EDGE 2 System

Models:

074-11854, 074-11855, 074-11865, 074-11795, 074-11796, 074-11797, 064-11344, 064-11343

Installation Manual

890-00687

Version 03

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PN895-00858 REV03

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.

Contents

1 Introduction

Topics Covered in this Chapter

- System Overview
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System Overview

EDGE system is an agricultural site management system designed to monitor and control a farm environment. EDGE system is designed to be permanently connected to the main voltages by the Expansion Boxes. EDGE system could be monitored and controlled remotely by Ethernet (Wide Area Network (WAN) by Internet provider) or / and controlled locally by LAN (Local Area Network) or WLAN[1] (Wireless Local Area Network).[1]

The main functions of the complete system are:

- Animal environment control functions: temperature controlling (cooling, heating, humidity controlling), lightning, ventilation controlling
- Variety of monitoring functions (configurable inputs: 0-5V, 4-20mA, pulse, dry contact, temperature
- Feeding functions: food distribution and controlling
- Scale functions: measuring the weight of the birds (Bird scale), measuring the weight of storage food (Bin scale)
- Production surveillance and alert functions: emails sending

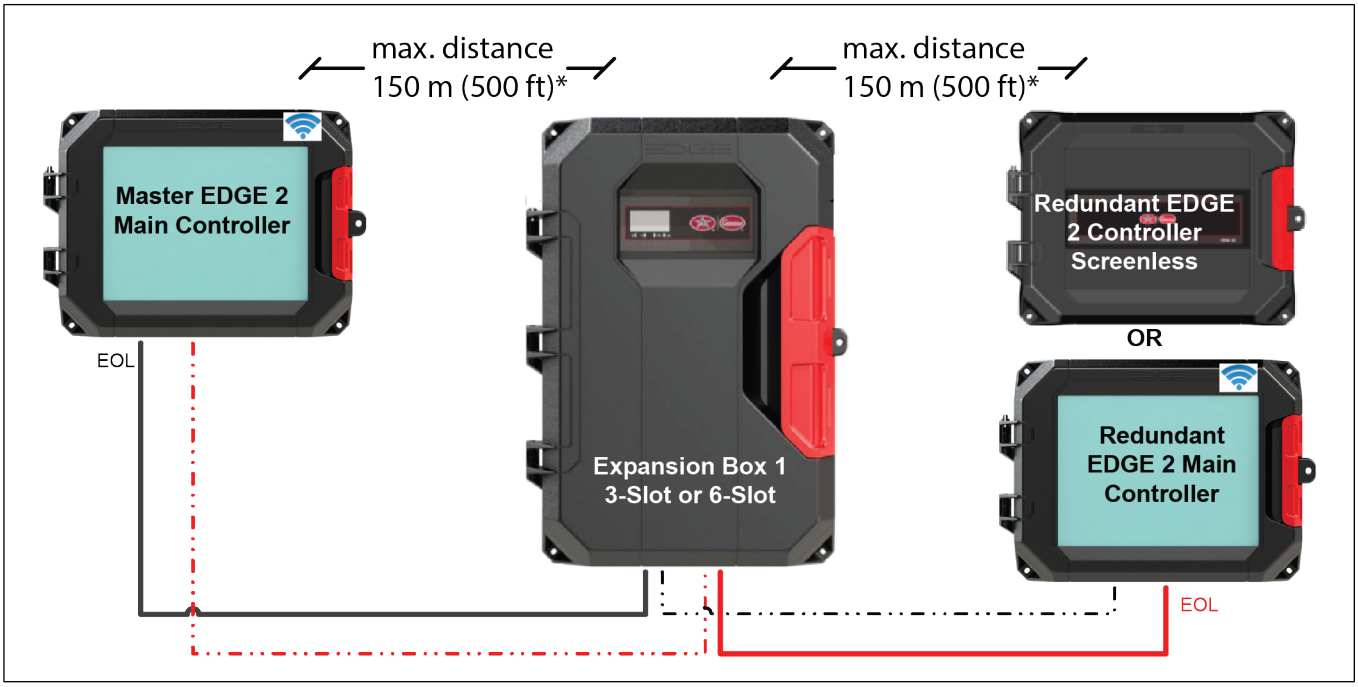
The minimum EDGE system is composed of a Main Controller and Expansion Boxes (I/O modules) which are described below:

Main Controller

The Main Controller is the “brains” of the EDGE system. It includes a CPU and a capacitive color LCD touch screen which allows the user to monitor and control the system’s status and functionalities. The Main Controller has Ethernet ports, an Ethernet Wireless option (WLAN at 2.4 GHz) , USB ports for data storage or to connect external USB module, an alarm relay, RS485 links to communicate to Expansion Plug-In Modules in the Expansion Box. It can be electrically supplied either by the Expansion Box through the RS485 communication networks low voltage communication cables (24Vdc), or by an external power supply (EDGE PSU 24V 36W).

1. In some countries the WiFi link is not available because of regulation restriction due to not having the country telecommunication certification.

Figure 1-1 *Non Redundant Scheme*



Expansion Boxes

The Expansion Boxes are supplied using the mains electrical supply. The Expansion Boxes communicate with the system's Main Controller via RS485 through low voltage (24Vdc) communication cables (Automation and Safety). Multiple Expansion Boxes can be used in one EDGE system. These Expansion Boxes are designed to accommodate various electronic cards (Expansion Plug-in Modules), each designed for different monitoring/control applications. Two different Expansion Boxes are available: 6-Slot Expansion Box and 3-Slot Expansion Box. These two Expansion Boxes are very similar in construction and differ only in terms of enclosure size, number of electronic card modules they can accommodate (6 Expansion Plug-in Modules for the 6-Slot, 3 Expansion Plug-in Modules for the 3-Slot).

Furthermore, both Expansion Boxes can accommodate up to 4 Solid State Relay modules (EDGE Variable Outputs) mounted on a heat sink in the back of the Expansion Box enclosure.

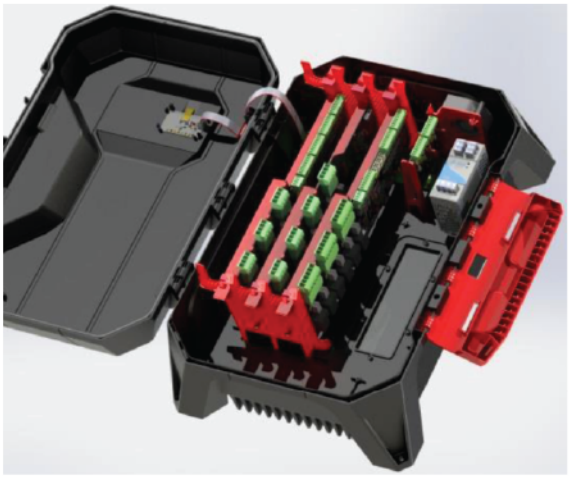
Items	Description
6-Slot Expansion Box	Consists of inputs and outputs. This enclosure can contain up to 6 plug-in modules
3-Slot Expansion Box	Consists of inputs and outputs. This enclosure can contain up to 3 plug-in modules

Figure 1-2 *Enclosure Identification*

EDGE 2 Main Controller
EDGE 2 Remote Display

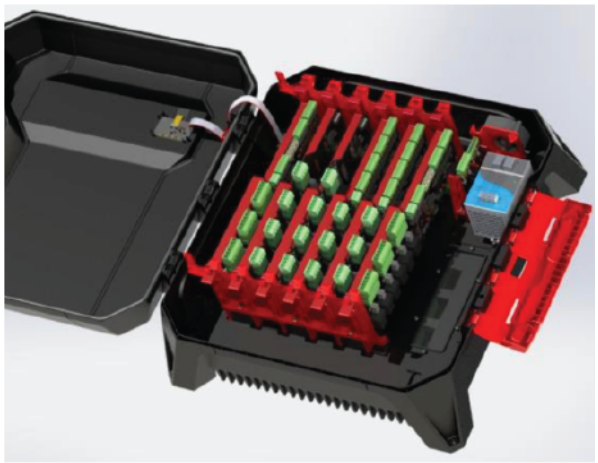
EDGE 2 Screenless Controller

3-Slot Expansion Box



3-Slot Expansion Box (Inside View)

6-Slot Expansion Box



6-Slot Expansion Box (Inside View)

External Modules Overview

External modules can be added to the basic EDGE system to extend its functionality by the RS485 links (Automation or Safety).

EDGE RS485 Repeater

The EDGE RS485 Repeater allows you to extend the RS485 network and can also be used to add the RS485 to different networks (T-Branch and H-Branch).

EDGE PSU 24V 36W

EDGE PSU 24V 36W is an external module which supplies external modules (EDGE Bin Scale, EDGE Bird Scale, EDGE 2 Main Controller, EDGE 2 Controller Screenless, EDGE 2 Remote Display) in case the Expansion Box power budget does not allow connexion directly on the EDGE Expansion Box.

EDGE Bin Scale (EDGE Bin Scale 3 Wires LC, EDGE Bin Scale 4 Wires LC TB)

EDGE Bin Scale is an external module which allows the capability to collect and to analyze the weight of feed in the bin. The module ensures the uninterrupted distribution of feed.

EDGE Bird Scale

EDGE Bird Scale is an external module which allows the capability to collect and to analyze the weight data that come from the bird scales.

EDGE Power Module

EDGE Power Module is a variable outputs external module. The module allows the increasing of the number of variables outputs on EDGE system. EDGE Power Module could contain up to 4 variables modules (EDGE Variable Output (SSR)). The 0-10Vdc outputs from Expansion Boxes control the variables modules. The EDGE Power Module could be controlled by EDGE 8IN-4V-6REL FAILSAFE or EDGE 4IN-12V.

NOTE: *The EDGE 4IN-12V can control up to 12 EDGE Variable Outputs, therefore it can control up to 3 EDGE Power Modules.*

EDGE 2 Remote Display

EDGE 2 Remote Display is a remote which displays data on its screen from the main system by Ethernet ports or allow the control of another EDGE 2 Main Controller. The EDGE 2 Remote Display is supplied by 24Vdc: EDGE PSU 24V 36W. The EDGE 2 Remote display is optional and it is not mandatory to use it in the EDGE network. EDGE 2 Remote Display replaces wireless or cellular devices to control remotely locally.

EDGE 2 Controller Screenless

EDGE 2 Controller Screenless is an EDGE Main Controller except there is not LCD screen. It is only accessible remotely.

NOTE: *The EDGE 2 Controller Screenless can only be used as a redundant Main Controller.*

EDGE Weather Station

EDGE Weather Station provides the outside environmental parameters to the ventilation controller which will correctly manage the ventilation system according to the outside parameters. The information from the sensors is transmitted by the Weather Station to the ventilation controller by the RS485 bus. The

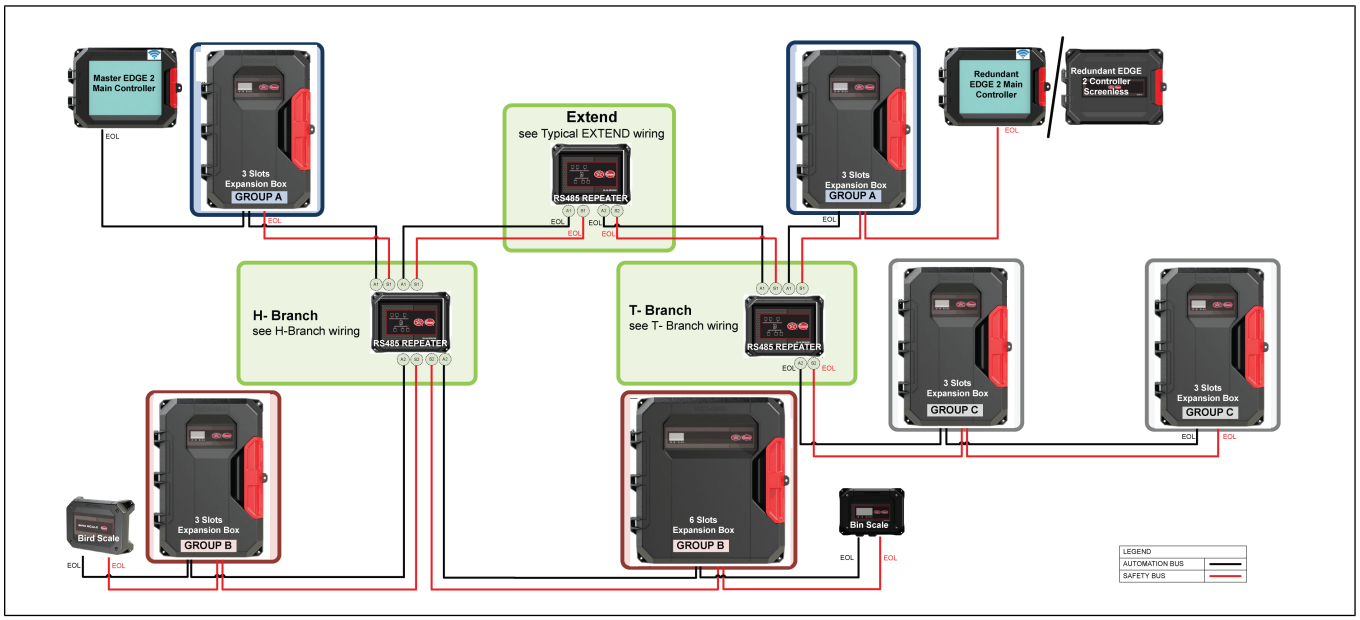
EDGE Weather Station can measure wind speed, wind direction, outside temperature, outside humidity, and atmospheric pressure.

EDGE 4IN-2V-8DO

This module allows the control of 8 control outputs (pilot duty) and the contacts feedback reading of relays or contactors from loads. This module is used to build virtual Expansion Box. The module is an opened enclosure which have to put in a cabinet.

EDGE 2 Basic Network

Figure 1-3 *EDGE Redundancy Scheme Example*



Expansion Plug-In Modules

Table 1-1 *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.
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 16IN-6REL	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.

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

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 that allows a proportional voltage output according to the 3-10Vdc input.
EDGE 4IN-6R-2LD	This module has 4 analog inputs, 6 relay outputs normally opened and 2 independent light dimmer outputs.
EDGE 4IN-6R-2LD Failsafe	This module has 4 analog inputs, 6 relay with two different outputs: normally opened and normally closed, and 2 independent light dimmer outputs.

Table 1-2 *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.

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.

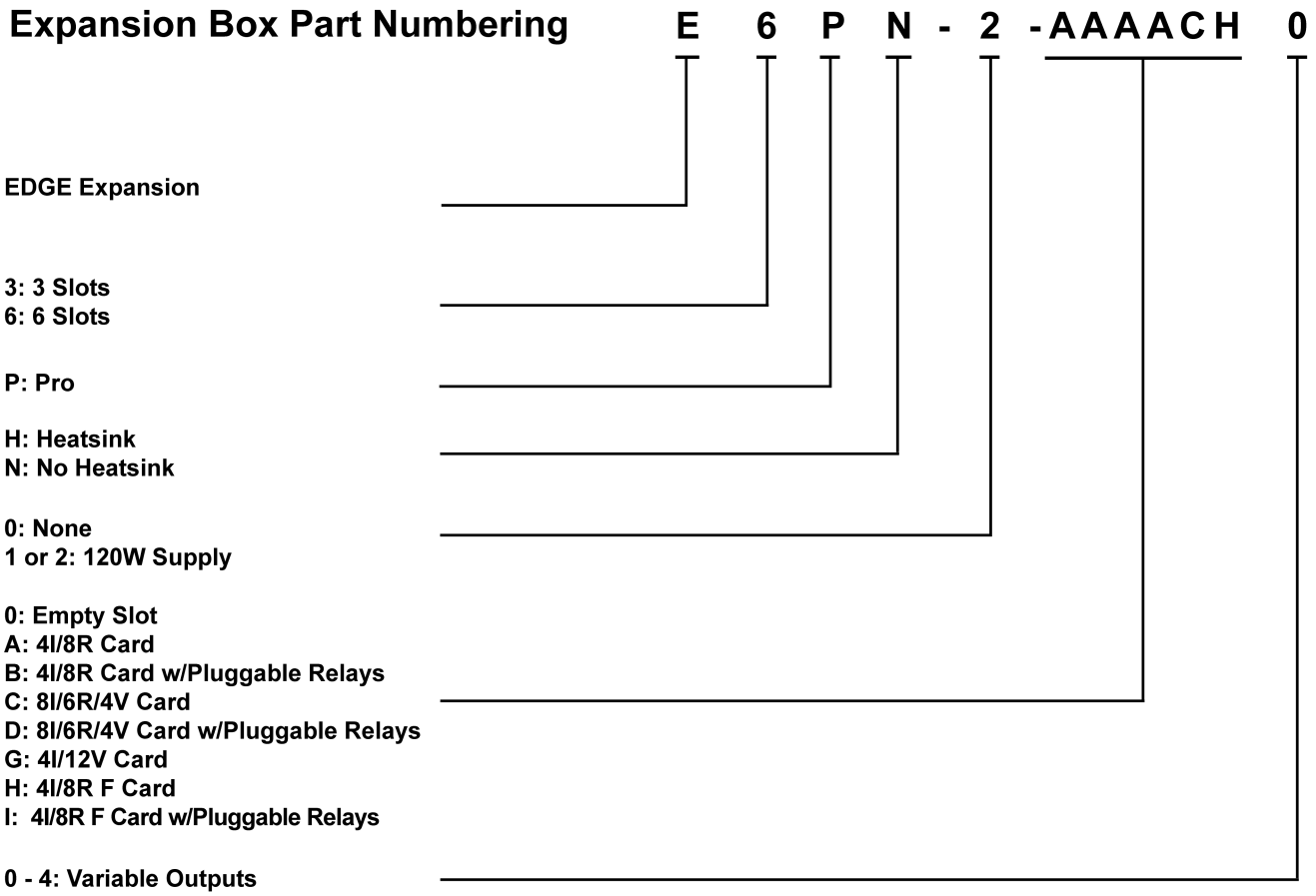
3-Slot Expansion Box model with a Heat sink: EDGE 3-SLOT BOX W/HSK or E3PH-_-____

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:



Power supply: The 3-Slot Expansion Box has a 120W power supply. The 6-Slot Expansion Box has only a 120W power supply.

The 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 numbers

- E3PH-1-C004
- E6PH-2-AAAACH4

:

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.

Reference Documents

This document should be read with the following accompanying documents:

- Details on installation and initial configuration of the EDGE 2 System can be found in the EDGE 2 System Installation Manual #890-00687.
- Details on the operation of the EDGE 2 System can be found in the EDGE 2 System User’s Manual #890-00686.

- Details on wiring diagrams of the EDGE 2 System can be found in the EDGE 2 System wirings diagrams:
  - #891-00596: EDGE 2 - Non redundancy System
  - #891-00597: EDGE 2 - Redundant System
  - #891-00598: EDGE 2 - General Wiring Information
- Details how to convert EDGE 1 system into EDGE 2 system can be found in the quick start guide # 892-00097.
- Details how to install EDGE 2 WIFI in EDGE 2 Controllers can be found in the quick start guide # 892-00100.

External EDGE Modules have their own documents.

Contact information

Sales

USA

Automated Production Systems (AP/Cumberland)
1004 East Illinois St.
Assumption, IL 62510 USA
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Phone: 217-226-4449 International phone: 217-226-4401
Fax: 217-226-3540 International fax: 217-226-4420
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Support

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Fax: 217-226-3540 International Fax: 217-226-4420
E-mail : *apsales@automatedproduction.com*

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Contact your nearest GSI authorized representative. Consult the Brazilian representative list at:
http://www.gsibrasil.ind.br/ -OR- *http://www.gsibrasil.ind.br/representantes/?tipo=pan*
-OR-
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Fax:1-866-880-2777
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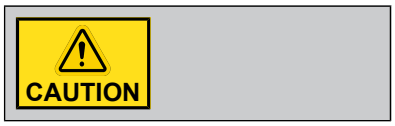
Manufacturer

GSI Electronics
5200 Armand Frappier Saint-Hubert, Qc
Canada J3Z 1G5

WARNING ***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

DANGER

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).

WARNING

The radio module (ESP32-S3) circuit board is electrostatic discharge (ESD) sensitive. ESD precautions must be observed when handling and installing these components.

The radio module (ESP32-S3) installations must be protected from electrical transients on the power supply and I/O lines. This is especially important in outdoor installations, and/or where connections are made to sensors with long leads. Inadequate transient protection can result in damage and/or create a fire and safety hazard.

Telecommunication Advice

NOTE: *In some countries the WIFI module is not available to purchase because of regulation restrictions.*

The EDGE 2 Controllers contain a wireless radio module inside: ESP32-S3 from Expressif System manufacturer. ESP32-S3 module is FCC/IC/CE certified. This is valid in the case no other intentional or un-intentional radiator components are incorporated into the product and there is no change in the module circuitry.

FCC ID and IC ID

The FCC ID of Expressif System Wireless radio module (ESP32-S3) is 2AC7Z-ESPS3WROOM1U.

The IC ID of Expressif System Wireless radio module (ESP32-S3) is 21098-ESPS3WROOMU.

FCC Caution and Safety Notices

Any changes or modifications (including the antennas) made to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment. This device and its antenna(s) must not be collocated or operating in conjunction with any other antenna or transmitter.

FCC Antenna Gain Restriction

The Expressif System Wireless radio (ESP32-S3) has been designed to operate with any patch antenna up to 2.6 dBi of gain at 2.4GHz.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm (7-7/8 in.) from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.

IC RSS-247 Detachable Antenna Gain Restriction

This device has been designed to operate with the antennas having a maximum gain of 2.6 dBi of gain at 2.4GHz. The required antenna impedance is 50 ohms.

Health and radiation

This equipment should be installed and operated with minimum distance 20 cm (7-7/8 in.) between the radiator and your body.

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 1-3 *Complete Enclosure Without Modules*

Item	Contents
EDGE 2 MAIN CONTROLLER	One EDGE 2 Main Controller, One quick start guide
EDGE 2 REMOTE DISPLAY	One EDGE 2 Remote Display, One quick start guide
EDGE 2 SCREENLESS CONTROLLER	One EDGE 2 Screenless Controller, One quick start guide
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 1-4 *Modules for 3-Slot Expansion Box and 6-Slot Expansion Box*

Item	Contents
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

Table 1-4 *Modules for 3-Slot Expansion Box and 6-Slot Expansion Box (cont'd.)*

Item	Contents
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
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
EDGE 4IN-6R-2LD	4 analog inputs, 6 relay outputs normally opened, and 2 independent light dimmer outputs
EDGE 4IN-6R-2LD FAILSAFE	4 analog inputs, 6 relays with two different outputs: normally opened and normally closed, and 2 independent light dimmer outputs

Table 1-5 *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

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.

Ordering Information

Basic System

A minimum non redundant basic EDGE 2 System consists of the following equipment:

- 1 x EDGE 2 Main Controller
- 1 x EDGE 6 Slot - Expansion Box or EDGE 3 Slot - Expansion Box

A minimum redundant basic EDGE 2 System consists of the following equipment:

- 1 x EDGE 2 Main Controller (Master)
- 1 x EDGE 2 Main Controller (Redundant) or EDGE 2 Screenless Controller (Redundant)
- 2 x EDGE Expansion Boxes or 1 x Expansion Box and 1 x External Power Supply of 150W on Safety Network

The following external modules can be connected to a basic EDGE 2 System to add more functionality:

- EDGE RS485 Repeater
- EDGE Bin Scale
- EDGE Bird Scale
- EDGE Power Module
- EDGE 2 Remote Display
- EDGE 2 Controller Screenless
- EDGE Weather Station
- EDGE 4IN-2V-8DO

System Building

EDGE 2 Controller Screenless

The EDGE 2 Controller Screenless can be used only as a Redundant Main Controller in a redundancy system scheme.

NOTE: *Use only Ethernet cables with EDGE 2 Controller Screenless for Ethernet network. The router must have DHCP function when using this type of controller.*

EDGE 2 Remote Display

Use the EDGE PSU 24V 36W to power the EDGE 2 Remote Display. This will make sure the EDGE Expansion Box power supply is not overcharged. The EDGE 2 Remote Display needs an EDGE 2 Main Controller to control the EDGE system indirectly. An EDGE network without a Main Controller is impossible.

WAN\LAN\WLAN Network

Ethernet network components are not provided. Ensure to purchase network components according to the implemented technology: Wireless, Cabled, and Cellular.

Installation Options:

The LAN network can be setup to reach outside Ethernet cables or wirelessly using a Cellular based network to reach an Ethernet service provider (WAN).

Depending on the option you choose, the planning and installation will be different for an Ethernet setup, make sure there is access to high speed Internet.

No Redundant Main Controller

- Ethernet is used only for remote connection purpose.
- The LAN network can be setup to reach outside Ethernet cables or wirelessly using a Cellular based network to reach an Ethernet service provider (WAN).

Redundant Controller and LAN\WLAN Network

You can setup a redundant Main Controller, in case the Main Controller Master fails. Use of a redundant Main Controller will determine its communication scheme:

- Redundant Main Controller using internally wired Ethernet (LAN) network
- Redundant Main Controller using internally wireless Ethernet (WLAN)
- Redundant Main Controller using Cellular network

Redundant Power Supply

The EDGE 2 System uses a redundant power supply

The maximum distance of the DC power cable is 450ft (137.6m) with a wire gauge of 16AWG in redundant power supply from the first EDGE Expansion Box in a group of two to the last EDGE 2 Controller on the EDGE network (see redundant schemes). Over this distance, use an EDGE PSU 24V 36W to supply power to the EDGE 2 Controllers. In this case, do not use the 24Vdc from the EDGE Expansion Box. In no redundant power supply scheme, the maximum distance of the DC power cable is 500ft (150m) with a wire gauge of 16AWG.

EDGE Network Design

Redundant Communication between EDGE Devices

The system uses redundant communication between the Expansion Boxes, external modules, and the main and redundant controls.

For a system without redundant communication, use only Automation links.

Automation and Safety bus have to be wired in daisy chain. Use EDGE RS485 Repeater to extend the network length or to create sub networks. An EDGE RS485 allows the network to be extended by 1500ft (457m) when using only a communication link without supplying DC power on an EDGE module at the end.

NOTE: *Up to 5 EDGE RS485 Repeaters can be used in series to extend a network branch.*

Installation option

Failsafe Plug-in Modules

You can purchase Failsafe Plug-In Modules that relay output contacts if the relay coil is de-energized in the event of a power outage.

NOTE: *NOTE: Failsafe Plug-In Modules enter into a Failsafe Mode when powered down.*

Variable Light Dimmer Outputs

By using EDGE 4IN-6R-2LD modules, EDGE 2 system allows 8 Amps lights dimming per channel in a livestock building. It has been designed to accommodate various models of dimmable compact fluorescent lights (CFL), dimmable cold cathode fluorescent lamps (CCFL), dimmable Light Emitting Diodes (LED).

NOTE: *CFL and CCFL lamps must be ELV ballast type (electronic only). Only two EDGE 4IN-6R-2LD or two EDGE 4IN-6R-2LD Failsafe Modules are allowed per Expansion Box. Both modules can be used in either the 6 Slot Expansion Box or the 3 Slot Expansion Box. In a 6 Slot Expansion Box, EDGE 4IN-6R-2LD cards have to be installed into slot 1 and slot 6. In a 3 Slot Expansion Box, EDGE 4IN-6R-2LD cards have to be installed into slot 1 and slot 3.*

NOTES

2 Pre-Installation Planning

Topics Covered in this Chapter

- Installation Options
- Power Supply
- Guidelines for Operating Environment
- Guidelines for Installation Location
- Guidelines for Routing Cables
- Grounding Recommendations for the System
- Installation Guidelines
- Light Dimmer Outputs (4IN-6R-2LD)

Installation Options

WAN\LAN Network

The LAN network can be setup to reach outside Ethernet cables or wirelessly using a Cellular based network to reach an Ethernet service provider (WAN). Depending on the option you choose, the planning and installation will be different.

- For an Ethernet setup, make sure there is access to high speed Internet.
- For a Cellular based network, plug the cellular base to the external USB connector on the EDGE 2 enclosure with a sealing rating of Nema 12.

Redundant Controller and LAN\WLAN Network

A redundant Main Controller is used in case the Main Controller Master fails. Use of a redundant Main Controller will determine its communication scheme.

- Redundant Main Controller using internally wired Ethernet (LAN) network
- Redundant Main Controller using internally wireless Ethernet (WLAN)
- Redundant Main Controller using Cellular network
- No Redundant Main Controller: Ethernet link can be used for remote connection.

Redundant Power Supply

The EDGE 2 System uses a redundant power supply. Depending on the option you choose, the planning and installation will be different. (28W max of DC load with 6 Slot Expansion Box on EDGE network, 60W max of DC load with 3 Slot Expansion Box on EDGE network)

The controller groups must be divided into subgroups of two Expansion Boxes (28W max of DC load with 6 Slot Expansion Box, 60W max of DC load with 3 Slot Expansion Box).

INSTRUCTIONS: Divide the total group of Expansion Boxes by 2 to make a subgroup of two Expansion Boxes. If there is an odd group of Expansion Boxes, you can make an even group using one of the following options:

- For a 6 Slot Expansion Box => use two 3 Slot Expansion Boxes.
- Use an Expansion Box with an external power supply of 150 Watts wired on the Safety Network.

Use Dual links on (Automation | Safety).

For a system without a redundant power supply: Use the Automation link and do not wire the 24Vdc wire between Expansion Boxes. (84W max of DC load on 3 Slot Expansion Box and 48W max of DC load on 3 Slot Expansion Box)

Failsafe Plug-in Modules

You can purchase Failsafe Plug-In Modules that relay output contacts if the relay coil is de-energized in the event and Failsafe Mode of a power outage.

NOTE: *Failsafe Plug-In Modules enter into a Failsafe Mode when powered down.*

Backup Mode and Failsafe Operation

The EDGE system enters backup mode when communication is lost between the EDGE 2 controllers 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 F, 4I/8REL F, and 4I-6R-2LD F modules. To ensure proper operation of equipment in the event of a EDGE 2 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

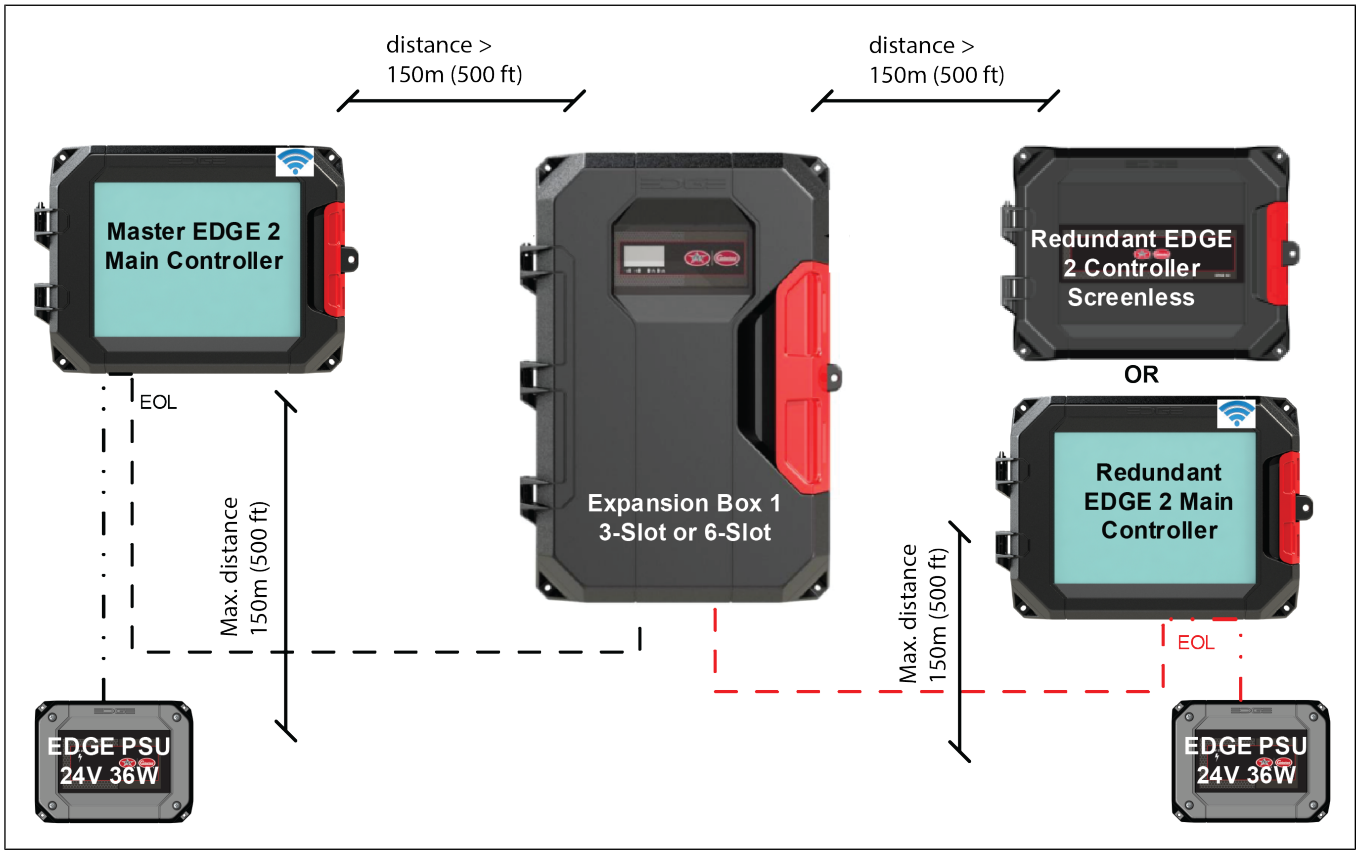
Power Supply

The power consumption of EDGE 2 Controllers are similar to the previous EDGE Main Controller. To upgrade an EDGE system, swapping out the Main Controllers is very easy if no new hardware features are implemented.

For example, new cellular bases are installed to a current system. This new feature could overload the power consumption of Expansion Boxes. To solve this problem, use an EDGE PSU 24V 36W close to the problematic EDGE 2 Controller and supply it directly. This solution can also be used in the case of voltage drop on an EDGE network that may be too long.

WARNING ***The maximum distance of the DC power cable is 450ft (137.6m) with a wire gauge of 16AWG in redundant power supply from the first EDGE Expansion Box in a group of two to the last EDGE 2 Controller on the EDGE network (see redundant schemes). Over this distance, use an EDGE PSU 24V 36W to supply power to the EDGE 2 Controllers. In this case, do not use the 24Vdc from the EDGE Expansion Box. In no redundant power supply scheme, the maximum distance of the DC power cable is 500ft (150m) with a wire gauge of 16AWG.***

Figure 2-1 *Distance > max. distance with 16 AWG — no redundant power*



EDGE 2 Controller Screenless

The EDGE 2 Controller Screenless can be used only as a Redundant Main Controller in a redundancy system scheme.

NOTE: *Use only Ethernet cables with EDGE 2 Controller Screenless for Ethernet network. The router must have DHCP function when using this type of controller.*

EDGE 2 Remote Display

Use the EDGE PSU 24V 36W to power the EDGE 2 Remote Display. This will make sure the EDGE Expansion Box power supply is not overcharged.

The EDGE 2 Remote Display needs an EDGE 2 Main Controller to control the EDGE system indirectly. An EDGE network without a Main Controller is impossible.

Equipment and Load Planning

According to the needs, the installer manual gives the maximum output rating accorded per load or equipment type. According to the maximum output rating, the number of equipment or loads allowed per output is limited per the power factor or the service factor of the equipment or loads.

EDGE Network Design

Automation and Safety bus have to be wired in daisy chain. Use EDGE RS485 Repeater to extend the network length or to create sub networks.

Power Rating of the External Modules

To calculate the total power consumption on the Expansion Box via EDGE network from the modules, add together the power consumption of each module

External Module Name	Power Consumption
EDGE Bird Scale	5W
EDGE Bin Scale	5W
EDGE Weather Station	4W
EDGE RS-485 Repeater	2W
EDGE 4IN-2V-8DO	8W
EDGE 2 Remote Display	24W
EDGE 2 Main Controller	24W
EDGE 2 Controller Screenless	17W

Guidelines for Operating Environment

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 EDGE 2 Controllers and the Expansion Boxes in a corridor or an area dedicated to electronic controllers.
- Do not install the controller in the room where the animals are and block every possible infiltration of air at the beginning and at the end of the cable duct.
- 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 EDGE 2 Controllers and 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.*

Network Operating Environment

Use access points which are allowed to be installed directly in the pig area. The Ethernet switch and router are not built for harsh environments. It is strongly advised to install them in a clean room or office. If this is not possible, consider using a NEMA 4X protection box to install them in. Request a CSA/UL certified box from your supplier.

Wireless Network Design

A lot of environmental parameters could affect the wireless communication: the barn configuration, the wall material, the building faraday cage effect, the antenna pattern transmission, or the number of units using a given network.

Ethernet Ports

Ethernet Port Protection

AP\Cumberland recommends the use of another Ethernet protection step when the Ethernet cable has to go from one barn to another using the Ethernet switches. This recommendation is applicable regardless of the way it is used to link both barns.

Ensure that the Ethernet protection ports can accept the use of CAT5 Ethernet speed at a minimum.

NOTE: *Some Ethernet protection ports can alter the Ethernet signals because it is too capacitive.*

Lightning can destroy an EDGE System Ethernet port if not protected when routing a connection from building to building.

AP\Cumberland recommends the use of an underground trench to link two barns.

Ethernet Infrastructure Advice

- Plan for the future expansion.
- Use a CAT5 Ethernet cable.
- Use cable management (Adding ladder rack, rack-based cable management).
- Avoid running unshielded twisted Ethernet cable (UTP) in parallel with high voltage cables. The magnetic field is disruptive and the communication becomes noisy and garbled.
- Avoid running Ethernet cables near electrically noisy devices like a frequency drive, Light Dimmer, motor load, etc.
- The typical distance limitation for UTP cabling with typical Ethernet is 100 meters (328 ft.).
- Follow all laws and local codes for the Ethernet cabling (GR-1089, International Telecommunications Union standards K.20, K.21, K.44, and K.45).
- Test each Ethernet cable and the telecommunication components.

Guidelines for Installation Location

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.

Operational Clearance — EDGE 2 Controllers

Mount the EDGE 2 Controllers and the EDGE PSU 24V 36W in a location that has sufficient air circulation around the box and can be easily accessed for service. Minimum clearance for an EDGE PSU 24V 36W is 22” W x 27” H. Minimum clearance for an EDGE 2 Controller is 32” W x 34” H.

Figure 2-2 *Minimum clearance - EDGE PSU 24V 36W*

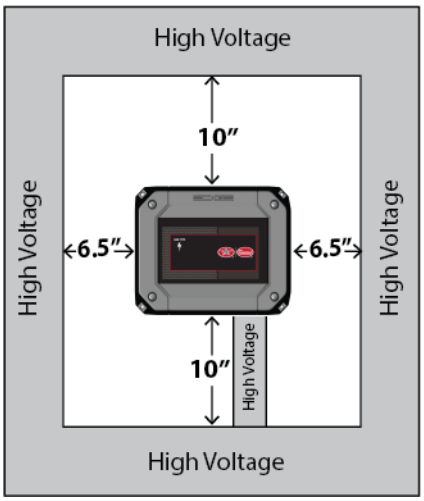
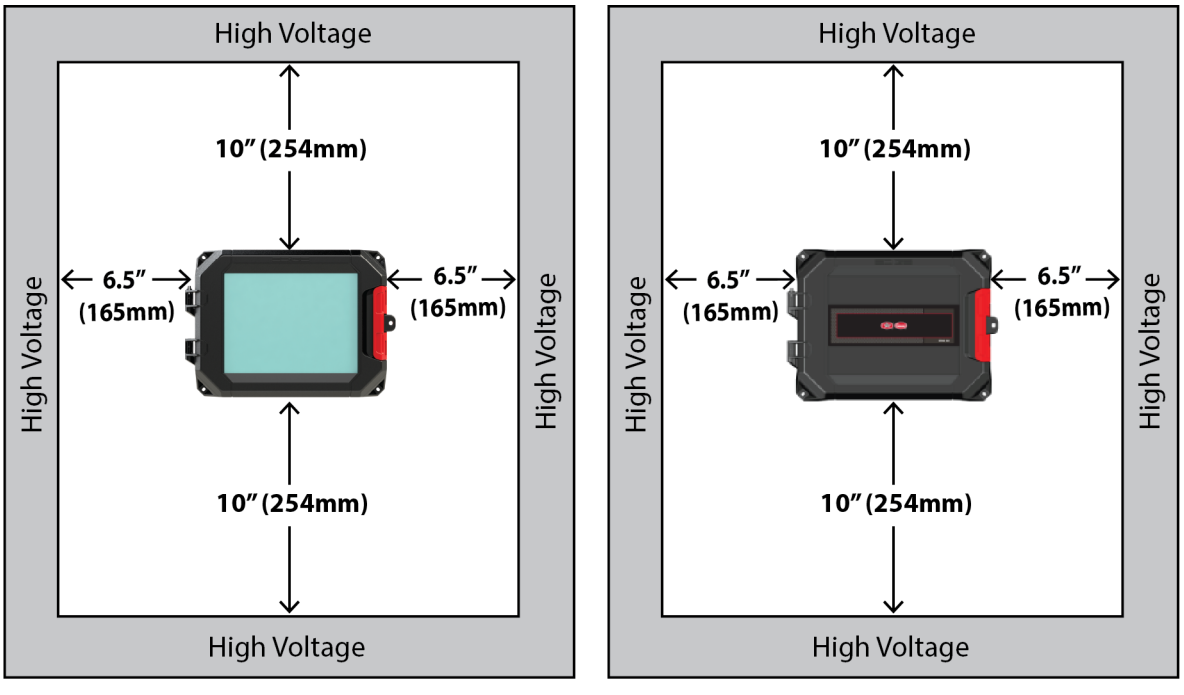


Figure 2-3 *Minimum clearance - EDGE 2 Controllers*



Operational Clearance — EDGE Expansion Boxes

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


EDGE 3-Slot Expansion Box
-Enclosure Dimensions-
26in (660mm) H x 18in (457mm) W x 11in (279mm) D
-Wall Space-
35in (889mm) W x 50in (1270mm) H
12in (305mm)
10in (254mm)
7in (178mm)
12in (305mm)

Cabling Type

WARNING

Use copper conductors only.

Guidelines for Routing Cables

Rigid Conduits

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 2 Controllers. 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

WARNING

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

Nylon Cable Glands

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

WARNING

Use watertight compression cable glands rated Nema 12 for each cable used.

WARNING

Use silicone to seal the cable gland rated Nema 12 if more than one cable is use in the same cable gland.

WARNING

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

WARNING

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.

NOTICE

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

Cable Support When not Using Rigid Conduits

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

IMPORTANT: *Refer to the national code for more details about possible installations.*

Cable Routing

NOTICE ***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 electro-magnetic interference.

WARNING ***Do not use rigid conduits over 1 inch (25.4mm) for the EDGE 2 Controllers. 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.*

WARNING ***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.

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

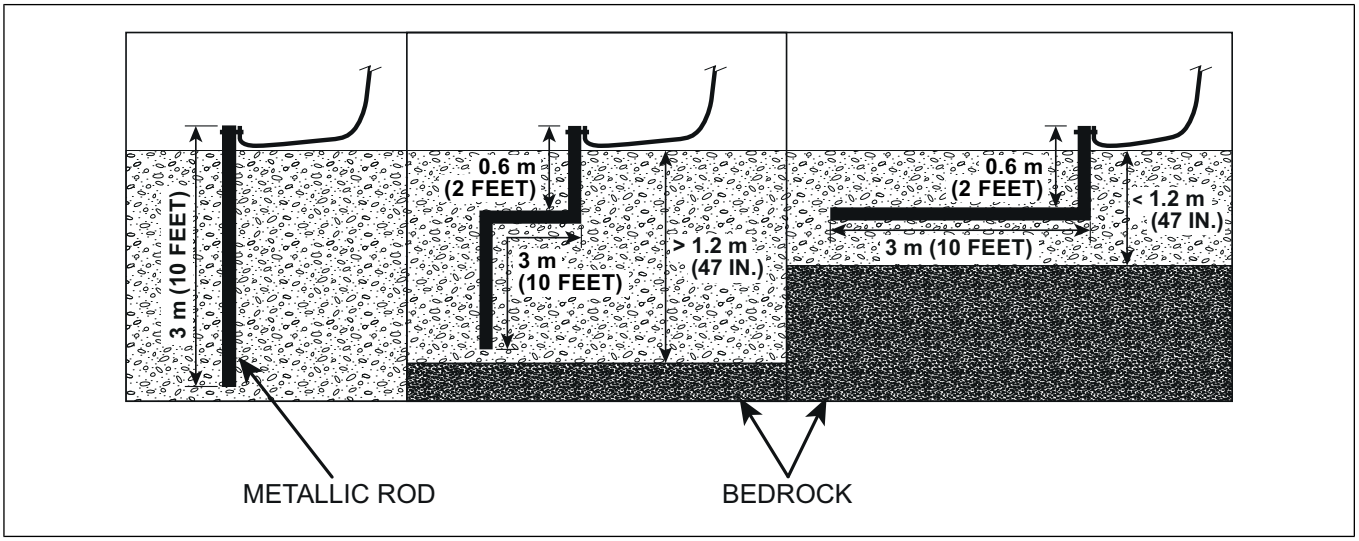
NOTICE ***The ground resistance levels must comply with local and national electrical codes.***

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 2-4 *Grounding installation depending on bedrock depth*



- 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 2-1 *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 2-2 *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	Belden # 9912, color code 189, or equivalent

Installation Guidelines

Electrical Noise

- Install the controllers as far as possible from high voltage sources. It must be installed at least 24 inches (600mm) away from a Variable Frequency Drive (VFD).
- Never mount a power supply or transformer near the controllers. Allow at least 12 inches (300mm) between them.

Cable Installation

- Ensure all cable entries are made through the bottom of the enclosures. Do not make holes through the top or side panels of enclosure and be careful not to damage the electronic cards located inside the enclosure when drilling.
- All incoming cables must connect directly to the terminals. No cabling should touch the side panels or the top circuit board. Do not use the controller as a junction box.

External Switchgears

Use external contactors for the ON-OFF switching of electrical motors if loads does not respect relays ratings. These contactors should be placed in a separate electrical distribution panel.

NOTE: *An additional snubber has to be installed on coil contactor when using external switchgears.*

Circuit Breaker

- AP\Cumberland recommends connecting only one device per Expansion Box output and to connect each device on a separate circuit breaker.
- If your Expansion Box has no power-on switch, an external switch or circuit breaker must be included in the building installation to interrupt power to L and N electric power lines. 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.

Three-phase Power Supply

EDGE Variable Outputs are independent. One different source could be use per EDGE Variable Output. With 3-phase power, ensure to use same phases to wire a specific EDGE Variable Output.

Probe Sensors

Do not install probes sensors near a low wall, heater, or fan.

Extending a Sensor

Always use twisted shielded cables of at least 18AWG (1mm2) to extend cabling to sensors and potentiometers. Solder all joints and use a heat shrink when extending cables. Never extend a sensor more than 500 feet (150m).

Low Voltage Cables

Install the low voltage cables at least 12 inches (300mm) away from high voltage cables (120, 230 or 380 Vac or 24Vdc motor loads). Always use twisted shielded cables to wire low voltage devices. Always cross high and low voltage cables at a 90° angles. This applies to the following low voltage devices:

- Sensor cables
- Potentiometer cables
- Communication cables
- 0-10V loads
- All other low voltage devices

Locking the Enclosure

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

Light Dimmer Outputs (4IN-6R-2LD)

Maximum Number of EDGE 4IN-6R-2LD Modules per Expansion Box

Only two EDGE 4IN-6R-2LD or two EDGE 4IN-6R-2LD Failsafe Modules are allowed per Expansion Box. Both modules can be used in either the 6 Slot Expansion Box or the 3 Slot Expansion Box. In a 6 Slot Expansion Box, EDGE 4IN-6R-2LD cards have to be installed into slot 1 and slot 6. In a 3 Slot Expansion Box, EDGE 4IN-6R-2LD cards have to be installed into slot 1 and slot 3.

Warranty is void if product is used in a manner not specified by the manufacturer.

EDGE 4IN-6R-2LD Modules Operating System

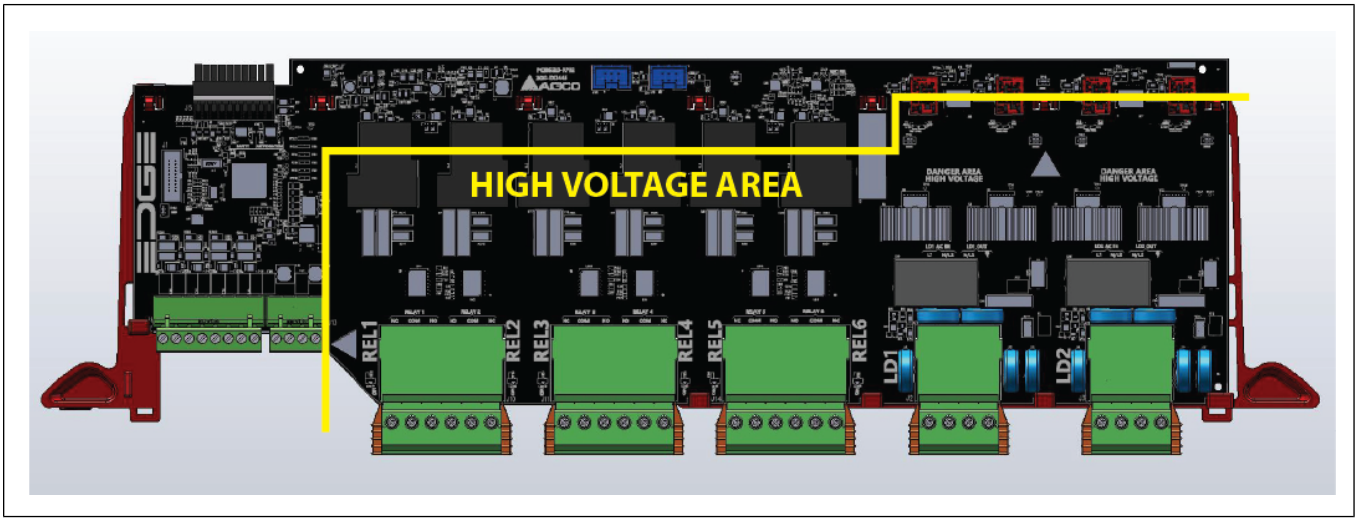
The EDGE 4IN-6R-2LD modules are only compatible with EDGE 2 Controllers.

IMPORTANT: *Make sure to order the correct EDGE Main Controller, once it is mounted to the wall, the product may not be returned.*

High Voltage Area Identification

The high voltage area is outlined on the PCB board by a white line that defines the high voltage area from the low voltage area.

Figure 2-5 *PCB High Voltage Area*



DANGER

High Voltage! Turn off the main electrical disconnect switch prior to servicing any electrical equipment. Failure to do so can cause serious injury or death.

GND1, GND2, GND3, and GND4 test points are high voltage.

WARNING

Installation must only be performed by qualified service personnel.

Usable Light Bulb Types

The EDGE 4IN-6R-2LD modules can only control one type of dimmable CFL/CCF/LED per zone. Using multiple types, wattages or brands of CFL/ CCFL/LED can create interferences that can cause the module to work improperly.

NOTE: *CFL and CCFL lamps must be ELV ballast type (electronic only)*

Warm up lights before dimming

The dimmable CFL/CCFL/LED bulbs may be exposed to various temperature conditions during storage and transportation. Turn the lamps ON at 100% for 24 hours after the first installation before dimming.

About dimmable CFL/CCFL/LED bulbs

The EDGE 4IN-6R-2LD modules can control the intensity of three types of energy-efficient lamps:

1. **Compact Fluorescent Light (CFL) —** This refers to compact fluorescent light or energy saving light.
2. **Cold Cathode Fluorescent Lamp (CCFL) —** This refers to light sources that are based on gas discharge principles, where the cathode of the lamp is not independently heated.
3. **Light Emitting Diodes (LED) —** This refers to a semiconductor diode that emits light when conducting current.

There are about 35 different electrical components in a typical dimmable CFL/CCFL/LED which can cause the bulbs to react differently one another (some bulbs may extinguish early; other may flicker before they extinguish at their low end).

Dimmable CFL/CCFL/LED may cause interference with AM radios, cordless telephones and remote control devices.

The lifetime of CFL/CCFL/LED are 8 times the lifetime of incandescent lamps. Many factors can affect their lifetime:

- Operating voltage;
- Manufacturing defects;
- Exposure to voltage spikes;
- Mechanical shocks;
- Frequency of On/Off cycles;
- Lamp orientation;
- Ambient operating temperature;
- etc.

The CFL/CCFL produce less light as time passes: a test made by the US Department of Energy of 'Energy Star' products in 2003–04 has demonstrated that one quarter of tested CFLs no longer met their rated output after 40% of their rated service life.

AC Source Filtering

The filters on a 4IN-6R-2LD only filter EMI high frequencies. AC Power sources must not be polluted by other electrical machine noise. One AC Power source must be dedicated to one Zone AC input.

If the electrical network is polluted by low frequency EMI like harmonics issues and flickering, the use of a harmonics filter can be used to help solve the issue.

NOTE: *In some areas around the world, the elimination of harmonics emission is mandatory. In this case, the use of harmonics filters is essential.*

Power Output Formulas for Light Dimmer

Use the power output formulas to determine the power needed for your system.

Method 1

The power factor (PF) is between 0.5 and 1, and the number of watts are given by the light manufacturer for one lamp.

Step	Formulas	Example
		Voltage: 120V Lamp details: 9 watts and PF=0.5
Determine the Apparent power of one lamp	$Lamp\ power\ (VA) = \frac{Lamp\ power\ (Watts)}{PF}$	$Lamp\ power\ (VA) = \frac{9\ watts}{0.5} = 18\ VA$
Determine how many lamps to use on each zone output	$number\ of\ lamps\ per\ zone = \frac{Output\ Power\ available\ (VA)}{Lamp\ power\ (VA)}$ Output Power (VA) = 800VA on 100V Output Power (VA) = 960VA on 120V Output Power (VA) = 1760VA on 220V Output Power (VA) = 1920VA on 240V	$number\ of\ lamps\ per\ zone = \frac{960VA}{18VA} = 53.3\ lamps$ Round off the decimal point 53 lamps

Method 2

The lamp is Energy Star and the power factor is not given and the number of watts is given by the light manufacturer for one lamp.

Set PF = 0.75 when a lamp is higher than 5 watts in the formulas used in Method 1.

Method 3

The current and the lamp power is given by the manufacturer for one lamp.

Step	Formulas	Example
		Lamp details: Voltage: 120V, 9 watts and 100mA
Determine the PF (Power factor)	$PF = \frac{Lamp\ power\ (Watts)}{Lamp\ voltage\ (V) * Lamp\ current(A)}$	$PF = \frac{9\ watts}{120V * 0.1A} = 0.75$ In the product range, PF ≥ 0.5 →OK
Determine how many lamps to use on each zone output	$number\ of\ lamps\ per\ zone = \frac{Power\ Output\ Amperage\ (A)}{Lamp\ current\ (A)}$ Output Amperage = 8.0A on 100-120V or on 220-240V	$number\ of\ lamps\ per\ zone = \frac{8.0A}{0.1A} = 80$ Round off the decimal point 80 lamps

Method 4

The current and the lamp power is given by the manufacturer for one lamp and the power factor is not in the product range (between 0.5 and below 1).

Light type	Lamp Power Factor (PF)
LED lamp or CFL/CCFL lamp	0.95
LED lamp or CFL/CCFL lamp	0.85
Energy Star LED lamp or CFL/CCFL lamp	0.75

Light type	Lamp Power Factor (PF)
LED lamp or CFL/CCFL lamp	0.65
LED lamp or CFL/CCFL lamp	0.5

Set PF = 0.5 in the Method 1 or Method 2; or use Method 5 with PF =0.5

Method 5 - Real Power

$$Real\ Power\ (W) = PF * Apparent\ Power\ (VA)$$

Light type	Lamp Power Factor (PF)	Real Power at 100Vac	Real Power at 120Vac	Real Power at 220Vac	Real Power at 240Vac
LED lamp or CFL/CCFL lamp	0.95	760W	912W	1672W	1824W
LED lamp or CFL/CCFL lamp	0.85	680W	816W	1496W	1632W
Energy Star LED lamp or CFL/ CCFL lamp	0.75	600W	720W	1320W	1440W
LED lamp or CFL/CCFL lamp	0.65	520W	624W	1144W	1248W
LED lamp or CFL/CCFL lamp	0.5	400W	480W	880W	960W

3 Networking

Topics Covered in this Chapter

- Network Overview
- EDGE Networks (RS485)
- Ethernet Ports
- Wireless Network (WiFi)
- Cellular Network

Network Overview

EDGE 2 Controllers communicate to the EDGE Expansion Boxes and the external modules by RS485 network cabled (Automation link and Safety link). EDGE 2 Controllers use Ethernet ports (Cabled or Wireless or Cellular) to reach WAN\LAN\WLAN Network. It is by this way that the EDGE system is controlled remotely locally or externally.

WAN\LAN\WLAN Network

AP\Cumberland does not provide Ethernet network components. Ensure to purchase network components according to the implemented technology: Wireless, Cabled, and Cellular.

Installation Options:

The LAN network can be setup to reach outside Ethernet cables or wirelessly using a Cellular based network to reach an Ethernet service provider (WAN).

Depending on the option you choose, the planning and installation will be different. For an Ethernet setup, make sure there is access to high speed Internet.

No Redundancy Main Controller

- Ethernet is used only for remote connection purpose.
- The LAN network can be setup to reach outside Ethernet cables or wirelessly using a Cellular based network to reach an Ethernet service provider (WAN).

Redundant Controller and LAN\WLAN Network

A redundant Main Controller is used in case the Main Controller Master fails. Use of a redundant Main Controller will determine its communication scheme:

- Redundant Main Controller using internally wired Ethernet (LAN) network
- Redundant Main Controller using internally wireless Ethernet (WLAN)
- Redundant Main Controller using Cellular network

Redundant Communication between EDGE Devices

There are two communication EDGE Network possibiltes configuration between the Expansion Boxes, external modules, and the main and redundant controllers.

- Redundant communication
- System without redundant communication

EDGE Networks (RS485)

Introduction

Redundant Communication between EDGE Devices

The system has to use redundant communication between the Expansion Boxes, external modules, and the main and redundant controls.

- For a redundant communication setup, use dual links for (Automation | Safety).
- For a system without redundant communication, use only Automation links.

Automation and Safety bus have to be wired in daisy chain. Use EDGE RS485 Repeater to extend the network length or to create sub networks. The maximum cable length without using Power supply wiring is 1500 ft.

Redundant Power Supply

The EDGE 2 System uses a redundant power supply.

The power consumption of EDGE 2 Controllers are similar to the previous EDGE Main Controller. To upgrade an EDGE system, swapping out the Main Controllers is very easy if no new hardware features are implemented.

For example, new cellular bases are installed to a current system. This new feature could overload the power consumption of Expansion Boxes. To solve this problem, use an EDGE PSU 24V 36W close to the problematic EDGE 2 Controller and supply it directly. This solution can also be used in the case of voltage drop on an EDGE network that may be too long.

WARNING ***The maximum distance of the DC power cable is 450ft (137.6m) with a wire gauge of 16AWG in redundant power supply from the first EDGE Expansion Box in a group of two to the last EDGE 2 Controller on the EDGE network (see redundant schemes). Over this distance, use an EDGE PSU 24V 36W to supply power to the EDGE 2 Controllers. In this case, do not use the 24Vdc from the EDGE Expansion Box. In no redundant power supply scheme, the maximum distance of the DC power cable is 500ft (150m) with a wire gauge of 16AWG.***

No Redundant Supply

1. Each Expansion Box must have its own PSU (power supply).
2. Only one link is required between controllers.
3. Only one Expansion Box must supply the EDGE 2 Controller.
4. The terminal ground (GND from 24VDC, Green color on diagram block) must be connected.

Use only Automation link.

Redundant Power Supply

EDGE 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.

The controller groups must be divided into subgroups of two Expansion Boxes (28W max of DC load with 6 Slot Expansion Box, 60W max of DC load with 3 Slot Expansion Box).

INSTRUCTIONS: Divide the total group of Expansion Boxes by 2 to make a subgroup of two Expansion Boxes. If there is an odd group of Expansion Boxes, you can make an even group using one of the following options:

1. For a 6 Slot Expansion Box => use two 3 Slot Expansion Boxes.
2. Use an Expansion Box with an external power supply of 150 Watts wired on the Safety Network.

Use dual links on (Automation | Safety).

NOTICE

Only 28W max of DC load is allowed with 6 Slot Expansion Box on EDGE network, Only 60W max of DC load is allowed with 3 Slot Expansion Box on EDGE network).

Refer to the wiring diagrams for cable distances.

Refer to the EDGE 2 System Quick Start Guide #892–00096 to recognize the scheme pattern.

Ethernet Ports

Ethernet Port Protection

AP\Cumberland recommends the use of another Ethernet protection step when the Ethernet cable has to go from one barn to another using the Ethernet switches. This recommendation is applicable regardless of the way it is used to link both barns.

Ensure that the Ethernet protection ports can accept the use of CAT5 Ethernet speed at a minimum.

NOTE: *Some Ethernet protection ports can alter the Ethernet signals because it is too capacitive.*

WARNING

By not protecting the Ethernet ports when they have to go outside, a thunderstorm could destroy the Ethernet link of the EDGE System.

NOTICE

AP\Cumberland recommends the use of an underground trench to link two barns.

Ethernet Infrastructure Advice

- Plan for the future.
- Use CAT5 Ethernet cable.
- Use cable management (Adding ladder rack, rack-based cable management).
- Avoid running unshielded twisted Ethernet cable (UTP) in parallel with high voltage cables. The magnetic field is disruptive and the communication becomes noisy and garbled.
- Avoid running Ethernet cables near electrically noisy devices like a frequency drive, Light Dimmer, motor load, etc.
- The typical distance limitation for UTP cabling with typical Ethernet is 100 meters (328 ft.).
- Follow all laws and local codes for the Ethernet cabling (GR-1089, International Telecommunications

- Union standards K.20, K.21, K.44, and K.45).
- Test each Ethernet cable and the telecommunication components when the telecommunication infrastructure installation is finished

Recommended Ethernet Cable

For a majority of installation inside the barn, a minimum unshielded twisted pair (UTP) Cat5 Ethernet cable or higher category could be selected on the market by using similar ratings.

Parameter	Value
1-100MHz Impedance(Ω)	100±15
1-100MHz Delay Shew (ns/100m)	≤45
DC Resistance (Ω/100m) max	9.38
DC Conductor Resistance Unbalance (%)max	5.0

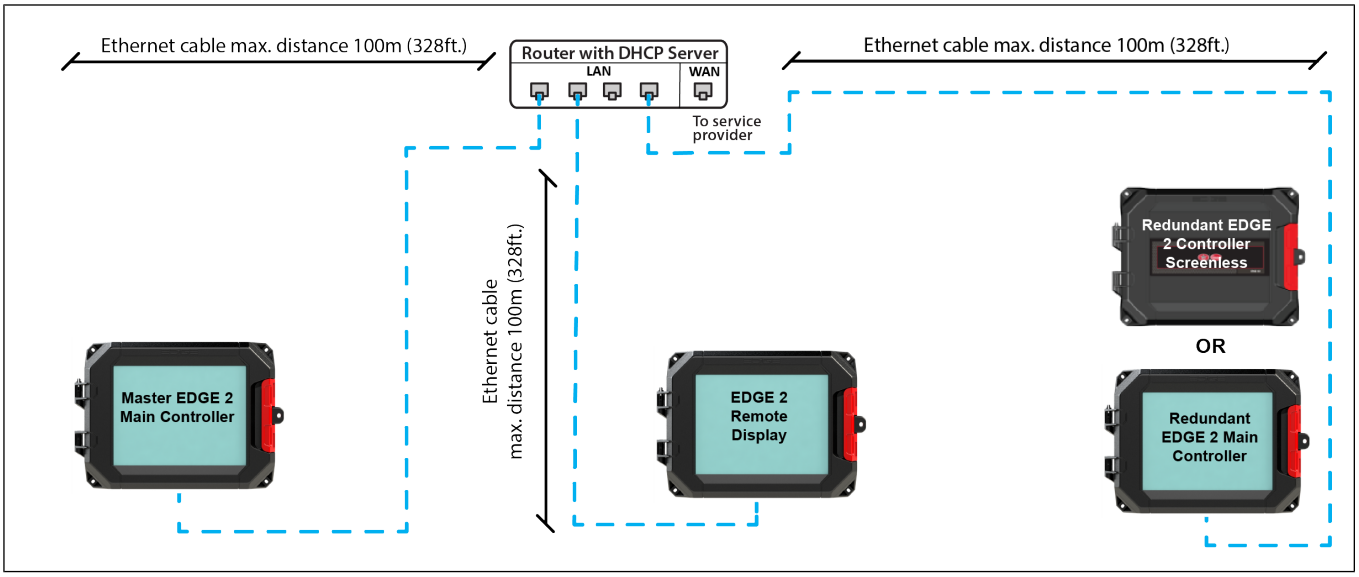
Electrical Characteristics (20℃) for Cat5 Ethernet Cable

Manufacturer	PSI Data P/N
PSI Data	PSI-5EODB-BX

In environments with a lot of electrical noise, (for example, close to a high voltage cable, a frequency drive, or a light control device), a shielded twisted pair cable is recommended.

A shielded twisted pair with braid is recommended for the link between two barns. To avoid ground loop, ground only one side of the Ethernet cable on the Ethernet switch. Normally, the Ethernet standard does not recommend to mix unshielded twisted pair cable and shielded twisted pair cable pattern. The goal here is to break the ground loop.

Figure 3-1 *Typical EDGE Network using Ethernet Cables*



Wireless Network (WiFi)

WLAN Network

AP/Cumberland does not provide Ethernet network components. Ensure to purchase network components according to the implemented Wireless technology.

The physical EDGE System WiFi network consist of the following parts:

- Router with WiFi or Router without WiFi and using access points

The router is the DHCP server for the WiFi network and is also the bridge with the customer network.

Installation Options:

The WLAN network can be setup to reach outside Ethernet cables or wirelessly using a Cellular based network to reach an Ethernet service provider (WAN).

Depending on the option you choose, the planning and installation will be different. For an Ethernet setup, make sure there is access to high speed Internet.

No Redundancy Main Controller and WLAN

Ethernet is used only for remote connection purpose.

The WLAN network can be setup to reach outside Ethernet cables or wirelessly using a Cellular based network to reach an Ethernet service provider (WAN).

Redundant Controller and WLAN Network

A redundant Main Controller is used in case the Main Controller Master fails. Use of a redundant Main Controller will determine its communication scheme:

- Redundant Main Controller using internally wireless Ethernet (WLAN)

WiFi Network Design

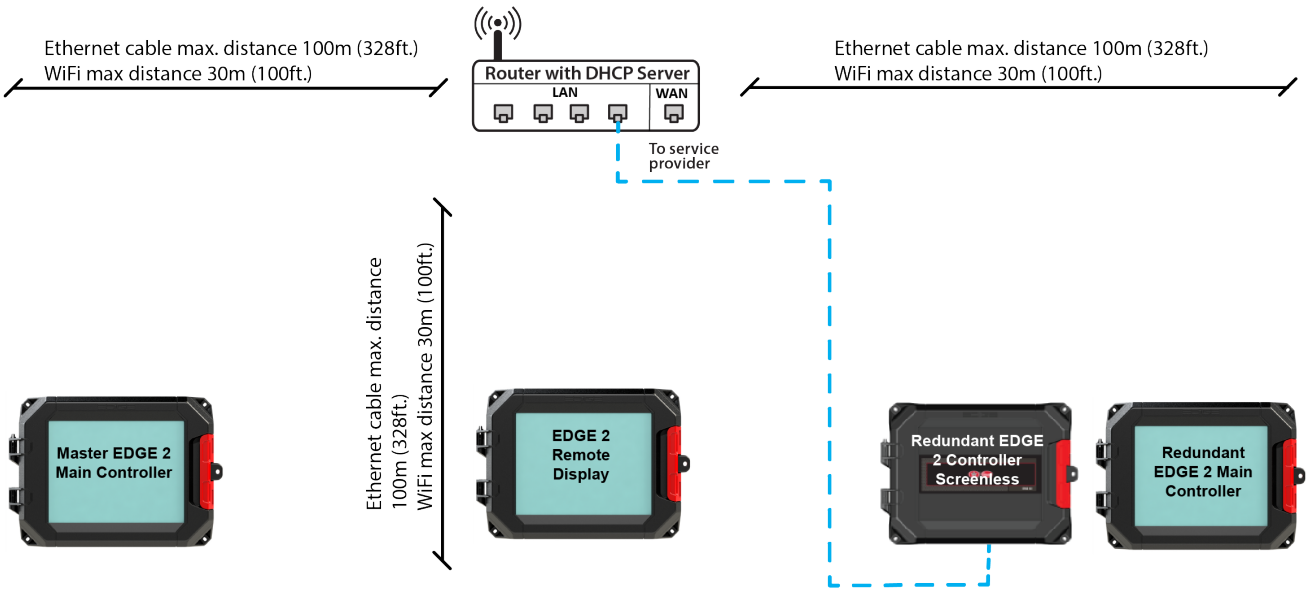
Having a strong WiFi signal throughout the barn is essential for a good working system. The WiFi signal has maximum coverage when a router or an access point is in a non-obstructed line of sight. Wooden walls and ceilings lower the WiFi signal strength. Metal support beams or girders will create low signal WiFi areas and metal or aluminum covered walls will block the WiFi signal.

A router or an access point has a typical coverage of 10,000 sqft. when not obstructed, this is a square of 100' by 100'. The signal is still there at 110', but it's no longer optimum and its strength cannot be predicted. If shaded by a beam, this distance can be considerably less.

The router or the access point emits a signal horizontally in a circle manner. It should be mounted in the center of the desired coverage area. Remembering that the coverage area is a circle around the router or the access point, wall mounting is not recommended. When mounting the router or the access point on a wall, it should be oriented properly and mounted as high as possible.

Planning the location and quantity of routers or access points should be done with the plans of the barn. Place a router or an access point on the ceiling for each 100' x 100' square and locate the EDGE 2 Controller with direct view of the access points. For a barn that is 230' by 100' and has few wooden or metal obstacles, use 2 access points. If the WiFi signal must go through wooden walls, it is better to use 3 access points. As metal walls essentially block the WiFi signal, there must be one access point per metal room. These are guidelines and experimentation may be required to create a WiFi network that delivers a strong signal to each component.

Figure 3-2 *Typical Wireless EDGE Network (WiFi)*



NOTE: *EDGE 2 Screenless must be connected directly using cable no matter what technology is used for the network.*

Cellular Network

For a Cellular based network, plug the celluar base into the external USB connector on the EDGE 2 Controller enclosure with a sealing rating of Nema 12.

NOTE: *Only EDGE 2 Main Controller and EDGE 2 Controller Screenless can be used as an external cellular base.*

4 EDGE 2 Controller Installation

Topics Covered in this Chapter

- EDGE 2 Main Controller and EDGE 2 Controller Screenless
- Preparing the Enclosures for Installation
- Mounting the Enclosures
- Connecting a Module to the Communication Network
- Connecting to Power Source
- DC Output Connections
- Connecting the Alarm Relay

EDGE 2 Main Controller and EDGE 2 Controller Screenless

Power Supplying

There are two ways to supply EDGE 2 Main Controller and EDGE 2 Controller Screenless:

1. By Expansion Box
2. By the EDGE PSU 24V 36W when the EDGE network is too long according to the network requirements or the voltage drop is too high on the EDGE network.

NOTE: *To supply power to an Expansion Box, refer to the Expansion Box and Virtual Expansion Box Installation on how to wire it to the EDGE 2 Main Controller or EDGE 2 Controller Screenless.*

Install the EDGE 2 Controllers on the wall before connecting it to an Expansion Box.

Communication between devices

No matter the DC power source, EDGE 2 Main Controller or EDGE 2 Controller Screenless have to connect the wires signal A and signal B to the Expansion Boxes.

NOTE: *Refer to the Expansion Box and Virtual Expansion Box Installation on how to wire it to the EDGE 2 Main Controller or EDGE 2 Controller Screenless or follow the next paragraphs in this section.*

EDGE PSU 24V 36W

The power consumption of an EDGE 2 Controller is similar to the previous EDGE Main Controller. To upgrade an EDGE system, swapping out the Main Controllers is very easy if no new hardware features are implemented.

For example, new cellular bases are installed to a current system. This new feature could overload the power consumption of Expansion Boxes. To solve this problem, use an EDGE PSU 24V 36W close to the problematic EDGE 2 Controller and supply it directly. This solution can also be used in the case of voltage drop on an EDGE network that may be too long.

EDGE 2 Remote Display

Use the EDGE PSU 24V 36W to power the EDGE 2 Remote Display. This will make sure the EDGE Expansion Box power supply is not overcharged.

NOTICE

The EDGE 2 Remote Display needs an EDGE 2 Main Controller to control the EDGE system indirectly. An EDGE network without a Main Controller is impossible.

Preparing the Enclosures for Installation

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

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 2 Controllers and the EDGE PSU 24V 36W.*

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

Remember

Do not mount the enclosures to drywall only. A structure behind the drywall must be able to support the enclosures. If needed,add a wooden or metal frame for support.

Preparing the EDGE 2 Controller

1. Open the enclosure by unlocking the latch.
2. Drill a hole the size of your cable connectors or your rigid conduits through the bottom side of the enclosure.
3. Remove any plastic fragments from the enclosure.
4. Install the cable connector or rigid conduit adaptors to the bottom of the enclosure.
5. Close the enclosures and lock the latch.

If using a Cellular based network, drill a hole the size of the cable connectors or your rigid conduits through the bottom side of the enclosure.

NOTE: *Only EDGE 2 Main Controller and EDGE 2 Controller Screenless could use an external cellular base.*

Preparing the EDGE PSU 24V 36W

1. Unscrew the screws from the cover and remove the cover.
2. Drill a hole the size of the your cable connectors or your rigid conduits through the bottom side of the enclosure.
3. Remove any plastic fragments from the enclosure.
4. Install the cable connector or rigid conduit adaptors to the bottom of the enclosure.
5. Install the enclosure cover and secure with screws.

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 2 Controller) with the hinges on the left hand side when facing the enclosure.*

NOTE: *Install the enclosure horizontally, so text is readable when facing the enclosure. Consult wiring diagrams for wire length restriction between enclosures.*

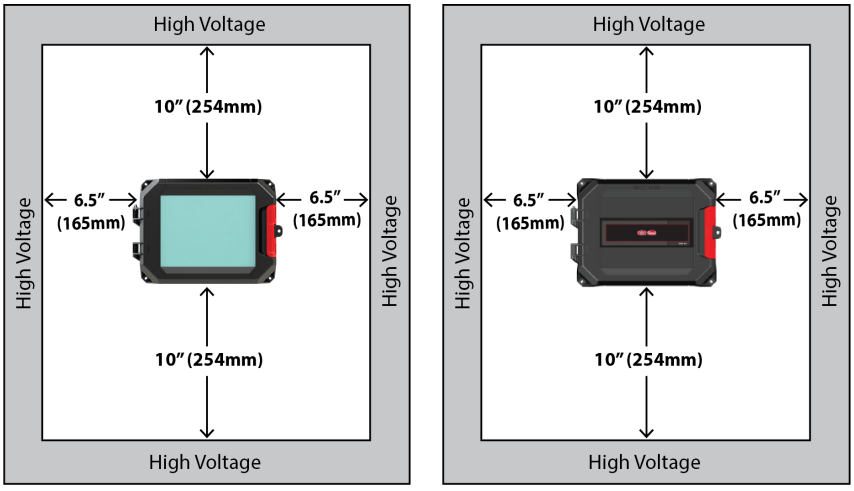
NOTE: *It is recommended to use Galvanized Flange Head Lag Screws for Wood that are 1/4" x 2" long.*

EDGE 2 Controller Installation

1. Place the enclosure at a height at which you can properly see the screen.
2. Verify that you can easily open the enclosure cover.
3. Screw in the top left hand corner screw first.
4. Using a level, make sure the enclosure is straight, and then screw in the second screw at the lower right hand corner.
5. Screw in the last two screws.

   IMPORTANT: *Leave a minimum clearance of 32" W x 34" H for the controller.*

Figure 4-1 *Minimum clearance*



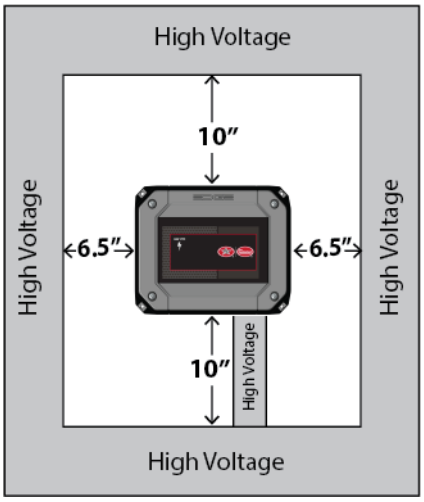
EDGE PSU 24V 36W Installation

1. Place the enclosure at a height at which you can properly access the EDGE PSU 24V 36W.
2. Screw in the top left hand corner screw first.

3. Using a level, make sure the enclosure is straight, and then screw in the second screw at the lower right hand corner.
4. Screw in the last two screws.

IMPORTANT: *Leave minimum clearance of 22" W x 27" H to allow for proper circulation, cover removal, and protection against electrically conducted noise.*

Figure 4-2 *Minimum clearance*



Connecting a Module to the Communication Network

The communication bus enables communication between the EDGE 2 Controllers 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.

   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 150 meters (500 feet) in non redundant scheme. The maximum distance of the DC power cable is 137.6 meters (450 feet) with a wire gauge of 16 AWG in redundant power supply from the first EDGE Expansion Box in a group of two to the last EDGE 2 Controller on the EDGE network (see redundant schemes). 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 457 meters (1500 feet). The cable must be twisted pair and shielded.***

WARNING ***Installation must only be performed by qualified service personnel.***

WARNING ***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 (4.43lbf*in) to 0.6 N*m (5.2lbf*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.***

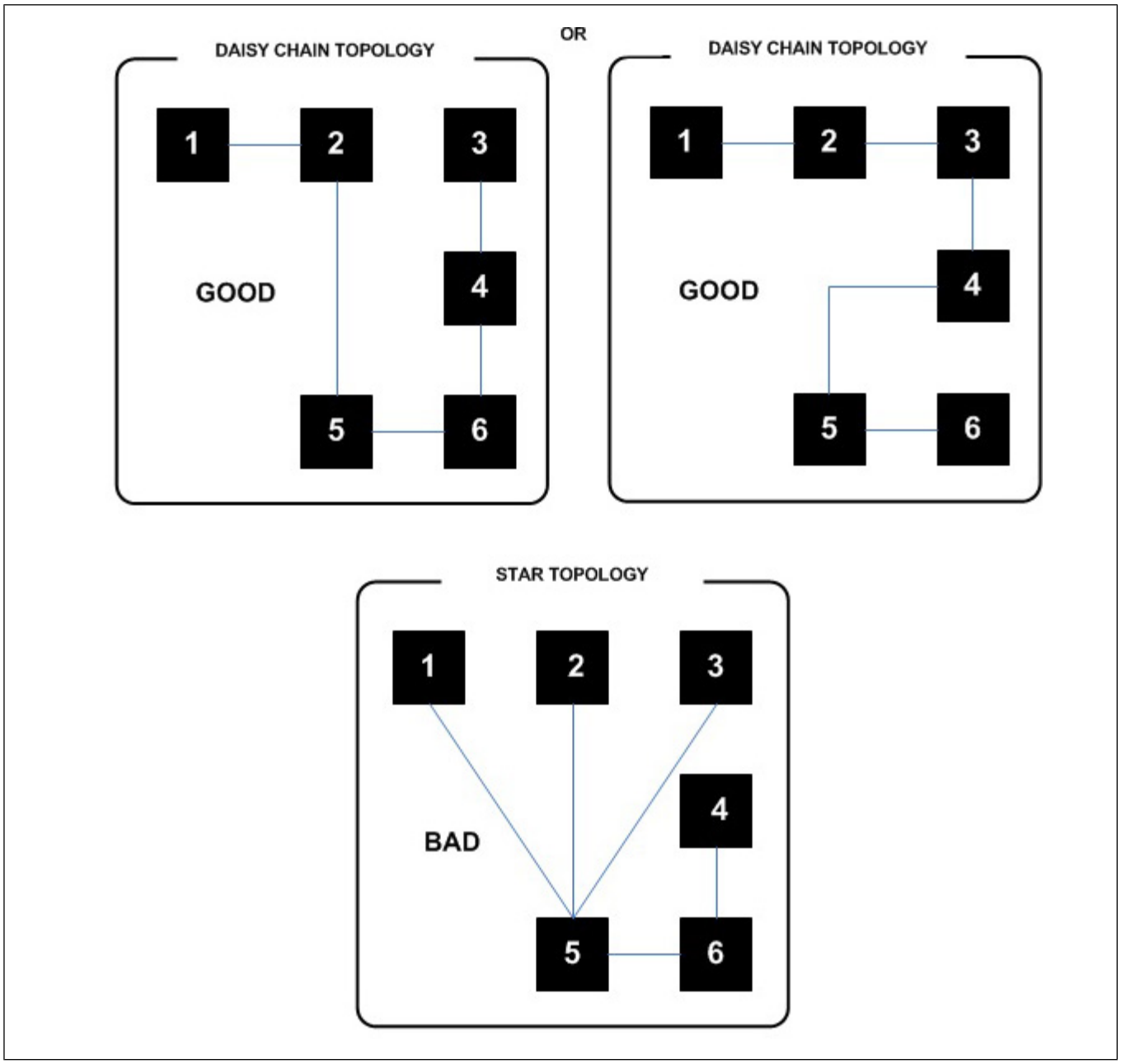
NOTICE ***TC-ER conductors in sizes 18 AWG and 16 AWG shall be type FFH-2, KF-2, KFF-2, PAF, PAFF, PF, PFF, PGF, PGFF, PTF, PTFF, RFH-2, RFHH-2, RFHH-3, SF-2, SFF-2, TF, TFF, TFFN, TFN, ZF, or ZFF. Conductor with other types and thicknesses of insulation shall be listed for Class 1 load circuit use.***

WARNING ***Use copper conductors only.***

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.

NOTICE *The terminal ground (GND from 24VDC, Green color on diagram block) must be connected between the EDGE 2 Controller and the EDGE Expansion Box*

NOTICE *When there is only communication between Boxes, the terminal ground (GND from 24VDC, Green color on diagram block) must be connected.*



Connecting to Power Source

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.*

WARNING

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. If using a SPST disconnecting switch, connect the SPST disconnecting switch to cut the hot line with a neutral circuit.

CAUTION

Disconnect power supply before servicing.

WARNING

Installation must only be performed by qualified service personnel.

NOTICE

For the AC terminal blocks, use a tightening torque at 0.78 N*m (6.9lbf*in) to fasten a wire gage from 12AWG to 16AWG.

What You Should Know

1. Unscrew the screws from the enclosure cover and remove the cover.
2. From an electrical distribution panel, in series with disconnecting switch, follow the wiring diagram to connect the main voltage supply to the system's main inputs on the EDGE PSU 24V 36W.
3. Open the disconnecting switch or breaker before wiring.
4. Plug the wires (L1 to L1, L2/N to L2/N, Earth to Earth) from the PSU 24V 36W into a power source (main voltage supply).
5. Correctly ground the system by using a Functional Earth configuration.
6. Replace the cover and fasten the screws to a torque of 1.5N*m (13.28lbf*in) when wiring or service is completed.

NOTE: *The working voltage range is between 90 Vac and 264 Vac. The EDGE PSU 24V 36W consumes a Power of 40W. Wire the wires in accordance with local and national safety codes. A minimum voltage rating of 300V and a minimum temperature rating of 90°C (194°F) is used for the wires. The use of a breaker of 5 Amps is recommended.*

WARNING ***Use copper conductors only.***

WARNING ***A minimum temperature insulation cable rating of 90°C (194°F) is required.***

Figure 4-3 *EDGE PSU 24V 36W Diagram*

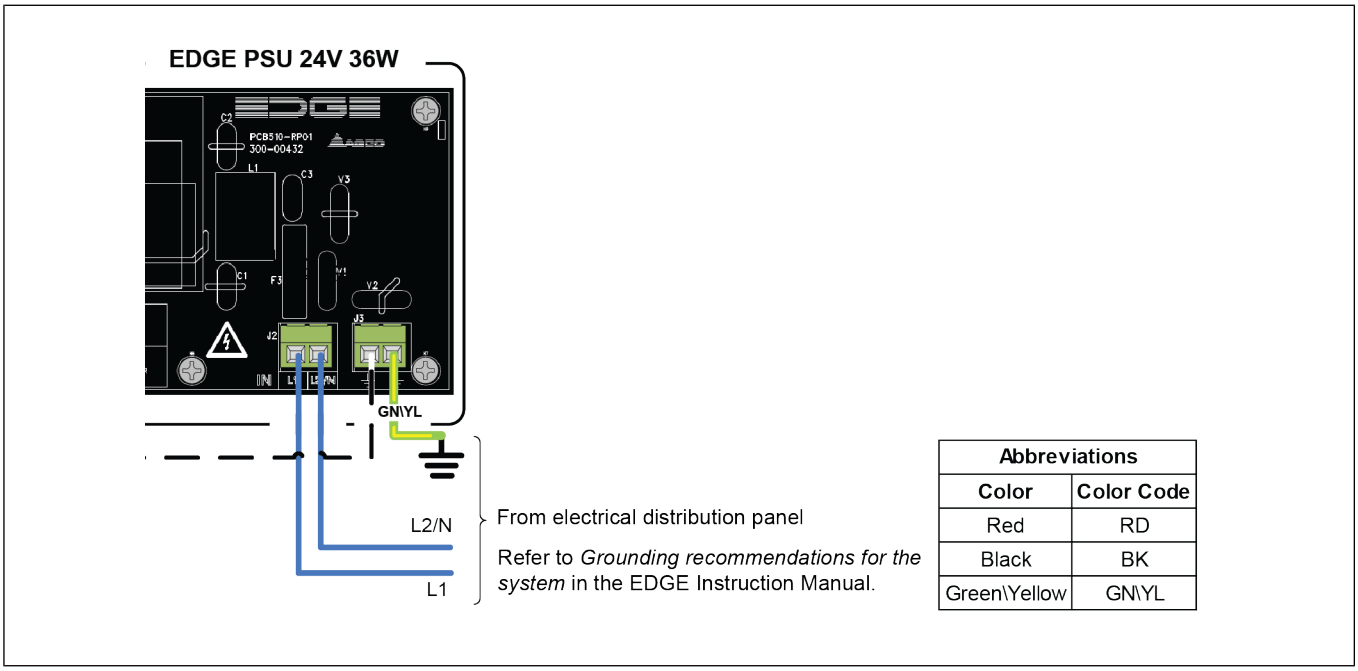


Figure 4-4 *SPST Disconnect Switch Wiring for PSU 24V 36W*

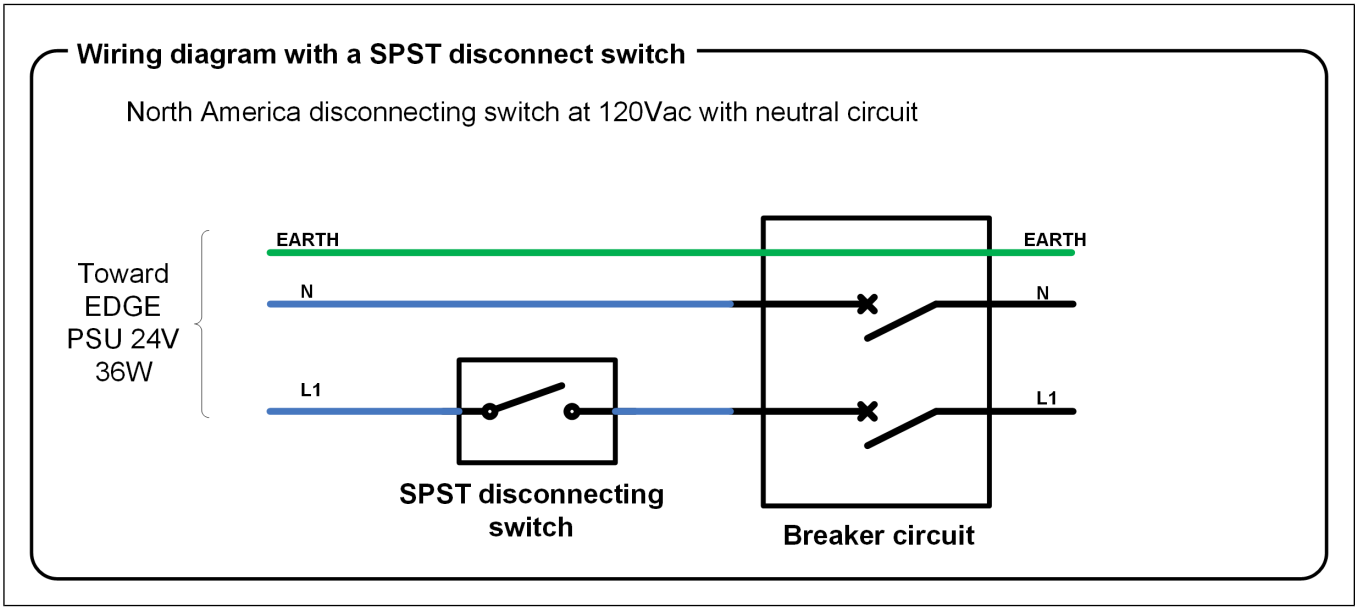
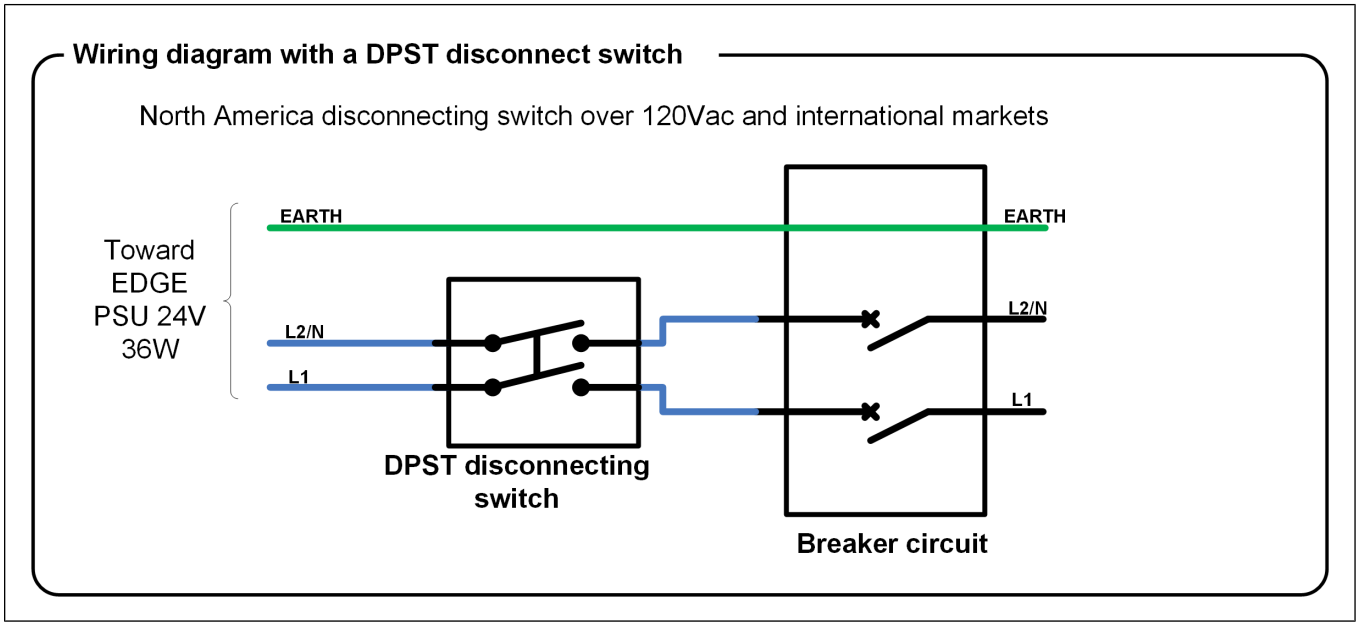


Figure 4-5 *DPST Disconnect Switch Wiring for PSU 24V 36W*



DC Output Connections

What you should know

The terminal used for 24Vdc output is named OUT. The OUT (+) is the positive output. The OUT (-) is the output return. The EDGE PSU 24V 36W allows up to a load of 1.5A under 24Vdc.

NOTE: *A minimum wire gauge of 18 AWG (diameter of 1.02mm or cross sectional area of 0.82mm^2) is required for proper operation. The maximum cable length allowed (including cable extensions) is 112m (370ft).The cable must be twisted and shielded. The minimum temperature insulation is 90° C (194°F). A voltage insulation of 600V is recommended.*

WARNING

Use copper conductors only.

WARNING

A minimum temperature insulation cable rating of 90°C (194°F) is required.

NOTICE

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

Refer to the Wiring Methods and Materials section from the National Electric Code to use the correct wire for the installation. 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. Conductors with other types and thicknesses of insulation shall be listed for Class 1 load circuit use.

The 24Vdc output is protected by one fuse of 3.15A, slow blow. One spare fuse is provided with the unit.

WARNING

Installation must only be performed by qualified service personnel.

CAUTION

Disconnect power supply before servicing.

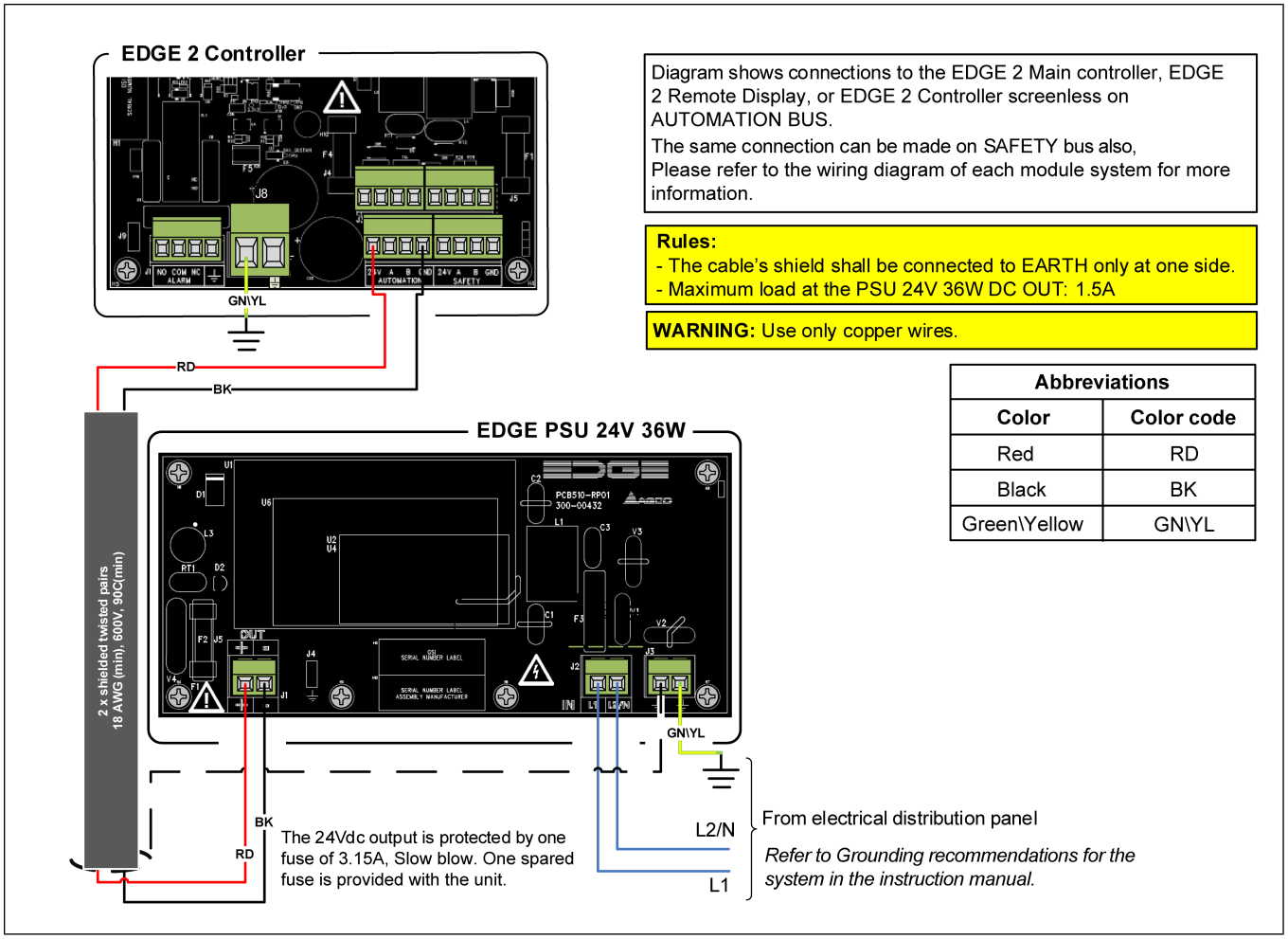
NOTICE

For the OUT terminal blocks, use a tightening torque of 0.78 N*m (6.9lbf*in) to fasten a wire gage 18AWG to 10AWG.

DC Connection for EDGE 2 Controllers

1. Unscrew the screws from the enclosure cover and remove the cover on the EDGE PSU 24V 36W. Unlock and open the EDGE 2 Controllers cover.
2. Wire one cable from EDGE PSU 24V 36W OUT to the EDGE 2 Controller 24V inputs by following the polarity at each side:
   - Connect the OUT(+) to the 24V input on Automation bus first if the Safety bus is not used.
   - Connect the OUT(-) to the GND input on Automation bus first if the Safety bus is not used.
3. On the EDGE PSU 24V 36W, replace the cover and fasten the screws to a torque of 1.5N*m (13.28lbf*in) when wiring or service is completed. Close and lock the EDGE 2 Controller cover.

Figure 4-6 *Power Connections for EDGE 2 Controllers*



Connecting the Alarm Relay

1. Locate the **ALARM** terminals on the EDGE 2 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 configurations.

WARNING

Use copper conductors only.

NOTES

5 Expansion Box and Virtual Expansion Box Installation

Topics Covered in this Chapter

- 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 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 an AC Power Source for Light Dimmer Output
- Connecting Light Dimmer Output
- Lamp Fixture Grounding
- Connecting Discrete Outputs
- Connecting the Current Sensors of Discrete Outputs

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 2 inches (50.8 mm) is allowed for the EDGE 3-Slot Expansion Box and the EDGE 6-Slot Expansion Box.*

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

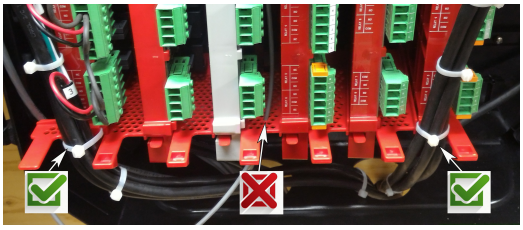


Figure 5-1 *EDGE 3-Slot Expansion Box*

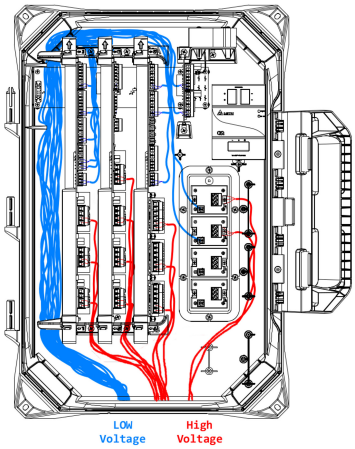
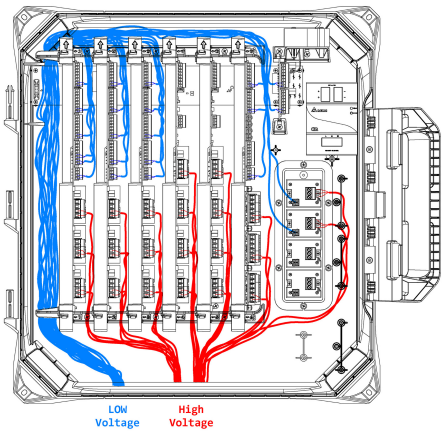


Figure 5-2 *EDGE 6-Slot Expansion Box*



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 (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.*

   > **CAUTION** ***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

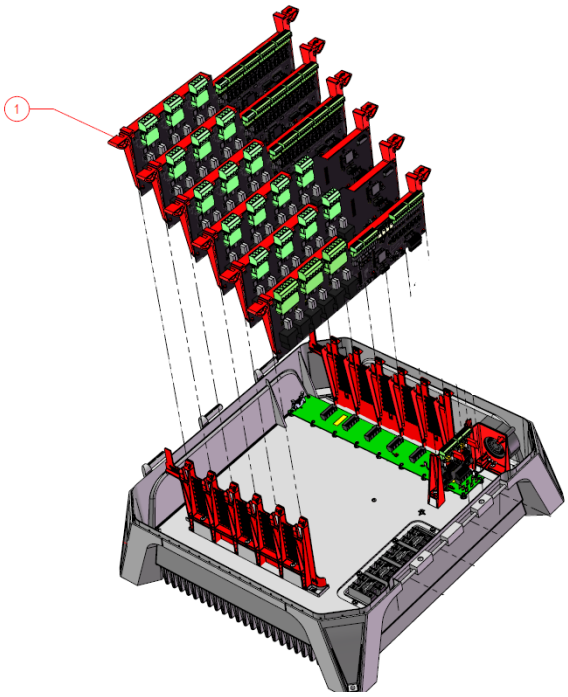
WARNING ***Installation must only be performed by qualified service personnel.***

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

WARNING ***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.***

CAUTION ***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.

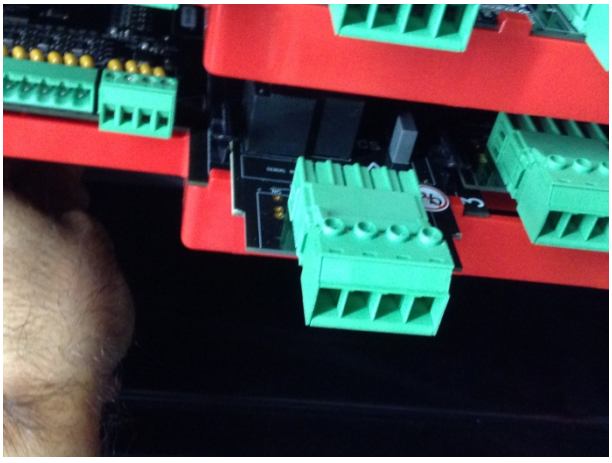
What You Should Know

WARNING ***Installation must only 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 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

> **WARNING** ***Installation must only 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.***

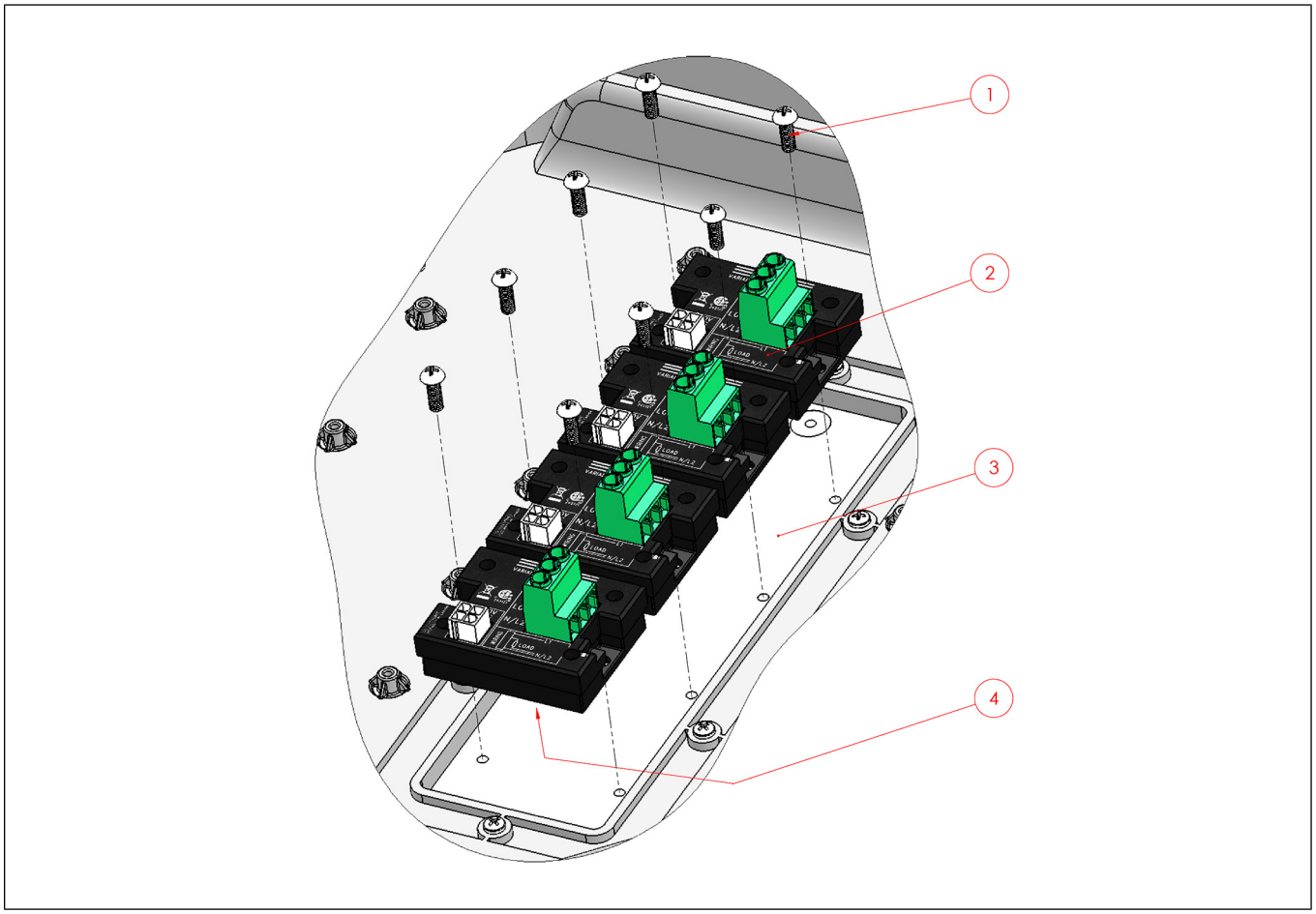
1. From the EDGE Variable Output kit packaging, Open and remove the EDGE Variable Output kit from the packaging.
2. Remove the “Post it (item 4)” from the EDGE Variable Output(s).

WARNING ***Take care to not remove the thermal pad when the "Post it" are removing from the thermal pad.***

WARNING ***Take care to not damage the thermal pad when the "Post it" are removing from the thermal pad.***

WARNING ***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.

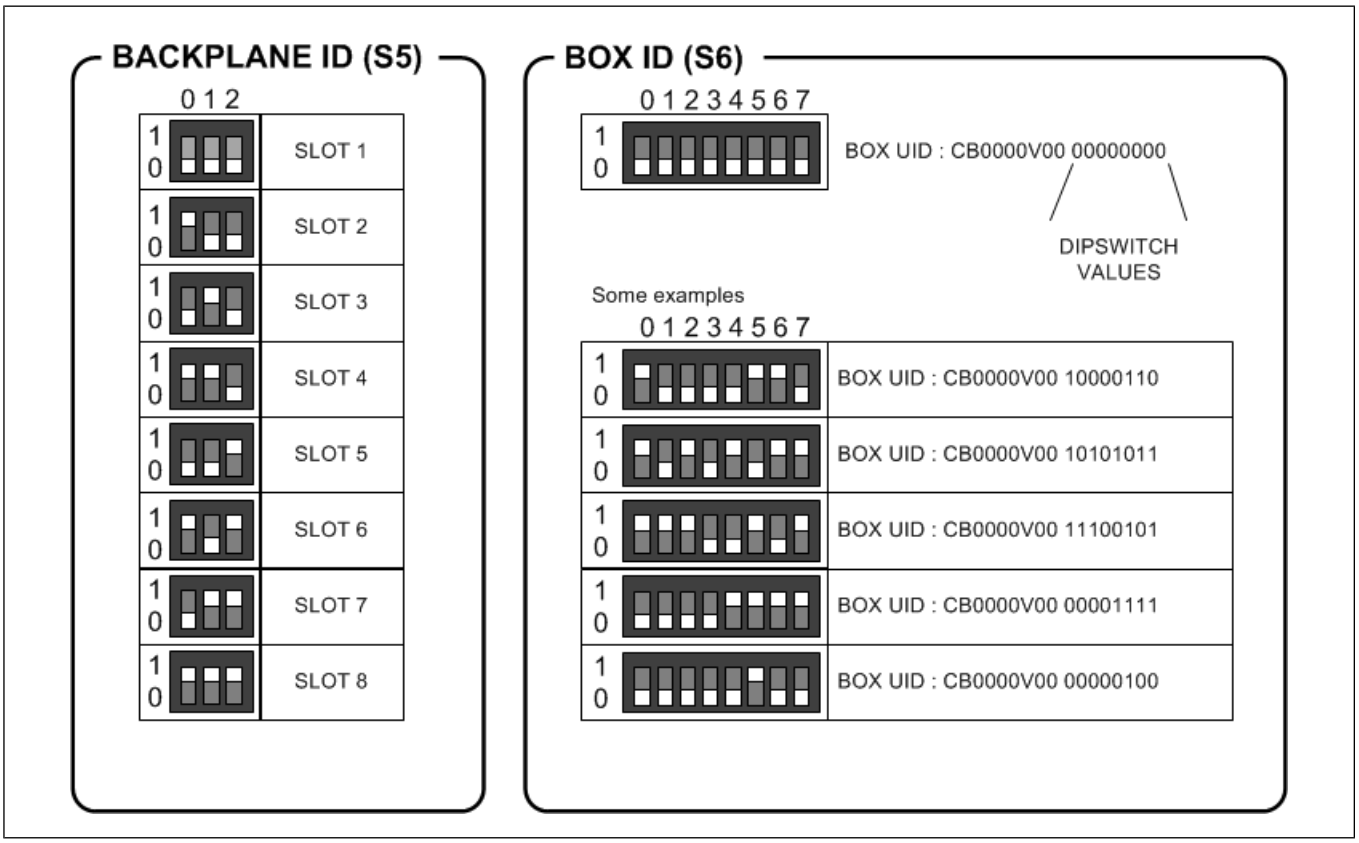
WARNING

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

EDGE system uses redundant supply.

Refer to the Networking Chapter 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.

WARNING *Use copper conductors only.*

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 150 meters (500 feet) in non redundant scheme. The maximum distance of the DC power cable is 137.6 meters (450 feet) with a wire gauge of 16 AWG in redundant power supply from the first EDGE Expansion Box in a group of two to the last EDGE 2 Controller on the EDGE network (see redundant schemes). 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 457 meters (1500 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.*

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

WARNING *Installation must only be performed by qualified service personnel.*

WARNING *Only one Expansion Box must supply the EDGE 2 Main Controller or EDGE 2 Screenless Controller, and controller groups must be divided by subgroups of two Expansion Boxes.*

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 2 Controllers 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.

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 150 meters (500 feet) in non redundant scheme. The maximum distance of the DC power cable is 137.6 meters (450 feet) with a wire gauge of 16 AWG in redundant power supply from the first EDGE Expansion Box in a group of two to the last EDGE 2 Controller on the EDGE network (see redundant schemes). 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 457 meters (1500 feet). The cable must be twisted pair and shielded.***

WARNING ***Installation must only be performed by qualified service personnel.***

WARNING ***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 (4.43lbf*in) to 0.6 N*m (5.2lbf*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, 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.***

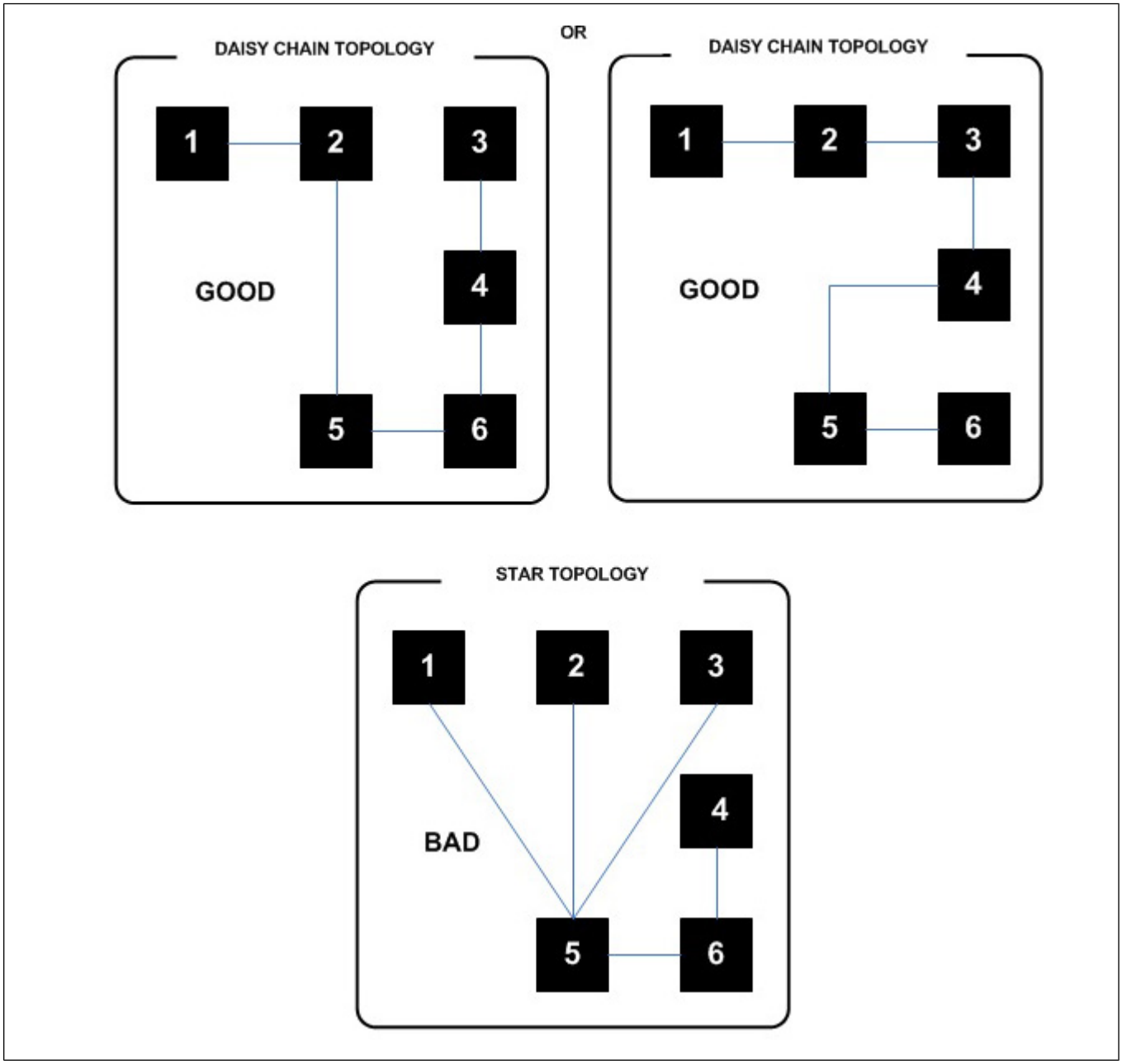
WARNING ***Use copper conductors only.***

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.

NOTICE ***The terminal ground (GND from 24VDC, Green color on diagram block) must be connected between the EDGE 2 Controller and the EDGE Expansion Box***

NOTICE ***When there is only communication between Boxes, the terminal ground (GND from 24VDC, Green color on diagram block) must be connected.***



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 0.82mm^2) 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.*

WARNING

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.*

CAUTION

Disconnect supply before servicing.

WARNING

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 (4.43lbf*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 1.30mm^2) to 18AWG (diameter of 1.02mm or cross sectional area of 0.82mm^2).

WARNING

Use copper conductors only.

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.*

WARNING	***Installation must only be performed by qualified service personnel.***
CAUTION	***Disconnect supply before servicing.***
WARNING	***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 (4.43lbf*in) to 0.6 N*m (5.2lbf*in) to fasten a wire gage from 16AWG to 18AWG.***
WARNING	***Use copper conductors only.***

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 (6.2lbf*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).***

The EDGE 4IN-2V-8DO only need a functional Earth.

NOTICE

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

WARNING

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

WARNING

Use copper conductors only.

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.*

WARNING

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.*

WARNING

Installation must only be performed by qualified service personnel.

CAUTION

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 127 W (6 Slot Expansion Box and 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 (7.96lbf*in) to 1.13N*m (10lbf*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).

WARNING

Use copper conductors only.

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.*

WARNING

Installation must only be performed by qualified service personnel.

WARNING

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.

CAUTION

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).***

WARNING ***Use copper conductors only.***

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.*

WARNING ***Installation must only be performed by qualified service personnel.***

CAUTION ***Disconnect supply before servicing.***

WARNING ***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.

NOTICE

For the Output terminal block connected on the EDGE variable module (SSR), use a tightening torque from 4.43lbf*in (0.5N*m) to 5.31lbf*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).

WARNING

Use copper conductors only.

Connecting an AC Power Source for Light Dimmer Output

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 EDGE 4IN-6R-2LD for each Zone. It must be in close proximity to the equipment and within easy reach of the operator. It must be marked as the disconnecting devices for the equipment.*

WARNING

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.

It is recommended to use 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.*

NOTE: *A minimum wire gauge of 14 AWG (diameter of 1.63mm or cross sectional area of 2.08mm²) is required for proper operation. The maximum current rating of each zone allowed is 8.0A. The minimum temperature insulation is 90 °C. A voltage insulation of 300V is recommended.*

NOTE: *The maximum breaker value per zone is 15 Amps max.*

NOTE: *Refer to local and national electrical codes.*

NOTICE

For the big terminal blocks used for AC inputs, 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 of1.62mm or cross sectional area of 2.08mm2).

WARNING

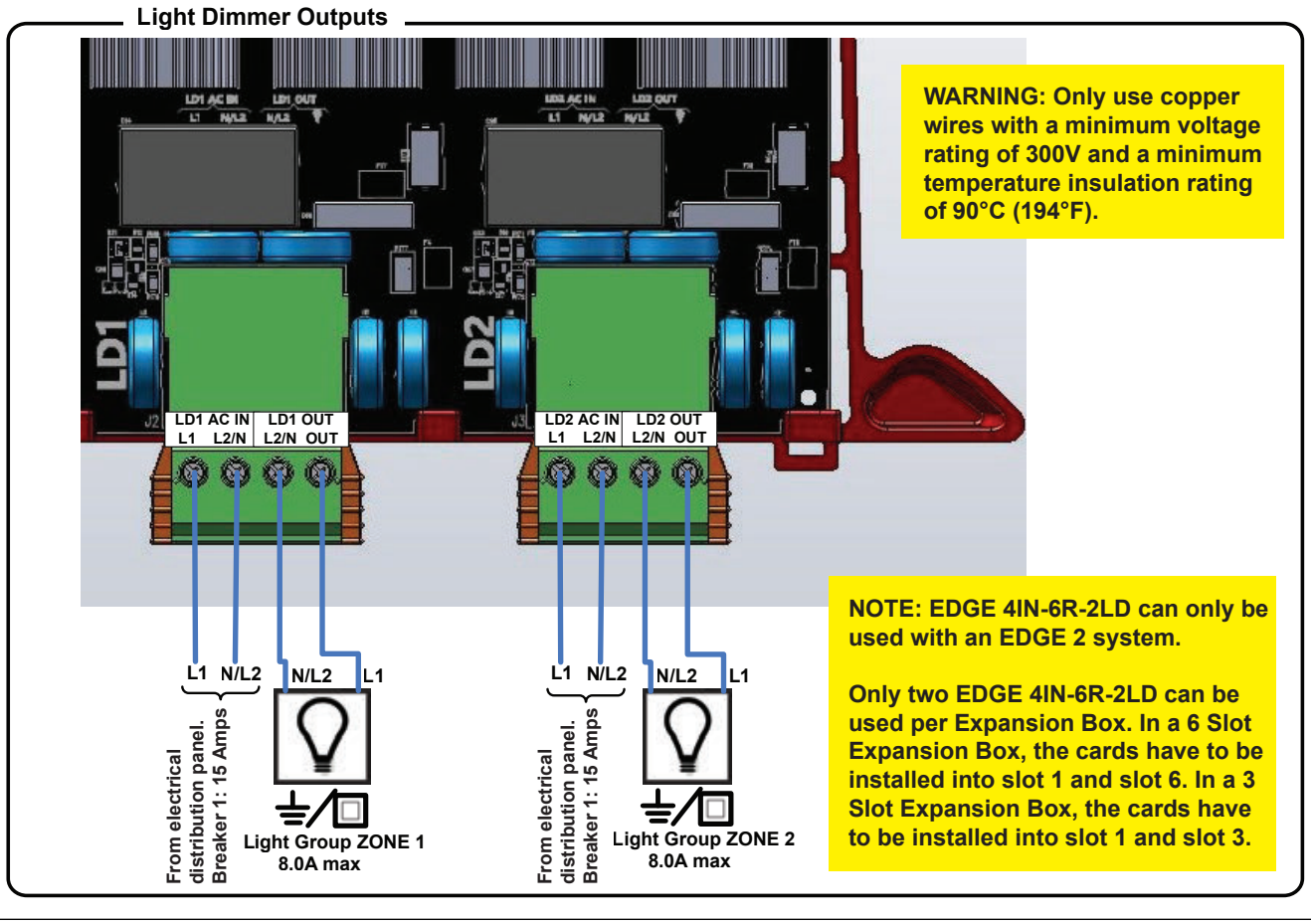
Installation must only be performed by qualified service personnel.

DANGER

Disconnect supply before servicing.

1. From an electrical distribution panel in series with disconnecting switches, follow the wiring diagram to connect the main voltage supply to the system's main inputs for each zone.
2. Open the disconnecting switches or breaker before wiring.
3. Plug the wires (L1 to L1, L2/N to L2/N) to the for each zone.

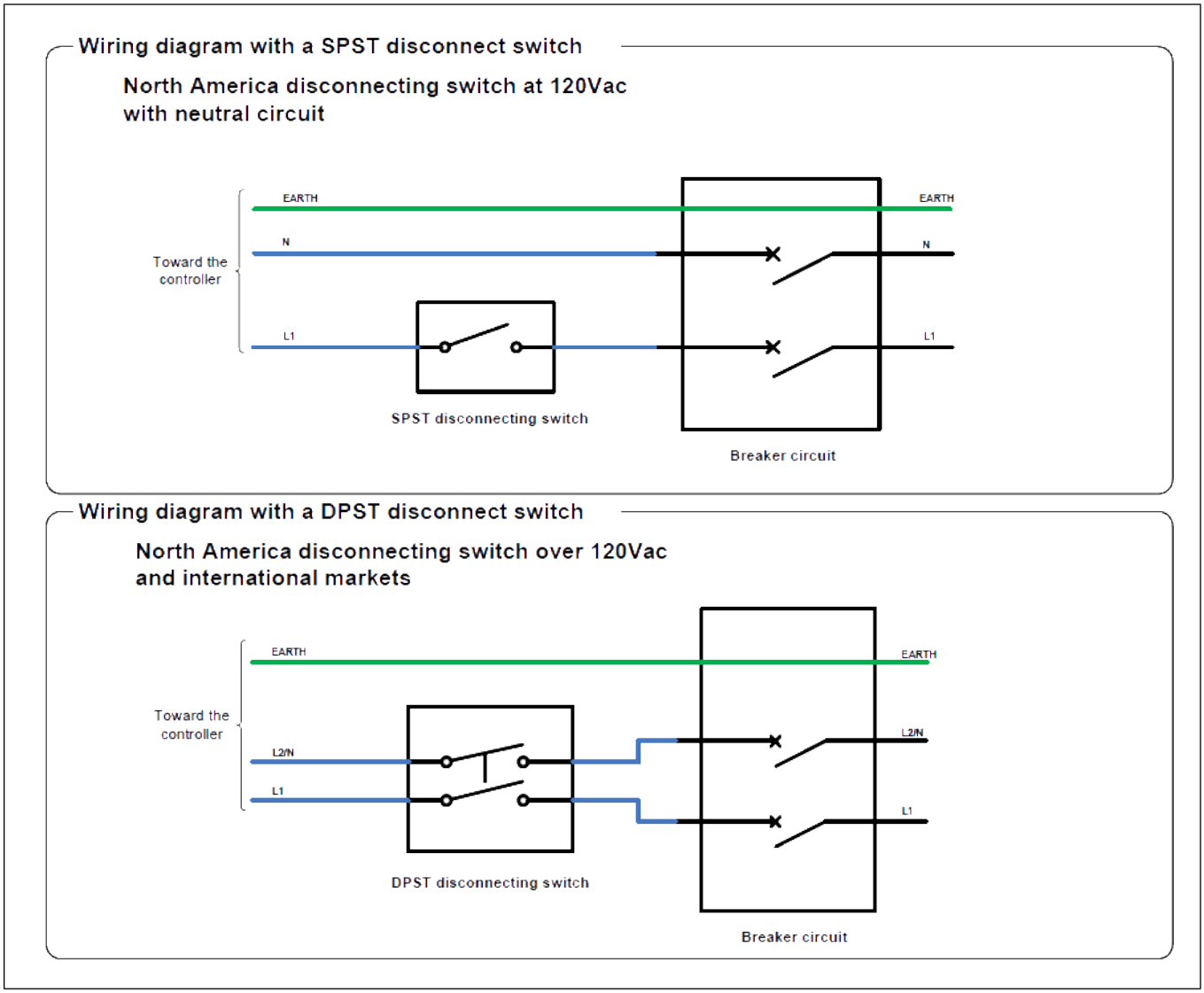
Figure 5-3 *Light Dimmer Outputs*



WARNING

Use only copper wires with EDGE Expansion Box terminal blocks.

Figure 5-4 *Disconnect switch wiring*



Connecting Light Dimmer Output

Before You Begin

Determine how many lamps that can be installed according to the power factor (PF) for each Zone and make sure the wiring supports the required power according to your calculation. Refer to *Power Output Formulas, page 79* and follow these steps:

1. Determine how many fixtures or lights you could install according to the power factor (PF) for each zone.
2. Make sure the wiring supports the calculation.

DANGER

Disconnect supply before servicing.

WARNING

Installation must only be performed by qualified service personnel.

NOTICE

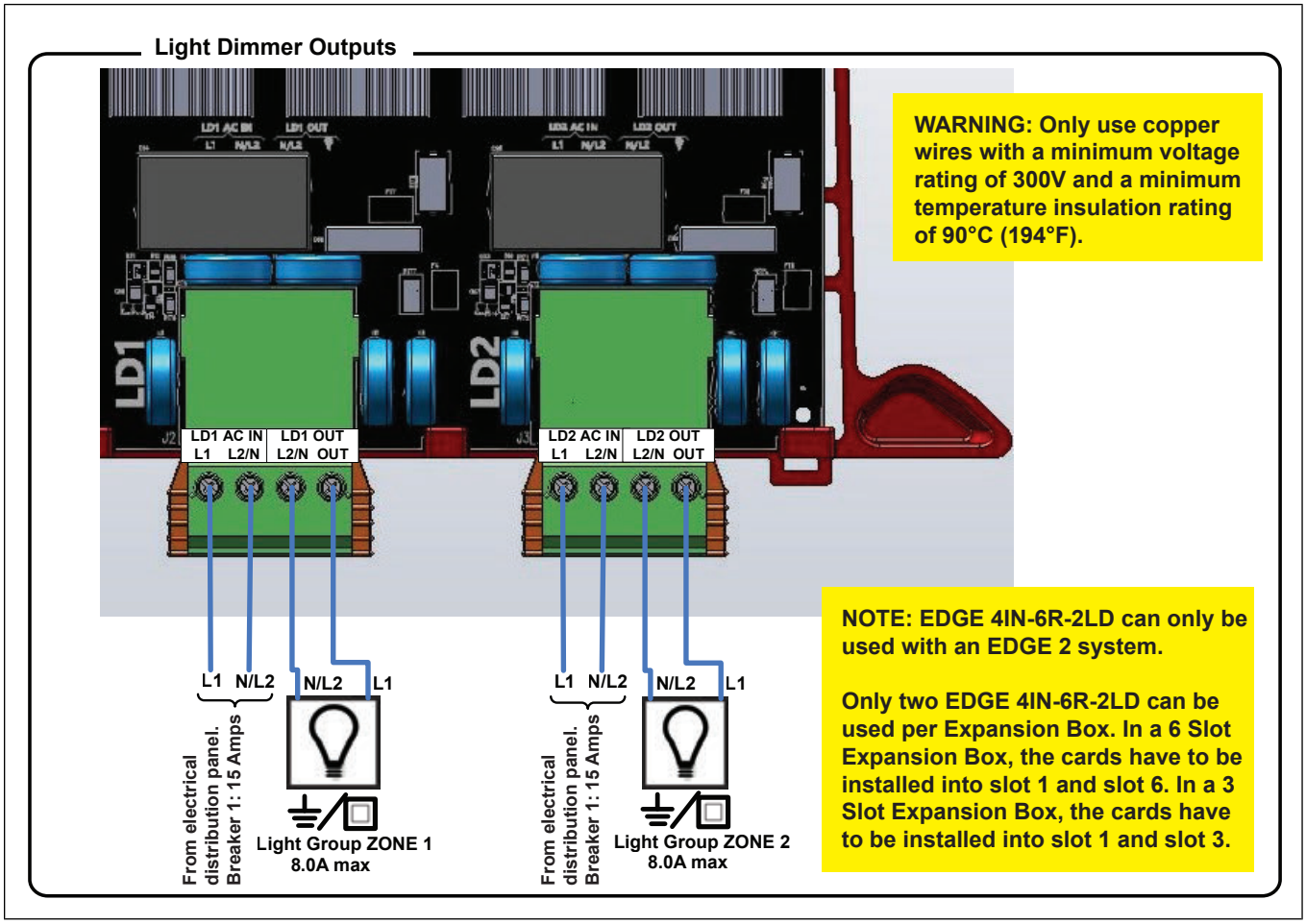
For the big terminal blocks used for AC inputs, use a tightening torque from 0.7N*m (6.2lbf*in) to 0.8N*m (7lbf*in) to fasten a wire gage from 10AWG (diameter of 2.58mm or cross sectional area of 5.26mm2) to 14AWG (diameter of 1.62mm or cross sectional area of 2.08mm2).

NOTE: *A minimum wire gauge of 14 AWG (diameter of 1.63mm or cross sectional area of 2.08mm^2) is required for proper operation. The maximum current rating of each zone allowed is 8.0A. The minimum temperature insulation is 90 °C. A voltage insulation of 300V is recommended.*

NOTE: *Refer to all local and national electrical codes.*

1. From the LDx AC output, wire the lamp fixtures in daisy chain.
2. Open the disconnecting switches or breaker before wiring.
3. Plug the wires (L1 to L1, L2/N to L2/N) from the EDGE 4IN-6R-2LD LDx Output to the first lamp fixtures for each zone.
4. Plug the wires (L1 to L1, L2/N to L2/N) from the previous lamp fixture to the next lamp fixture for each zone.
5. Repeat the step 4 the time to complete the lamps fixtures wiring for each zone.
6. Correctly ground the lamps fixtures directly to the distribution panel by using a protective Earth configuration. (Refer to the topic Lamp Fixture Grounding).

Figure 5-5 *Light Dimmer AC Power Output*

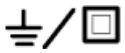


WARNING

Use only copper wires with EDGE Expansion Box terminal blocks.

Lamp Fixture Grounding

Figure 5-6 *Symbol meaning on fixtures*



The fixture has an earth connection or no earth connection (double square symbol means double insulation)

WARNING

If the fixture has an earth connection, connect it directly to the electrical distribution panel.

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.*

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.*

WARNING

Installation must only be performed by qualified service personnel.

WARNING

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.

CAUTION

Disconnect supply before servicing

WARNING

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.*

WARNING

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.

WARNING

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.

NOTICE

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).

WARNING

Use copper conductors only.

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.*

WARNING

Use copper conductors only.

WARNING

Installation must only be performed by qualified service personnel.

WARNING

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.

CAUTION

Disconnect supply before servicing

WARNING

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.*

WARNING

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.

NOTICE

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).

6 Installation Order Overview

Topics Covered in this Chapter

- EDGE 2 System Installation Order
- EDGE 2 System Configuration
- EDGE 2 System Operation Summary

EDGE 2 System Installation Order

Physical Installation

Install the EDGE system on the wall according to the plan by respecting the cable distances between controllers, their minimum clearances, and other restrictions:

- EDGE Expansion Boxes and equipment
- EDGE External Modules (EDGE Bird Scales, EDGE Bin Scales, EDGE RS485 Repeater, EDGE Power Modules, EDGE Weather Station) and equipment
- EDGE 2 Main Controller
- EDGE 2 Redundancy Controller
- EDGE 2 Remote Display
- Installation of Ethernet cabling

Module Detection

After turning ON the EDGE 2 system, the EDGE will detect the modules on EDGE Network.

NOTE: *The EDGE has to upgrade the modules firmware during module detection. This operation can take a few minutes. DO NOT CONFIGURE CONTROLLERS UNTIL THE FIRMWARE UPDATES ARE COMPLETE.*

Ethernet EDGE 2 Controller Configuration

Set your Ethernet link if redundancy scheme is used and/or remote control is required: by Ethernet cables (LAN) or by Ethernet WIFI (WLAN).

Software Update (optional)

You can check to make sure if a software update is available, by going to System->Software Update.

EDGE 2 System Configuration

Configuration

The easiest way is to export an existing configuration from an EDGE 2 or EDGE 1 system and import it to the new EDGE 2 system.

NOTE:

Light programs and multiple day schedules will not be exported in the configuration file. Other ways to create the configuration are by using the WEB browser or by user interface on site.

Minimum configurations needed to operate the EDGE system:

- Site Configuration
- Time and units
- User Management
- Rooms
- Site Name
- Controller Name
- Equipment configuration
- Room Setup

EDGE 2 System Operation Summary

Normal Mode

EDGE system automatically controls the equipment according to their settings and the input feedback or according to a scenario in the automatic mode. The EDGE system can also control the equipment in manual mode.

Backup Mode

Modules enter into Backup Mode when no communication is received from either the master controller or the redundant controller for 2 minutes. Modules do not communicate with each other in Backup Mode.

Backup Mode is a degraded thermostatic control derived from the controller's configuration.

Temperature controlled equipment uses an average of the assigned temperature probes on the module. Temperature driven equipment default to Failsafe when its module does not have a temperature probe. Equipment in bypass are kept in their bypass state in Backup Mode.

Failsafe Mode

Modules enter into Failsafe Mode when powered down.

7 Getting started

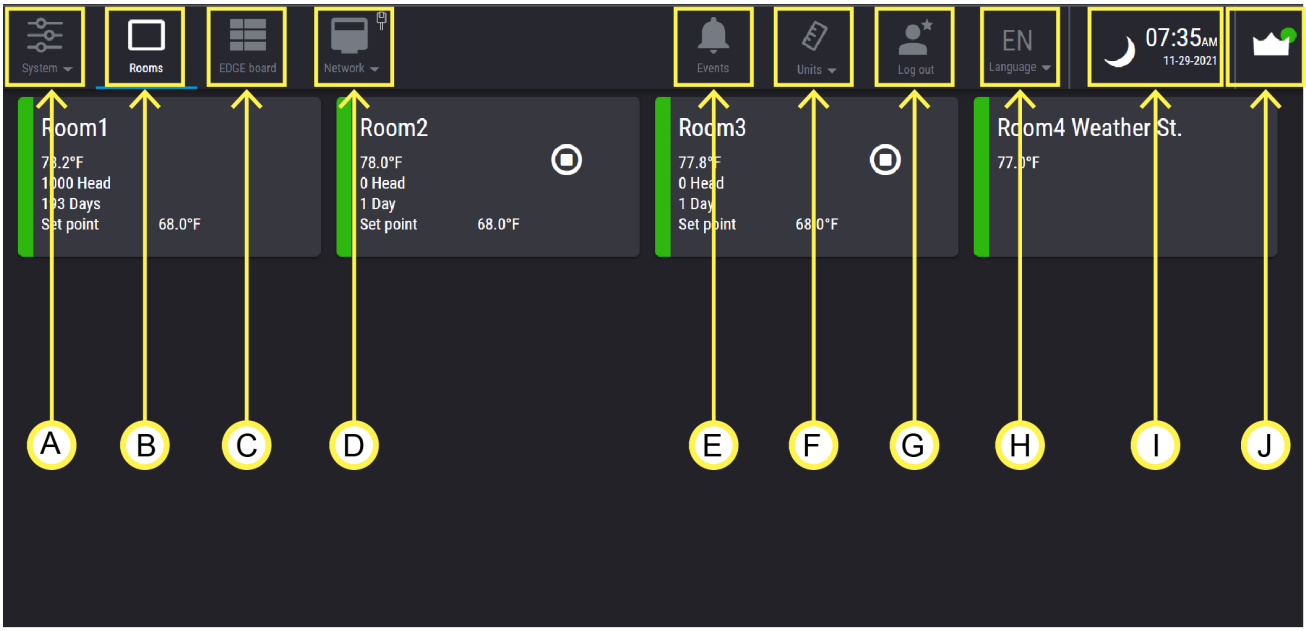
Topics Covered in this Chapter

- Main Page Navigation
- EDGE 2 Menu Structure
- Room Screen Navigation Overview
- Room shortcuts and operation room
- Moving Tiles
- Color coding
- Copying, pasting, or duplicating information
- List of icons

Main Page Navigation

To see a room, you have to add a room in the menu System -> Site Configuration.

Figure 7-1 *Main Page Screen*



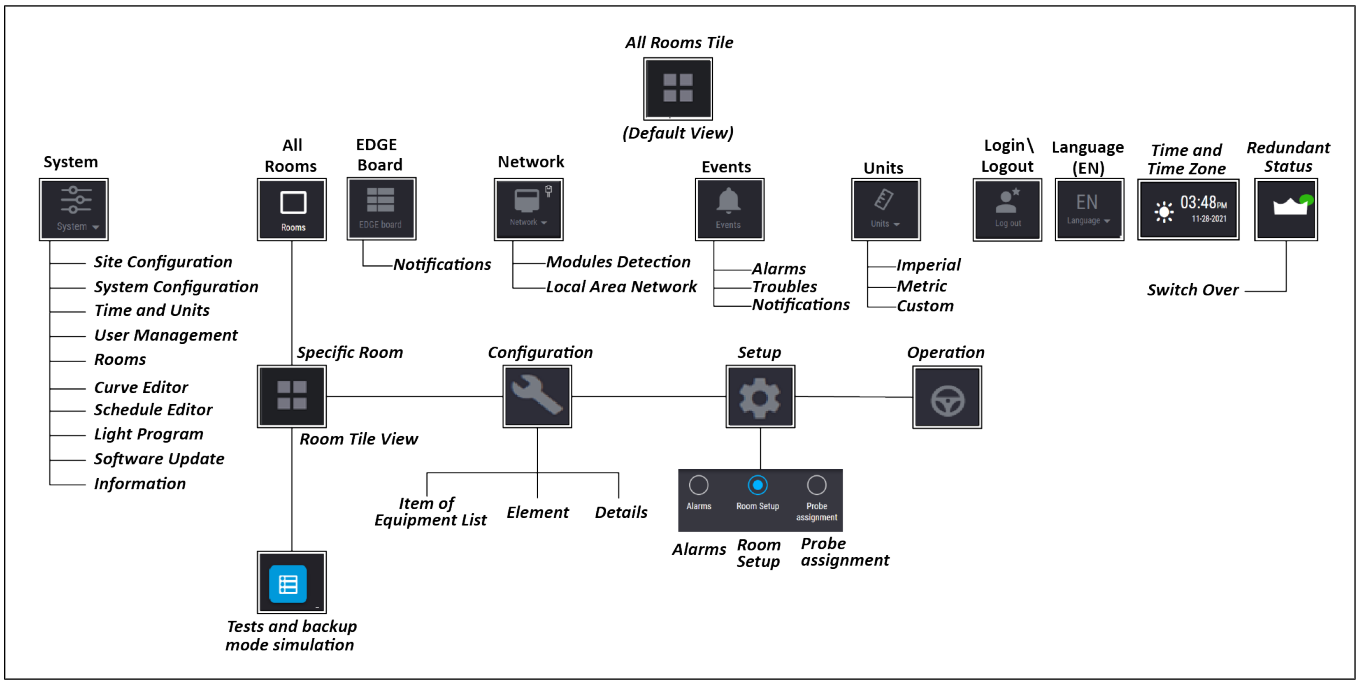
A	System Drop down menu
B	Press to access All Rooms
C	Press to access EDGE Notifications Board
D	Press to access Network
E	Press to access Events (Alarms and Troubles)
F	Press to access Units configuration
G	Press to access Login and Logout
H	Press to change the language displayed on the user interface
I	Displays the time and date, and press to access Date and Time modifications
J	Identifies the master unit with a green background and a crown when using redundancy. Slave units are solid gray

NOTE: *The LCD screen uses a capacitive touch screen. By using a finger and sliding it by a direction, you could move on the screen. By using and sliding two finger simultaneously, you could zoom-in or zoom-out a page.*

EDGE 2 Menu Structure

Simplified outline of the EDGE 2 menu structure.

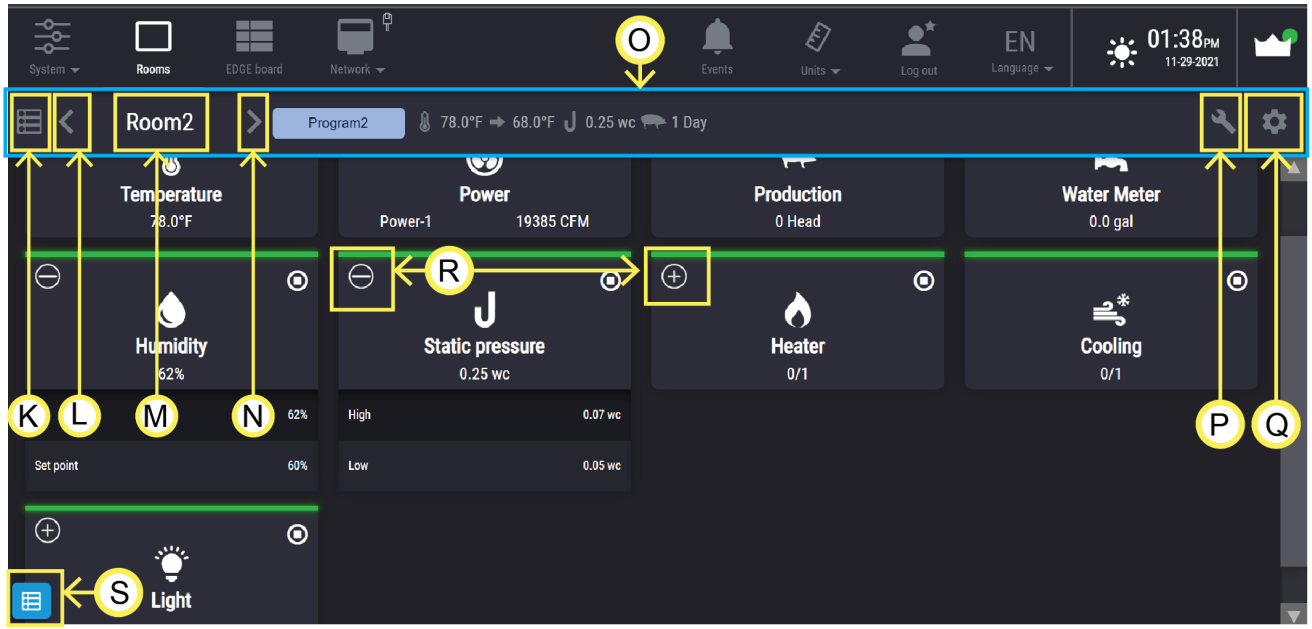
Figure 7-2 *Simplified Menu Structure*



Room Screen Navigation Overview

You have to be in a room to add or set up equipment and see room operations.

Figure 7-3 *Room Screen Navigation*

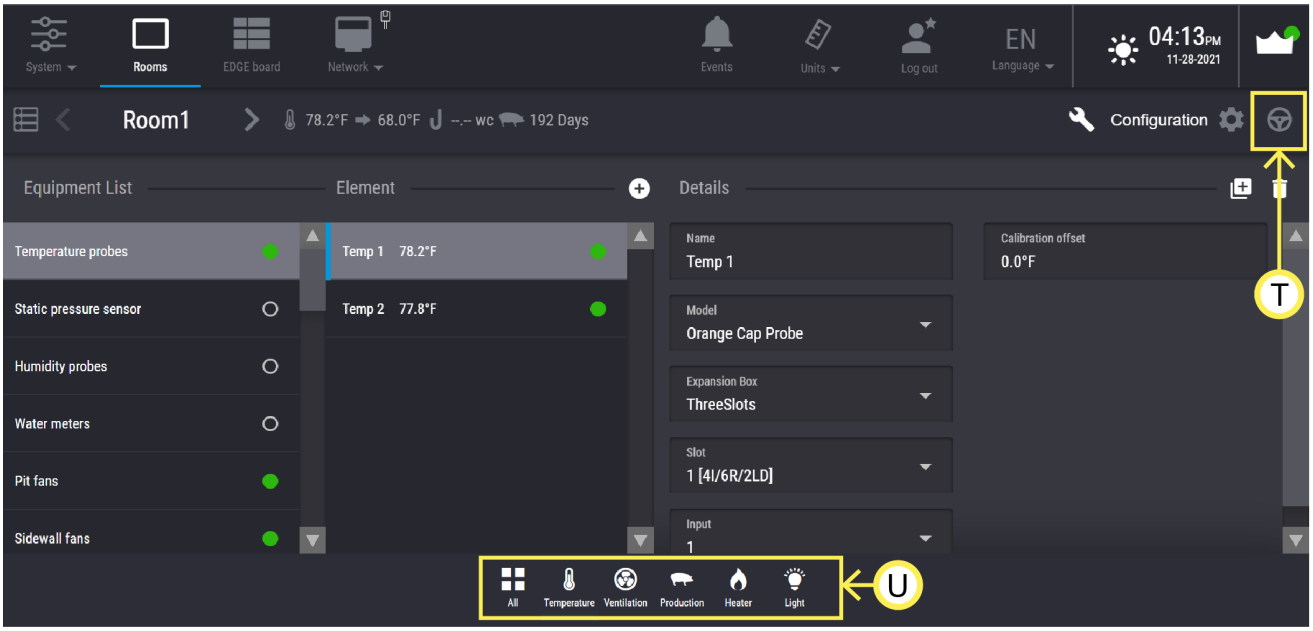


K	Opens the change room selection screen
L	Displays the previous room (not shown when only one room is configured)
M	Name of the room the user is actually looking at
N	Displays the next room (not shown when only one room is configured)
O	Room summary
P	Open the equipment configuration room
Q	Open the room setup to assign the equipment to the room
R	+ : Hidden parameters available - : unhidden parameters available
S	Access to test menu

Room shortcuts and operation room

After pressing Configuration when in a Room screen, the Room Operation button will appear and also the shortcuts of the previous Room Tiles.

Figure 7-4 *Room shortcuts*

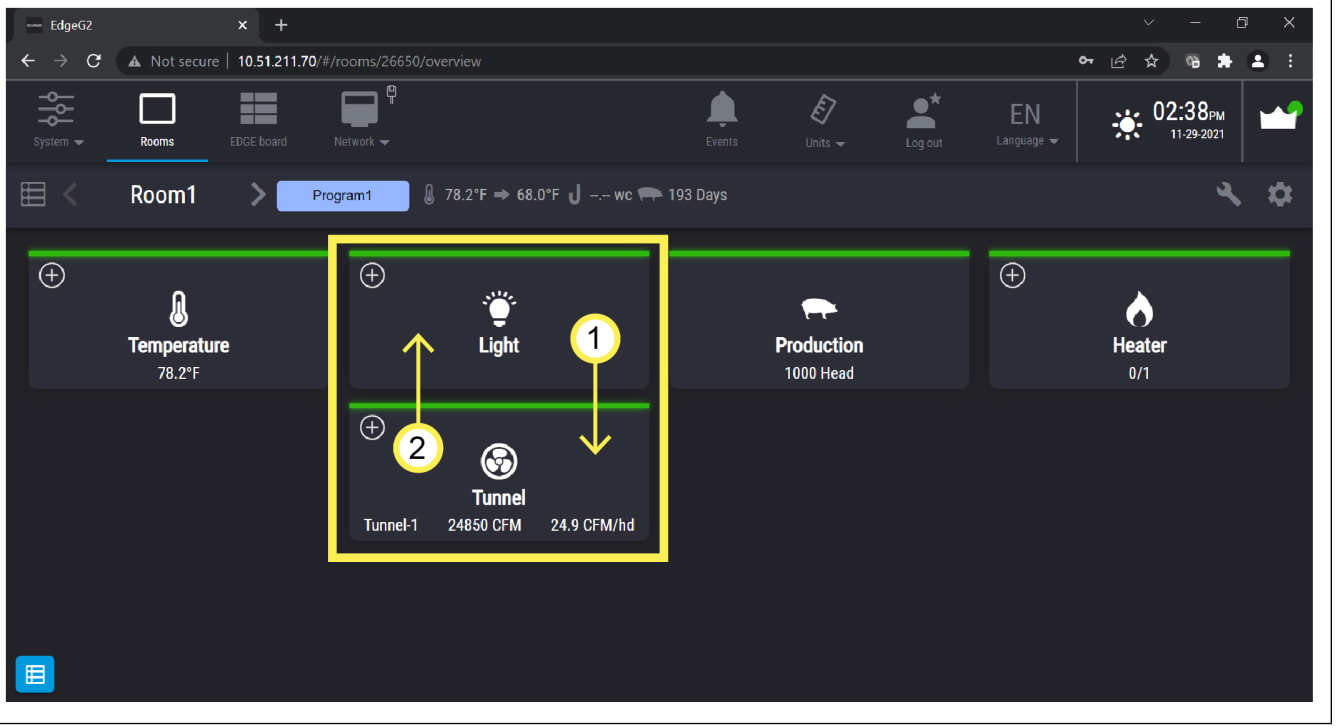


T	Access to Room Operation (active when in the equipment page)
U	Access to previous Room Tiles

Moving Tiles

EDGE allows you to move the Tiles to order them according to your needs.

Figure 7-5 *Moving Tiles*



NOTE: *This feature is also available in the virtual mode.*

Color coding

A logical color scheme is used as a visual cue to draw your attention to a particular area or parameter on the user interface.

Yellow	Designates bypass or manual mode
Red	Designates that an alarm is present
Orange	Designates that a trouble is present
Grey	When configuring, it means the configuration isn't complete. When on the main screen, it means everything is in a normal state
Green	Designates equipment is configured and working correctly
Blue	Designates clean mode
Brown	Pre-heat mode

Copying, pasting, or duplicating information

To speed up the configuration process, you can use the copy and paste button to copy equipment information or even entire rooms. Only the information that is different is left to complete.

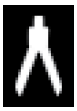
1. Completely configure an input or output, then press on the  icon.

A new tile is now displayed next to the copied tile.

2. Enter the name, and remaining information in the blank cells.

List of icons

	Main screen: Room screen		Temperature icon
	Access to operations room		Inside temperature
	System configuration		Pit fan icon
	Equipment configuration		Sidewall fan icon
	Access the setup menu		Tunnel fan icon
	Return to main screen		Natural curtains and Inlet icon (Ceiling, Tunnel, and Sidewall)
	Indicates the number of unacknowledged alarms in all rooms combined		Heater icon
	Indicates the number of troubles present in all rooms combined		Brooder icon
	Select a language. Displays the letter of currently selected language		Stir fan icon
	Delete		Cool cells
	Copy and paste		Mister / dripper
	Add		Mister / fogger
	Down one		Set temperature
	Up one		Power ventilation
	Curve editor		Rain sensor
	Software update		Check box

	Feed augers		Wind speed and wind direction sensor
	Static pressure sensor		Automatic or manual
	Feed actuators		Activated or deactivated
	Relative humidity sensor		Animal age
	Water valves		Cooling icon
	Lights		De-icing
	Selected		Clean mode
	Not selected		Curve calendar
	Bypassed or manual mode		Calibration
	Air quality		Dairy production
	Poultry production		Bird scale weighing platform

8 Software version and configuration file management

Topics Covered in this Chapter

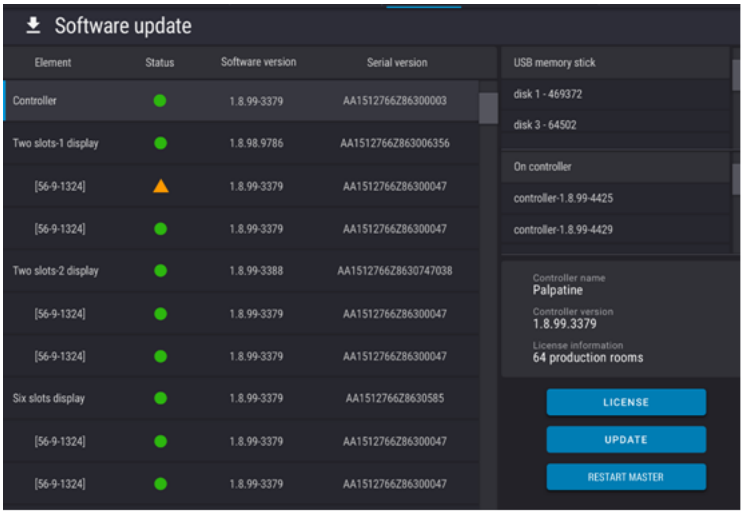
- Updating the software
- Managing system configurations
- Deleting a module
- Deleting an Expansion Box

Updating the software

Having the latest software and firmware in your controller allows you to have access to all new features and improvements.

1. Press on System main menu on the top left hand side of the screen.
2. Press on **Software update** from the drop down menu.

Figure 8-1 *Software update interface*



3. Press on the line displaying the component you want to update in the left hand pane. You can choose between updating the complete system, just the EDGE Main Controller, or a selected module.

Icon	Meaning
	It is working and no update available
	The components with an icon beside them are out of date
	Not detected

4. Press on the file you would like to use. You can only choose one file at a time from either the USB stick or a previously uploaded file.
5. Press on **Update** if you want to update the component, or press on **Restart** if you want to reboot the EDGE Main Controller or selected Expansion Box.

Managing system configurations

1. Press on the system icon from the main page, and then press on **System configuration**.
2. Press on the button corresponding to the action you would like to perform:

Button	Description
Import Configuration	User is prompted to select a Configuration file from either local disk or USB memory stick.
Import Contact List	User is prompted to select a Contact List file from either local disk or USB memory stick.
Export Current Configuration	User is prompted to enter a file name. Exports the Configuration file on a USB stick with all system's serial numbers.
Export Current Contact List	Makes export popup appear. Exports the (encrypted) contact list and information on a USB stick.
Profile Configuration	Saves the network profile.
Export Log	Makes export popup appear. Exports the Logs on a USB stick.
Delete Current Configuration	Delete the current controller configuration.
Restart Controller	Force a rebooting of the controller.

3. Press on the configuration file you would like to load, rename, or delete.

Deleting a module

1. Press on the Network icon  at the top of the screen.
2. Select Module detection in the drop down menu.
3. Select the Expansion Box containing the module you want to delete, and then select the module you want to delete.
4. Press on the delete icon  .

A message prompting you to confirm you want to delete the module is displayed. The equipment connected to the module will be unusable.

5. Press on **Ok** to delete the module.

Restriction

A module can't be deleted if the room/barn is in production mode. You must first stop production.

When you press on **Ok**, the system unassigns all associated equipment inputs and outputs, but doesn't delete the equipment. The affected equipment has a grey tile and LED on the configuration page.

NOTE: *A module can be erased from the system and still be physically inserted in an Expansion Box slot. When a module is deleted, all references to it are erased, and it will be discovered as a new module the next time an auto detection runs.*

Deleting an Expansion Box

Before You Begin
All modules associated with the Expansion Box must be deleted or must not have any associated equipment prior to Expansion Box deletion

1. Press on the Network icon  at the top of the screen.
2. Select Module detection in the drop down menu.
3. Select the Expansion Box you want to delete.
4. Press on the delete icon  .

   A message stating all modules and references associated to the Expansion Box will be deleted is displayed.
5. Press on **Ok** to delete the Expansion Box.

   NOTE: *An Expansion Box can be erased from the system and still be physically connected to the EDGE network. It will be discovered as a new Expansion Box the next time an auto detection runs.*

NOTES

9 Initial configuration

Topics Covered in this Chapter

- Selecting a preferred language
- Entering the site name
- Setting the date, time, and units parameters
- Entering local area network settings
- Naming the detected Expansion Boxes and plug-in modules
- Detecting, adding, duplicating, deleting plug-in modules and expansion boxes
- Viewing module statistics

Selecting a preferred language

Once the EDGE Main Controller is connected and the Power is turned on, you need to select the language you would like to see displayed on the screen. You can choose between English, Spanish, French, Portuguese, Russian, and Chinese.

1. Press on the language of your choice and then press on the **Begin** button to go to the next step.
2. At any time when navigating through the user interface, press on the change language icon to select the two letters corresponding to the language of your choice.

Entering the site name

Entering the site name and the controller name allows you to differentiate quickly between your sites.

1. Select the System Icon followed by Site Configuration in the drop menu.
2. Select the type of site from the drop down menu: Poultry, Swine, or Dairy.
3. Enter the site name, and then the controller name.
4. Select if you want to add a PIN number for local access.

   Check the checkbox if you want to raise an alarm on communication loss with Expansion Box.

   Check the checkbox if you want to trigger main alarm relay on communication loss with Expansion Box.

   Check the checkbox if you want to trigger main alarm relay on sidewall inlets open circuit and power loss.

Setting the date, time, and units parameters

1. Press on the System icon following by Time and Units in the drop menu.
2. Set the following parameters:

   Date format — Select the format you would like the date to be displayed in on screen

   Current date — Enter the current date

Time format — Select the format you would like the time to be displayed on screen

Current time — Enter the current time

Day starts at — Enter the time at which the controller starts taking into account the day parameters

Night starts at — Enter the time at which the system starts taking into account the night parameters

Metric, Imperial, Custom — Select the desired units you would like the values displayed on screen

Entering local area network settings

Before You Begin

You can get a gsiedge.com account username, password and account ID number free of charge from your AP/Cumberland representative. You will use the web account ID number to assign your device to your gsiedge.com account. The network can be either cabled or wireless.

1. Press on the Network icon and then select **Local Area Network** from the drop menu.
2. Select between Dynamic Host Configuration Protocol (**DHCP**) and Static Internet Protocol (**IP**). Populate the **IP address**,**Subnet mask** and **Default gateway fields** if you select Static IP.
3. Select either **Automatic DNS** or **Manual DNS**. Enter the DNS servers if you select Manual DNS.

   NOTE: *If the Wireless Module detects a wireless network, select the wireless network and enter the password to connect the module to the network.*

Naming the detected Expansion Boxes and plug-in modules

The controller automatically detects Expansion Boxes and modules and assigns them a unique identification address. The name of the Expansion Box is displayed on the corresponding OLED display on the module itself, and on the main screen. This helps you identify the Expansion Boxes and plug-in modules installed in the Expansion Boxes. Once identified, you can assign a new name to the Expansion Box.

1. Press on the Network icon  and then select module detection from the drop menu.
2. Select the enclosure that you want to edit and than press **Edit**.
3. Press in the name field and enter the name of your choice using the alphanumeric keypad.

Detecting, adding, duplicating, deleting plug-in modules and expansion boxes

When the system is powered on, the system searches for all plug-in modules connected to the EDGE controller, and automatically detects the modules and adds them in the system configuration.

1. Press on the Network icon  and then select Module Detection from the drop menu.

   The tiles for all the expansion boxes that are detected are displayed in the upper left hand pane. The color of the tile represents its state:

   Green — Configuration is complete for this enclosure; all serial/type match for all modules. No plug-in module is missing, and there is no trouble on any module within this Expansion Box.

   Grey — Configuration is not completed (serial number match not completed)

   NOTE: *In offline configuration enclosure tiles are always grey.*

Orange — At least one module, sub module or the enclosure itself is experiencing a trouble condition.

2. Press on the  icon to force the discovery of expansion boxes and modules that have not been detected on the EDGE network. This function can be used after having fixed a problem that had made modules invisible to the controller on one of the two EDGE networks.
3. Press on the  icon to add an Expansion Box. This function is used for offline configuration or to indicate that an existing Expansion Box has not been discovered on the network by the system.
4. Press on the  icon to duplicate the Expansion Box information. This icon is used for offline configuration to duplicate an enclosure and its set of modules.
5. Press on the  icon to delete an Expansion Box.

   Deleting an Expansion Box has the following effect:

   - All associated plug-in modules are deleted
   - All associated equipment lose their input/output assignation - their corresponding tile in the equipment configuration page becomes grey

   NOTE: *If there is equipment associated with any module within the Expansion Box, the delete operation is not allowed and you are prompted to unassign the inputs and outputs of the equipment prior to attempting a deletion.*

Viewing module statistics

Once all the modules have been detected by the EDGE, the information about the modules can be seen by pressing the Network icon  , and then selecting **Module Detection** and then selecting the desired module.

Statistics displayed on the **Module detection** page:

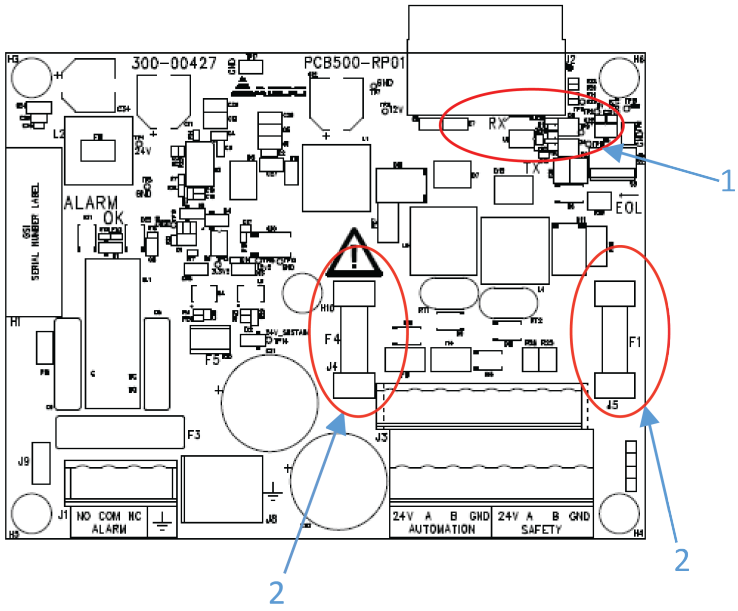
- **Aut. supply** (Automation supply voltage)
- **Saf. supply** (Safety supply voltage)
- **Aut. network** (Automation network)
- **Aut. Err. total** (Automation network errors total)
- **Saf. network** (Safety network)
- **Saf. Err. total** (Safety network errors total)
- **Temperature** (Module CPU temperature)

You can also clear the statistics or delete the module on this page.

10 Troubleshooting

EDGE 2 Controller

Figure 10-1 *PCB500 in the EDGE 2 Controller enclosure*



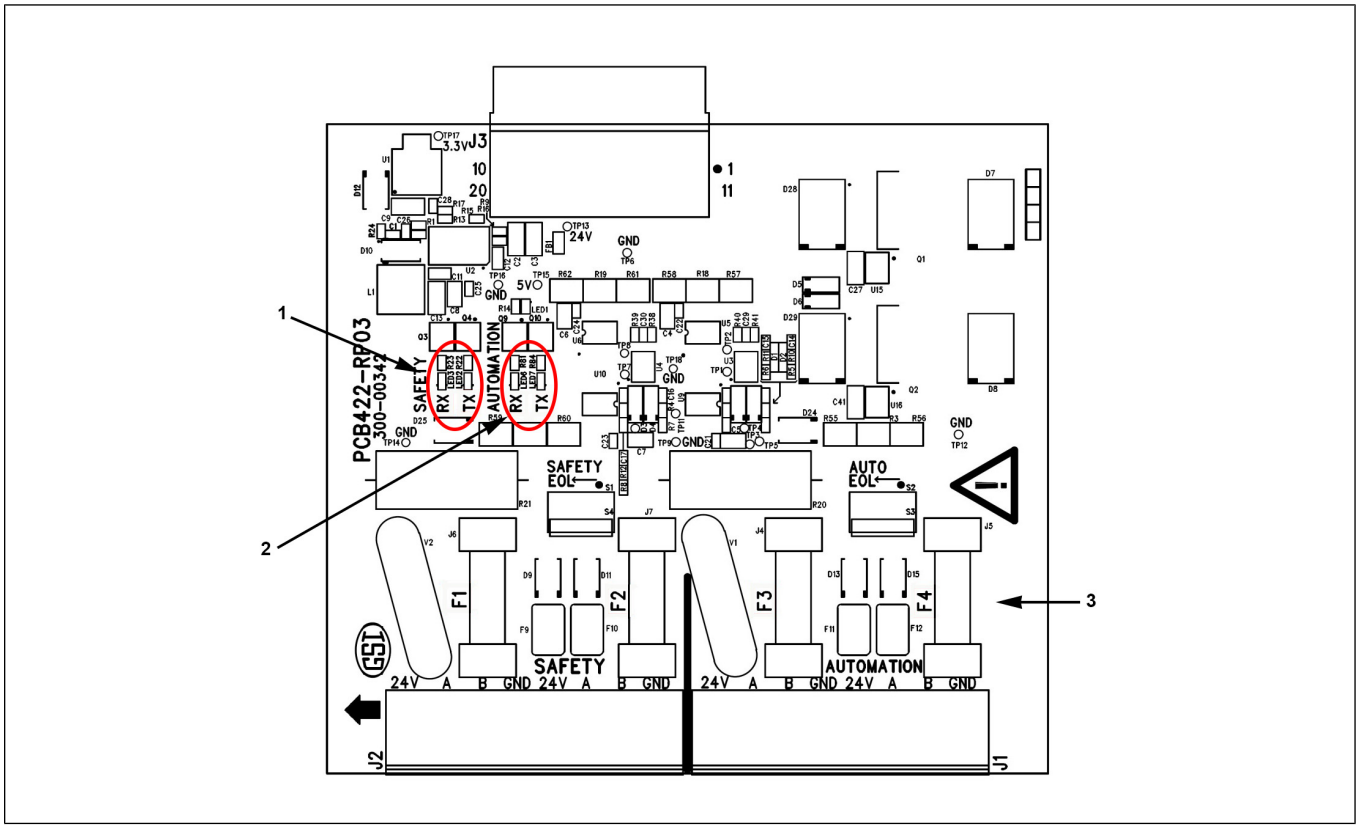
1	Automation network activity LEDs and Safety network activity LEDs	
2	F4	Automation network fuse
	F1	Safety network fuse

The controller doesn't communicate	Verify if the controller is powered on
	Verify if there are activities on the bus communication by looking at the activities LEDs on PCB-500
	Verify if F4 and F1 on PCB500 are not blown.
	Verify if the network link is installed correctly: Terminal A from the Expansion Box to the EDGE 2 Controller terminal A, Terminal B from Expansion Box to EDGE 2 Controller terminal B.
	Verify if the network communication is installed in daisy chain.
	Verify if your end of line (EOL) are set correctly on your network
	Verify if the network link is not cut: wire is cut or the protections are activated
	Verify if there is not a short-circuit on the network link between terminal A and B
	Verify if the network link length is below 4000 feet (1200m) with the recommended gage.
	Measure the voltage between the terminal 24V and GND. The voltage must be at least 16V

	If the problem persists, contact AP/Cumberland or GSI Electronics
The controller doesn't Power on	Verify if the following LEDs are activated on PCB-495: LED 12V, LED 5V, LED 3.3V1, LED 3.3V2
	Verify if the fuses F4 and / or F1 are burned, if that is the case, find the issue and correct it then replace the burned fuse.
	Measure the voltage between the terminal 24V and GND. The voltage must be at least 16V
	Verify if the Power link is installed correctly: Terminal 24V from Expansion Box to EDGE 2 Controller terminal 24V, Terminal GND from Expansion Box to EDGE 2 Controller terminal GND
	Verify if the Power link is not cut: wire is cut
	Verify if the Power link length is below 1000 feet (300m) with the recommended gage.
	If the problem persists, contact AP/Cumberland or GSI Electronics
Alarm relay doesn't activate the load when an alarm is activated	Verify if the LED Alarm OK is activated on PCB-500
	Verify the wiring if the right contact is used correctly
	Verify if the load does not activate the protection. The current must be below 1.5A and higher than 0.1A
	Verify if the load link is not cut
	Verify if a voltage supply reaches the terminal ALARM-COM
	Verify if the EDGE 2 Controller configuration are set correctly and on which parameters.
	Verify if Low alarm limit and high alarm limit are set correctly
	If the problem persists, contact AP/Cumberland or GSI Electronics
Alarm relay is still activated	Did you acknowledge the alarm?
	Did you fix the issue before acknowledging the alarm?
	Verify if the EDGE 2 Controller configuration are set correctly and on which parameters.
	Verify if Low alarm limit and high alarm limit are set correctly
	If the problem persists, contact AP/Cumberland or GSI Electronics

3-Slot or 6-Slot Expansion Box

Figure 10-2 *PCB422 in an expansion box enclosure*



1	Safety network activity LED's	
2	Automation network activity LED's	
3	F1 & F2	Safety network fuses
	F3 & F4	Automation network fuses

The 3 or 6-Slot Expansion Box doesn't power on	Verify if wires are connected from the Panel Mount Power Supply to the Backplane (PCB-420 and PCB-421)
	Verify if wires from the main voltage supply are connected to the Panel Mount Power Supply
	Verify if wires are connected at the right terminals
	Measure the voltage between the terminal 24V and GND. The voltage must be at least 24V
	If the problem persists, contact AP/Cumberland or GSI Electronics
The 3 or 6-Slot Expansion Box does not communicate with the EDGE 2 Controller or other Expansion Box without power supply	Verify if the Expansion Box is powered up
	Verify if there are activities on the bus communication by looking at the activities LED's on PCB-422
	Verify if F1, F2, F3 or F4 on PCB422 are not blown.
	Verify if the network link is installed correctly: Terminal A from Expansion Box to x Slots Expansion Box terminal A, Terminal B from Expansion Box to x Slots Expansion Box terminal B
	Verify if the network communication is installed in daisy chain.

	Verify if your end of line (EOL) are set correctly on your network
	Verify if the network link is not cut: wire is cut or the protections are activated
	Verify if there is not a short-circuit on the network link between terminal A and B
	Verify if the network link length is below 4000 feet (1200m) with the recommended gage.
	Measure the voltage between the terminal 24V and GND. The voltage must be at least 16V on the EDGE 2 Controller or on other Expansion Box without power supply
	Verify if the fuses F1 –F4 are not burned, it is the case. Find the issue and correct it and replace the burned fuse.
	If the problem persists, contact AP/Cumberland or GSI Electronics
The 3 or 6-Slot Expansion Box doesn't Power on EDGE 2 Controller or other Expansion Box without power supply	Verify if the fuses F1 –F4 are not burned, it is the case. Find the issue and correct it and replace the burned fuse.
	Measure the voltage between the terminal 24V and GND. The voltage must be at least 24V
	Verify if the Power link is installed correctly: Terminal 24V from Expansion Box to EDGE 2 Controller terminal 24V, Terminal GND from Expansion Box to EDGE 2 Controller terminal GND
	Verify if the Power link is not cut: wire is cut
	Verify if the Power link length is below 1000 feet (300m) with the recommended gage.
	Measure the voltage between the terminal 24V and GND. The voltage must be at least 16V on the EDGE 2 Controller or on other Expansion Box without power supply
	If the problem persists, contact AP/Cumberland or GSI Electronics
Issues with the input sensors	Verify if the sensor wiring complies with the wiring diagrams
	Verify if the sensor configuration is set correctly on the EDGE 2 Controller
	If the problem persists, contact AP/Cumberland or GSI Electronics
Issues with 0-10VDC outputs	0-10VDC output is not able to control the device. Ensure that the 0-10VDC input does not draw more than 20mA
	Verify if the sensor wiring complies with the wiring diagram
	Ensure that the right 0-10 VDC output is used
	Verify if the 0-10VDC configuration is set correctly on the EDGE 2 Main Controller
	The 0-10VDC output follows the variable output module (SSR). It is normal; each 0-10VDC is in parallel with an 0-10VDC variable output module (SSR) control output
	If the problem persists, contact AP/Cumberland or GSI Electronics
ON/OFF relay does not activate the load	Verify if the relay activation LEDs are activated
	Verify if the equipment wiring complies with the wiring diagram
	Ensure that the right relay output is used
	Verify if the relay configuration is set correctly on the EDGE 2 Controller
	Verify if the load does not activate the protection. The current must be below 23A and higher than 0.1A for the electronic fuses

	The current must be below the maximum value assigned to the equipment in the Main Controller's equipment configuration page
	Verify if the electronic fuse is activated on the EDGE 2 Controller
	Verify if the load link is not cut
	Verify if a voltage supply reaches the terminal RELAY - COM
	Verify if there is no an alarm
	If the problem persists, contact AP/Cumberland or GSI Electronics
The variable output module (SSR) does not activate the load	Verify if the variable output module (SSR) wiring complies with the wiring diagram
	Ensure that the right variable output module (SSR) output is used
	Verify if the variable output module (SSR) configuration is set correctly on the EDGE 2 Controller
	Verify if the load does not activate the protection.
	If the electronic fuse is activated, reset the electronic fuse by resetting it on the EDGE 2 Controller software
	Verify if the load link is not cut
	If the problem persists, contact AP/Cumberland or GSI Electronics

EDGE 4IN-2V-8DO

The EDGE 4IN-2V-8DO does not communicate	Verify if the EDGE 4IN-2V-8DO is powered up, look at the LEDs (3.3V, 5V, 13.1V) if there are activated
	Verify if the dip-switches are set correctly
	Verify if there are activities on the bus communication by looking at the activities on the Auto bus or Safe bus
	Verify if the network link is installed correctly: Terminal A from modules to Main Controller terminal A, Terminal B from modules to Main Controller terminal B
	Verify if the network communication is installed in daisy chain
	Verify if your end of line (EOL) are set correctly on your network
	Verify if the network link is not cut: wire is cut or the protections are activated
	Verify if there is not a short-circuit on the network link between terminal A and B
	Verify if the network link length is below 4000 feet (1200m) with the recommended gage
	Measure the voltage between the terminal 24V and GND. The voltage must be at least 16V
	If the problem persists, contact AP/Cumberland or GSI Electronics
The EDGE 4IN-2V-8DO does not power up	Verify if the EDGE 4IN-2V-8DO is powered up, look at the LEDs (3.3V, 5V, 13.1V) if there are activated
	Verify if the fuses F26, F27, F28, F38 are not burned. Find the issue and correct it and replace the burned fuse
	Measure the voltage between the terminal 24V and GND. The voltage must be at least 18V
	Verify if the power link is installed correctly: Terminal 24V from modules to Main Controller terminal 24V, Terminal GND from modules to Main Controller terminal GND

	Verify if the power link is not cut: wire is cut
	Verify if the power link length is below 1000 feet (300m) with the recommended gage
	If the problem persists, contact AP/Cumberland or GSI Electronics
Issues with inputs sensors	Verify if the sensor wiring is conformed to the wiring diagrams
	Verify if the sensor is connected at the right terminal
	Verify if the sensor configuration is set correctly on the EDGE 2 Controller
	If the problem persists, contact your AP/Cumberland or GSI Electronics
Issues with the 24V outputs	Verify if the sensor wiring is conformed to the wiring diagrams
	Verify if the sensor is connected at the right terminal
	Ensure that the 24V output does not draw more than 50mA
	If the problem persists, contact AP/Cumberland or GSI Electronics
Issues with 0-10Vdc outputs	0-10Vdc output is not able to control the device. Ensure that the 0-10Vdc output does not draw more than 100mA
	Ensure that the 24V inputs are at least 18Vdc
	Verify if the 0-10Vdc output is conformed to the wiring diagram
	Ensure that the right output 0-10Vdc is used
	Verify if the 0-10Vdc configuration is set correctly on the EDGE 2 Main Controller
	The 0-10Vdc output follows the Variable Output. It is normal; each 0-10Vdc is in parallel with an 0-10Vdc Variable Output control output
	If the problem persists, contact AP/Cumberland or GSI Electronics
The AC Switch (COMM-A / OUT-Ax, COMM-B /OUT-Bx) does not activate the contactor coil or the relay coil or the power output is not activated	Verify if the led of AC switch is activated (OUT-Ax or OUT-Bx)
	Verify if the AC switch wiring is conformed to the wiring diagram
	Ensure that the right AC switch output is used
	Verify if the AC switch configuration is set correctly on the EDGE 2 Main Controller
	Verify if the load does not activate the protection. The current must be below 0.5Arms and higher than 0.1A
	Verify if the load link is not cut
	Verify if a voltage reaches the terminal COMM-A or COMM-B
	If the problem persists, contact AP/Cumberland or GSI Electronics
The current sensor (CS_ Ax, CS_Bx) does read	Verify if the current sensors (CS_Ax, CS_Bx) wiring is conformed to the wiring diagram
	Verify if the current sensor configuration is set correctly on the EDGE 2 Controller
	Verify if the load link is not cut
	If the problem persists, contact AP/Cumberland or GSI Electronics

EDGE Variable Output

Problem	Solution
The EDGE Variable Output does not power up	Verify if the control cable is connected
	Verify if the control cable is connected at the right terminals in the finished product
	If the problem persists, contact AP/Cumberland or GSI Electronics
The EDGE Variable Output does not supply the load	Verify if the EDGE Variable Output wiring is conformed to the wiring diagram
	Verify if the EDGE Variable Output configuration is set correctly on the control unit
	Verify if the load does not activate the software protection on the control unit
	If the problem persists, contact AP/Cumberland or GSI Electronics
The EDGE Variable Output does not activate the load and the lockout led is activated	Verify if there is a dead short on the EDGE Variable Output at the AC output side
	Verify if the wiring at L1 and LOAD were not Interchanged on the EDGE Variable Output
	Verify if the wiring at L1 and LOAD were not Interchanged on the load
	Verify if the load failed (dead short)
	Verify if the wires are not short-circuited
	If the problem persists, contact AP/Cumberland or GSI Electronics
The EDGE Variable Output does not activate the load and the lockout led is not activated	Verify if the EDGE Variable Output configuration is set correctly on the control unit
	Verify if the load does not activate the software protection on the control unit
	Verify if the breaker circuit is closed
	Verify if there is power on the EDGE Variable Output circuit
	Verify if the load is connected
	Verify if there is only one wire from the source L1 and goes to the Variable Output terminal L1. The source L1 must not go to the load.
	Verify if the wires L1 and L2/N were not Interchanged on the Variable Output terminals
	Verify if the wires are not cut or fastened correctly

	If the problem persists, contact AP/Cumberland or GSI Electronics
The EDGE Variable Output does not vary correctly	Verify if the EDGE Variable Output configuration is set correctly on the control unit
	Verify if the Variable Output gives the nominal voltage of the voltage source with a setpoint of 100%
	If the problem persists, contact AP/Cumberland or GSI Electronics

Light Dimmer on EDGE 4IN-6R-2LD

Problem	Solution
The Light Dimmer AC Output is always at 100%	Verify the wiring conforms to the wiring diagram.
	Verify wires from the main voltage supply are connected to terminal blocks J2 (LD1-L1 and LD1-L2\N) and J3 (LD2-L1 and LD2-L2\N).
	Verify wires to the load are connected to terminal blocks J2 (LD1-L2\N and LD1-OUT) and J3 (LD2-L2\N and LD2-OUT).
	Verify the operation mode is set correctly.
	If the problem persists, contact your dealer or GSI Electronics.
The Light Dimmer AC Output is always “OFF” Lights are not turning “ON”	Verify the AC wiring conforms to the wiring diagram.
	Verify wires from the main voltage supply are connected to terminal blocks J2 (LD1-L1 and LD1-L2\N) and J3 (LD2-L1 and LD2-L2\N).
	Verify wires to the load are connected to terminal blocks J2 (LD1-L2\N and LD1-OUT) and J3 (LD2-L2\N and LD2-OUT).
	Verify the breakers are not open.
	Verify the power wires are not cut.
	Verify the power wires are correctly secured in the terminal blocks.
	Verify the operation mode is set correctly.
	The EDGE shows a Hardware trouble.
	Verify there is not a short circuit at the Zone output.
	If the problem persists, contact your dealer or GSI Electronics.
The Light Dimmer AC Output is not working in manual mode	Verify that the selected mode is BYPASS mode.
	If the problem persists, contact your dealer or GSI Electronics.
The Light Dimmer AC Output is not working in automatic mode	Verify that the selected mode is Auto mode.
	If the problem persists, contact your dealer or GSI Electronics.
The Light Dimmer AC Output does not dim properly (LED, CFL, CCFL)	Verify the wiring conforms to the wiring diagram.
	If the lights do not dim properly, try different waveform curves.
	If the lights do not dim properly, reset the minimum and the maximum light intensity.
	Use skipped points to waive specific points on waveform curves.
	Make sure you are using the same light model on the same zone.

Problem	Solution
	Make sure that the lamp is a dimmable model (LED, CFL, CCFL).
	Verify the AC voltage level at the Light Dimmer inputs is in the operation range of the lights.
	If the problem persists, contact your dealer or GSI Electronics.
The Light Dimmer AC Output does not dim properly without flickering (LED, CFL, CCFL)	Follow the same steps of the previous issue “The Light Dimmer AC Output does not dim properly”.
	Make sure you have followed all steps before contacting your dealer or GSI Electronics.
	Make sure that the Light Dimmer power source is not polluted by another electrical device.
	If it is an electrical noise issue, use only a dedicated power source for the Light Dimmer outputs.
	If it is an electrical noise issue, try another power source for the Light Dimmer.
	If the problem persists, contact your dealer or GSI Electronics.
The Light Dimmer AC Output shows an Hardware trouble	Verify the AC wiring conforms to the wiring diagram.
	Reset the hardware fault to see if it was a short term event (overvoltage issue such as a thunderstorm). In this case, the module will work again.
	Did you wash the room? Water infiltration in the lamp fixture can cause a temporary short circuit. Turn off the Light Dimmer AC Output and turn ON later to give the water time to evaporate.
	Verify there is not a short circuit at the Light Dimmer AC Output.
	If the problem persists, contact your dealer or GSI Electronics.
The Light Dimmer shows the Internal communication trouble	Make sure the power wires respect the minimum clearance around the plastic enclosure.
	Make sure that power wires are not mixed with low voltage cables.
	If the problem persists, contact your dealer or GSI Electronics.

NOTES

A LED meanings

EDGE 2 Controllers

LED Identification	Description
12V	LED active when the 12VDC is present
5V	LED active when the 5VDC is present
1.5V	LED active when the 1.5VDC system is present
3.3V1	LED active when the 3.3VDC bus 1 is present
3.3V2	LED active when the 3.3VDC bus 2 is present
SATA ACT.	LED active when SATA drive is used
WLAN	LED active when wireless communication is established
WWAN	Not used
WPAN	Not used
LINK1000	LED active when 1000 Base-Tx is used
LINK100	LED active when 100 Base-Tx is used
LINK/ACTIVITY	LED active when the link is present LED blinks off during activity
USB0 ON	LED active when USB port is activated
USB1 USB2 ON	LED active when USB port is activated
USB3 ON	LED active when USB port is activated
THRM TRIP	Not used
DGB1	Indicate the TOP EDGE hardware revision
DGB2	
DBG3	
DBG4	
TX on PCB-500	LED blinks when TX activity on Safety port or Automation port
RX on PCB-500	LED blinks when RX activity on Safety port or Automation port
ALARM OK on PCB-500	LED active when there is not an alarm

EDGE 3-Slot and 6-Slot Expansion Box

LED Identification	Description
AUTOMATION-RX	LED blinks off during activity
AUTOMATION-TX	LED blinks off during activity
SAFETY-RX	LED blinks off during activity
SAFETY-TX	LED blinks off during activity
3.3V	LED active when the 3.3VDC is present

ON (close to the relays)	LED active when the relay is activated
DBG1	DEBUG LEDs (and BOARD_ID)
DBG2	

EDGE 4IN-2V-8DO

LED identification	Description
AUTOMATION-RX	LED blinks off during activity
AUTOMATION-TX	LED blinks off during activity
SAFETY-RX	LED blinks off during activity
SAFETY-TX	LED blinks off during activity
3.3V	LED active when the 3.3Vdc bus is present
5V	LED active when the 5Vdc bus is present
13.1V	LED active when the 13.1Vdc bus is present
OUT-Ax/OUT-Bx	LED active when the AC switch is activated
ID	LED active on the specific EDGE 4IN-8DO when the EDGE 2 Main Controller calls a specific EDGE 4IN-8DO ID
DBG1	Debug LEDs
DBG2	

EDGE Variable Output

LED identification	Description or function
	LED active when a dead short is present at the startup

EDGE 4IN-6R-2LD

Leds identification on PCB-523	Description or function
12V PWR	Led active when the 12Vdc is present
5V PWR	Led active when the 5Vdc is present
3.3V PWR	Led active when the 3.3Vdc bus is present
12V1 PWR	Led active when the 12Vdc bus 1 is present
12V2 PWR	Led active when the 12Vdc bus 2 is present
12V3 PWR	Led active when the 12Vdc bus 3 is present
12V4 PWR	Led active when the 12Vdc bus 4 is present
AUTOMATION-RX	Led blinks off during activity
AUTOMATION-TX	Led blinks off during activity
SAFETY-RX	Led blinks off during activity
SAFETY-TX	Led blinks off during activity
ON (close to the relays)	Led active when the relay is activated
DBG1	Debug Leds (and BOARD_ID)
DBG2	

NOTES

B List of Terminals

EDGE 2 Controllers

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

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
LD (x) AC INPUT - L1	High voltage Input (AC) from distribution panel
LD (x) AC INPUT - L2/N	High voltage Input (AC return) from distribution panel
LD (x) OUT - 	High voltage Ouput (AC Dimmable output)
LD (x) OUT - L2/N	High voltage Ouput (AC Dimmable output return)

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

C Technical Specifications

Table C-1 *EDGE 2 Main controller — Safety Ratings*

Inputs: DC Supply Input : 24Vdc ±10%, 18W **Outputs**: Alarm relay output: $24V_{DC/AC}$, 1.5A	
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) 95 % (± 3 %) 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)	20
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 C-2 *EDGE 2 Main Controller — Functional Ratings*

Enclosure dimensions	Height	355 mm (14 inches)
	Width	482 mm (19 inches)
	Depth	152 mm (6 inches)
Weight	4150 grams (9.15 lbs)	
Display	Size	15 inches, 12 high
	Type	LED
	Resolution	1024 X 768
Ethernet ports		
10/100 Ethernet Transceiver	IEEE802.3/802.3u (Fast Ethernet) ISO 802-3/IEEE 802.3 (10BASE-T)	
Wireless	WiFi	

Table C-3 *EDGE 2 Remote Display — Safety Ratings*

Inputs: DC Supply Input : 24Vdc ±10%, 18W	
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) 95 % (± 3 %) 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)	20
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 C-4 *EDGE 2 Remote Display — Functional Ratings*

Enclosure dimensions	Height	482 mm (19 inches)
	Width	355 mm (14 inches)
	Depth	152 mm (6 inches)
Weight	4150 grams (9.15 lbs)	
Display	Size	15 inches, 12 high
	Type	LED
	Resolution	1024 X 768
Ethernet ports		
10/100 Ethernet Transceiver	IEEE802.3/802.3u (Fast Ethernet) ISO 802-3/IEEE 802.3 (10BASE-T)	
Wireless	WiFi	

Table C-5 *EDGE 2 Screenless Controller — Safety Ratings*

Inputs: DC Supply Input : 24Vdc ±10%, 11W **Outputs**: Alarm relay output: $24V_{DC/AC}$, 1.5A	
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) 95 % (± 3 %) 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)	20
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

Main supply voltage fluctuations shall not exceed +/- 10% of the nominal supply voltage.

Table C-6 *EDGE 2 Screenless Controller — Functional Ratings*

Enclosure dimensions	Height	482 mm (19 inches)
	Width	355 mm (14 inches)
	Depth	152 mm (6 inches)
Weight	2834 grams (6.25 lbs)	
Ethernet ports		
10/100 Ethernet Transceiver	IEEE802.3/802.3u (Fast Ethernet) ISO 802-3/IEEE 802.3 (10BASE-T)	
Wireless	WiFi	

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 C-7 *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 C-8 *6-Slot Expansion Box and 3-Slot Expansion Box ratings*

6-Slot	100Vac-240Vac, ±10%,50-60Hz, 1 phase, 127W
3-Slot	100Vac-240Vac ±10%; 50-60Hz, 1 phase, 127W
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 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

Table C-8 *6-Slot Expansion Box and 3-Slot Expansion Box ratings (cont'd.)*

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 Minimum load of 0.2A Full Load amperage on the motor nameplate is not the maximum amp. When varying, the amperage might be higher.

Table C-8 *6-Slot Expansion Box and 3-Slot Expansion Box ratings (cont'd.)*

		(Nb of Units = Max current rating divided by the max current of the fan)
LED and CCFL loads		120/208/240Vac; 50/60Hz, 750W/ 920VA MAX Minimum load of 0.2A / 25W
Ballast load		120Vac; 50/60Hz; 1200W; 10 MAX 208 Vac; 50/60Hz; 1040W; 5A MAX 240Vac; 50/60Hz; 720W; 3A MAX Minimum load of 0.2A
Light Dimmer Outputs		
INPUTS :		
SUPPLY INPUT:100-120/220-240Vac ±10%,50-60Hz,1/2 phase(s)		
OUTPUTS:		
POWER OUTPUT(Per channel):	– 100-120/220-240Vac 8.0Amps max – 100-120Vac, 800-960VA, (CFL/CCFL, LED) – 220-240Vac, 1760–1920VA, (CFL/CCFL, LED)	

Table C-9 *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: 0There 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	Compliant to GSIE temperature probes Accuracy of ±0.1ºC in a normal operation Allowable loss of performance in a noisy environment: Accuracy of ±0.65ºC from initial reading with a fixed resistor of 1% precision used for testing purpose.
Analog 0-5 Volts	Sensor must be able to drive a 2k Ohms load, which means the sensor must drive at least 2.5mA to ensure correct readings.

	Accuracy of ±30mV in a normal operation. Allowable loss of performance in a noisy environment: Accuracy of ±80mV 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 ±0.2mA in a normal operation. Allowable loss of performance in a noisy environment: Accuracy of ±0.4mA 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 ±0.6A for AC load <20A in a normal environment. Allowable loss of performance in a noisy environment: Accuracy of ±0.8A from initial reading with a load of 1% precision used for testing purpose
Relay outputs with current sensing input	Accuracy of ±0.5A for AC load <20A in a normal environment. Allowable loss of performance in a noisy environment: Accuracy of ±0.75A from initial reading with a load of 1% precision used for testing purpose
Current sensing input	Accuracy of ±0.5A for AC load <20A in a normal environment Allowable loss of performance in a noisy environment: Accuracy of ±0.75A 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
Installation Category	2
Altitude	2000 Meters Max. (6561 Ft. Max)
Operating Relative Humidity (maximum)	0 to 10°C (32 to 50°F) 95 % (± 3 %) 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 C-10 *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) 95 % (± 3 %) 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

D Low Voltage Cable Specifications

Communication Bus (Automation/Safety)

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

Cable Parameter	Value		
	Minimum	**Typical**	**Maximum**
Cable type	Twisted and shielded		
Minimum gauge	18AWG (*diameter of 1.02mm or cross sectional area of 0.82mm²)*		
Maximum cable length (including cable extensions)	457 meters (1500 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.

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

Parameter	Wire gage when a load of 24W (max 1.5A) is connected between the source and the load in a non-redundant system				
Wire gauge	**18 AWG** *(diameter of 1.02mm or cross sectional area of 0.82mm²)*	**16* AWG** *(diameter of 1.29mm or cross sectional area of 1.30mm²)*	**14 AWG** *(diameter of 1.62mm or cross sectional area of 2.08mm²)*	**12 AWG** *(diameter of 2.05mm or cross sectional area of 3.30mm²)*	**10 AWG** *(diameter of 2.58mm or cross sectional area of 5.26mm²)*
	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.)	150m (500 ft.)	300m (1000 ft.)	600m (2000 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.

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

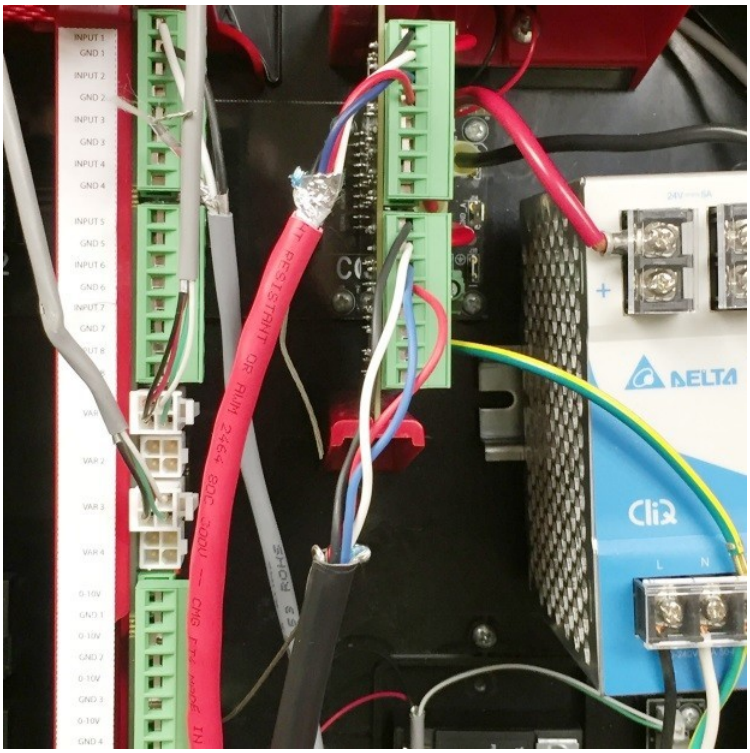
NOTICE ***EDGE network cables have to use class 1 load type. AP/Cumberland recommends using TC-ER cable type.***

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, 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.***

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

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
500' (150 m)*	16 AWG
*Recommended cable for redundant system	

Communication Cable Requirements	
Distance	Minimum Wire AWG
1500' (457 m)*	18 AWG
*Total Distance from first control to last control	

WARNING

Use copper conductors only.

Item	Description	Lbs.	Kgs.
WR-16-2TS-S	Wire, 16 AWG 2 Twisted Shielded Pairs, Comm & Power, 600V, 1000'/ Spool	84	38.10
WR-16RED-2TS-S	Wire, 16 AWG 2 Twisted Shielded Pairs, Comm & Power, 600V, Red Jacket, 1000'/Spool	84	38.10
WR-18-1TS-S	Wire, 18 AWG 1 Twisted Shielded Pair, Comm & Power, 600V, 1000'/ Spool	25	11.34
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	11.34
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 D-3 *Other Low Voltage Cables*

Item	Description
Cable type	Twisted and shielded
Minimum gauge	18AWG (*diameter of 1.02mm or cross sectional area of 0.82mm²)*
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

E Temperature Probe Installation

EDGE 2 Controllers can use two models of temperature probes:

- Legacy temperature probe (LEGACY TEMP PROBE)
- EDGE LED temperature probe (EDGE LED TEMP PROBE)

What you need to know:

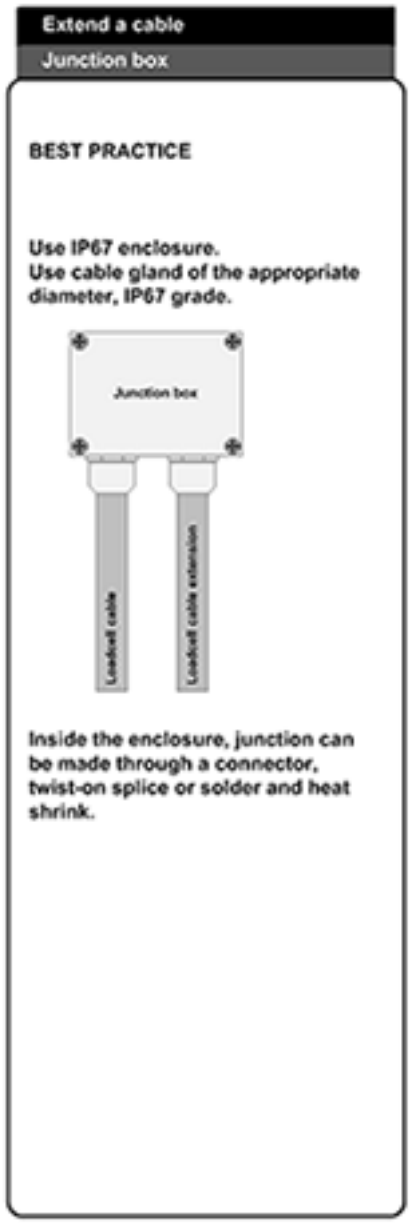
- Identify each probe on the floor with its terminal input number.
- Curl the probe tip upwards using a cable tie to prolong its life time.
- Do not connect the bare wire (shield) of shielded cables to earth.
- Do not install the probes near a low wall, a heater, or a fan.

Refer to *Connecting an Analog Input, page 72* for installation instructions.

NOTES

F Extending a cable

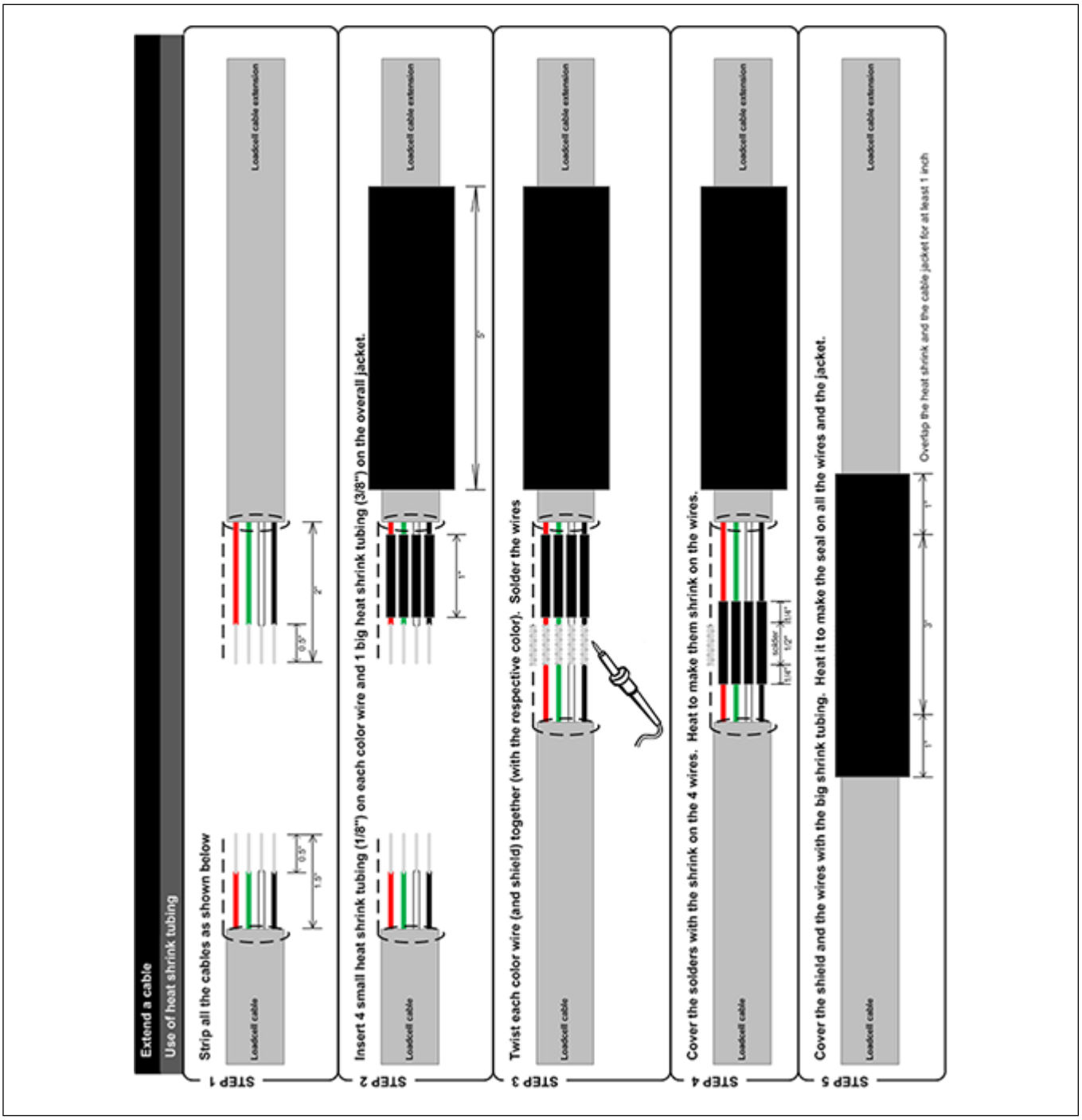
- Best practice: using a junction box



WARNING

Use copper conductors only.

- Using of heat shrink tubing



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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