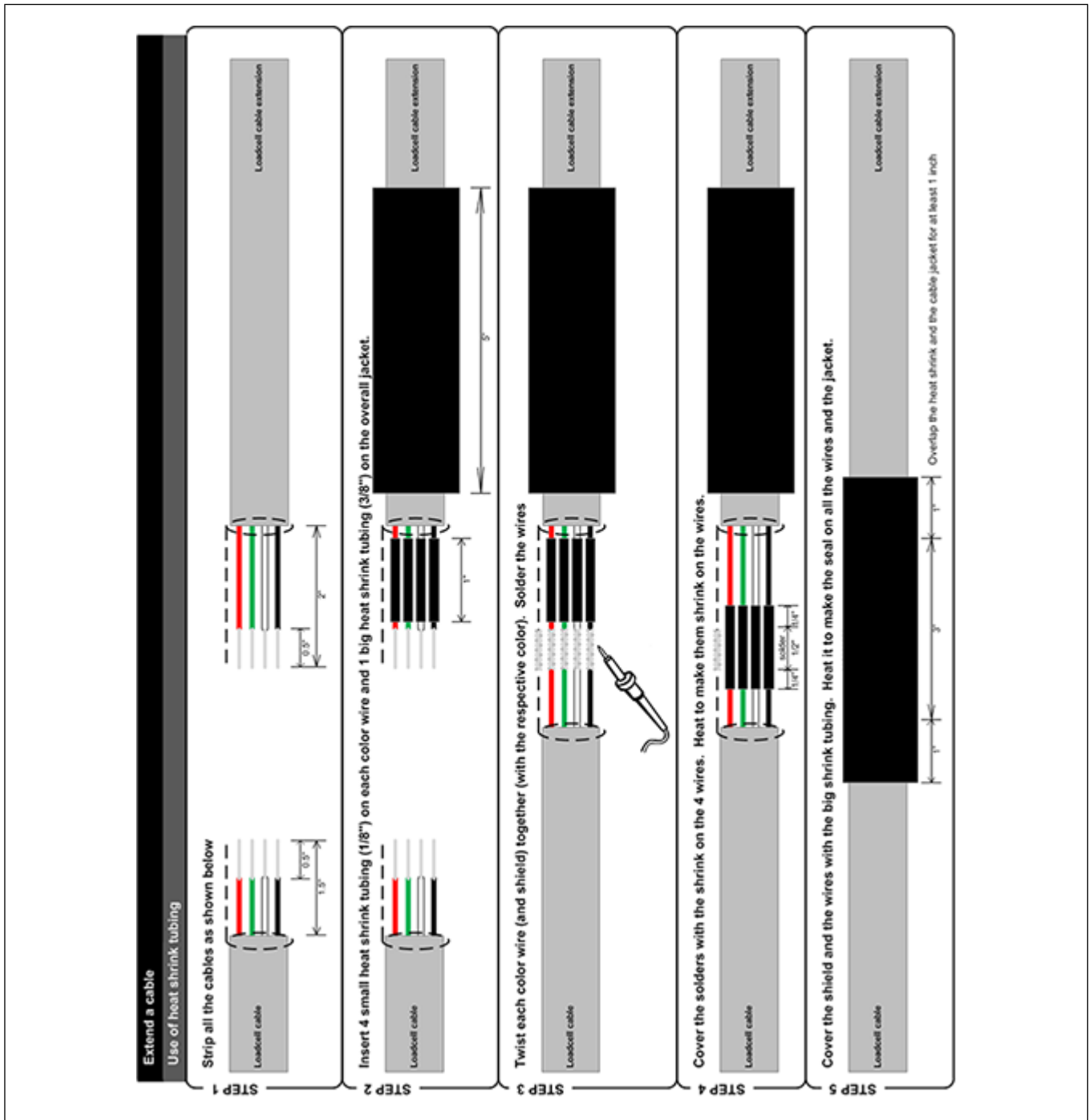
D Extending a cable

- Best practice: using a junction box



Appendix D: Extending a cable

- Using of heat shrink tubing



E Low Voltage Cable Specifications

Communication Bus (Automation/Safety)

Table E-1 Communication cables (Signal A and signal B)

Cable Parameter	Value		
	Minimum	Typical	Maxium
Cable type	Twisted and shielded		
Minimum gauge	18AWG (diameter of 1.02mm or cross sectional area of 0.82mm ²)		
Maximum cable length (including cable extensions)	1200 meters (4000 feet)		
Certification and type	CSA,CMG FT4 type, 18AWG, 600V, 194°F 90°C) UL,AWM or CM type, 18AWG, 600V, 194°F 90°C) If DC power is used in the same cable use TC-ER type (600V, 194°F (minimum 90°C))		
Characteristic Impedance	73 Ω	120 Ω	140 Ω
Inductance	—	0.258 μH/ft, Nominal	0.3 μH/ft
Mutual Capacitance	—	12 pF/ft	30 pF/ft
Velocity of propagation	66%	75%	—
Conductor DCR	—	6.9Ω/1000ft @ 20°C, Nominal	8Ω/1000ft Max @ 20°C
OA Shield DCR	—	1.8Ω/1000ft @ 20°C, Nominal	7Ω/1000ft
Attenuation (Max dB/100ft)		0.13 @ 125 kHz 0.25 @ 500 kHz 0.36 @ 1 MHz	
Pair Lay Length	—	2.50" LHL	2.75" LHL
Jacket Diameter*	—	0.414 inch	0.449 inch

* Some products are provided with strain reliefs. If the cable diameter goes over this diameter value, the strain reliefs may not work properly.

Appendix E: Low Voltage Cable Specifications

Table E-2 DC Power cables (Signal 24V and signal GND)

Parameter	Wire gage when a load of 17W (max 0.7A) is connected between the source and the load				
Wire gauge	18 AWG (diameter of 1.02mm or cross sectional area of 0.82mm ²)	16* AWG (diameter of 1.29mm or cross sectional area of 1.30mm ²)	14 AWG (diameter of 1.62mm or cross sectional area of 2.08mm ²)	12 AWG (diameter of 2.05mm or cross sectional area of 3.30mm ²)	10 AWG (diameter of 2.58mm or cross sectional area of 5.26mm ²)
	1 pair twisted shielded	1 pair twisted shielded	1 pair twisted shielded	1 pair twisted shielded	1 pair twisted shielded
Max. length	150m (500 ft.)	300m (1000 ft.)	600m (2000 ft.)	900m (3000 ft.)	1200m (4000 ft.)
Inductance Nominal (typical)	0.17 µH/ft	0.174 µH/ft	0.16 µH/ft	0.16 µH/ft	0.14 µH/ft
Conductor DCR @20°C, Nominal (typical)	6.1 Ω/1000ft	3.6 Ω/1000ft	2.6 Ω/1000ft	1.63 Ω/1000ft	1.09 Ω/1000ft
Certification and type	CSA, CIC (TC-ER) FT4 type, 16AWG, 600V, 194°F (minimum 90°C) UL, TC-ER FT4 type, 16AWG, 600V, 194°F (minimum 90°C)				
Maximum Jacket diameter*	0.449 inch				

* Some products are provided with strain reliefs. If the cable diameter goes over this diameter value, the strain reliefs may not work properly.



Insulation on conductors must be rated for 600 Volts and 90°C (194°F).

NOTICE

EDGE network cables have to use class 1 load type. AP/Cumberland recommends using TC-ER cable type.

NOTICE

Refer to the Wiring Methods and Materials section from the National Electric Code to use the correct wire for the installation.

NOTICE

TC-ER conductors in sizes 18 AWG and 16 AWG shall be type FFH-2, KF-2, KFF-2, PAF, PAFF, PF, PFF, PGF, PGFF, PTF, PTF, RFH-2, RFHH-2, RFHH-3, SF-2, SFF-2, TF, TFF, TFFN, TFN, ZF, or ZFF. Conductor with other types and thicknesses of insulation shall be listed for Class 1 load circuit use.

AP/Cumberland can provide sourced color-coded communication wire to install EDGE controls. The wire will be available in both 16 and 18 gauge to accommodate the specified distance between controls (as shown above). The communication wire is available in one or two twisted shielded pairs, and with two different outside jacket colors (red and black.) Black-jacketed wire is to be used for the automation circuit

Appendix E: Low Voltage Cable Specifications

and red-jacketed wire is to be used for the safety circuit. Each of the communication wires is comprised of two or four unique colored wires to further reduce installation errors.



Power Cable Requirements

Distance	Minimum Wire AWG
500' (150 m) *	18 AWG
1000' (300 m)	16 AWG

* Maximum distance between any two expansion boxes

Communication Cable Requirements

Distance	Minimum Wire AWG
4000' (1200 m) *	18 AWG

* Total Distance from first control to last control

Appendix E: Low Voltage Cable Specifications

Item	Description	Lbs.	Kgs.
WR-16-1TS-S	Wire, 16 AWG 1 Twisted Shielded Pair, Comm & Power, 600V, 1000'/Spool	44	20.00
WR-16-2TS-S	Wire, 16 AWG 2 Twisted Shielded PairS, Comm & Power, 600V, 1000'/Spool	84	38.18
WR-16RED-1TS-S	Wire, 16 AWG 1 Twisted Shielded Pair, Comm & Power, 600V, Red Jacket, 1000'/Spool	44	20.00
WR-16RED-2TS-S	Wire, 16 AWG 2 Twisted Shielded PairS, Comm & Power, 600V, Red Jacket, 1000'/Spool	84	38.18
WR-18-1TS-S	Wire, 18 AWG 1 Twisted Shielded Pair, Comm & Power, 600V, 1000'/Spool	25	11.36
WR-18-2TS-S	Wire, 18 AWG 2 Twisted Shielded PairS, Comm & Power, 600V, 1000'/Spool	66	30.00
WR-18RED-1TS-S	Wire, 18 AWG 1 Twisted Shielded Pair, Comm & Power, 600V, Red Jacket, 1000'/Spool	25	11.36
WR-18RED-2TS-S	Wire, 18 AWG 2 Twisted Shielded PairS, Comm & Power, 600V, Red Jacket, 1000'/Spool	66	30.00

Other Low Voltage Cables

Table E-3 Other Low Voltage Cables

Item	Description
Cable type	Twisted and shielded
Minimum gauge	18AWG (<i>diameter of 1.02mm or cross sectional area of 0.82mm²</i>)
Maximum sensor cable length	150 m (500 feet)
Temperature cable	194°F (minimum 90°C)
Class load type	2

For example:

- Sensor cables (humidity, temperature, static pressure, gas sensor, ...etc.)
- Potentiometer cables

Limited Warranty - Protein Products

The GSI Group, LLC. (“GSI”) warrants products which it manufactures, to be free of defects in materials and workmanship under normal usage and conditions for a period of 12 months from the date of purchase (or, if shipped by vessel, 14 months from the date of arrival at the port of discharge). If, in GSI’s sole judgment, a product is found to have a defect in materials and/or workmanship, GSI will, at its own option and expense, repair or replace the product or refund the purchase price. This Limited Warranty is subject to extension and other terms as set forth below.

Warranty Enhancements: The warranty period for the following products is enhanced as shown below and is in lieu of (and not in addition to) the above stated warranty period.

	Product	Warranty Period
AP® Fans	Performer Series Direct Drive Fan Motor	3 Years
AP® and Cumberland®	Flex-Flo/Pan Feeding System Motors	2 Years
Electronic Controls	All Protein controls manufactured by GSI	24 Months from date code on part
Cumberland® Feeding and Watering Systems	Feeder System Pan Assemblies	5 Years, prorated **
	Feed Tubes (1.75" and 2.00")	10 Years, prorated *
	Centerless Augers	10 Years, prorated *
	Watering Nipples	10 Years, prorated *

* Warranty prorated from material list price:
 0 to 3 years - no material cost to end user
 3 to 5 years - end user pays 25%
 5 to 7 years - end user pays 50%
 7 to 10 years - end user pays 75%

** Warranty prorated from material list price:
 0 to 3 years - no material cost to end user
 3 to 5 years - end user pays 75%

Conditions and Limitations:

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY DESCRIPTION SET FORTH HEREIN; SPECIFICALLY, GSI DISCLAIMS ANY AND ALL OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH: (I) ANY PRODUCT MANUFACTURED OR SOLD BY GSI, OR (II) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

The sole and exclusive remedy for any claimant is set forth in this Limited Warranty and shall not exceed the amount paid for the product purchased. This Warranty only covers the value of the warranted parts and equipment, and does not cover labor charges for removing or installing defective parts, shipping charges with respect to such parts, any applicable sales or other taxes, or any other charges or expenses not specified in this Warranty. GSI shall not be liable for any other direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. Expenses incurred by or on behalf of a claimant without prior written authorization from the GSI warranty department shall not be reimbursed. This warranty is not transferable and applies only to the original end user. GSI shall have no obligation or responsibility for any representations or warranties made by or on behalf of any dealer, agent or distributor. Prior to installation, the end user bears all responsibility to comply with federal, state and local codes which apply to the location and installation of the products.

This Limited Warranty extends solely to products sold by GSI and does not cover any parts, components or materials used in conjunction with the product, that are not sold by GSI. GSI assumes no responsibility for claims resulting from construction defects, unauthorized modifications, corrosion or other cosmetic issues caused by storage, application or environmental conditions. Modifications to products not specifically delineated in the manual accompanying the product at initial sale will void all warranties. This Limited Warranty shall not extend to products or parts which have been damaged by negligent use, misuse, alteration, accident or which have been improperly/inadequately maintained.

Service Parts:

GSI warrants, subject to all other conditions described in this Warranty, Service Parts which it manufactures for a period of 12 months from the date of purchase, unless specified in Enhancements above. Parts not manufactured by GSI will carry the Manufacturer’s Warranty.

(Protein Limited Warranty_REV01_06 November 2018)

This equipment shall be installed in accordance with the current installation codes and applicable regulations which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.



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