Hardware Installation and Setup Instructions

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Attention

This section serves as a notice of the immediate or potential dangers involved when working with the equipment described throughout this manual. Any person involved in installation, maintenance, or service of the equipment should first carefully examine the equipment and read the instructions contained in this manual to ensure that personal and/or equipment injury is avoided.

The following safety messages appear throughout this manual to alert of immediate or potential danger to life as well as property.

Note : Indicates an important note.

Tip : Indicates a helpful tip or trick.

Safety Reminder : Applicable safety instructions will be included with this symbol.

DANGER : Indicates an immediately hazardous situation which ,if not avoided, will result in serious injury or death.

WARNING : Indicates a potentially hazardous situation which ,if not avoided, may result in serious injury or death.

CAUTION : Indicates a potentially hazardous situation which ,if not avoided, may result in minor or moderate injury.

Disclaimer

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designated to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Instructions contained in this user's guide should be performed only by qualified persons in accordance with local and national codes. Blue Ridge Technologies International, LLC and its affiliates assume no responsibility for any consequences related to the improper use of this manual.

Overview : Document
This document provides mounting and connection instructions for the following Blue Ridge Technologies Relay Panel (RP) products :
   RP16, 32, 48, 64 with Surface / Flush Mount Doors
RP enclosures are Type 1 rated and must be mounted in a dry / indoor environment.
Sections of this Install Guide apply to optional equipment and may not be applicable. Siemens' P1 and Automated Logic Corporation's BACnet ARCnet protocols are only available to authorized integrators.
For RP integration with a Building Automation System (BAS) as well as software configuration refer to the Application Guide.
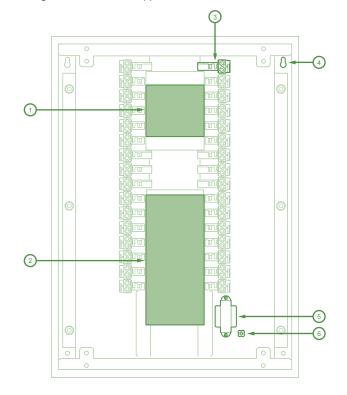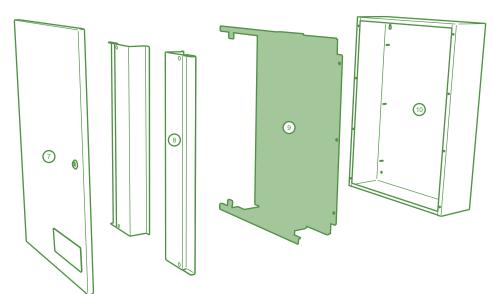
Overview : Component
The RP includes the following items :
   1 - RP
   1 - BT485 BAS Network Terminator (BT485 Terminator)

Overview : Assembly
1.   LEXP Digital Input Expansion Card (LEXP not applicable on RP16)
2.   Controller
3.   Lighting Tough Relay (LTR)
4.   "Key Hole" Mounting Hole (Top of Panel)
5.   Transformer
6.   Earth Ground Lug
7.   Panel Door
8.   Relay Covers
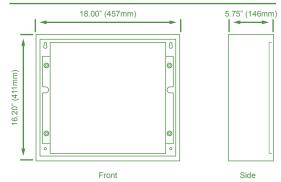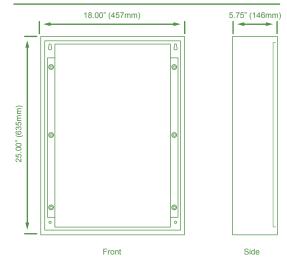9.   Panel Interior
10.   Panel Enclosure

(Figure 1)

⚠️ Disconnect line voltage power before performing RP installation.

⚡ All circuits must be tested for wiring errors and shorts prior to RP installation.

Before handling any RP components, the technician should be grounded to prevent circuit board damage.

Overview : Dimensions

RP16 : Enclosure Dimensions
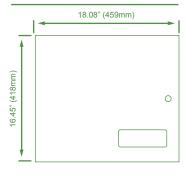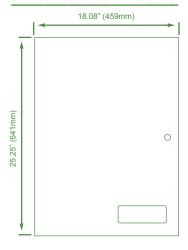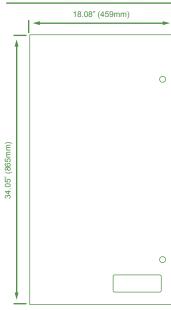
18.00" (457mm)
5.75" (146mm)
16.20" (411mm)

Front
Side

Surface Mount Door Dimensions

18.08" (459mm)
16.45" (418mm)

Recessed Mount Door Dimensions

19.58" (497mm)
17.70" (450mm)

RP32 : Enclosure Dimensions

18.00" (457mm)
5.75" (146mm)
25.00" (635mm)

Front
Side

Surface Mount Door Dimensions

18.08" (459mm)
25.25" (641mm)

Recessed Mount Door Dimensions

19.58" (497mm)
26.50" (673mm)

RP48 : Enclosure Dimensions

18.00" (457mm)
5.75" (146mm)
33.80" (859mm)

Front
Side

Surface Mount Door Dimensions

18.08" (459mm)
34.05" (865mm)

Recessed Mount Door Dimensions

19.58" (497mm)
35.30" (897mm)

(Figure 2)
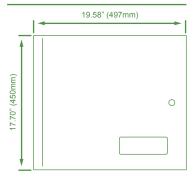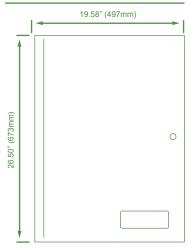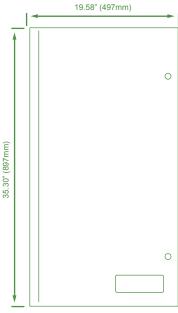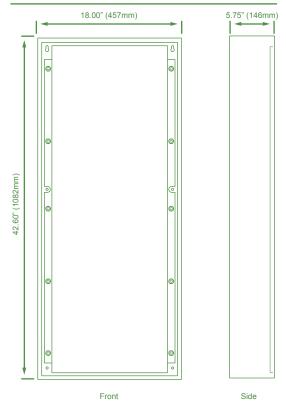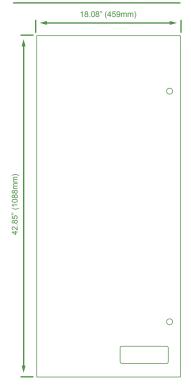
Overview : Dimensions

RP64 : Enclosure Dimensions

18.00" (457mm)

5.75" (146mm)

42.60" (1082mm)

Front

Side

Surface Mount Door Dimensions

18.08" (459mm)

42.85" (1088mm)

Recessed Mount Door Dimensions

19.58" (497mm)

44.10" (1120mm)
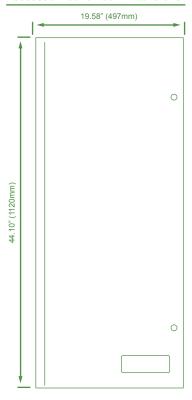
(Figure 3)

Preparation : Door Removal

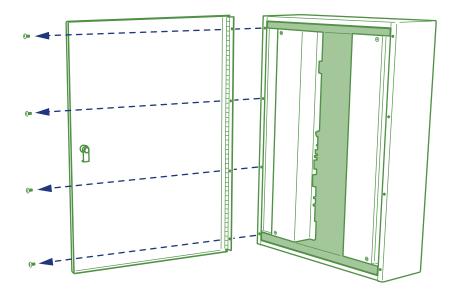Remove the Panel Door from the Panel Enclosure. (Figure 4)
1. Open Panel Door
2. Remove fasteners from the door's hinge.
3. Separate Panel Door from Panel Enclosure.

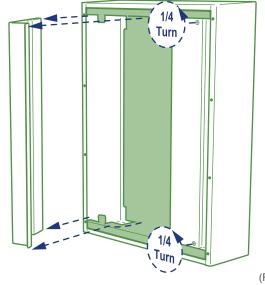(Figure 4)

Preparation : Relay Cover Removal

Remove the Relay Covers from the Panel Enclosure. (Figure 5)
1. Unlock 1/4 turn fasteners located near top and bottom of Relay Cover.
2. Remove Relay Covers by rotating inside edge outward and pulling Relay Covers free.

(Figure 5)

Preparation : Interior Removal
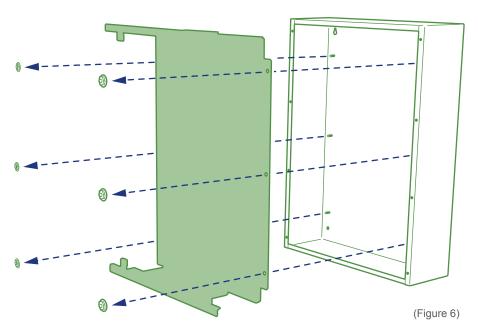
Remove the Panel Interior from the Panel Enclosure. It is beneficial to mark position of penetrations in the Panel Enclosure prior to removing the Panel Interior. (Figure 6)
1. Unfasten the nuts retaining the Panel Interior.
2. Pull the Panel Interior outward to free it from the Panel Enclosure.
3. Store the Panel Interior in a secure location free of dust and debris.

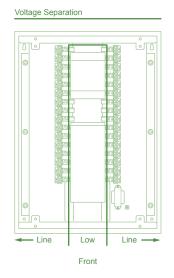(Figure 6)

Preparation : Enclosure

Prior to mounting the Panel Enclosure make penetrations for all applicable bushings and/or conduit. Ensure sufficient clearance for Panel Interior. (Figure 7)
1.   Ensure the Panel Enclosure is oriented correctly. Key holes should be located at the top of the panel.
2.   Drill or punch the appropriate hole(s) in the Panel Enclosure for the application.

Voltage Separation

← Line   Low   Line →

Front

(Figure 7)

Mounting

The Panel Enclosure may now be mounted.
1.   Ensure the Panel Enclosure is oriented correctly. Key holes should be located at the top of the panel.
2.   Mark the location of all Panel Enclosure mounting holes to the mounting surface. (Figure 8)
3.   Prepare the mounting surface with hardware appropriate to support the panel's weight. See Panel Weight Chart
4.   Hang Panel Enclosure.
5.   Remove dust and debris from Panel Enclosure.
6.   Reinstall Panel Interior. DO NOT exceed 40 in-lbs when tightening Panel Interior retention nuts.
7.   Install appropriate bushings, conduit, and wire.
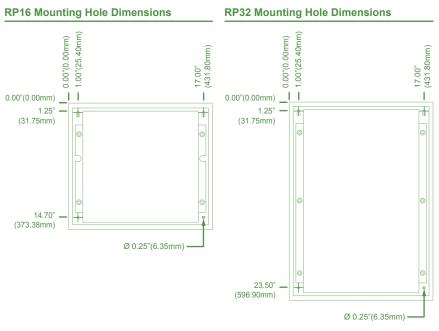
Panel Weight Chart

Relay Panel Capacity	Approximate Weight at Full Capacity
RP16	32 lbs (14.5 kg)
RP32	47.5 lbs (21.5 kg)
RP48	63.5 lbs (28.8 kg)
RP64	82.5 lbs (37.4 kg)

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Mounting

RP16 Mounting Hole Dimensions

0.00"(0.00mm)
1.00"(25.40mm)
17.00" (431.80mm)

0.00"(0.00mm)
1.25" (31.75mm)
14.70" (373.38mm)

Ø 0.25"(6.35mm)

RP32 Mounting Hole Dimensions

0.00"(0.00mm)
1.00"(25.40mm)
17.00" (431.80mm)

0.00"(0.00mm)
1.25" (31.75mm)
23.50" (596.90mm)

Ø 0.25"(6.35mm)
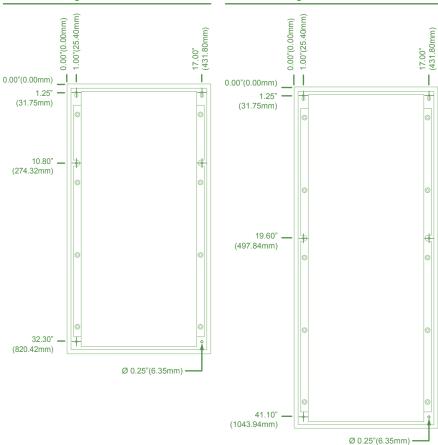
RP48 Mounting Hole Dimensions

0.00"(0.00mm)
1.00"(25.40mm)
17.00" (431.80mm)

0.00"(0.00mm)
1.25" (31.75mm)
10.80" (274.32mm)
32.30" (820.42mm)

Ø 0.25"(6.35mm)

RP64 Mounting Hole Dimensions

0.00"(0.00mm)
1.00"(25.40mm)
17.00" (431.80mm)

0.00"(0.00mm)
1.25" (31.75mm)
19.60" (497.84mm)
41.10" (1043.94mm)

Ø 0.25"(6.35mm)

(Figure 8)

Terminations : Line Voltage

Complete line voltage terminations. (Figure 9 and 10)
1. Confirm power is disconnected from the panel.
2. Route leads as appropriate.
3. Cut to length and strip as appropriate.
4. Complete Transformer and LTR terminations.
5. Cap unused primary lead from Transformer.
6. Torque each LTR screw terminal to 36 in-lbs.

Transformer Specifications
   Type: 30VA Inherently Limited
   Primary: Dual Tap 120 or 277VAC +/-10%, 30VA, 50-60 Hz
   Secondary: 24VAC +/-10% Inherently Limited
   Wire Requirement: 18AWG Minimum (Solid or Stranded)

LTR Specifications
   Type:
      UL Listed
      SPST latching with manual override lever
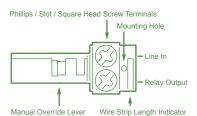   Electrically operated mechanically held, pulse driven
      Short Circuit Current Rating (SCCR) 30,000A @ 277 VAC
   Ratings: Tungsten 20A @ 120VAC / Ballast 20A @ 277VAC / Ballast 20A @ 347VAC / Resistive 20A @ 277VAC / Resistive 20A @ 347VAC
   Load Terminal: Universal screw terminal, box type clamp
   Terminal Capacity (per side): (2) 14-10AWG or (1) 8AWG (Solid or Stranded copper wire)

Transformer Terminations

- 277VAC Brown
- 120VAC Black
- Neutral White
- Earth Ground

(Figure 9)

LTR Terminations

Phillips / Slot / Square Head Screw Terminals
Mounting Hole
Line In
Relay Output
Manual Override Lever
Wire Strip Length Indicator
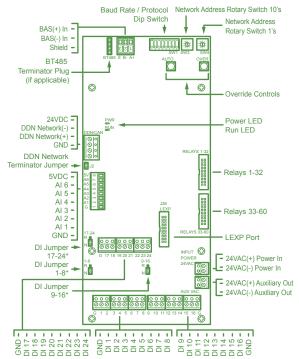
(Figure 10)

Terminations : Low Voltage

All low voltage leads are terminated on the Controller and LEXP. These screw terminals accept a 0.4 x 2.5mm slot head screw driver. For reference, some terminal blocks may be removed to reveal terminal labels. (Figure 11)
1. Confirm power is disconnected from the RP.
2. Route leads.
3. Cut to length and strip as appropriate.
4. Insert stripped lead into screw terminal and tighten screw.
5. Repeat for each lead.

Controller Specifications
   Power In: 24VAC +/-10%, 30VA, 50-60 Hz
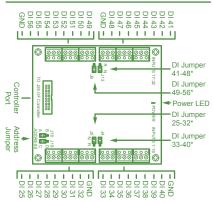   Auxiliary Out: 24VAC Full Wave Rectified

Controller Terminations

Baud Rate / Protocol Dip Switch
Network Address Rotary Switch 10's
Network Address Rotary Switch 1's
BAS(+) In
BAS(-) In
Shield
BT485 Terminator Plug (if applicable)
Override Controls
24VDC
DDN Network(-)
DDN Network(+)
GND
Power LED
Run LED
DDN Network Terminator Jumper
5VDC
AI 6
AI 5
AI 4
AI 3
AI 2
AI 1
GND
Relays 1-32
Relays 33-60
DI Jumper 17-24*
DI Jumper 1-8*
DI Jumper 9-16*
LEXP Port
24VAC(+) Power In
24VAC(-) Power In
24VAC(+) Auxiliary Out
24VAC(-) Auxiliary Out

GND DI 17 DI 18 DI 19 DI 20 DI 21 DI 22 DI 23 DI 24 GND DI 1 DI 2 DI 3 DI 4 DI 5 DI 6 DI 7 DI 8 DI 9 DI 10 DI 11 DI 12 DI 13 DI 14 DI 15 DI 16 GND

AI (Analog Input) / DI (Digital Input) / GND (Ground)
*DI Jumper Position N(Dry Contact) / R(Externally Powered)

LEXP Terminations

GND DI 56 DI 55 DI 54 DI 53 DI 52 DI 51 DI 50 DI 49 GND DI 48 DI 47 DI 46 DI 45 DI 44 DI 43 DI 42 DI 41

Controller Port
Address Jumper

DI Jumper 41-48*
DI Jumper 49-56*
Power LED
DI Jumper 25-32*
DI Jumper 33-40*

DI 25 DI 26 DI 27 DI 28 DI 29 DI 30 DI 31 DI 32 GND DI 33 DI 34 DI 35 DI 36 DI 37 DI 38 DI 39 DI 40 GND

*DI Jumper Position N(Dry Contact) / R(Externally Powered)
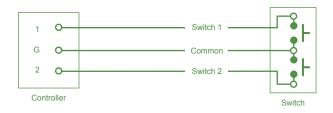
(Figure 11)

Terminations : Low Voltage

Digital Input Specifications

   Controller: 24 two-wire inputs
   LEXP: 32 two-wire inputs
   Software Configuration: Maintained, state change, momentary on/off, momentary on, or momentary off
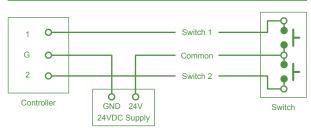   Jumper Configuration: 8 input segments, dry contact (N) or 24VDC externally powered (R)
   Wire Requirement / Maximum Length: 18AWG (Solid or Stranded) / Dry Contact 500'(152m) or externally powered 1,000'(304m)
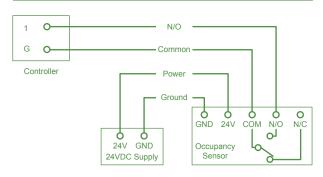
Digital Input: Two Button Low Voltage Switch (Dry Contact)

Digital Input: Two Button Low Voltage Switch (Externally Powered)

Digital Input: 4-Wire 24VDC Occupancy Sensor (Dry Contact)
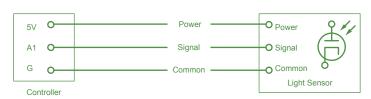
(Figure 12)

Analog Input Specifications

   Analog Input: 6 three-wire 0-5VDC inputs
   Wire Requirement / Maximum Length: 18AWG (Solid or Stranded) / 250'(76m)

Analog Input: 5VDC Light Sensor

(Figure 13)

Terminations : Low Voltage

BAS Network Specifications
   Topology: RS-485, 3 conductor (+, -, and shield), daisy chain wiring (no stars or t-taps)
   Wire Requirement / Maximum Length: Belden 8760 / 4000'(1216m)
BACnet MS/TP
   Baud Rate: DIP switch selectable 9.6K, 19.2K, 38.4K, or 76.8K
   Device Profile: BACnet Advance Application Controller (AAC)
   Address Range: 1 – 99 selectable with rotary dials
   Unit Load: Full unit load, 32 devices per MS/TP segment
   Points: See Application Guide and PIC Statement
N2
   Baud Rate: DIP switch selectable 9.6K
   Address Range: 1 – 255 selectable with rotary dials and DIP switch
P1
   Baud Rate: DIP switch selectable 4.8K, 9.6K, 19.2K, or 38.4K
   Address Range: 1 – 99 selectable with rotary dials
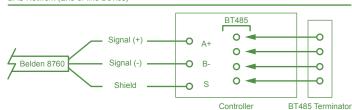
See Automated Logic Corporation's *ARC156 Wiring Technical Instructions* for the latest BACnet ARCnet specifications.

Install BT485 Terminator if RP is operated as end of line device(first or last device on network). BT485 Terminator requires no specific orientation in relation to the terminal.
See Controller Setup for Address and Protocol settings.

(Figure 14)

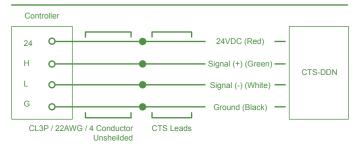DDN Network Specifications
   Protocol: Digital Device Network (DDN)
   Address Range: 1-60, DIP switch selectable
   Topology: Daisy Chain Wiring (no stars or t-taps)
   Wire Requirement: CL3P, 22AWG, 4 conductor, Unsheilded
   Maximum Stations (w/o external power): 10 CTS-DDN
   Maximum Length (w/o external power): 500'(152m)
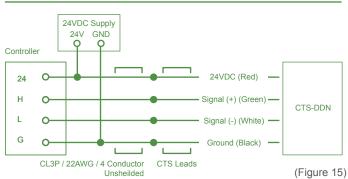   Maximum Stations (w/ external power): 60 one-button, 30 two-button, or a combination for 60 buttons total
   Maximum Length (w/ external power): 2,000'(610m)
   Power / Draw: 24VDC / 15mA per CTS-DDN

(Figure 15)

Controller Setup

Controller configuration and RP testing are the final steps of installation. (Figure 16)

Setup

1. Confirm power is disconnected from the Controller and the Power / Run LED's are not illuminated.
2. Set the DDN Network Terminator Jumper if utilizing DDN Network. Two devices on the DDN Network should be set for network termination. If the Controller is the end-of-line, terminate the Controller and the device at the opposite end of the network. If the Controller is positioned at a mid-point on the network, terminate devices at the opposite ends of the network either side of the Controller.
3. Set the Digital Input (DI) Jumpers. (Controller and LEXP)
4. Set the Baud Rate / Protocol Dip Switch for protocol and baud rate.
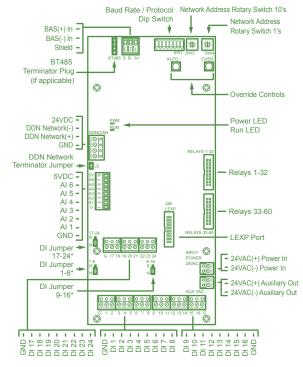5. Set the Network Address.

Testing

1. Connect power to the Controller. Wait 10 seconds for power up.
2. Confirm normal LED operation.
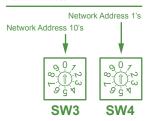   Power LED: Solid illumination
   Run LED: Continuous blinking
3. Press and release the Over Button. Confirm the Relays turn off.
4. Press and release the Over Button again. Confirm the Relays turn on.
5. Press and release the Auto Button to exit override mode.
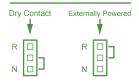6. Test procedure complete.

Controller Terminations

AI (Analog Input) / DI (Digital Input) / GND (Ground)
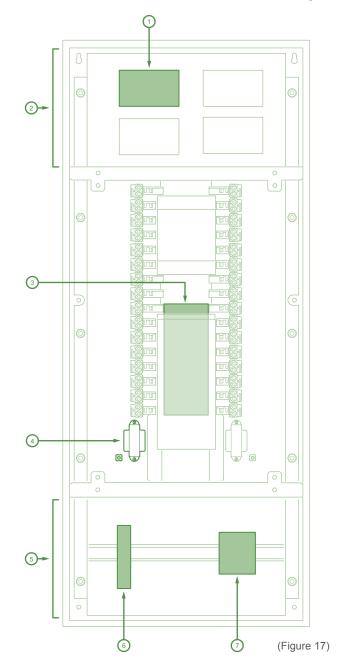*DI Jumper Position N(Dry Contact) / R(Externally Powered)

(Figure 16)
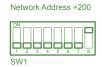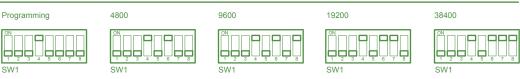
Optional Equipment

RP may be equipped with the following optional equipment. (Figure 17)
1. Multi-pole Electrically Held Lighting Contactor
2. Line Voltage Bay
3. UL924 Emergency Bypass
4. Auxiliary Transformer w/Earth Ground Lug
5. Low Voltage Bay
6. BACnet IP Router
7. 24VDC Power Supply

Complete optional equipment termination and configuration.
1. Confirm power is disconnected from the RP.
2. If applicable remove Dead Front Cover to reveal the Line/Low Voltage Bay
    a.   Unlock 1/4 turn fasteners located on inside edge of the cover.
    b.   Remove cover by rotating inside edge outward and pulling cover free.
3. Complete required termination and configuration. See Page 14 for specifications.
4. If applicable replace Dead Front Cover.
    a.   Align cover tabs with matching slots in Panel Enclosure and rotate the covers inside edge inward.
    b.   Lock 1/4 turn fasteners located on inside edge of the cover.

(Figure 17)

Optional Equipment

Specifications for the optional equipment are listed below. When applicable, additional third party documentation is included for detailed specifications and instructions.

Low Voltage Bay
    Dimensions
        Bay Interior: 9.00"(229mm)H x 17.88"(454mm)W x 5.00"(127mm)D
        RP Overall: Add approximately 9.00"(229mm) to overall RP height
    Location: Bottom of RP
    Custom Option: Dead Front Cover (reduces bay depth to 4.30"(109mm))
    RP equipped with Low Voltage Bay UL Listed, UL508A, US/Canada

Line Voltage Bay
    Dimensions
        Bay Interior: 9.00"(229mm)H x 17.88"(454mm)W x 4.30"(109mm)D
        RP Overall: Add approximately 9.00"(229mm) to overall RP height
    Location: Top of RP (maintains left and right wire chases from top of RP)
    Accessories: Dead Front Cover (separates line and low voltage compartments)
    RP equipped with Line Voltage Bay UL Listed, UL508A, US/Canada

Multi-pole Electrically Held Lighting Contactors* (Figure 18)
    Coil: 120 / 277 VAC
    Contactors: 4 Pole 30A N/O (field convertible to N/C)
    Wire: 16-10AWG or 8-6AWG with ring terminals (Solid or Stranded)
    Quantity: 1, 2, or 4 Contactors for control of up to 16 circuits

347VAC Transformer (Replaces Standard Transformer) (Figure 19)
    Type: UL Listed Single Tap
    Primary: 347VAC, 50VA, 60 Hz
    Secondary: 24VAC +/-10% Inherently Limited
    Wire Requirement: 18AWG Minimum (Solid or Stranded)

Auxiliary Transformer
    Matched to primary transformer specification 120/277 or 347VAC

24VDC Power Supply* (Figure 20)
    Primary: 100-240VAC (50-60HZ)
    Secondary: 2.5A 24 VDC +/- 1% (Adjustable from 22.5-29.5VDC)
    Wire: 24-12AWG (Solid or Stranded)

BACnet IP Router*
    Routing between BACnet MS/TP and BACnet Ethernet / IP
    Factory wired for power and BACnet MS/TP 9600 (19200, 38400, and 76800 available at reduced network capacity).
    Ethernet Connection
        Network Type: BACnet Ethernet / IP
        Data Rate: 10/100 Mbps
        Wire Requirement / Maximum Length: CAT5 / 328'(100m)
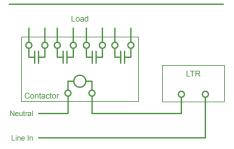
UL924 Emergency Bypass
    UL924 provides energy management control of emergency lighting circuits during normal operation while maintaining emergency function during power loss. See the UL924 Install Guide for specific instructions.

Contactor Coil Terminations
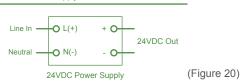
(Figure 18)

347 Transformer Terminations

347VAC Brown
Neutral Black
Earth Ground

(Figure 19)

24VDC Power Supply Terminations

Line In — L(+)   + — 24VDC Out
Neutral — N(-)   -

24VDC Power Supply

(Figure 20)

* Included third party documentation applies to this equipment.