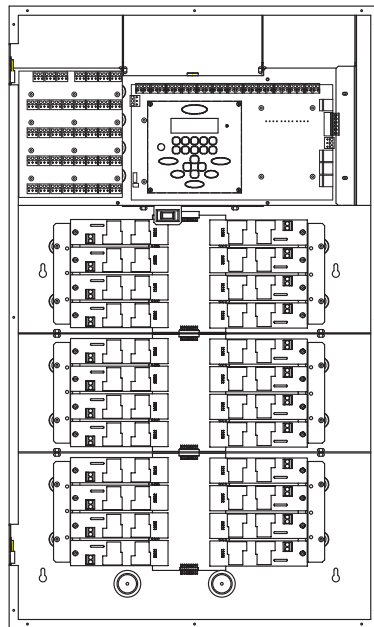




Installation Guide

Z-MAX Plus™ Relay Panels

Covering Z-MAX 24 & 48 Relay Panels with Master Control Module
Software Revision 2.00 and above



Z-MAX

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Apply the "Emergency Circuits" label, provided, to the front of the door

IMPORTANT SAFEGUARDS

When using electrical equipment, basic safety precautions should always be followed including the following:

a) READ AND FOLLOW ALL SAFETY INSTRUCTIONS

- b) Do not use outdoors.
- c) Do not mount near gas or electric heaters.
- d) Equipment should be mounted in locations and at heights where it will not readily be subjected to tampering by authorized personnel.
- e) The use of accessory equipment not recommended by manufacturer may cause an unsafe condition.
- f) Do not use this equipment for other than intended use.

SAVE THESE INSTRUCTIONS

All servicing shall be performed by qualified service personnel.

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Overview

Introduction

Thank you for choosing Leviton's Z-MAX line of products for your relay needs. The Z-MAX product line offers a scalable solution of relay and relay control which can fit any application from the simple 2 or 3-circuit needs with time clock control, to a complete campus solution, fully integrated with your building management system products.

This manual is designed to assist you in the installation of your product. Included are guidelines, requirements, and instructions which are required only for the installation and low voltage termination of your product. Other resources available to you are as follows:

- Quick Start Programming Guide (included with every panel)
- Supplemental addendum released in-between user's guide revisions
- Programming & System Planning Guide
- Additional resources located at our website at <http://www.leviton.com/lms>

The programming and system planning guide was supplied in print with your system purchase. The guide also can be found on the enclosed compact disc. In the event that an additional printed copy is required, please contact Leviton Technical Support at (800)959-6004 and we will send one to you.

NOTE

Leviton recommends always checking our website at <http://www.leviton.com/lms> for late breaking notes, requirements, application information, and firmware updates.

This manual covers all products in the Z-Max product line; however the steps given are somewhat generic in nature. The particular requirements for your product, especially as related to termination, may differ slightly from that shown. Please review all markings and labels on your product to ensure that your actions are correct.

Product Specifications & Capabilities

The specifications and capabilities for each product are shown in the table on page 3, however, generally your product will fit into one of four categories. As the four categories are used throughout this manual, it's helpful to recognize which category your product fits in so you know which sections of the manual apply to each product type.

Master

"Master" relay panels offer the full suite of capabilities of the Z-Max products including all networking functionality and modular relays. Relay panel sizes range from as few as 8 relays per panel up to 96 relays per panel.

Basic

The "Basic" relay panel is very similar to the Master except the feature set has been reduced. It is designed to be used in stand alone installations where only basic capabilities are desired.

Remote

"Remote" relay panels are designed for remote installation and mounting where relay switching from 4 to 48 load circuits is desired, but control intelligence, programming, and interface to other systems is required at a central location. Exactly (1) Master panel must exist on the same network as the remote relay cabinets, and the remote panels can control relays, accept discreet inputs, and accept an emergency input.

EZ-Max

Panels designated as "EZ-Max" panels are very similar to a "Basic" relay panel except that in addition to the feature set being reduced, the hardware has also undergone change to make it a more economical and easy to install package. For example, on an EZ-Max panel, the relays are not modular. You still get the superior switching technology of the Z-Max panels, just in a non-modular format.

Product Specifications & Capabilities Chart

The table on page 3 gives a generalized overview of the specifications of all Z-Max relay products. In the table, the following abbreviations are used:

Y = Yes

N = No

O = Optional

* = An asterisk in any column indicates that there is support for this feature, however, there are conditions with which you should be aware. Consult the specific sections of the manual dealing with this feature for additional information and requirements.

Z-Max Product Type	Min-Max Relays	Relay Types	Weight (lbs (Kg))	Size W", H", D" (Wcm,Hcm,Dcm)	Flush Mount Option	# Discreet Inputs	Sw. Input Board Avail	Luma-Net Network	DMX Network	Master/Slave Net	Emergency Input	Emergency Output	Touch-Tone Phone	Data Modem	Ethernet Network	Front Panel Program	Event Scheduler
Master Panel, 8 relays	0-8	Any	16 (7.26)	13" x 13" x 4-9/32" (33 x 33 x 10.9)	Y	8	N	Y	Y	Y	Y	Y	O*	O*	O*	Y	Y
Master Panel, 24 relays	0-24	Any	44 (19.96)	20-1/4"x34"x4-9/32" (54.4 x 86.4 x 10.9)	Y	12	Y	Y	Y	Y	Y	Y	O*	O*	O*	Y	Y
Master Panel, 48 relays	0-48	Any	65 (29.48)	20-1/4"x54"x4-9/32" (54.4 x 86.4 x 10.9)	Y	12	Y	Y	Y	Y	Y	Y	O*	O*	O*	Y	Y
Basic Panel, 8 relays	0-8	Any	16 (7.26)	13" x 13" x 4-9/32" (33 x 33 x 10.9)	Y	8	N	N	N	N	N	N	O*	O*	N	Y	Y
EZ-Max, 4 Standard relays	4	Std	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	6*	N	N	N	N	N	N	O*	N	N	Y	Y
EZ-Max, 4 2-Pole relays	4	2PL	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	6*	N	N	N	N	N	N	O*	N	N	Y	Y
EZ-Max, 4 347V relays	4	347	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	6*	N	N	N	N	N	N	O*	N	N	Y	Y
Remote, 4 Standard relays	4	Std	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	4	N	N	N	Y	Y	Y	N	N	N	N	N
Remote, 4 2-Pole relays	4	2PL	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	4	N	N	N	Y	Y	Y	N	N	N	N	N
Remote, 4 347V relays	4	347	10.6 (4.83)	10" x 10" x 4-9/32" (25.4 x 25.4 x 10.44)	N	4	N	N	N	Y	Y	Y	N	N	N	N	N
Remote, 24 Max Relays	0-24	Any	44 (19.96)	20-1/4"x34"x4-9/32" (54.4 x 86.4 x 10.9)	Y	12	Y	N	N	Y	Y	Y	N	N	N	N	N
Remote, 48 Max Relays	0-48	Any	65 (29.48)	20-1/4"x54"x4-9/32" (54.4 x 86.4 x 10.9)	Y	12	Y	N	N	Y	Y	Y	N	N	N	N	N
Z-Max with Breakers, 120V Cabinets and 48 Master or Remote Panel	0-48	Any	195 (88.45)	24"x87"x4-9/32" (61 x 220 x 10.9)	N	Features are defined based on the Z-Max relay cabinet to which it is paired											
Z-Max with Breakers, 120V Cabinets and 24 Master or Remote Panel	0-24	Any	174 (78.93)	24" x 67" x 4-9/32" (61 x 170 x 10.9)	N												
Z-Max with Breakers, 277V Cabinets and 48 Master or Remote Panel	0-48	Any	335 (152)	60" x 40-1/2" x 6" (152 x 103 x 15.2)	N												
Z-Max with Breakers, 347V Cabinets and 48 Master or Remote Panel	0-48	347 & Lat only	335 (152)	60" x 40-1/2" x 6" (152 x 103 x 15.2)	N												

Figure 1-1: Product line product capabilities Chart (all products shown)

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Inspection

Carefully unpack the relay cabinet, and inspect to make sure there is no hidden shipping damage. Report any damage to the freight carrier who delivered the system. Claims for damages are filed with the freight carrier.

In case of damaged components, your relay cabinet may be serviced in the field with factory replacement parts.

Installation Overview

Installing a remote relay cabinet involves only a few steps:

- Step 1:** Mount the relay cabinet to the wall, install conduit, and pull all wire (page 7)
- Step 2:** Terminate line voltage wiring (page 15)
- Step 3:** Terminate any low voltage discreet input wiring (page 21)
- Step 4:** Terminate any network wiring (page 53)
- Step 5:** Inspect your work (REQUIRED FOR ALL CABINETS) (page 49)
- Step 6:** Power-up and test the system
- Step 7:** Install latest software/firmware from Leviton website, www.leviton.com/lms
- Step 8:** Perform all necessary configuration

Each of the above steps are covered in detail throughout the rest of this user's guide. In each section notes, warnings, requirements, suggestions, and procedures are included which will help you be successful in the installation and use of your system.

Warnings - READ ME FIRST

- Conduit Entry Locations: The cabinets have been designed with specific locations supporting conduit entry for line and low voltage circuits. There are specific areas of the cabinet which are restricted from some or all types of conduit access. Reference the Physical Installation section of this manual for specific details.
- Line & load circuit wiring: The line wiring should come from an over-current device and the load circuit wiring shall go to the specific load to be controlled. On some models which have integrated branch circuit protection, the line side of the relay has been pre-wired to a circuit breaker. With these products, only the load side of the circuits needs to be connected.
- To be installed and/or used in accordance with appropriate electrical codes and regulations.
- To be installed by a qualified Electrician.
- DO NOT CONNECT line voltage wires to low voltage terminals.
- Mount in a location where audible noise is acceptable.
- When using with fluorescent ballasts, both lighting fixture and ballast must be grounded.
- Use this relay cabinet only with minimum 75° C copper wire at 75% ampacity.
- Disconnect power when servicing the relay cabinet, fixture or when changing lamps.
- Indoor use only.
- TO AVOID FIRE, SHOCK OR DEATH: TURN OFF POWER AT MAIN CIRCUIT BREAKER, OR FUSE, AND TEST THAT THE POWER IS OFF BEFORE WIRING, OPENING THE PANEL, OR REPLACING ANY COMPONENT!
- During operation, cabinet cover is to be removed by qualified personnel ONLY! Heed all caution markings indicating the presence of High Voltage. High voltage may be up to 600V.
- Test each circuit for short circuits before connecting it to relay so damage to the relay and it's electronics can be avoided.
- Verify that all un-used power supply leads are insulated with wire nuts.

Installation Checklist

Install the cabinets by following these simple steps:

- Step 1:** Unpack the system
- Step 2:** Report any damage to the freight carrier
- Step 3:** If appropriate, remove any covers and/or doors
- Step 4:** If appropriate, remove the mounting plate assembly and store where damage will not occur to the electronics
- Step 5:** Attach the cabinet to the wall (reference stickers inside the cabinet for proper orientation if it is in question)
- Step 6:** Drill conduit entry holes if KO's are not provided and attach conduit where appropriate
- Step 7:** Pull all wire into the cabinet
- Step 8:** Test & Verify all wiring by directly connecting line to load - Correct any faults and re-test wiring prior to proceeding
- Step 9:** If applicable, re-install any control electronics removed in step #4
- Step 10:** Terminate discreet input control wiring
- Step 11:** Terminate network control wiring
- Step 12:** Test each Line/Load circuit for shorts
- Step 13:** Terminate the feed & load wiring to each relay
- Step 14:** Blow out dust, dirt, or debris which has accumulated in the cabinet
- Step 15:** Apply power to the system
- Step 16:** Verify proper operation of each relay using the override buttons
- Step 17:** Configure cabinet per owner's requirements

Relay Cabinet Mounting

There are several steps required when mounting your relay cabinet:

- Step 1:** Install the flush mounting kit if appropriate
- Step 2:** Plan your conduit runs & electrical room layout
- Step 3:** Determine the appropriate methods for mounting your cabinet to the wall
- Step 4:** Mount the cabinet to the wall
- Step 5:** Install conduit, pull wire, and other items as required
- Step 6:** Proceed to Line & Load Voltage termination (page 15)

Selection of a Mounting Location

Choosing a mounting location for your cabinet is critical to the overall success and ease of installation. Each style of cabinet has its unique wiring requirements which must be observed. Please review the next few pages, which describe and illustrate these requirements.

Suggested Mounting Heights

Although successful operation is completely independent of mounting height, the suggested mounting heights below were selected to locate the cabinet at a reasonable and accessible working height.

Cabinet	Suggested Mounting height to bottom of cabinet
24 Relay Cabinet	32" (826 mm)
48 Relay Cabinet	12" (318 mm)

Environmental Considerations

- Cabinets generate heat (see table which follows). Make sure they are mounted in a climate controlled space where the temperature will be 0-40° C (32-104°F) or 20-30° C (68-86°F) if used as Emergency Lighting Power Equipment.
- Reinforce the wall for strength as required for weight and local code
- Clearance on left and right side of the panel should be maintained at 1 1/2 " or greater
- Relays will click while in operation. Locate the panels where audible noise is acceptable.

Cabinet	MAX BTU/HR
24 Relay Cabinet	583
48 Relay Cabinet	1166

Figure 2-1: Relay Cabinet Max head load (BTU/hr.)

Preferred areas for conduit entry

Your relay cabinet has been designed to be easy to install with a variety of installation options to fit many applications. However, there still are specific considerations which must be made. One of these is the allowed, and in some cases disallowed, areas for conduit entry. Disallowed areas are areas where conduit entry is impossible either due to physical or code limitations. These areas are clearly marked in the following illustrations. Once you recognize the disallowed areas for conduit entry, you can look at the allowed areas. Each cabinet style has designated areas for low voltage and line voltage conduit entry. Observation of these requirements will ensure smooth installation and continued code compliance.

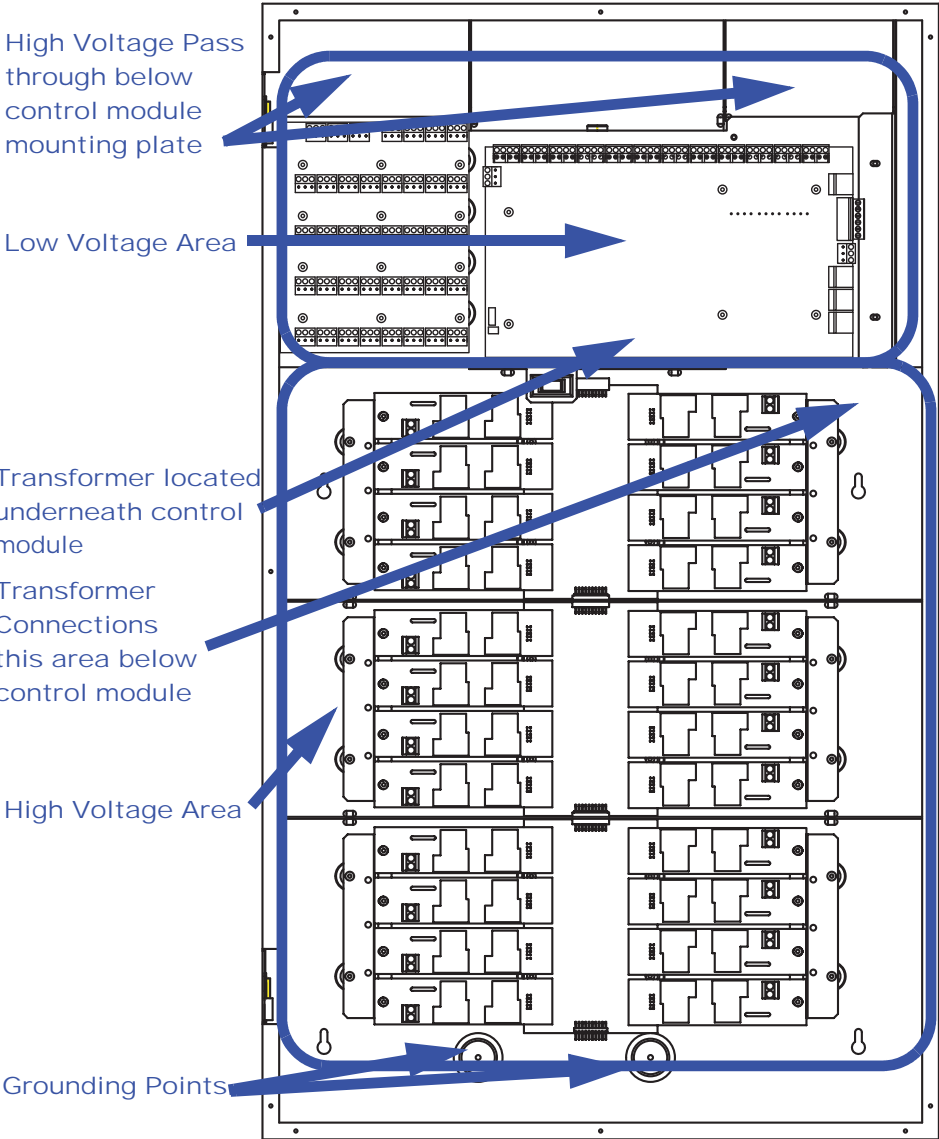


Figure 2-2: 24 & 48 Relay Cabinets Conduit Entry (24 relay cabinet shown, 48 similar)

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Sample Electrical Room Layouts

The "right" layout for your application is a decision only you can make. The layouts depicted in the following illustrations show some simple and effective systems which you're welcome to use and adapt to your particular installation.

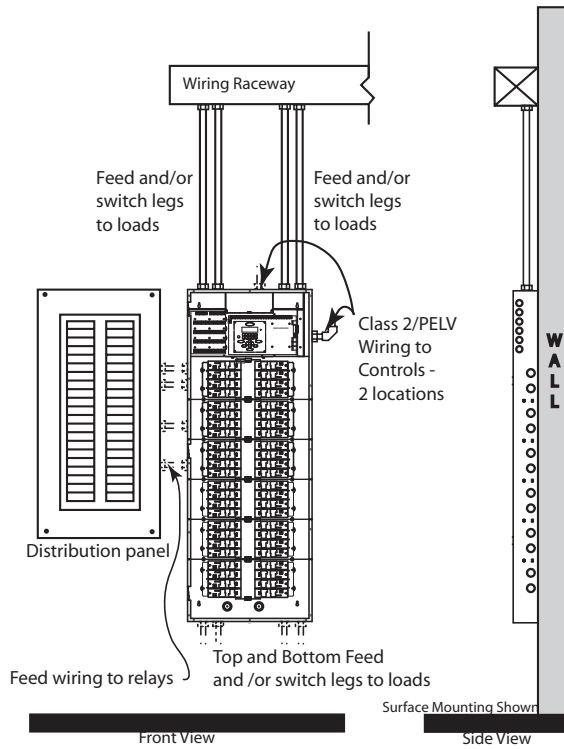


Figure 2-3: Sample Electrical Room Layouts for all cabinets

Mounting Provisions & Dimensions

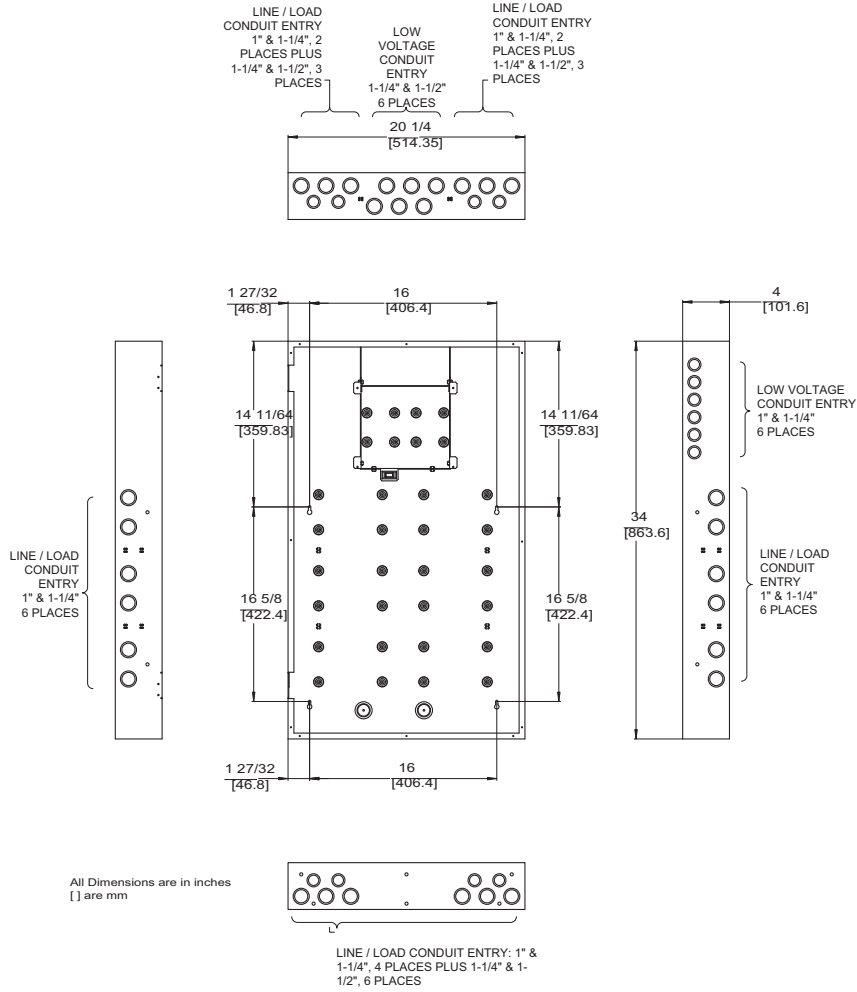


Figure 2-4: Z-MAX 24 Master & Remote relay cabinet mounting provisions and dimensions

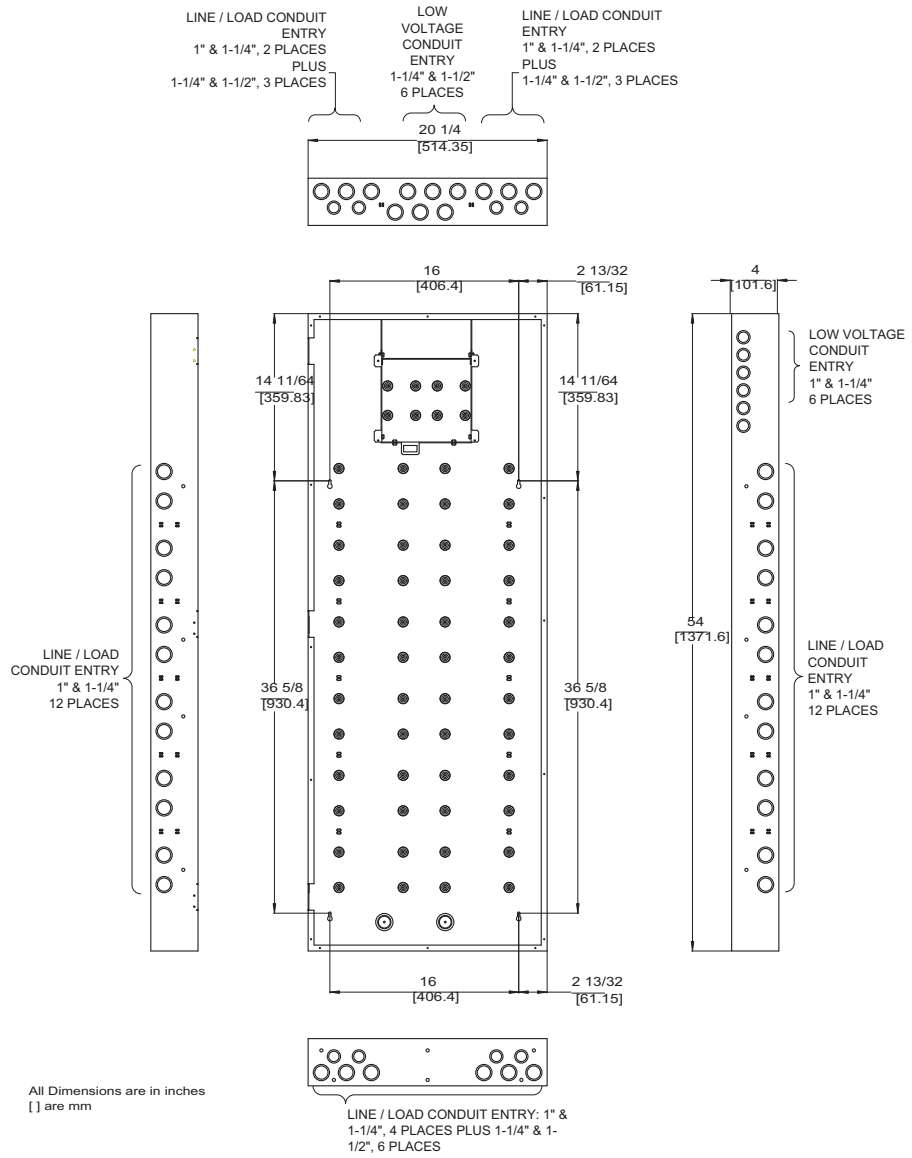


Figure 2-5: Z-Max 48 Relay cabinet mounting provisions and dimensions

Step-by-step Mounting Instructions

- Step 1:** Locate where the cabinet will be hung on the wall. Choose a location in a dry area that is convenient to the branch circuit panel.
- Step 2:** Leviton requires that cabinet mounting hardware reach through the drywall to wall studs or other suitable solid backing. However, properly sized struts and suitable hardware can also be used. The load must be evenly distributed to the anchors without exceeding the recommended anchor limit. Using drywall screws directly through drywall without a stud is not acceptable. Make sure that adequate support at all points is provided. For fully loaded cabinet weights, see "Product line product capabilities Chart (all products shown)" on page 3..
- Step 3:** Remove the cover. Some cabinets may also require the removal of data and/or grounding wires. Make sure that this occurs prior to removal of the door and that they are reconnected when reinstalling the door. On cabinets with hinges, simply lift the door off the hinges. On cabinets with screws, remove the cover screws. Appropriately store the cover for future use.
- Step 4:** On the (4) relay panels only, locate the mounting plate assembly attached to the back of the enclosure. Locate the 4 mounting screws in the 4 corners of the rear plate. Loosen these 4 screws. Lift the entire assembly up and out of the enclosure.
- Step 5:** Prior to proceeding, reference "24 & 48 Relay Cabinets Conduit Entry (24 relay cabinet shown, 48 similar)" on page 9 which shows the location of the mounting holes and allowed conduit entry locations for each cabinet type.
- Step 6:** Prior to attaching the cabinet to any surface, verify that the top of the cabinet is actually located at the top. Some cabinets have "up" arrows to aid in this indication.
- Step 7:** Attach the cabinet to it's prepared mounting surface as appropriate.
- Step 8:** Cut, punch, or remove knockouts for the desired conduit openings. Pay special attention to any disallowed areas for conduit entry.
- Step 9:** Pull all wire, both line and low voltage as appropriate.
- Step 10:** Carefully & completely remove any dust, debris, metal particles, etc. from inside the cabinet in preparation for wire termination and eventually power up.
- Step 11:** Proceed to the next section.

Line Voltage & Control Power Termination

Overview of Power Wiring - Feed\Line Wiring

Wiring is simple. All you need is the following:

- Dedicated circuit for control power - Hot, Neutral and Ground
- Individual load wires leaving relays, output circuits.

NOTE

Since the panel is fed from multiple circuits, locate each one and lock-out each feed in the OFF position.

All cabinets have ample area for conduit entries for feed, load, and control wiring. Ensure that conduit entry is only in the allowed locations. Refer to "24 & 48 Relay Cabinets Conduit Entry (24 relay cabinet shown, 48 similar)" on page 9 for permitted locations.

Each relay panel has areas dedicated for line voltage wiring and similar orientation. Please find on the next few pages figure which illustrate this.

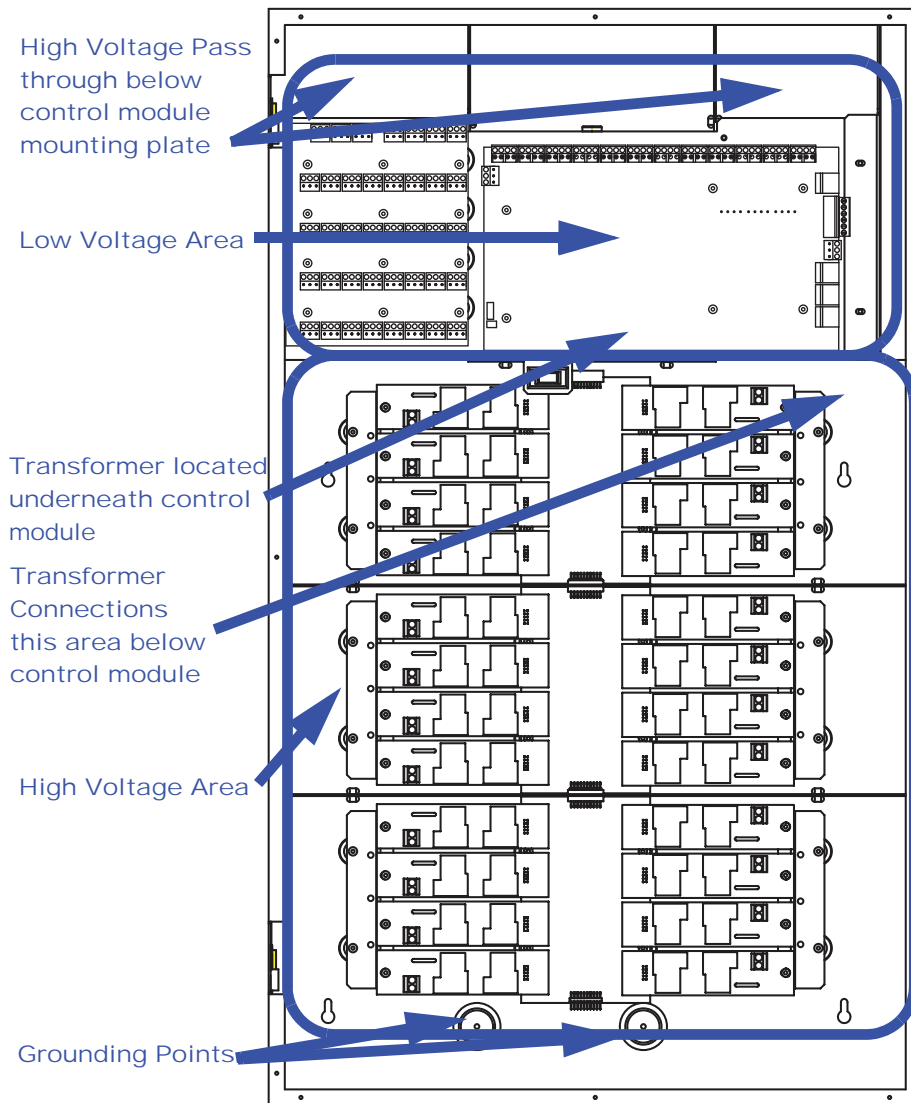


Figure 3-1: 24 Cabinet Low Voltage and High Voltage Wire Connections (48 similar)

Line and Load Circuit Wiring

Z-MAX relay cabinets have multiple relay circuits of a specific type depending on the cabinet model. For details of the different relay types, their capacities, and permitted wire sizes, please reference the chart on page 18.

Testing the Circuits

Prior to connecting any circuit to a relay, and after all load and feed connections have been made opposite the relay cabinet, test each circuit by following this procedure:

Step 1: Turn off the breaker feeding the circuit

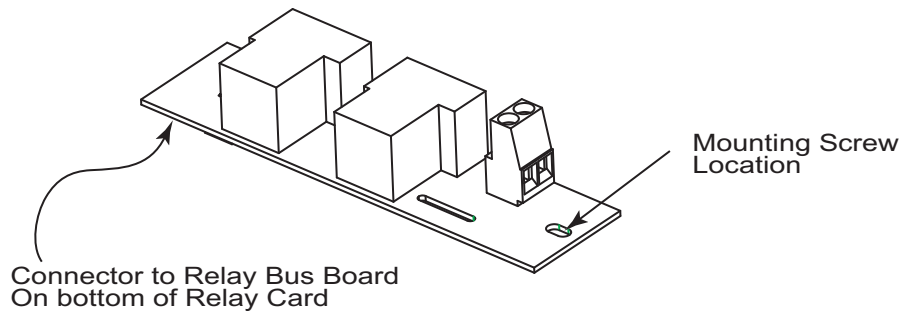
Step 2: Ensure that all connections and wiring between the relay cabinet and the circuit breaker panel are complete

- Step 3:** Ensure that all connections and wiring between the relay cabinet and the load are complete.
- Step 4:** At the relay cabinet, connect the feed(s) for relay #1 to the load for relay #1 with a wire nut or other appropriate means.
- Step 5:** Energize the circuit by turning on the circuit breaker.
- Step 6:** Resolve any mis-wiring, shorts, etc. for the connected circuit.
- Step 7:** Repeat the above steps for all circuits in all relay panels for your system. When all circuits have been tested, disconnect all Lines from Loads and proceed to the next section.

Installing Relay Cards

On several relay cabinet models, the relays are removable. If you have one of these cabinets and need to add or remove relay modules, please follow these instructions:

- Step 1:** Locate the appropriate location for the relay card



- Step 2:** Align the connector from the relay card with the relay bus board and gently push the two together.
- Step 3:** Once firmly seated, use a phillips screwdriver to drive the mounting screw tightly in place.

NOTE

If you need to remove the relay cards that shipped installed from the factory, remove the shipping screw located near the connector and discard. This screw is only required for shipping and not for installation.

Wiring the relays

- Step 1:** Connect the line (feed/circuit breaker) side of the circuit to the "input" terminal(s) on the relay card.
- Step 2:** Connect the load side of the circuit to the "output" terminal(s) on the relay card.
- Step 3:** Please note that relay card terminals accept the following wire sizes:

Relay Type (Part #)	Wire Size	Wire Type	Torque	Max Voltage	Tungsten Rating (120V)	Ballast Rating	Motor Rating (120V/277V)	Inductive Ballast, Transformer, HID Rating
Standard 1-Pole relay module (RELAY-STD)	20-8 AWG Copper	Solid or Stranded	7 in-lbs	277V	20A	20A	1HP/2HP	20A
2-Pole Relay Module (RELAY-2PL)	20-6 AWG Copper	Solid or Stranded	20.5 in-lbs	277V per pole (480V)	-	20A	2HP	20A
347V Relay Module (RELAY-347)	20-6 AWG Copper	Solid or Stranded	20.5 in-lbs	347V	-	20A	-	20A
Latching Relay Module (RELAY-LAT)	20-8 AWG Copper	Solid or Stranded	7 in-lbs	277V	20A	20A	1HP/2HP	20A
				347V		15A		15A

Figure 3-1: Wire Sizes & Capacities for Relays

Step 4: Circuit neutrals may follow the path of the line load conductors through the relay panel or the line/load conductors may pass back to the panelboard to be joined with the neutral to the load.

The diagrams on the following pages show how to wire the relay circuits.

WARNING: MISWIRING THE RELAY MODULES WILL CAUSE DAMAGE TO THE RELAY MODULE, THE RELAY CABINET, AND POSSIBLY OTHER SYSTEMS

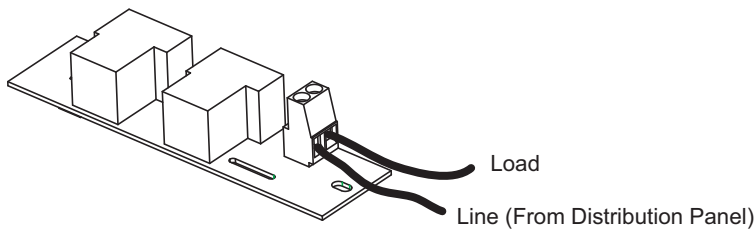


Figure 3-1: Wiring Diagram for Z-MAX Standard 1 Pole Relay Card (latching relay card similar)

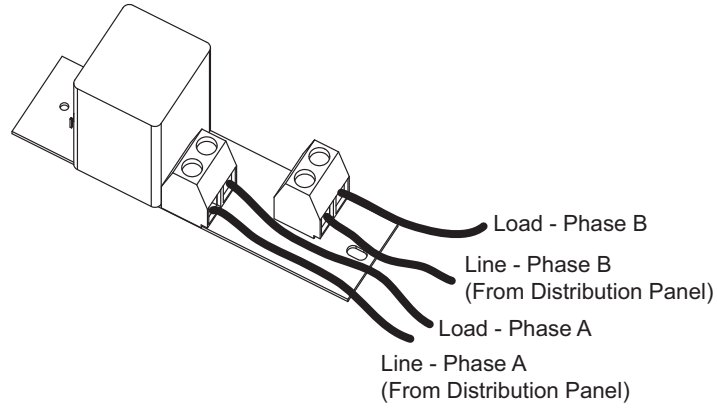


Figure 3-2: Wiring Diagram for Standard 2-Pole Relay Card

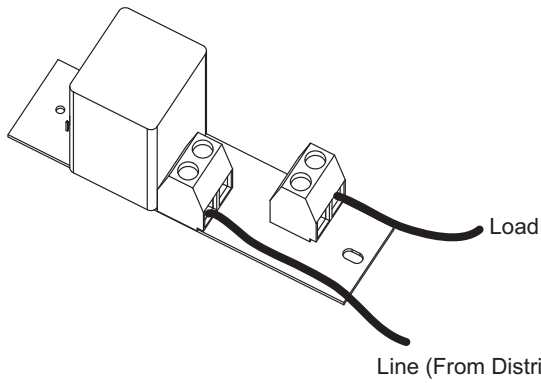


Figure 3-3: Wiring Diagram for Z-Max 347 V Relay Card

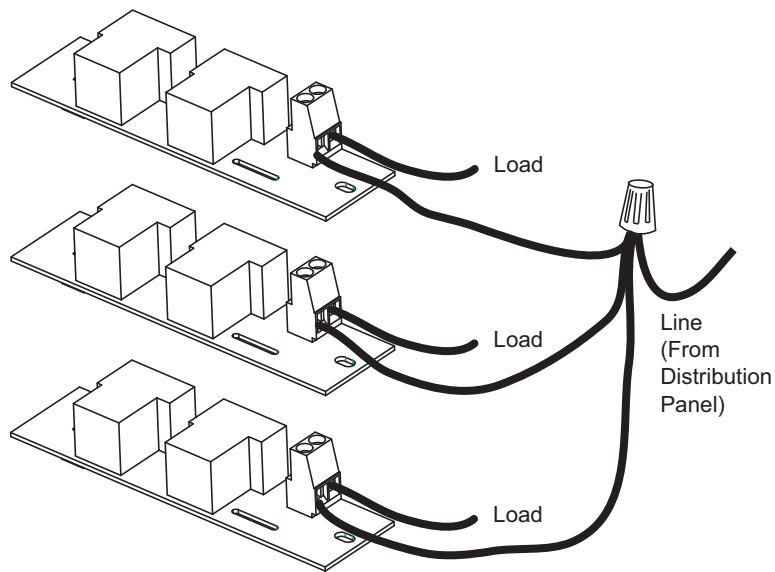


Figure 3-4: Wiring of Multiple Relays to Common Branch Circuit Breaker

Control Electronics Power Wiring

Your relay cabinet requires a specific power circuit for the control electronics. Leviton recommends that this power circuit be dedicated specifically and used only for power to the control electronics.

NOTE If any Emergency Circuits are fed or controlled from this panel, it must be located electrically where fed from a UPS, generator, or other guaranteed source of power during emergency and power outage situations.

To connect your relay cabinet's control electronics to power, please follow these steps:

- Step 1:** Connect the relay cabinet to the circuit panel using conduit.
- Step 2:** Remove all cuttings and dirt.
- Step 3:** Run a dedicated circuit from the circuit panel or distribution panel to the relay panel for the control electronics. Make sure the power is off at the breaker.
- Step 4:** Wire the circuit as shown in the following figure:

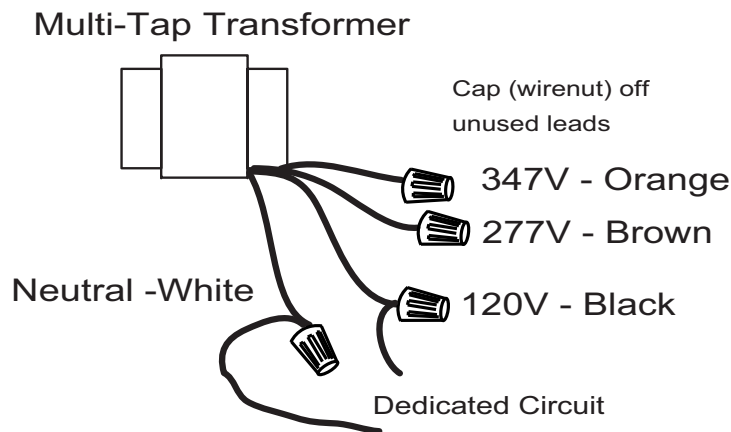


Figure 3-1: 24 & 48 Relay Cabinets Control Electronics Power Wiring

NOTE The transformer leads can be found in the lower right corner on the 8 cabinet and underneath the control module on the right hand side of the 24 and 48 cabinet.

NOTE The 48 cabinet has two sets of leads which can be connected in parallel to the same dedicated circuit.

NOTE Branch circuit wiring must be a minimum of 14AWG.

- Step 4:** Connect the circuit's ground wire to the relay cabinet.
- Step 5:** Keep the circuit off until all wires are terminated, tested, and double checked.

Low Voltage Control Wiring

NOTE

The use of low voltage control inputs on Remote Relay panels is only available in software release 1.40 and above for both the master and slave cabinets. If you plan to use this feature, please make sure that all cabinets have been upgraded. Additionally, if your cabinet was shipped before 1.40 was released, the firmware may need to be updated. If you suspect this is the case, please contact our technical services department at (800)959-6004.

Once the power wiring has been completed, control wiring can be addressed. Control wiring can be divided into two categories: analog and digital. When dealing with remote relay panels, only the analog control inputs can be used.

Control Overview

The Leviton Z-MAX relay products use an intelligent central control card (Digital Main Control Module) and a dedicated system of networking wiring, allowing for control of the relays in the remote cabinet from any control source connected to the master relay cabinet and from any low voltage source connected to the remote relay cabinet.

Control input to a relay cabinet can be any combination of the following:

- Low Voltage momentary or maintained through a discreet input
- Momentary 2-Pole On/Off through a discreet input
- Photocell 0-10VDC or Switched through a discreet input
- Occupancy sensor through a discreet input
- 0-10VDC analog through a discreet input
- Dry Contacts through a discreet input
- Various Network control inputs (covered after this section)

Please reference "Product line product capabilities Chart (all products shown)" on page 3 which shows the quantity and types of inputs available for each cabinet. Excepting only network inputs, all inputs support every type as shown above.

The specific wiring requirements for each input type is discussed on the following pages.

NOTE

Each product (and in some cases each model of a product) has a slightly different layout at the terminal blocks. The specific function of each terminal is labeled on the circuit board adjacent to the terminal blocks. When wiring the inputs, verify that you are connecting the correct wire to the correct terminal based on function even if it deviates from that shown in this documentation. Contact our technical services department with any undocumented questions.

Control Wiring Termination

This section gives instructions for terminating all types of low voltage inputs.

- Leviton recommends minimum 18AWG stranded wire for all low voltage wiring.
- Terminate all control wiring directly to the terminal blocks on the printed circuit board. Use a small 1/8-in. flat screwdriver on these terminals.
- Terminal blocks are 2-part terminals and can be removed for ease of termination. When reinstalling them make sure they are plugged in the correct direction according to the way they were wired.
- On the 4 relay remote panel, models re4sd-*, inputs #5 & #6, labeled photocell and occupancy sensors can not be used.
- All control wiring shall be considered Class 2.
- Use control wire type and size as specified below:

Connector Type	Wire Size and type	Torque
Switch Inputs	14-24 AWG, Stranded	2 in-lb.

Figure 4-1: Control Wire Type and Size

Input Trigger-What determines an "ON"

Each of the low voltage inputs can be triggered by either the supply of voltage or a connection to common. When voltage is supplied to an input indicating a change of state, we call this "pulling up the input" or "active high". When a connection to common triggers the input, causing a change of state, we call this "pulling down the input" or "active low".

By default, all inputs are active high (that is receiving voltage to trigger). Active High inputs must not exceed a nominal +24VDC and must be above +9vdc. Active Low inputs must connect to the same common at the same potential as the cabinet.

To change from an active high input to an active low input, the polarity jumper must change position. There are several illustrations which show the location of these jumpers. Additionally, when configuring the input, it must be configured as an "Active Low" input. Reference the section in this user guide which deals with the configuration of low voltage discreet inputs.

Input Power Requirements

The relay cabinet has a finite amount of power which it can supply to connected devices. This topic is discussed in detail in the following section starting on page 77 entitled "Power Considerations for Control Systems." Please make sure that you do not exceed the amount of available peripheral power, or damage to your relay cabinet or connected devices may occur.

General Requirements for Connecting any Device to Low Voltage Inputs

- Step 1:** Connect leads per wiring diagram as illustrated in the figures on the following pages
- Step 2:** Twist strands of each lead tightly (making sure that there are no stray strands) and push firmly into appropriate plug connector location.
- Step 3:** Tighten the screws on the plug connector—making sure that no bare conductor is showing.
- Step 4:** Plug the connector back onto the control module with the screws facing the front and the wires coming out of the connector toward the top of the cabinet.

Connecting Low Voltage Switches

Z-MAX relay panels support a variety of low voltage switch types such as:

- Momentary - provides momentary contacts, triggering alternating on/off actions
- Maintained - triggers On action when connection is made, Off action when removed
- Momentary On/Off with On & Off terminals provided - provides momentary connection to the "On" terminal to trigger an on action, momentary connection to the "Off". Used with single pole double throw center off (SPDT-CO) switches
- Momentary On/Off with only "IN" or "ON" terminal - used with 2 pole center off switches and must be used in conjunction with either the part number #rac00-2sc or #rac00-2sb switch input kits to convert from a 1 terminal to a 2 terminal input

Each Input has a multi-position screw terminal with various positions. The terminal can be pulled off its base for ease of wiring. Two possible pinouts are shown.

Please remember to verify the function of each pin as labeled on the product with the device being wired to ensure that it is wired correctly.

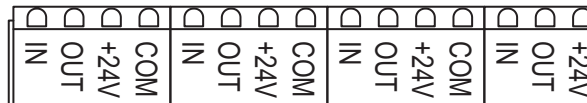


Figure 5-1: Low voltage terminal layout, 24 & 48 relay cabinets

Typical terminal designations for all products are shown below. Please confirm the function of each pin on your device with the labeling on the circuit board prior to any termination.

Pin Label	Function
+24V	Supplies +24Vdc power to devices, usually unregulated
COM	Connection to DC Common of the cabinet
IN	Switch Input or signal from device. Usually expecting +V to trigger.
OUT	Used for connection to device LED indicating on/off state of that input. Connects to common when on, floats when off. (Max 0.04A)
LED	Used for connection to device LED indicating on/off state of that input. Connects to common when on, "floats" when off. (Max 0.04A)
ON	Usually can be configured identically to the IN terminal but can be configured as Momentary ON input only
OFF	Momentary OFF input only

Figure 5-2: Discreet input terminal labels and their meaning - applies to all Leviton products

By default the "IN" or the "ON" terminal is expecting +V to trigger as would be typical with many styles of low voltage switches. If a connection to common is required, it requires some jumper and software reconfiguraiton. For more information on this topic, please reference the discussion on input triggers found on page 22.

Connecting Low Voltage Switch

- Step 1:** Strip each wire from your device and tightly twist the wires together.
- Step 2:** Insert the wires from the device into the connector on the relay cabinet in the appropriate location.
- Step 3:** Tighten the terminal screw, and repeat for all wires from the device.
- Step 4:** Plug the terminal block back into the cabinet with the screws facing toward you and the wires exiting toward the side or top of the cabinet. Alternatively, the connector can be inserted with the screws parallel to the circuit board and the wires exiting toward you.
- Step 5:** Verify that the wires land on the correct terminals

Occupancy Sensors

One of the control input types which your relay cabinet can accept is Occupancy Sensors. When using an occupancy sensor, the cabinet is expecting a DC voltage, between +9V & +24V to trigger an occupied state, or a floating input to indicate an unoccupied state. The specific function of what happens in each of these states is set via software configuration. This section only deals with connecting your Occupancy Sensor to your relay cabinet.

Occupancy Sensor Wiring

Step 1: Connect leads per wiring diagram below.

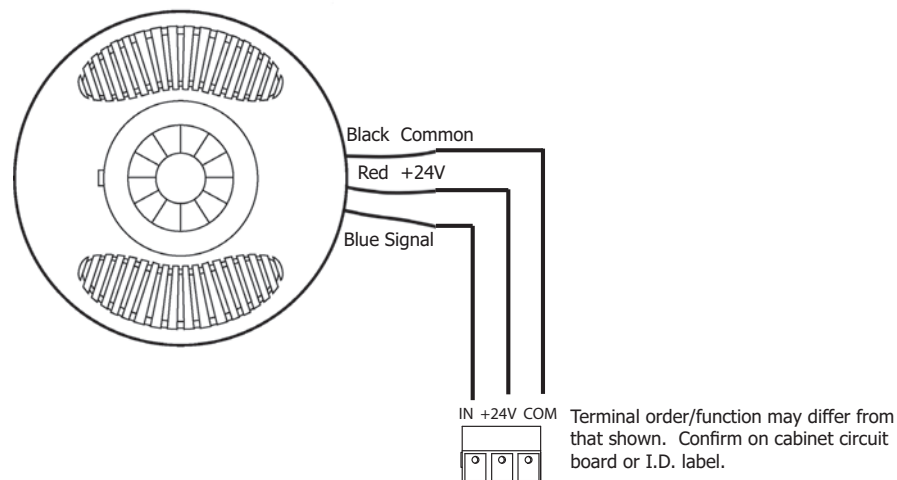


Figure 6-1: Occupancy Sensor Termination using Dedicated Occ Sensor Terminal

- Step 2:** Twist strands of each lead tightly (making sure that there are no stray strands) and push firmly into appropriate plug connector location.
- Step 3:** Tighten the screws on the plug connector making sure that no bare conductor is showing.
- Step 4:** Plug the connector back onto the control module.
- Step 5:** Verify that the wires from the Occupancy Sensors are connected to the correct terminals in the cabinet.

Photocells

The relay cabinet is capable of supporting the following types of photocells:

- Switched Photocell (On/Off, trigger point set at photocell)
- 0-10V Photocell

The configuration and behavior of your photocell is set via software and discussed elsewhere. This section only covers installation.

Photocell Wiring

Step 1: Connect leads per wiring diagram as illustrated in one of the following figures:

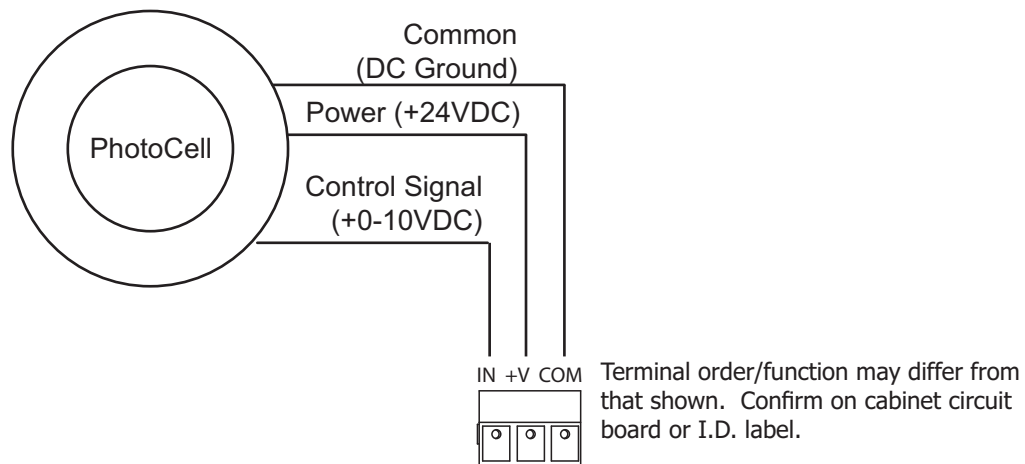


Figure 7-1: 0-10VDC Photocell Wiring

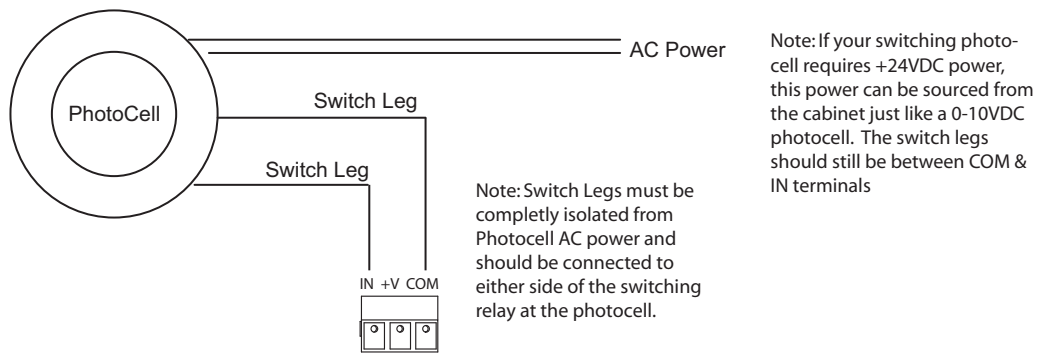


Figure 7-2: Switching Photocell

- Step 8:** Twist strands of each lead tightly (making sure that there are no stray strands) and push firmly into appropriate plug connector location.
- Step 9:** Tighten the screws on the plug connector making sure that no bare conductor is showing.
- Step 10:** Plug the connector back onto the control module with the screws facing the front and the wires coming out of the connector toward the top of the cabinet.
- Step 11:** If using a switched photocell, make sure that the jumper below the connector is in the "ON" position.

Emergency

The control card of some models of the Z-MAX relay panels (“Product line product capabilities Chart (all products shown)” on page 3) has both an emergency input and output. The input can be driven by a contact closure such as one from a fire alarm or by a low voltage signal capable of sinking 5 mA (3 - 5 volts is emergency off and 0 - 2 volts is emergency on). Emergency output has a common contact and both NO and NC contacts. In the non-emergency state, the NO contact is closed. If the emergency input is activated (closed) or if power is interrupted to the relay cabinet, the NC contact will be closed.



Extended information available in the Z-Max System Design Guide.

(Information about this guide can be found on page 1)

If it is desirable, the output of one cabinet can be connected to input of another cabinet. In this case, connect the commons of both input and output together and connect the NC output contact to the emergency signal on the input connector as shown in the following Figures.

NOTE

The Z-MAX cabinet emergency is compatible with the a-2000 series.

Each relay can be configured to go on, off or to no change via the setup menu when in an emergency state.

If the emergency input changes from closed to open (low to high), the relays will return to their previous states.

NOTE

The emergency input is set from the factory as a level 2 priority, only overridable by the internal bypass switch.

Emergency terminal locations for the Z-Max 8, 24, & 48 Master relay cabinets are shown. Remote Relay Panel wiring is similar. EZ-Max does not have accommodations for emergency wiring.

Master/Remote Network Interconnection

Physically interconnecting your relay panels together on a master/slave network is easy. It requires only the use of category 5 or better network wire, with RJ-45 connectors on each end.



Extended information available in the Z-Max System Design Guide.
(Information about this guide can be found on page 1)

Please reference the illustrations below which show the connection locations for the Master/Slave network wiring for your panel type. Note that there are (2) receptacles, one to go to the "next" panel and one coming "from" the previous panel. It does not matter which one you use, so long as you only use the pair that is labeled "Master/Slave" or on some panels "CAN 1".

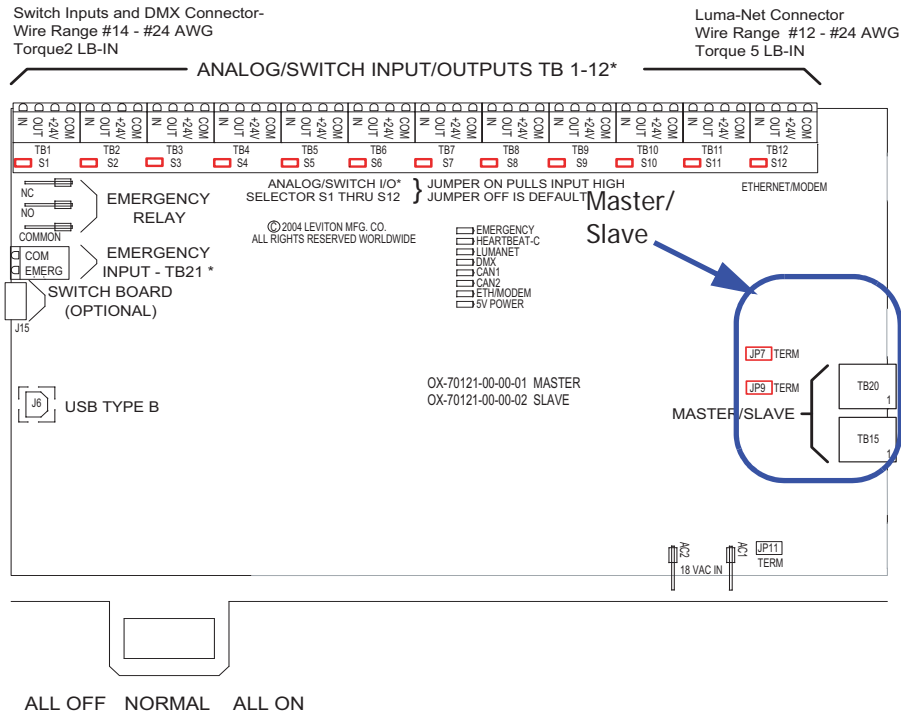
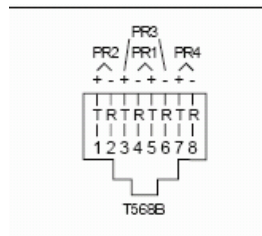


Figure 9-3: Master/Slave Connections Z-MAX 24, & 48 Relay Panel

RJ-45 Pinout

There are two major standards for the pinout of RJ-45 connectors. These two standards are often referenced as TIA-568A & TIA-568B. Although either is acceptable so long as it is consistent throughout a project, Leviton recommends the use of only the TIA-568B standard. The only difference between the standards is what color wires terminate to each of the (8) RJ-45 pins. Per the TIA-568B standard, the pinout for your RJ-45 connectors are as follows:

TIA-568B Wiring Standard Chart		
Pin	Pair #	Color
1	2	Orange/White
2		Orange
3	3	Blue/white
4	1	Green
5		Green/white
6	3	Blue
7	4	Brown/White
8		Brown



NOTE

Unlike some other wiring systems, Category 5 networking wiring requires that the connectors at both ends of the cable be wired the same.

NOTE

RJ-45 connectors must be "crimped" onto the end of your Category-5e cable in order to successfully make your connections. This requires a special tool made specifically for this purpose called an "RJ-45 Crimper" or other similar terminology. Always use one of these crimpers when making these connections. Read and understand the instruction by the crimpers manufacturer prior to use. Leviton offers a crimper as Leviton part number 47613-EZC.

Termination

All CAN based networks must be terminated at both ends. The Z-MAX Master/Slave network is no exception.

Each panel has a termination jumper. When a relay panel is the last panel on the run, it's termination jumper must be installed.

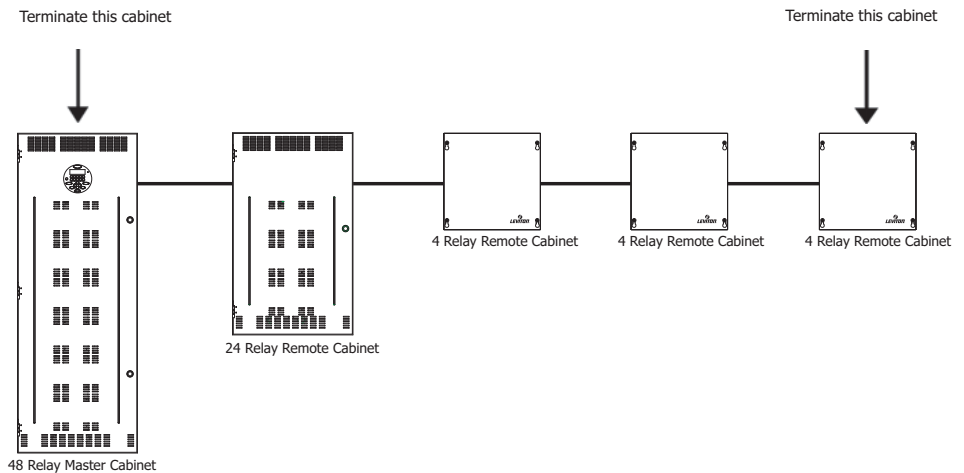


Figure 9-4: Cabinets requiring termination

How to Terminate Relay Cabinets

Step 1: Locate the termination jumper which corresponds to the Master/Slave communication receptacles on your relay panel

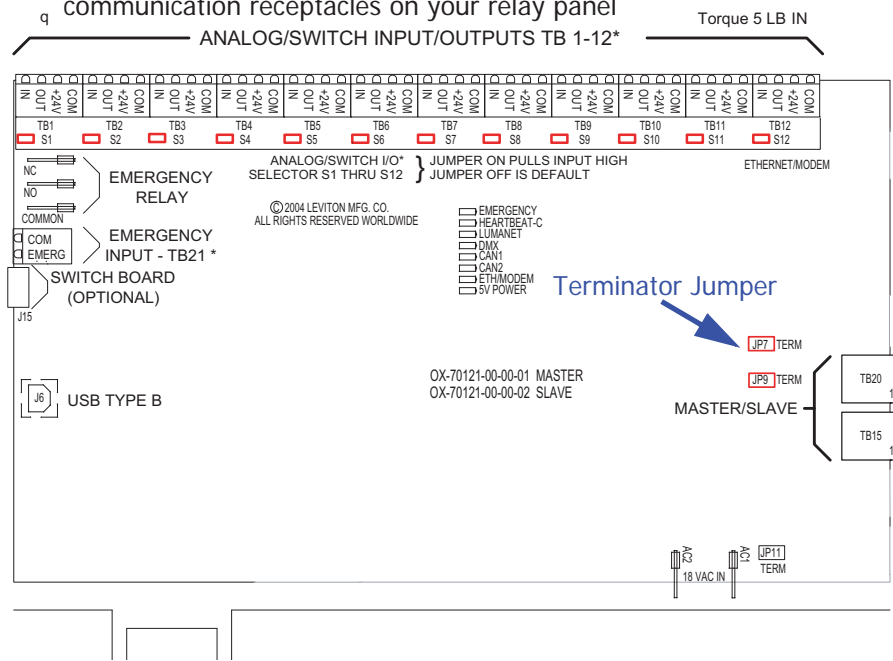


Figure 9-1: 24/48 relay panel control module shown, others similar

Step 10: Install the jumper. Your cabinet is now terminated.

Luma-Net III

Luma-Net is Leviton's proprietary digital architectural lighting control protocol. Luma-Net can be used for the following items:

- Communication and control by Dimensions 8000 control stations and accessories
- Communication and control by Dimensions 4200 control stations and accessories
- Intercommunication between Z-Max relay cabinets
 - Relay Group Control & Response
 - Time Synchronization
 - Advanced network communication



Extended information available in the Z-Max System Design Guide.

(Information about this guide can be found on page 1)

Requirements

Luma-Net has specific topology, wiring, and wire type requirements. Please reference the system design guide for critical information on this topic.

Wiring the Phoenix Connector

Step 1: Connect leads per the following wiring diagram.

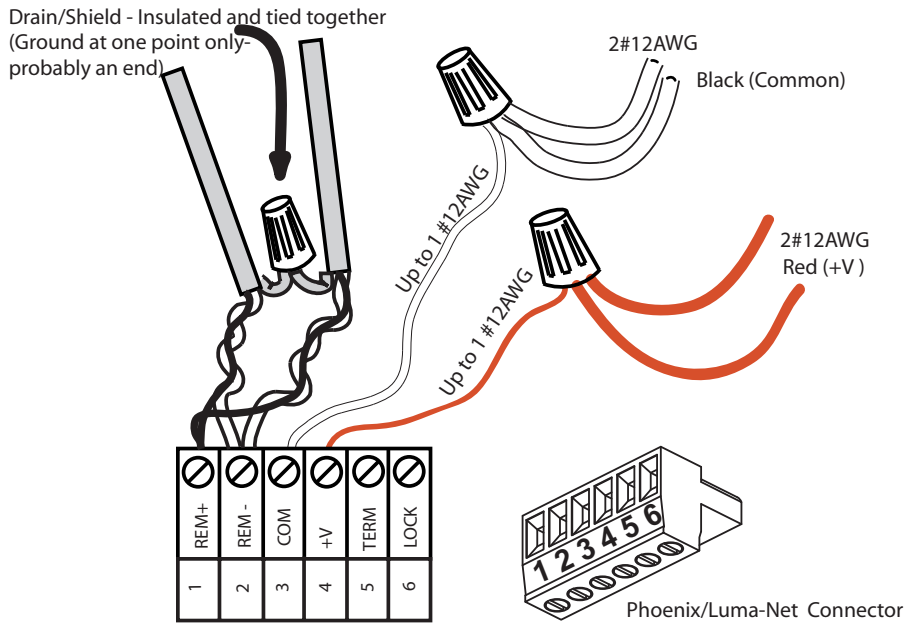
Step 2: Twist strands of each lead tightly (making sure that there are no stray strands) and push firmly into appropriate plug connector location.

Step 3: Tighten the screws on the plug connector—making sure that no bare conductor is showing.

Step 4: Tie the Drain/Shield wires together and insulate using a small piece of heat shrink tubing.

NOTE

DO NOT connect +V between panels. Power from only one source should be available to any one device.



Step 5: Install termination jumpers as required. Termination jumpers are required at the two ends of the Luma-Net run. The termination can be accomplished on the Luma-Net connector with a jumper wire as shown below. Termination can also be accomplished on the control board by jumpering the 2 pin header to the left of the Luma-Net connector.

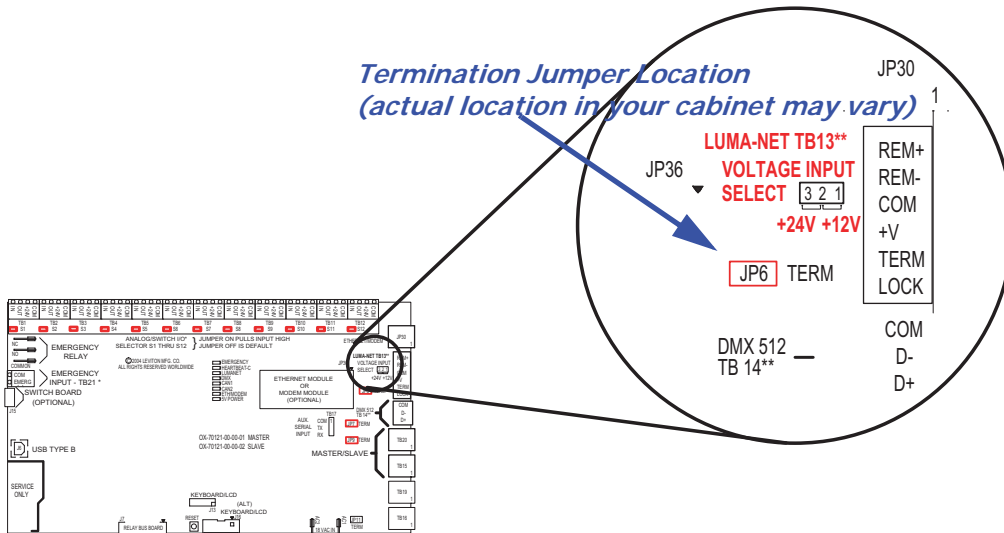


Figure 10-1: Typical termination jumper location

NOTE

The common (DCC) must be connected to earth ground at only one point in the run. The relay cabinet or a Luma-Net Hub (if used) are the most common locations.

DMX 512

The digital control panel accepts DMX512 signals, an industry standard signal widely used in the theater and advanced architectural. This protocol offers fast response and guaranteed messaging between the controller and the receiving device(s) allowing for a precision not capable with other control protocols. Incorporating DMX directly into your device adds the opportunity to use theatrical consoles, theatrical station controls, and advanced architectural systems to control some or all of the relays in the Z-MAX relay cabinet.



Extended information available in the Z-Max System Design Guide.
(Information about this guide can be found on page 1)

Requirements

DMX has specific wiring, wire type, topology, and termination requirements. Please reference the system design guide for additional information on this topic.

Wiring the DMX Connector

- Step 1:** Connect leads per the following wiring diagram.
- Step 2:** Twist strands of each lead tightly (making sure that there are no stray strands) and push firmly into appropriate plug connector location.
- Step 3:** Tighten the screws on the plug connector—making sure that no bare conductor is showing.
- Step 4:** Tie the Drain/Shield wires together and insulate using a small piece of heat shrink tubing.
- Step 5:** Install termination jumpers as required. Termination can be accomplished on the control board by jumpering the 2 pin header to the left of the DMX connector.

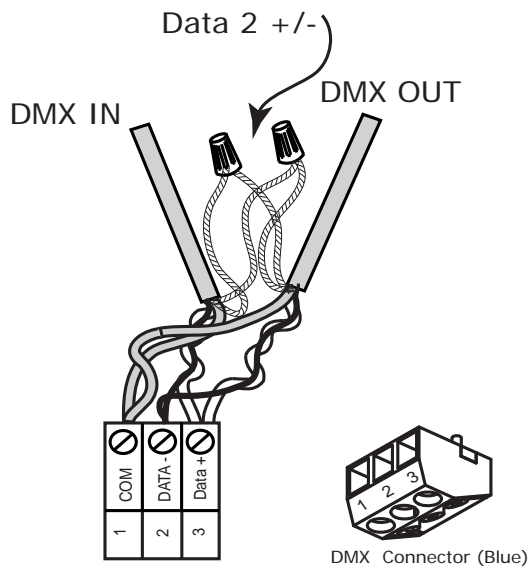


Figure 11-1: Z-Max DMX connector wiring

Modem Module Installation/Phone Line Connection

Many relay cabinet models have an optional modem which can be installed. The part number for this modem is rac00-mod and generally is ordered separately from the cabinet. When the modem module is installed, the additional functionality is available:

- Touch-Tone Remote Control from a telephone (TIM) - In this mode, you dial in to the relay cabinet from a touch-tone telephone and activate/deactivate relays by using different combinations of button presses on your telephone.
- Remote Programming via computer Modem - In remote programming mode, you can dial in to your relay panel from a computer which operates our Z-MAX configuration software. Once connected, the configuration software can be used to configure your cabinet remotely.



Extended information available in the Z-Max System Design Guide.

(Information about this guide can be found on page 1)

Installation of a modem is a two step process:

- Step 1:** Install the Modem Module
- Step 2:** Connect the Telephone Line

Modem Module Installation

- Step 1:** Disconnect Power from the cabinet
- Step 1:** Locate the modem socket on your control module
- Step 2:** Remove the modem module from it's packaging, and install into the modem socket by aligning the gold dot with the location shown in the illustrations, aligning the pins into the socket, and then gently but firmly pressing the modem into place. Reference the drawing below which shows the correct orientation of the modem.

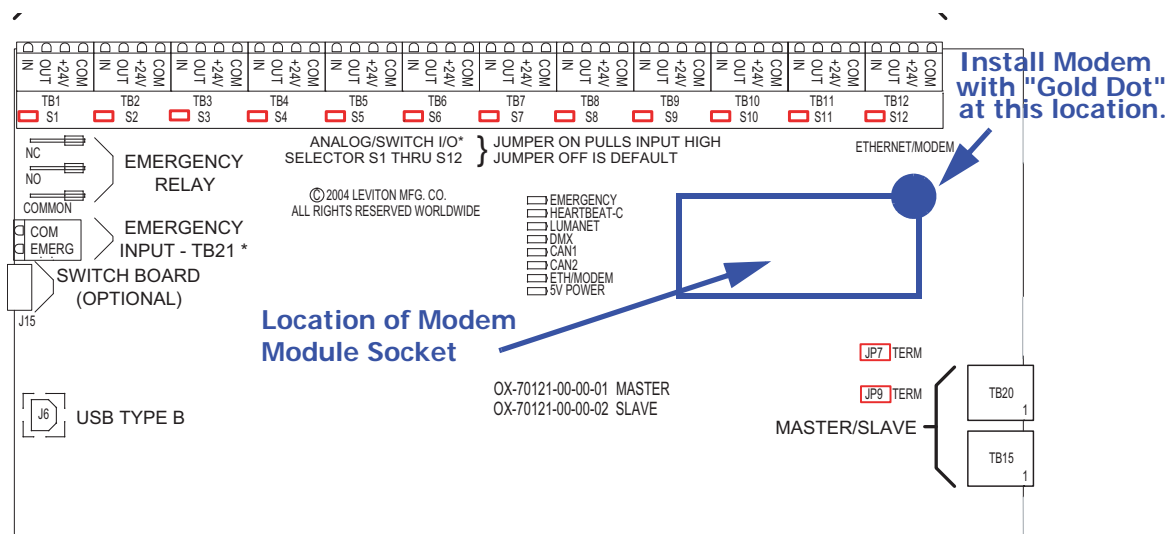


Figure 12-1: Modem Module Installation, 24 & 48 relay cabinets

WEB VERSION

Pinout

Pinout for the modem is the same as for standard telephone plug wiring. If using an RJ-12 connector, your pinout is as follows:

Pin # (left to right as viewed from connector end)	Wire Color	Function
1	N/A	No connection
2	N/A	No connection
3	Red	Tip
4	Green	Ring
5	N/A	No connection
6	N/A	No connection

Figure 12-2: Telephone plug pinout

RJ-12, or RJ-45 connectors may be used. RJ-12 connectors are for the most part industry standard POTS telephone interconnects.

Ethernet Network Module Installation

Many relay cabinet models have an optional ethernet module which can be installed. The part number for this module is rac00-eth and is generally ordered separately from the cabinet. When the ethernet module is installed, the following additional functionality is available:

- Upload/Download of Relay cabinet software
- Remote terminal based console access for diagnostics and control
- Upload/Download of relay configuration data.



Extended information available in the Z-Max System Design Guide.

(Information about this guide can be found on page 1)

Installation of an ethernet module is a two step process:

Step 1: Install the Ethernet Module

Step 2: Connect the Ethernet Line

NOTE

Prior to touching any part of any electronics, make sure that you first touch any grounded metal surfaces so that you can discharge any build up of static electricity.

Step 1: Disconnect Power from the cabinet.

Step 1: Locate the ethernet socket on your control module.

Step 2: Remove the ethernet module from it's packaging, and install into the socket by aligning the gold dot with the location shown in the illustrations, aligning the pins into the socket, and then gently but firmly pressing the ethernet module into place. Reference the following figures which show the correct orientation of the ethernet module.

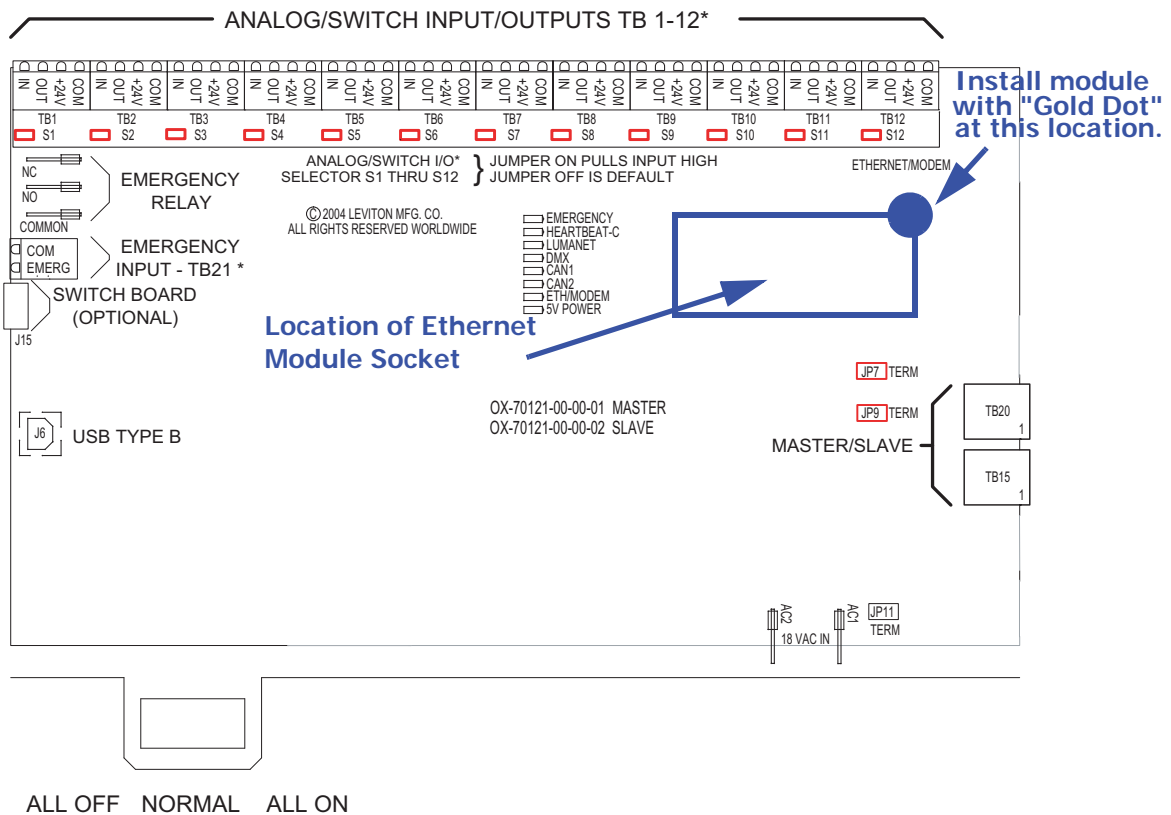


Figure 13-1: Ethernet Module Installation, 24 & 48 relay cabinets

Connection Methods

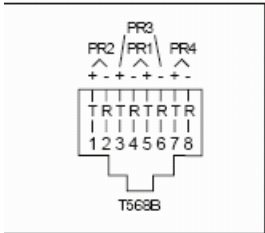
Termination to a Z-Max relay cabinet is via an RJ-45 connector. The connector is located directly adjacent to the ethernet module. To make the connection to an Ethernet network, crimp a connector onto the end of your ethernet cable taking into consideration the notes given in the section below, "RJ-45 Plug Connection," and plug the cable into the RJ-45 connector on the panel.

RJ-45 Plug Connection

There are two major standards for the pinout of RJ-45 connectors. These two standards are often referenced as TIA-568A & TIA-568B. Although either is acceptable so long as it is consistent throughout a project, Leviton recommends the use of only the TIA-568B standard. The only difference between the standards is what

color wires terminate to each of the (8) RJ-45 pins. Per the TIA-568B standard, the pinout for your RJ-45 connectors are as follows:

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Pin	Pair #	Color
1	2	Orange/White
2		Orange
3	3	Blue/white
4	1	Green
5		Green/white
6	3	Blue
7	4	Brown/White
8		Brown



NOTE Unlike some other wiring systems, Category 5 networking wiring requires that the connectors at both ends of the cable be wired the same.

NOTE RJ-45 connectors must be "crimped" onto the end of your Category-5e cable in order to successfully make your connections. This requires a special tool made specifically for this purpose called an "RJ-45 Crimper" or other similar terminology. Always use one of these crimpers when making these connections. Read and understand the instruction by the crimpers manufacturer prior to use. Leviton offers a crimper as Leviton part number 47613-EZC.

Power-Up & Installation Verification Checklist

Prior to the application of power to your relay cabinet, all of the following steps must have been successfully executed.

- Inspect each relay load wiring for incomplete termination
- Inspect each relay's load wiring for terminals not completely tightened
- With each relay in the "off" position, check for voltage between the Line & Load terminals; there should be none.
- Inspect all low voltage wiring and ensure that it is complete.
- Inspect control power wiring, ensure that it is complete.
- Confirm that any unused supply wires on the control power transformer have been suitably capped.
- Confirm that all connected load wiring between the relay panel and it's load has been completed.
- Confirm that wiring between the cabinet and all low voltage devices has been completed.
- Apply power to the cabinet.
- Confirm that the cabinet boots properly and returns to the status "normal" screen.
- Set the Time & Date from the menu.
- Update system software with the latest available software from the website, if appropriate.
- Proceed to panel programming.

LIMITED 2 YEAR WARRANTY AND EXCLUSIONS

Leviton warrants to the original consumer purchaser and not for the benefit of anyone else that this product at the time of its sale by Leviton is free of defects in materials and workmanship under normal and proper use for two years from the purchase date. Leviton's only obligation is to correct such defects by repair or replacement, at its option, if within such two year period the product is returned prepaid, with proof of purchase date, and a description of the problem to **Leviton Manufacturing Co., Inc., Att: Quality Assurance Department, 20497 S.W. Teton Ave, Tualatin OR 97062**. This warranty excludes and there is disclaimed liability for labor for removal of this product or reinstallation. This warranty is void if this product is installed improperly or in an improper environment, overloaded, misused, opened, abused, or altered in any manner, or is not used under normal operating conditions or not in accordance with any labels or instructions. **There are no other or implied warranties of any kind, including merchantability and fitness for a particular purpose**, but if any implied warranty is required by the applicable jurisdiction, the duration of any such implied warranty, including merchantability and fitness for a particular purpose, is limited to two years. **Leviton is not liable for incidental, indirect, special, or consequential damages, including without limitation, damage to, or loss of use of, any equipment, lost sales or profits or delay or failure to perform this warranty obligation.** The remedies provided herein are the exclusive remedies under this warranty, whether based on contract, tort or otherwise.

For Technical Assistance Call: 1-800-959-6004
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