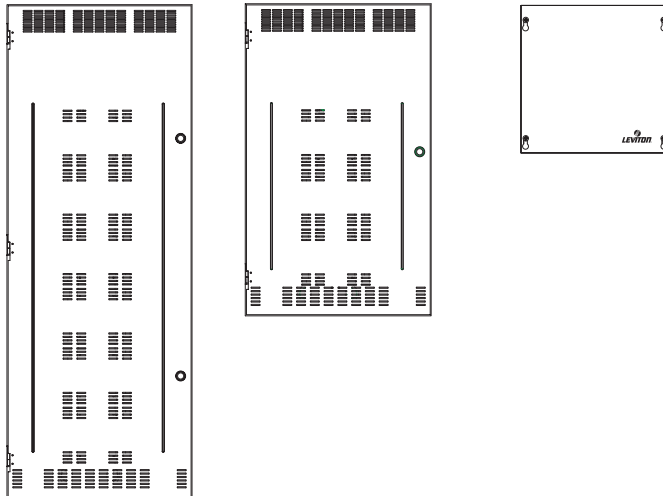




Master/Remote Guide

TOPOLOGY, INTER-CONNECTION, & CONFIGURAITON OF Z-MAX MASTER/REMOTE NETWORKS



Master/Slave Network Topology

There are some basic rules and requirements of Master/Slave networks which must be observed for your network to function. These rules are as follows:

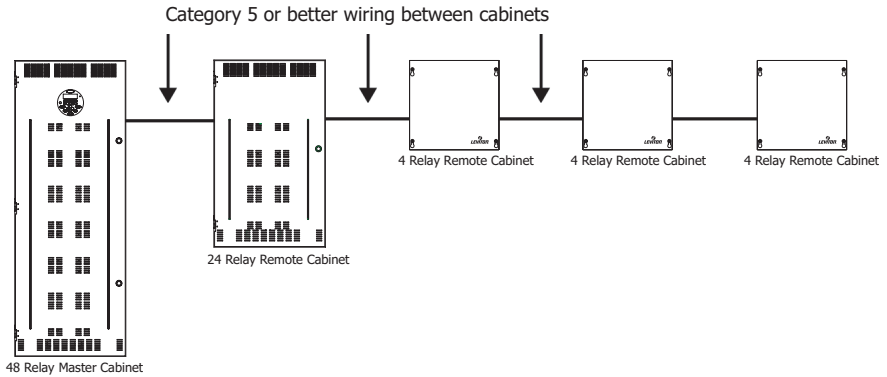
Specification	Description
Maximum End to End Run Length	1500 feet
Maximum number of relays per network	96 (Master + Slave)
Maximum number of nodes on the network	250
Network Topology	Daisy-Chain
Interconnection Method	Category 5e or better wire with RJ-45 connectors
Maximum number of master panels per master/slave network	1
Recommended Wire	Belden 1700A or Equivalent
Network Protocol	Z-MAX Master/Slave over CAN

NOTE

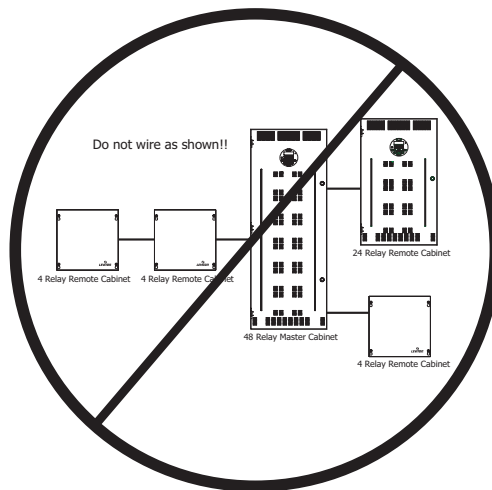
Any combination/mix of remote relay panels may be used on a single Master/Slave network so long as there is only one master and you do not exceed the maximum number of relays per network.

Network Topology

All Master/Remote panels must be connected in a daisy-chained fashion. For example, please consider the illustrations below:



The right way - Daisy-Chain Wiring



The wrong way - Star or other scheme

Network Layout Planning

The previous section illustrated some of the technical requirements and physical layout for Master/Slave networks. When planning your network, it's equally important when considering the numbering of relays.

Relays are divided into two types: local and network. The local relays are the relays inside the master cabinet, and the network relays are the remote or slave cabinet relays. By default, all relay cabinets are configured for 1-48 "local" relays, and all slave cabinets without dipswitches are out of the box programmed to start at relay number 49.

No two relays can have the same relay number and there are a limited number of relay numbers available on a Master/Slave network. In some installations it may make sense to decrease the number of local relays to only the number of actual relays in the master cabinet so that the total number of controlled relays per network can be maximized.

Example 1 - 48 Relay Master, 24 Relay Remotes

A (48) relay master cabinet and a (24) relay slave cabinet is the required equipment for your project. The number of local relays in the master is by default 48 which matches the number of local relays, so you're ok. Also, by default, the (24) relay slave cabinet starts at relay number 49. Considering the facts of this example, everything is OK using the default settings. In summary:

- Master Cabinet with (48) relays, relay numbers 1-48 (default)
- Remote Cabinet with (24) relays, relay numbers 49-72 (default)

Example 2 - 48 Relay Master, (2) 24 Relay Remotes

Extend the above example and add a second (24) relay remote cabinet. Remembering that by default the remote relay cabinets without dipswitches (like the 24) start at relay number 49, and remembering that we already have relay number 49-72 used in the first remote cabinet, we can conclude that the added remote

cabinet must be configured via USB to start at relay number 73.
In summary:

- Existing Master Cabinet with (48) relays, relay numbers 1-48
- Existing Remote Cabinet with (24) relays, relay numbers 49-72
- Added Remote Cabinet with (24) relays, relay numbers 49-96, must be reconfigured via USB since out of box the default setup is addressed to relay numbers 49-72 which would have been in conflict with the existing cabinet.

Example 3 - 8 Relay Master, (2) 24 Relay Remotes, (3) 4 Relay Remotes

In order to execute this example, with (68) total relays, it's required to decrease the number of local relays in the (8) relay master cabinet so that you can stay within the (96) relay maximum per master/slave network, relay numbers are contiguous, and the number of available relays are maximized.

First Let's look at the "out of the box" configuration:

- (8) Master cabinet, (8) relays, but # of local relays is 1-48
- (24) Remote #1, (24) relays, 49-72 (out of box config)
- (24) Remote #2, (24) relays, 49-72 (out of box config)
- (4) Remote #1, (4) relays, starting relay number 0 (out of box config)
- (4) Remote #2, (4) relays, starting relay number 0 (out of box config)
- (4) Remote #3, (4) relays, starting relay number 0 (out of box config)

You will note that there are substantial conflicts with the out of the box configuration.

Therefore, the new configuration will look like this:

- (8) Master cabinet, (8) relays, but # of local relays is 1-8
- (24) Remote #1, (24) relays, relay numbers 9-32
- (24) Remote #2, (24) relays, relay numbers 33-56
- (4) Remote #1, (4) relays, relay numbers 57-60
- (4) Remote #2, (4) relays, relay numbers 61-64

- (4) Remote #3, (4) relays, relay numbers 65-68

In order to achieve this configuration, the following configuration changes must be made:

- 1 The number of local relays, a setting under Global Defaults on the master cabinet, must be reduced to 8;
- 2 The two (24) relay cabinets must be configured from a PC over USB as starting relay numbers 9 and 33;
- 3 The three (4) relay remotes, must be configured via the control module dipswitch, for starting relay numbers 57, 61, & 65.

For instructions specific to your project, please contact our Technical Services Department. The phone number can be found on the back page of this manual.

Relay Numbering Chart

Leviton recommends that when planning your network, you fill out the chart on the following page, or other similar chart which you prefer to document your system. This completed chart should be stored with your master relay panel complete with the circuit schedules of all of the relay panels. For an example circuit schedule, see page 41.

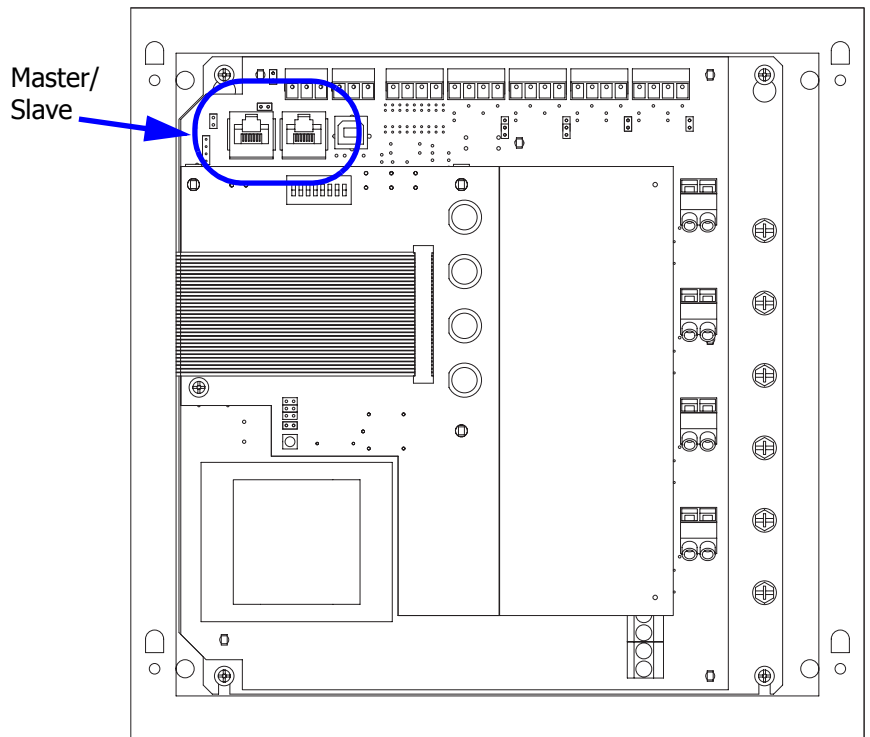
Relay Numbering Chart

Panel #	Starting Relay #	Ending Relay #	Panel Name	Notes
P1	1			
P2				
P3				
P4				
P5				
P6				
P7				
P8				
P9				
P10				
P11				
P12				
P13				
P14				
P15				
P16				
P17				
P18				
P19				
P20				
P21				
P22				
P23				
P24				

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.

Please reference the illustrations below which show the connection locations for the Master/Slave network wiring for each 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".

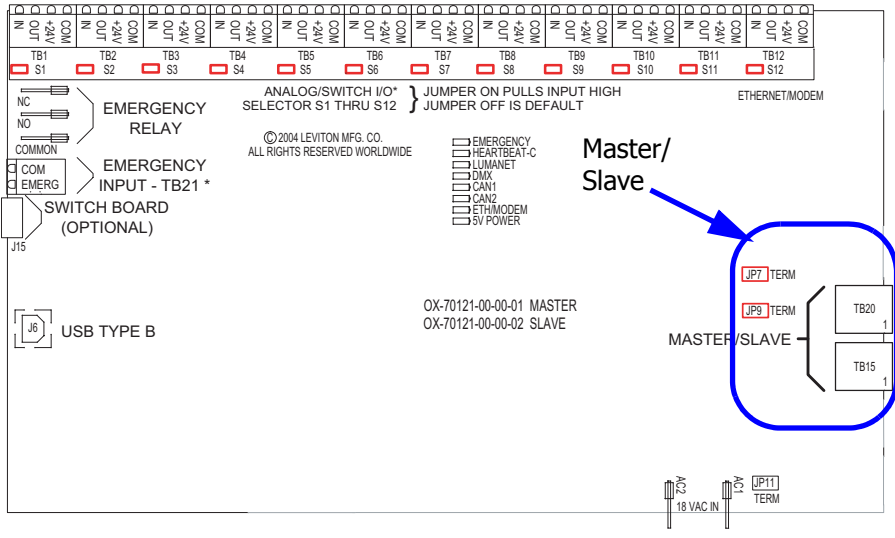


Master/Slave Connections, 4 Relay Cabinet

Switch Inputs and DMX Connector-
Wire Range #14 - #24 AWG
Torque 2 LB-IN

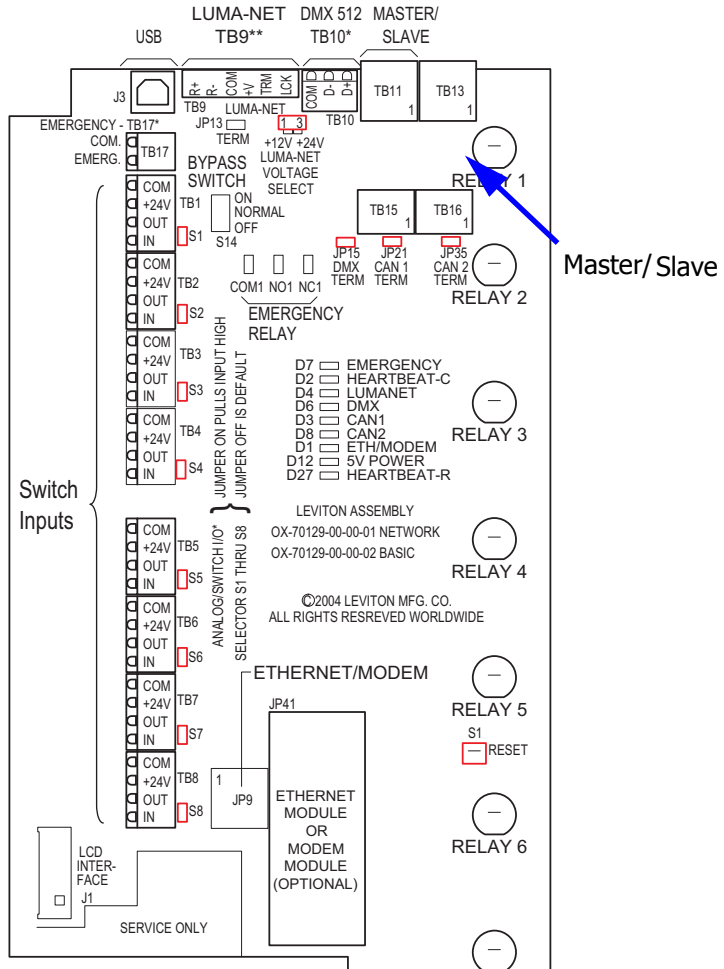
Luma-Net Connector
Wire Range #12 - #24 AWG
Torque 5 LB-IN

ANALOG/SWITCH INPUT/OUTPUTS TB 1-12*



ALL OFF NORMAL ALL ON

Mater/Slave Connections, 24 & 48 Relay Panel

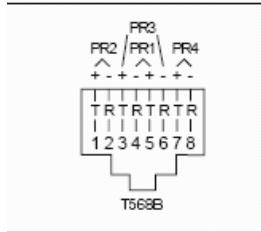


Master/Slave Connections, 8 Relay Panel

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.

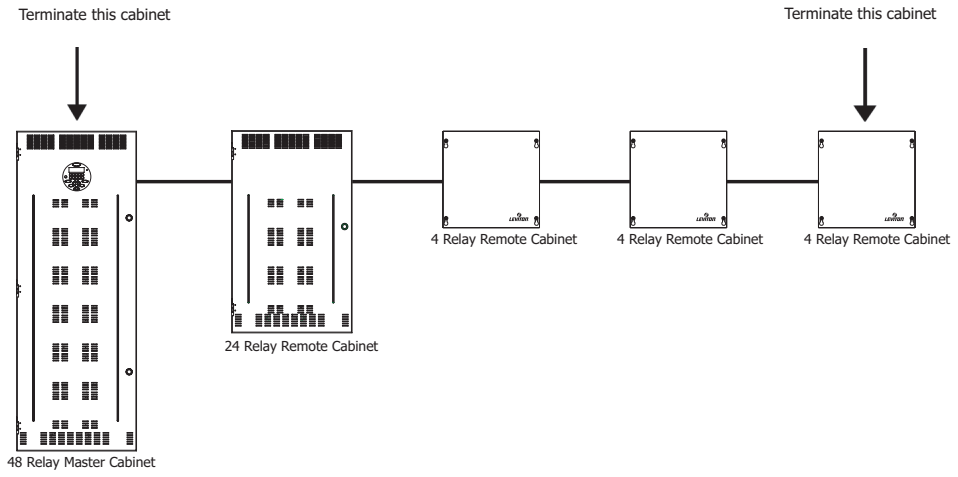
NOTE

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.

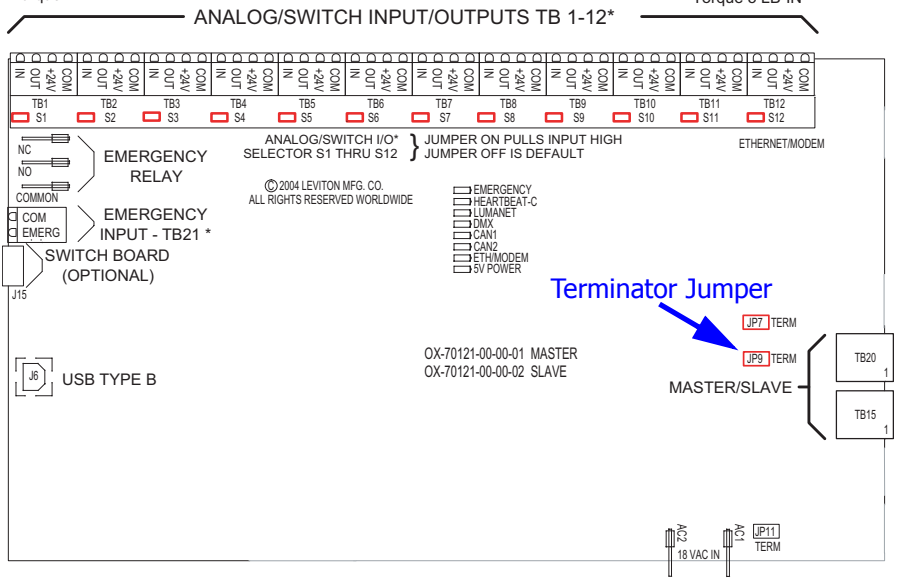
Each panel has a termination jumper. When a relay panel is the last panel on the run, it's termination jumper must be installed.



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



Step 2: Install the jumper. Your cabinet is now terminated.

Configuration

All of the functional configuration of your relay cabinet is performed at the master control module. However, prior to the master control module being able to address the remote relay cabinets, there are two primary configuration steps which must occur:

- Set the Starting Relay Number
- Set the starting relay & remote input number

Before we get into the specific configuration of the above items, please review the basic rules of Master/Slave networks and network topology on page page 1. The rules expressed in that section are critical to the successful operation of your network.

Out of the Box Configuration

The steps required to successfully configure your remote relay panel are as follows:

- Step 1:** Configure the Slave Cabinets
- Step 2:** Configure the Master Cabinet for Master/Slave
- Step 3:** Verify Network Communication
- Step 4:** Configure relay functionality at the Master

Remote/Slave Cabinet Configuration

The remote relay cabinets must be configured with their starting relay number. On some of the relay cabinets this is performed using a dipswitch on the circuit board inside the cabinet, on other relay cabinets this configuration must be performed from a PC connected via USB.

Comments & Examples on Relay Numbering

Please find a discussion with examples of relay numbering found on page 3. This information may be helpful when configuring your relay panels.

Configuration of Remote Relay Cabinets with Dipswitches

Locate the 8 position dipswitch and set the "MRN" code which corresponds to the starting relay number. The MRN code and corresponding starting relay numbers can be found in the table on the next page. The MRN code equals the sum of all the values "enabled" by the dipswitch.

Table of MRN Codes & Starting Relay Number

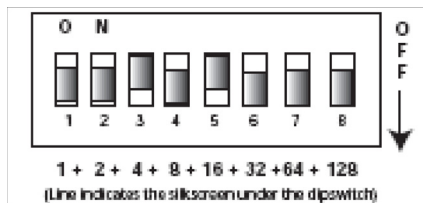
MRN Code	Start Relay Number
1	1
2	5
3	9
4	13
5	17
6	21
7	25
8	29
9	33
10	37
11	41
12	45
13	49
14	53
15	57
16	61
17	65
18	69
19	73
20	77
21	81
22	85
23	89
24	93

To Set the MRN Code:

Step 1: Choose the MRN code that corresponds to your starting relay code as shown in the Table of MRN Codes & Starting Relay Number on page 17.

Step 2: Enter the MRN code into the dipswitch by adding the value of each lever in the "On" position. The values of the levers are as follows:

- $1 = 1$
- $2 = 2$
- $3 = 4$
- $4 = 8$
- $5 = 16$
- $6 = 32$
- $7 = 64$
- $8 = 128$



For example, if you wanted to set the starting relay number to 77, you would reference from the starting relay number to MRN code chart that

Starting Relay Number 77 = MRN Code 20

From that you then would deduce that you need Lever 3 & 5 in the on position because $16 + 4$, the values associated with levers 3 & 5 sum to 20, resulting in a starting relay number of 77.

Configuration of Remote Relay Cabinets without Dipswitches or via USB

Remote relay cabinets that do not have dipswitches for setting the starting relay number you must be configured via USB. The instructions contained in this part of the manual assume that you already have a successful connection between your PC and your relay cabinet. For instructions connecting your PC to your relay

cabinet, please reference the instructions contained at our website, www.leviton.com and in your master control panel user guide. Additionally, for this purpose, your PC requires additional software and drivers which must be downloaded from our website.

Once connected to the relay panel via USB and you have the terminal program open at the Z-MAX prompt, there are several settings which can be set to affect operation of master/slave cabinets. From the terminal prompt, the command 'help' (without quotes) can be used at anytime to list out all commands and their syntax. Note that not all settings are applicable to remote panels.

- MRN Code - sets the MRN code determining the starting relay for this panel. This is usually the only option you're going to need to set for Remote relay panels. A table of MRN codes and their corresponding starting relay number can be found on page 17.
- MRE Code - The setting is only used in Master panel configurations to set the number of external relays. On slave cabinets this should always be set to 0, the default setting
- MRI Code - Set the number of local (or internal) relays to the cabinet. This should be set to the maximum number of relay module positions in the cabinet.

Configuration of Master Control Panel

Enable Master/Slave Communication

Configuration of the master control panel can be performed from the LCD. There are three settings which need to be set on the Master Control panels to enable Master/Slave Communication

- Remote Relay (RMT RLY) Setting, to enable Master/Slave communication
- Number of Local Relays (LOC RELAY) if a setting other than the default of (48) is required
- Set the Remote Node ID of the Mater panel to indicate that it is a master (MAS).

Enabling Master/Slave Communication

Step 1: Press the **MENU** button to enter the menu structure

Step 2: Use the arrow keys and the **SELECT/SAVE** key to navigate to Configuration, System Setup, then Global Defaults

Step 3: Using the arrow keys, find the menu below:

```
G L O B A L   D E F A U L T S
R E M O T   N O D E I D   O F F
```

Step 4: Press **SELECT/SAVE** until the OFF is blinking, then use the arrow keys to set it to MAS

```
G L O B A L   D E F A U L T S
R E M O T   N O D E I D   M A S
```

Step 5: Press **SELECT/SAVE** to save the setting

NOTE

If it is desired to have a Master relay panel operate as a Slave panel, set the RMT RLY to an MRN code from the preceding table which will define both this panel as a Remote panel and set the starting relay number.

Setting the Total number of Remote Relays

The total number of remote relays controlled by this master must be set so that the master cabinet knows how many relays it needs to address. To set this value:

Step 1: Press the **MENU** button to enter the menu structure

Step 2: Use the arrow keys and the **SELECT/SAVE** key to navigate to Configuration, System Setup, then Global Defaults

Step 3: Using the arrow keys, find the menu below:

```
G L O B A L   D E F A U L T S
R E M O T   R E L A Y S   O F F
```

Step 4: Press **SELECT/SAVE** until the OFF is blinking, then use the arrow keys or numbers to set it to enter the total number of relays in all remote relay cabinets. If we were only controlling one 24 remote cabinet and one 4 relay remote cabinet, this value would be 28.

```
G L O B A L   D E F A U L T S
R E M O T   R E L A Y S   2 8
```

Step 5: Press **SELECT/SAVE** to save the setting

Enabling Remote Discrete Inputs

If you intend to have switches or other inputs (discrete) land at the remote relay panels yet to be configured from the master control panel, you must enable the receipt by the master panel of these messages. To enable remote discrete inputs, please perform the following steps:

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.

Step 1: Press the **MENU** button to enter the menu structure

Step 2: Use the arrow keys and the **SELECT/SAVE** key to navigate to Configuration, System Setup, then Global Defaults

Step 3: Using the arrow keys, find the menu below:

```
G L O B A L   D E F A U L T S
R M T   D I S C R E T E   O F F
```

Step 4: Press **SELECT/SAVE** until the OFF is blinking, then use the arrow keys or numbers to change it to ON.

```
G L O B A L   D E F A U L T S
R M T   D I S C R E T E   O N
```

Step 5: Press **SELECT/SAVE** to save the setting

Communication Verification

Once all setup has been performed, and with the system powered up, verify that the Master & Remote cabinets have successfully "linked" to each other and are in communication with each other. To perform this validation, open the panels and look at the diagnostic LED's. Depending on the panel type, the location of these LED's may vary. Look for the LED labeled "Master/Slave" or "CAN". The status of this LED could be as follows:

- Blinking - Congratulations, cabinets are communicating successfully
- Off - Communication is not enabled. Check the Remote Node ID setting. (See page 20)
- On Solid - Addressing Conflict or other communication error. Verify configuration of all master and remote panels.

Conclusion

Once power circuits and low voltage inputs have been connected, and communication between the remote panels and their master have been verified, this part of the setup is complete.

The master control panel now has control over all inputs and relays. The relays act as an extension of the master relays and

the inputs act as an extension of the master inputs. To complete the functional programming of your system, please reference your Z-MAX User's guide which details the remainder of the required programming.

Warranty Information

Limited Warranty

Leviton Manufacturing Co Inc. warrants the products represented in this manual to be free of material and workmanship defects for a period of ten years after system acceptance or ten years after shipment from Leviton, whichever comes first.

This Warranty is limited to repair or replacement of defective equipment returned Freight Pre-Paid to Leviton Manufacturing at 20497 SW Teton Ave., Tualatin, Oregon 97062, USA. User shall call 1-800-959-6004 and request a return authorization number to mark on the outside of the returning carton, to assure that the returned material will be properly received at Leviton.

All equipment shipped back to Leviton must be carefully and properly packed to avoid shipping damage. Replacements or repaired equipment will be returned to sender freight prepaid, F.O.B. factory. Leviton is not responsible for removing or replacing equipment on the job site, and will not honor charges for such work. Leviton will not be responsible for any loss of use time or subsequent damages should any of the equipment fail during the warranty period, but agrees only to repair or replace defective equipment returned to its plant in Tualatin, Oregon.

This Warranty is void on any product that has been improperly installed, overloaded, short circuited, abused, or altered in any manner. Neither the seller nor Leviton shall be liable for any injury, loss or damage, direct or consequential arising out of the use of or inability to use the equipment. This Warranty does not cover lamps, ballasts, and other equipment which is supplied or warranted directly to the user by their manufacturer. Leviton makes no warranty as to the Fitness for Purpose or other implied Warranties.



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