

## 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.

	<b>NOTE</b> : Indicates an important note.
	<b>TIP</b> : Indicates a helpful tip or trick.
	<b>SAFETY REMINDER</b> : Applicable safety instructions will be included with this symbol.
	<b>DANGER</b> : Indicates an immediately hazardous situation which, if not avoided, will result in serious injury or death.
	<b>WARNING</b> : Indicates a potentially hazardous situation which, if not avoided, may result in serious injury or death.
	<b>CAUTION</b> : 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.

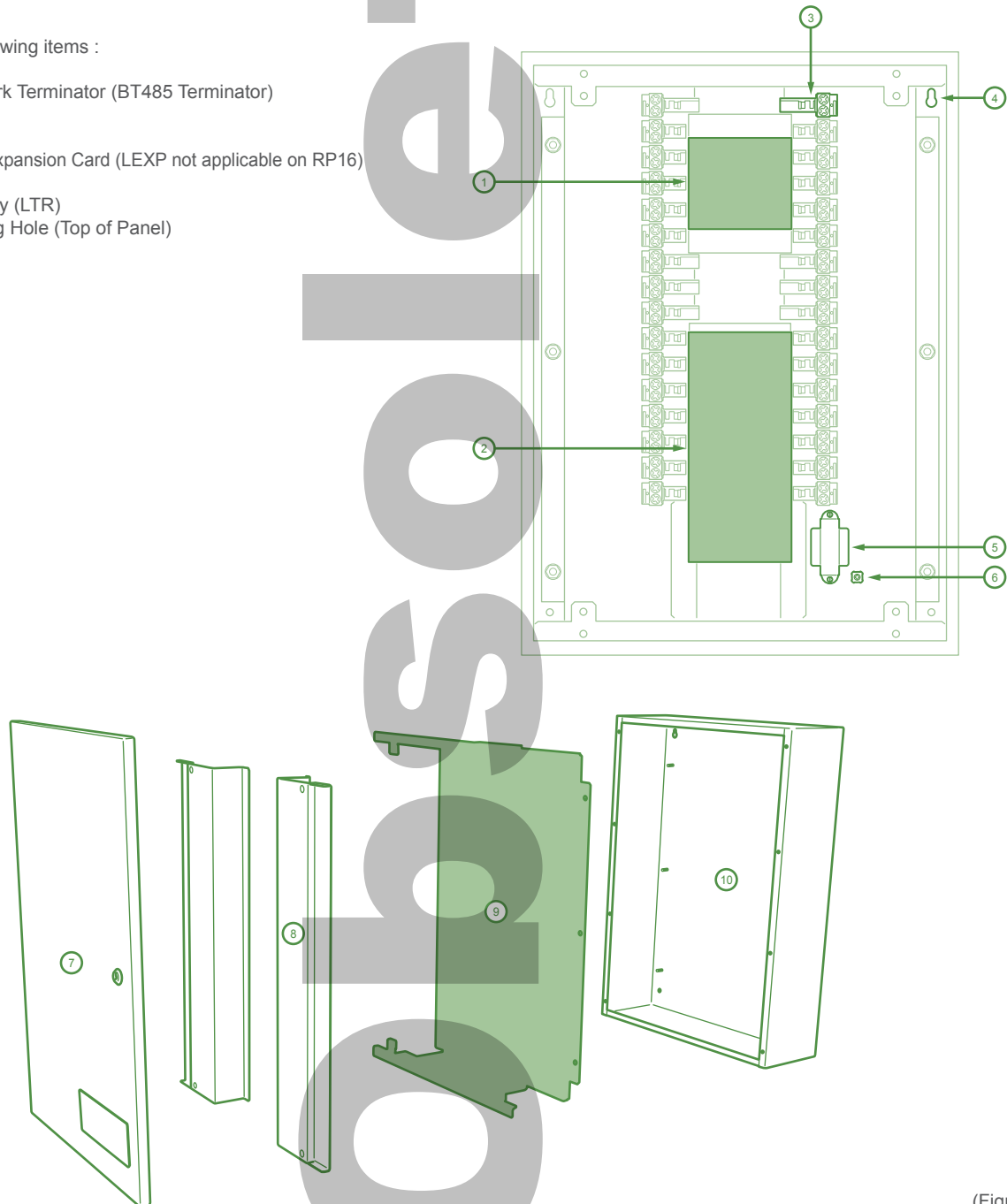
### Overview : Component

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.

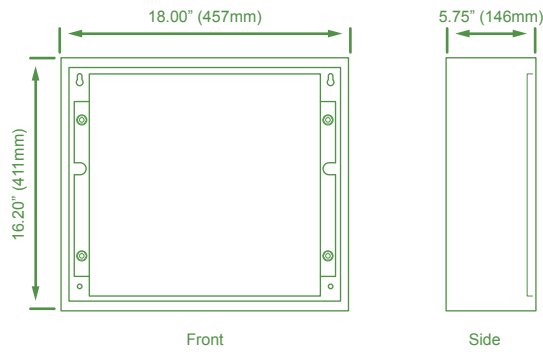


All circuits must be tested for wiring errors and shorts prior to RP installation.

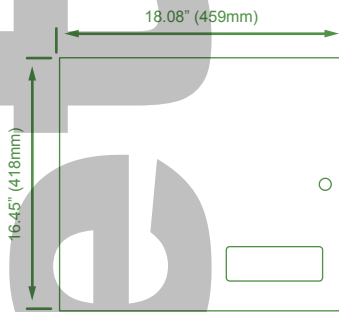
Before handling any RP components, the technician should be grounded to prevent circuit board damage.

**Overview : Dimensions**

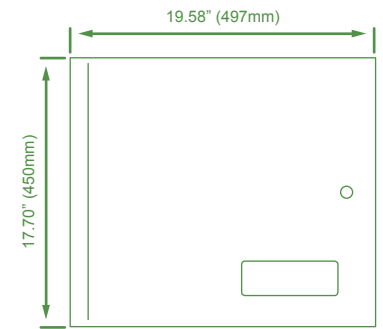
**RP16 : Enclosure Dimensions**



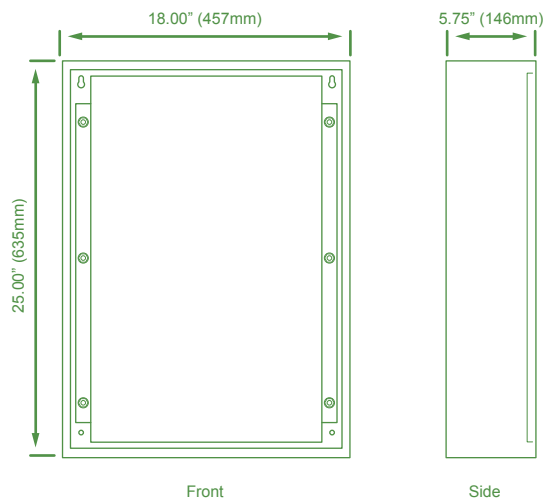
**Surface Mount Door Dimensions**



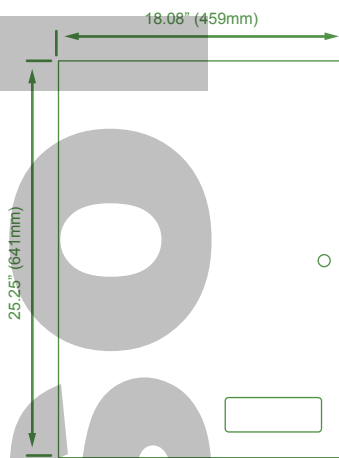
**Recessed Mount Door Dimensions**



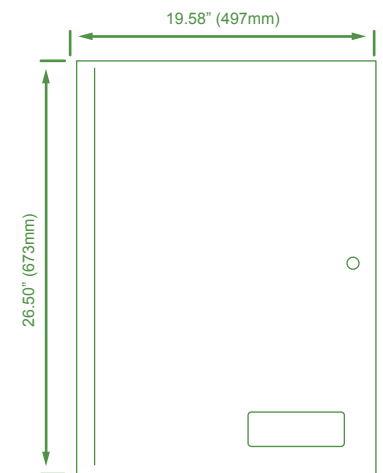
**RP32 : Enclosure Dimensions**



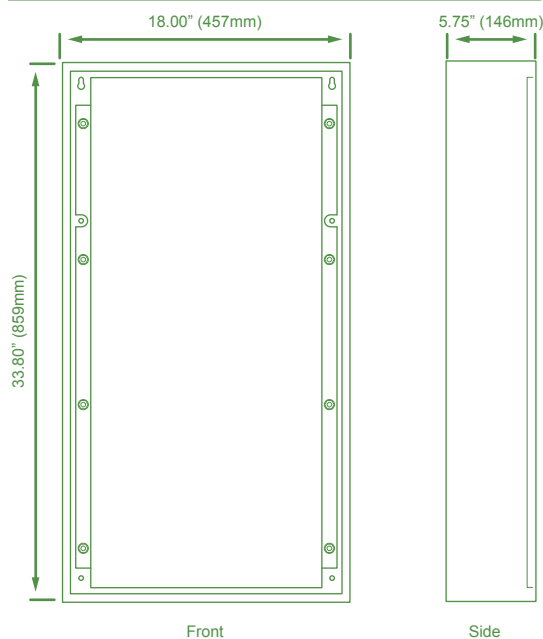
**Surface Mount Door Dimensions**



**Recessed Mount Door Dimensions**



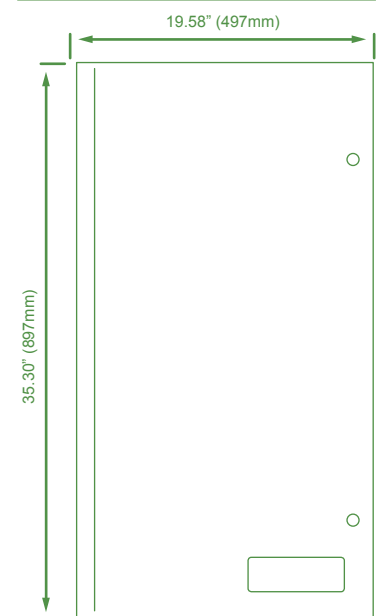
**RP48 : Enclosure Dimensions**



**Surface Mount Door Dimensions**



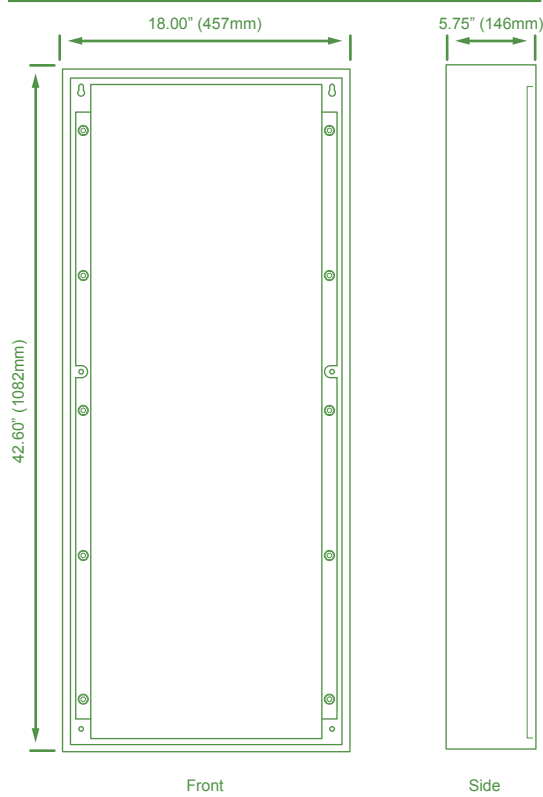
**Recessed Mount Door Dimensions**



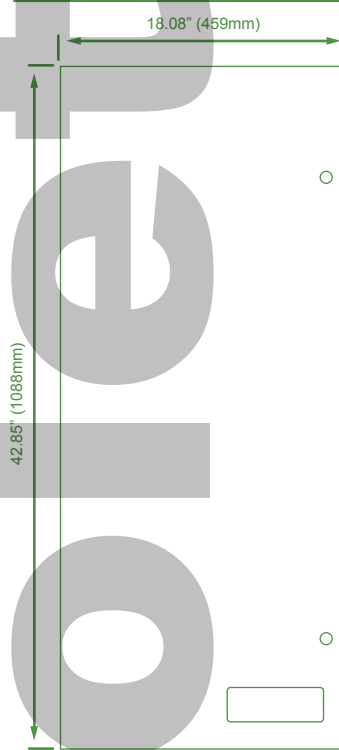
(Figure 2)

## Overview : Dimensions

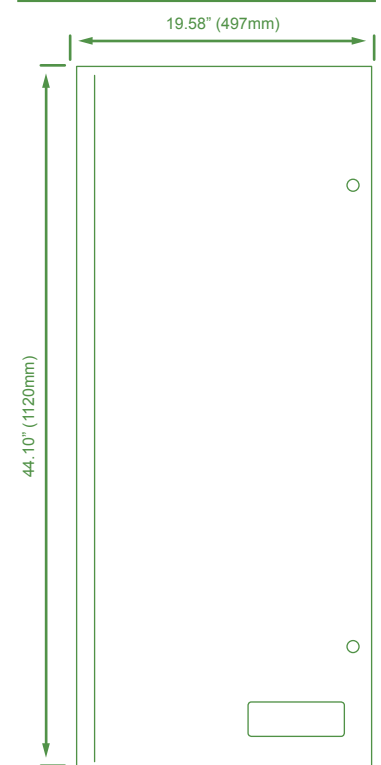
### RP64 : Enclosure Dimensions



### Surface Mount Door Dimensions



### Recessed Mount Door Dimensions

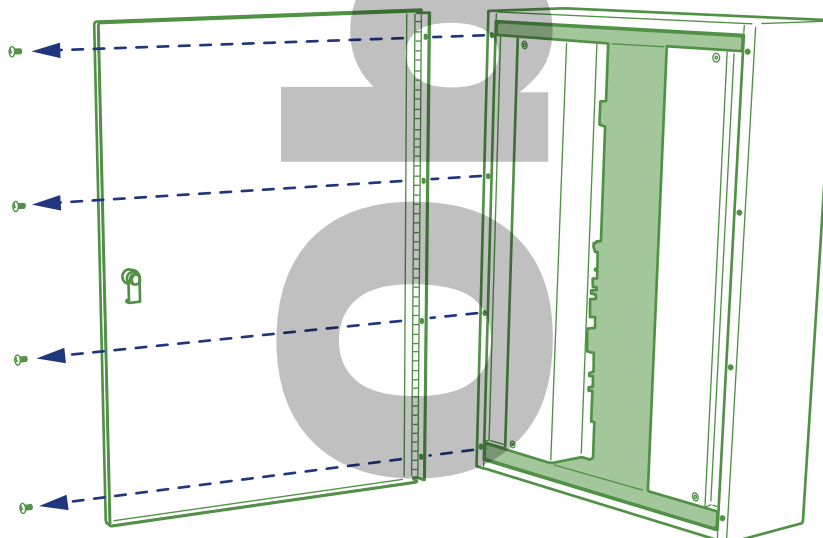


(Figure 3)

### 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.

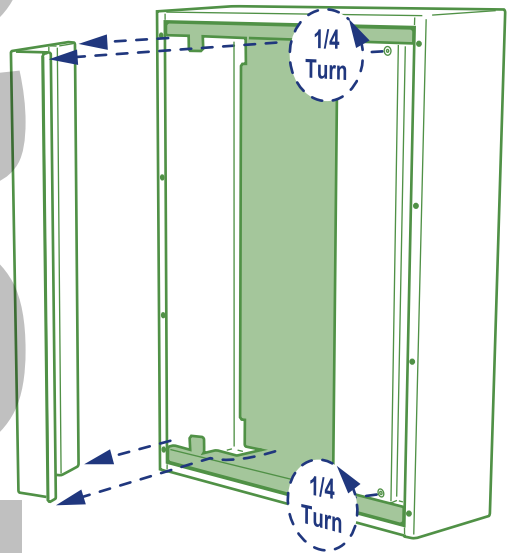


(Figure 4)

### 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.

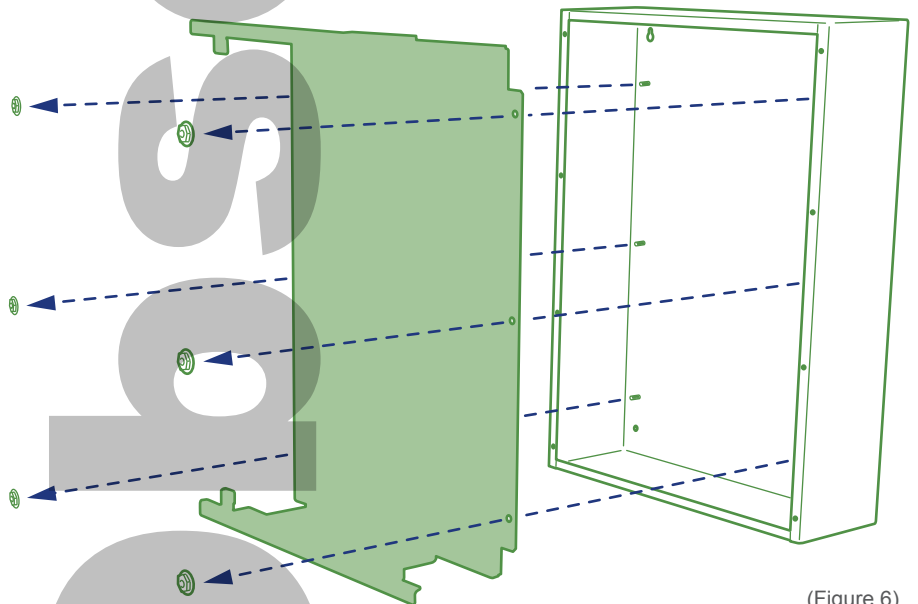


(Figure 5)

### 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.

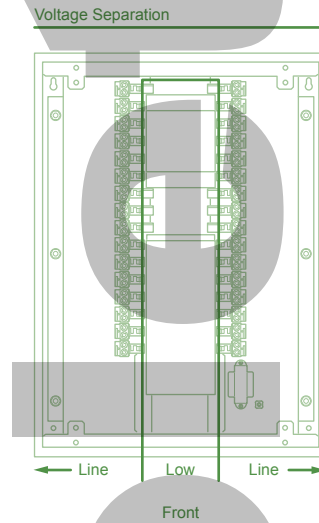


(Figure 6)

## 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.



(Figure 7)

## Mounting

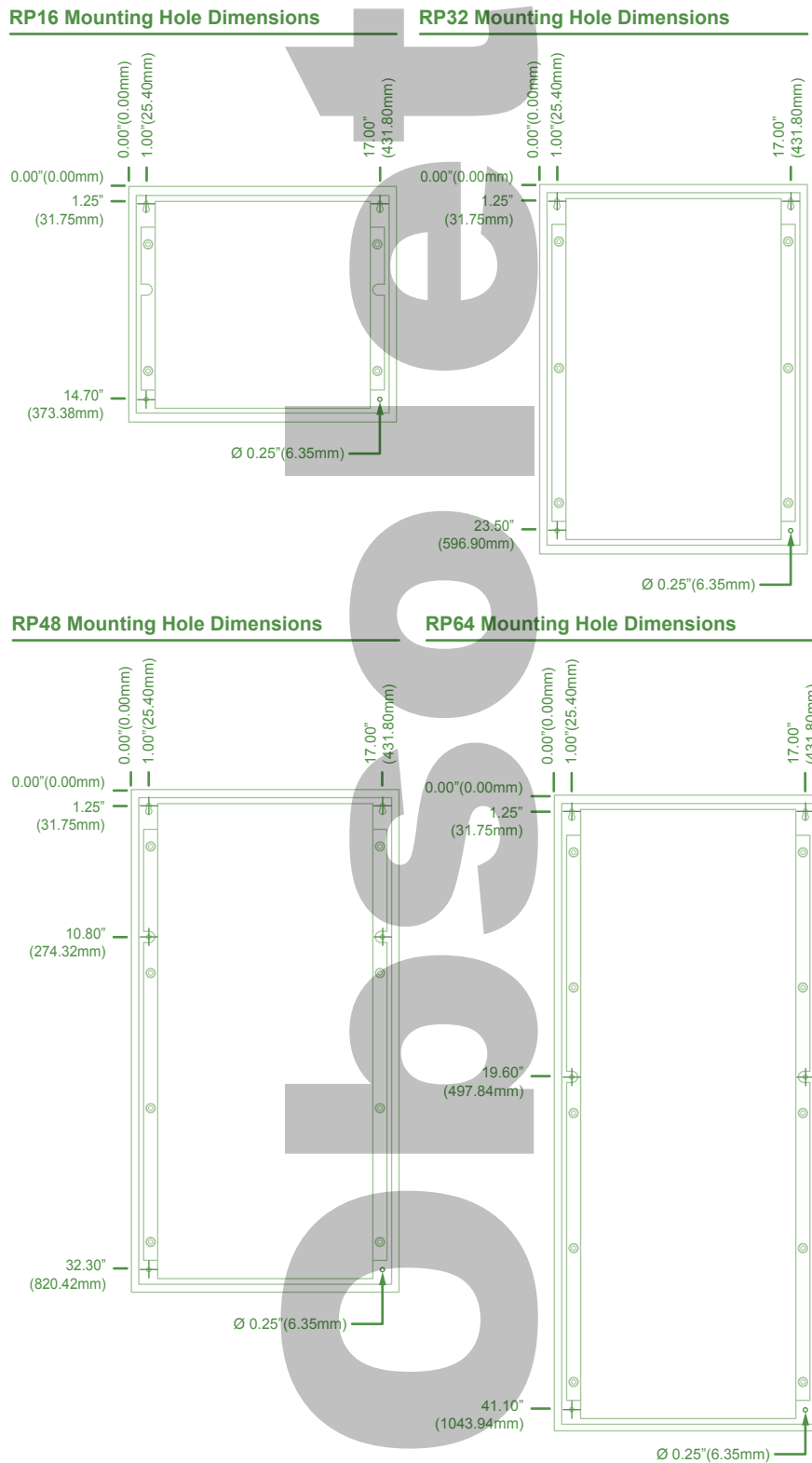
The Panel Enclosure may now be mounted.

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)

## Mounting



(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.

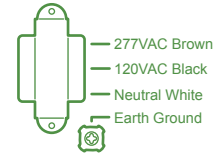
### Transformer Specifications

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

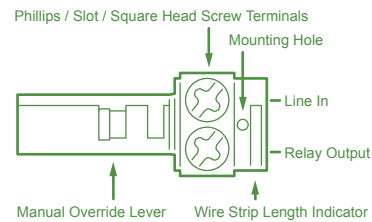
Type:  
 UL Listed  
 SPST latching with manual override lever  
 Electrically operated mechanically held, pulse driven  
 Short Circuit Current Rating (SCCR) 30,000A @ 277 VAC  
 Ratings: Tungsten 20A @ 120VAC / Ballast 20A @ 277VAC / Ballast 20A @ 347VAC / Resistive 20A @ 277VAC / Resistive 20A @ 347VAC  
 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



(Figure 9)

### LTR Terminations



(Figure 10)

### Terminations : Low Voltage

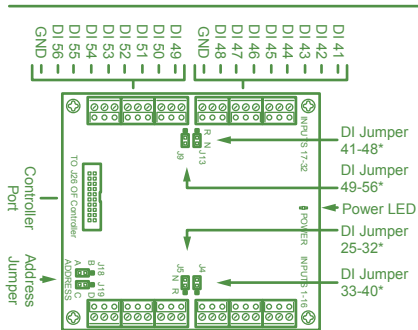
All low voltage leads are terminated on the Controller and LEXP. These screw terminals accept a 0.4 x 2.5mm slot head screw driver. For reference, some terminal blocks may be removed to reveal terminal labels. (Figure 11)

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

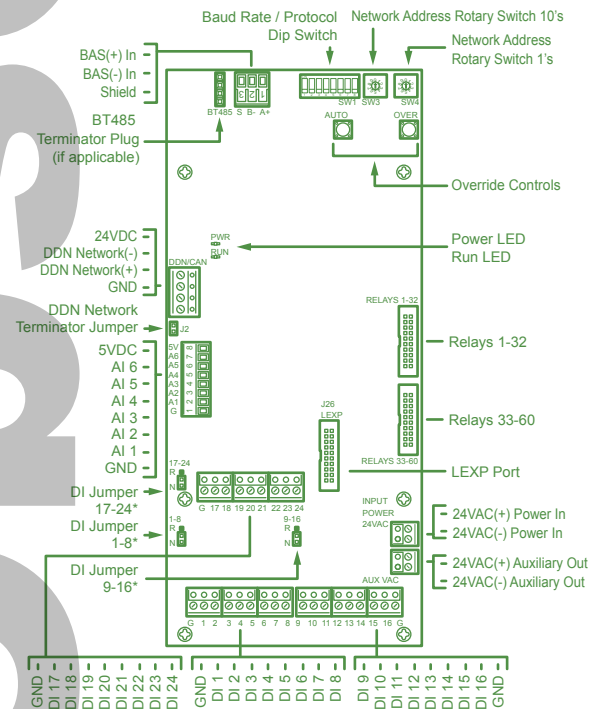
Power In: 24VAC +/-10%, 30VA, 50-60 Hz  
 Auxiliary Out: 24VAC Full Wave Rectified

### LEXP Terminations



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

### Controller Terminations



AI (Analog Input) / DI (Digital Input) / GND (Ground)

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

(Figure 11)

## Terminations : Low Voltage

### Digital Input Specifications

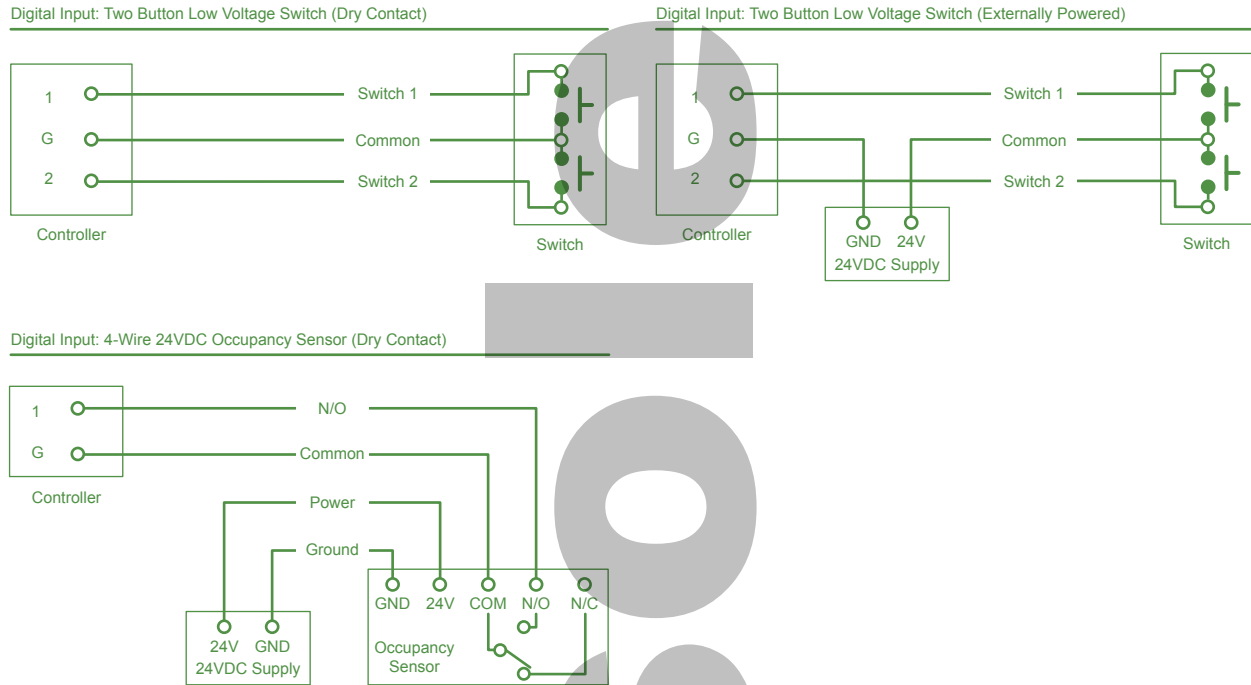
Controller: 24 two-wire inputs

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)

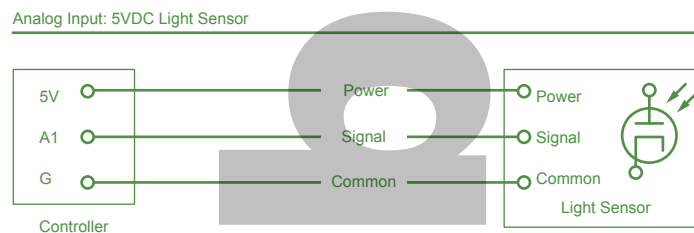


(Figure 12)

### Analog Input Specifications

Analog Input: 6 three-wire 0-5VDC inputs

Wire Requirement / Maximum Length: 18AWG (Solid or Stranded) / 250'(76m)



(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

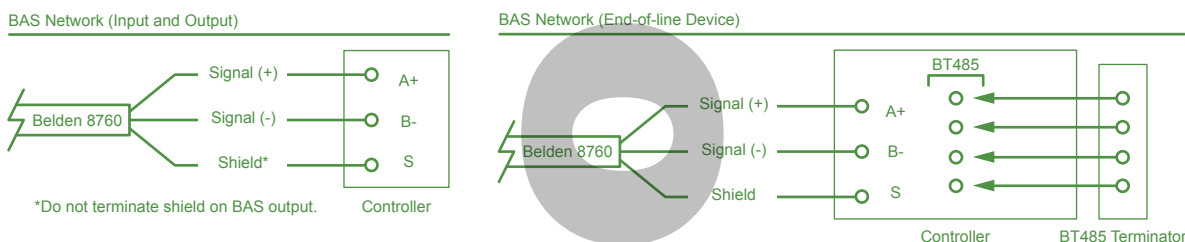
Baud Rate: DIP switch selectable 4.8K, 9.6K, 19.2K, or 38.4K

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, Unshielded

Maximum Stations (w/o external power): 10 CTS-DDN

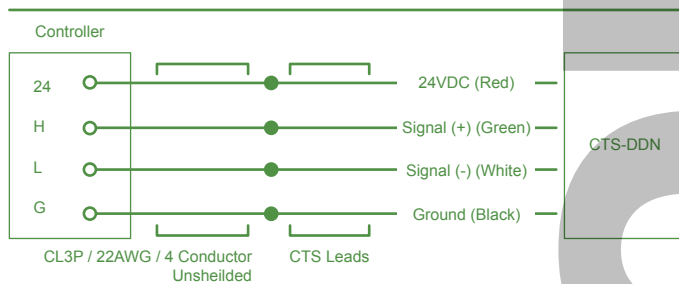
Maximum Length (w/o external power): 500'(152m)

Maximum Stations (w/ external power): 60 one-button, 30 two-button, or a combination for 60 buttons total

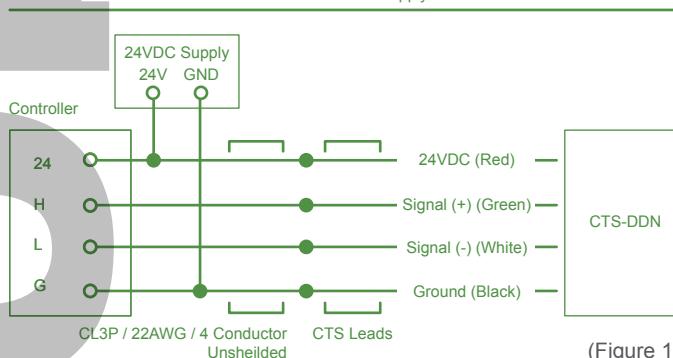
Maximum Length (w/ external power): 2,000'(610m)

Power / Draw: 24VDC / 15mA per CTS-DDN

### DDN Network: CTS-DDN



### DDN Network: CTS-DDN w/24VDC External Power Supply



(Figure 15)

### Controller Setup

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

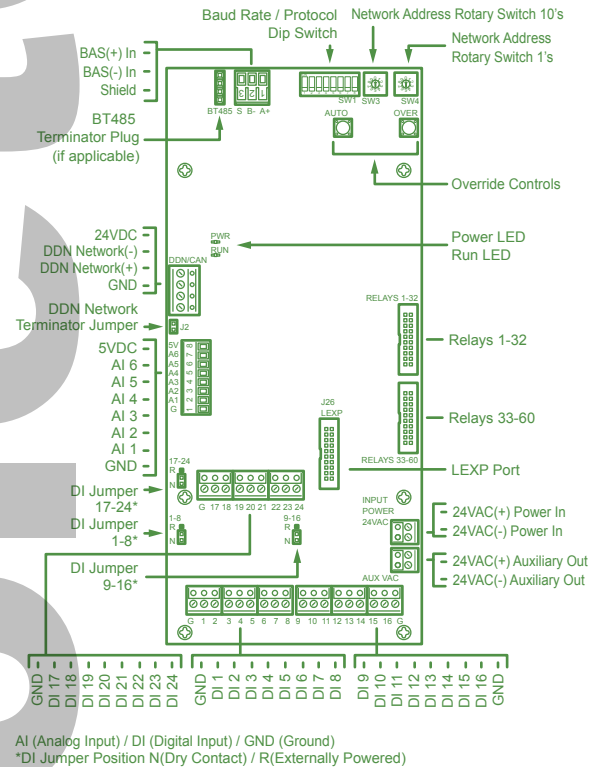
#### Setup

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.

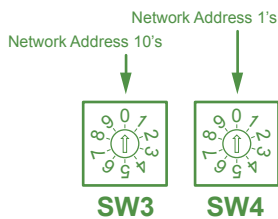
#### Testing

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

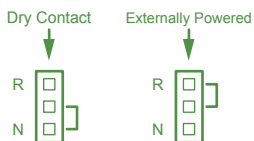


#### Network Address

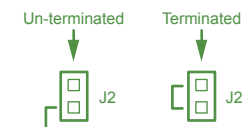


See right for N2 addresses 100-255

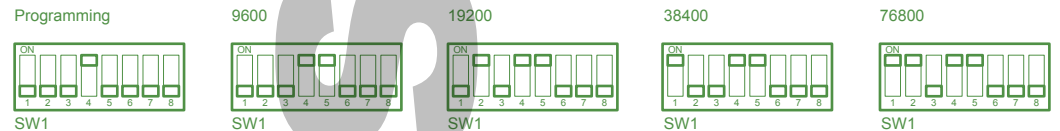
#### Digital Input (DI) Jumper



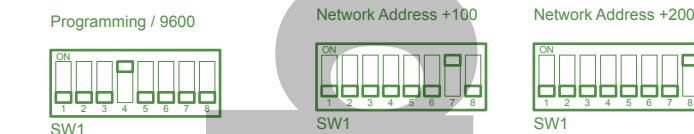
#### DDN Network Terminator Jumper



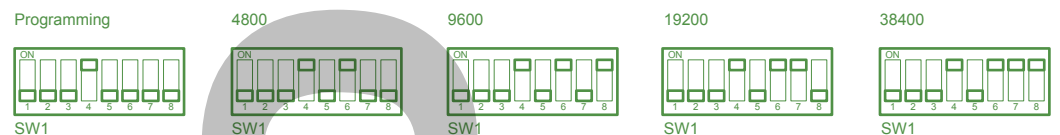
#### Baud Rate / Protocol Dip Switch: BACnet MS/TP



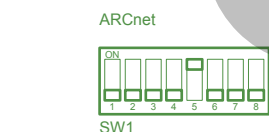
#### Baud Rate / Protocol Dip Switch: N2



#### Baud Rate / Protocol Dip Switch: P1



#### Baud Rate / Protocol Dip Switch: BACnet ARCnet



(Figure 16)

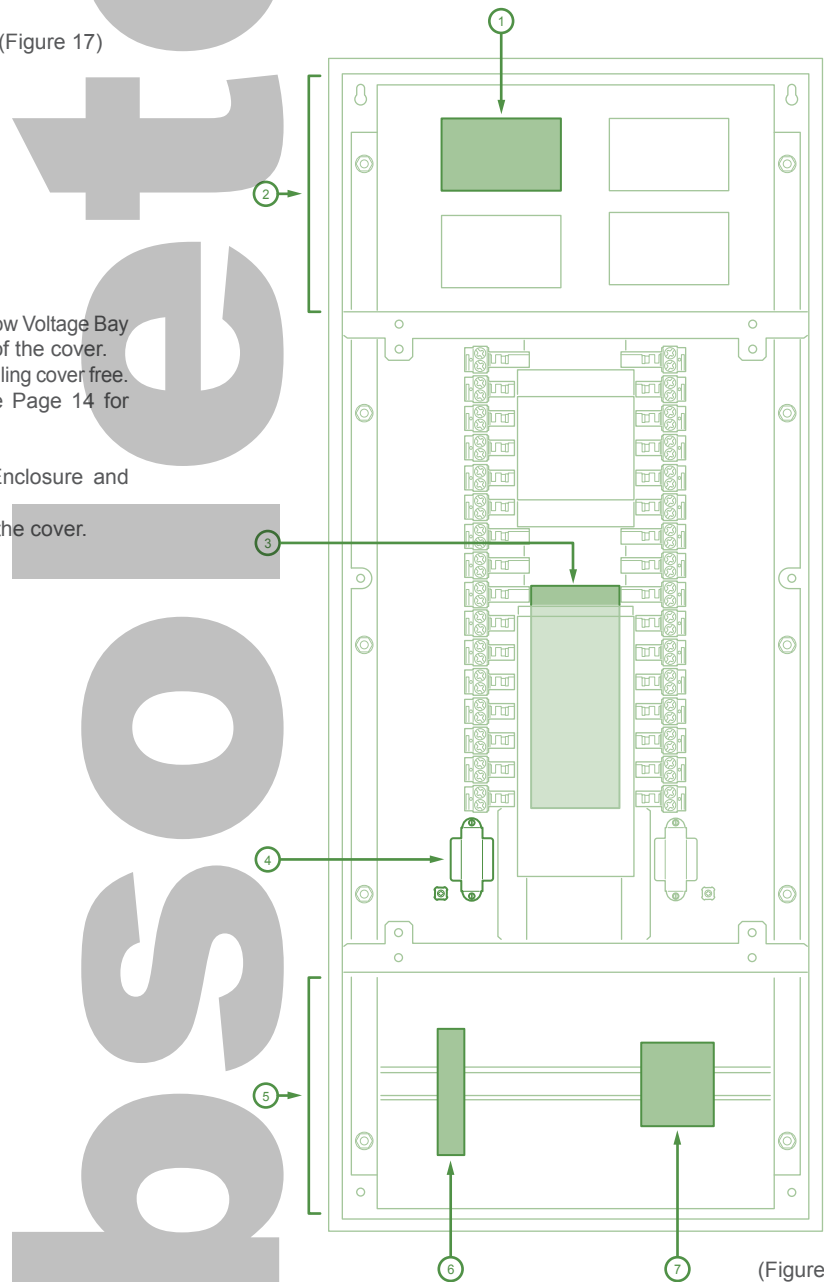
## Optional Equipment

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)



**WARNING : Live Parts**  
 Disconnect before servicing. Disconnect provided by installer, located remotely.  
 Panel protected by circuit breaker or equivalent current limiting device.  
 Transformer Input Voltage Rating : 120 or 277 VAC +/- 10%, 30 VA, 50 / 60 Hz  
 Transformer Output Voltage Rating : 24 VAC +/- 10%  
 Relay Short Circuit Current Rating (SCCR) 20,000 Amps @ 277 VAC  
 Use only copper conductors rated only @ 60 degree celsius minimum.

## 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

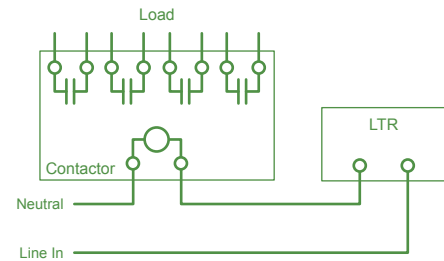
Data Rate: 10/100 Mbps

Wire Requirement / Maximum Length: CAT5 / 328'(100m)

### UL924 Emergency Bypass

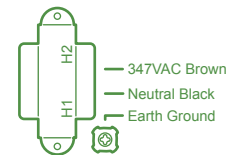
UL924 provides energy management control of emergency lighting circuits during normal operation while maintaining emergency function during power loss. See the UL924 Install Guide for specific instructions.

### Contactor Coil Terminations



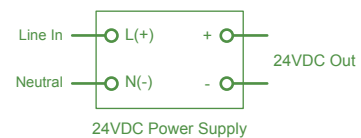
(Figure 18)

### 347 Transformer Terminations



(Figure 19)

### 24VDC Power Supply Terminations



(Figure 20)



**WARNING : Live Parts**  
Disconnect before servicing. Disconnect provided by installer, located remotely.  
Panel protected by circuit breaker or equivalent current limiting device.  
Transformer Input Voltage Rating : 120 or 277 VAC +/- 10%, 30 VA, 50 / 60 Hz  
Transformer Output Voltage Rating : 24 VAC +/- 10%  
Relay Short Circuit Current Rating (SCCR) 20,000 Amps @ 277 VAC  
Use only copper conductors rated only @ 60 degree celsius minimum.