IRIDEON®

AR500™ Remote Ballast Rack Installation Manual

Revision A

Part Number: **7091M2100** Rev A
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Introduction

Welcome to the Irideon® AR500™ Remote Ballast Rack Installation Manual. This manual contains the procedures for safe and efficient installation of the remote ballast rack system. AR500 remote ballast racks may be populated with up to six ballast and control electronics for control of up to six AR500 remote luminaires:

- AR500 BR-2 – Ballast rack including control electronics for two AR500 luminaires
- AR500 BR-3– Ballast rack including control electronics for three AR500 luminaires
- AR500 BR-4– Ballast rack including control electronics for four AR500 luminaires
- AR500 BR-5– Ballast rack including control electronics for five AR500 luminaires
- AR500 BR-6– Ballast rack including control electronics for six AR500 luminaires

How to use this manual

Use this manual during system installation. This manual contains complete step by step installation instructions which are very important to follow:

- *System Layout, page 2* displays general system risers for installation.
- *Preparing for installation, page 3* details installation requirements in preparation of your installation.
- *Installation, page 7* provides step by step instructions for installation of the remote ballast rack including all cabling, addressing and ballast installation.

Contacting ETC®

For general information about the Irideon remote ballast rack system, contact ETC Technical Support at 608.831.4116.

Warnings and notice conventions

These symbols are used in the Irideon AR500 Remote Ballast Rack documentation and on equipment to alert you to danger or important information:

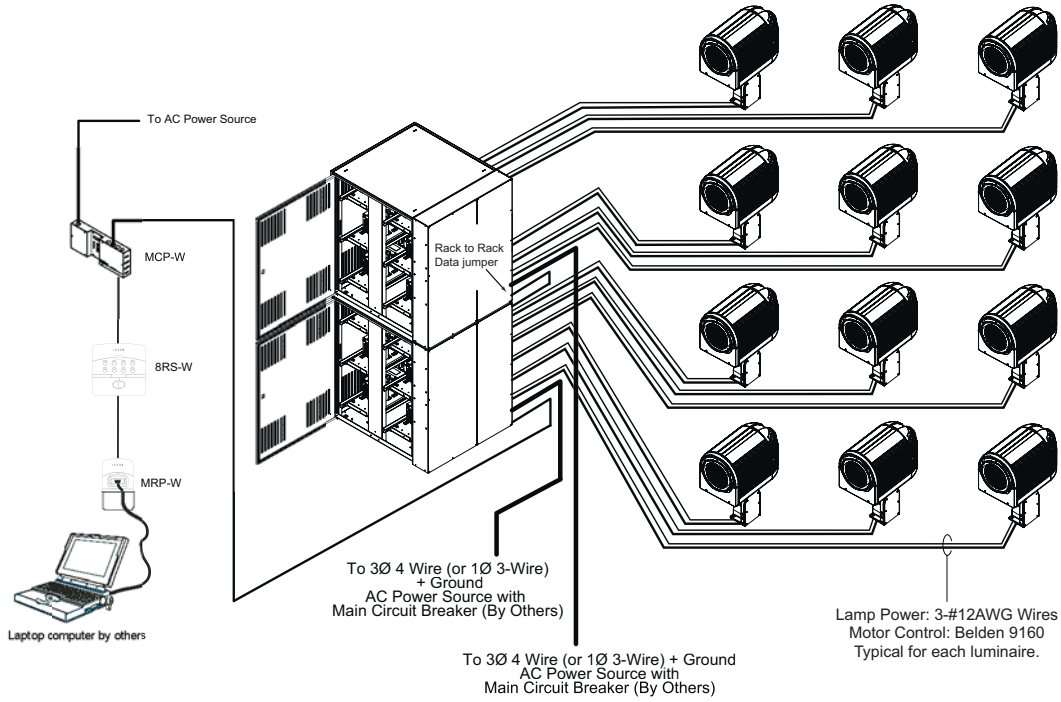
WARNING: Warns you when electricity may cause injury.

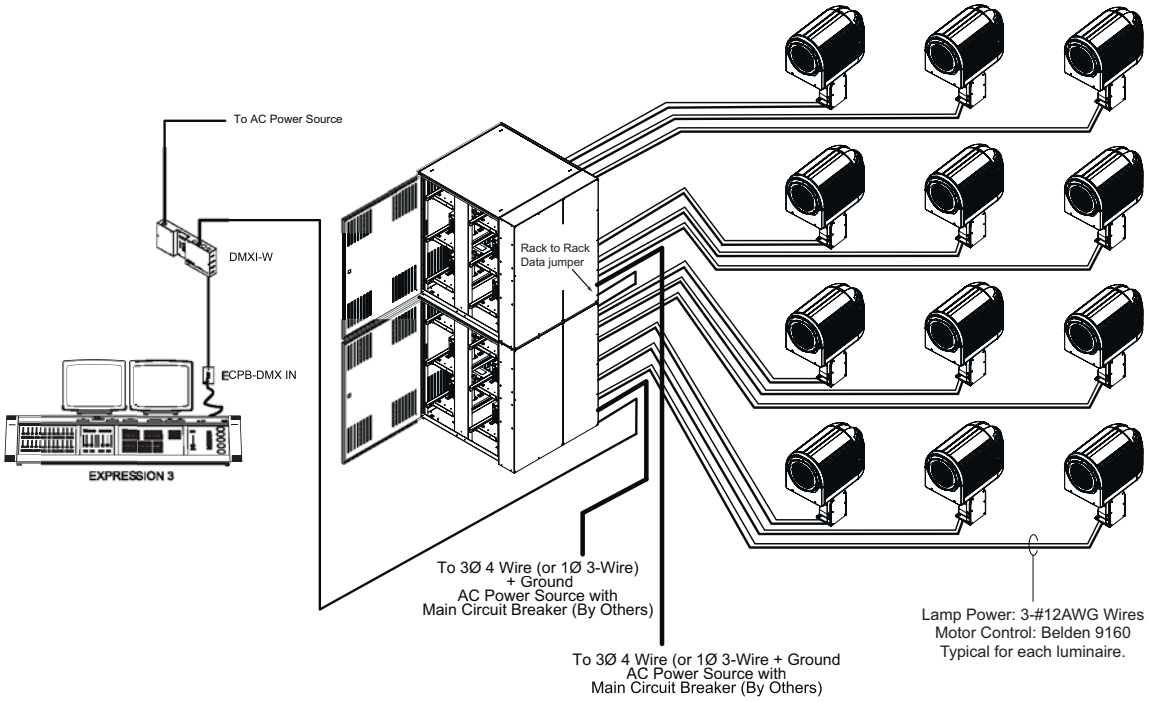
CAUTION: Alerts you to important information relating to equipment performance or reliability.

Note: Provides you with additional helpful information.

System Layout

The Irideon AR500 remote ballast rack is a compact alternative power and signal distribution method for the AR500 remote luminaire. Each remote ballast rack provides space for a maximum of six individual ballast assemblies and six control electronic assemblies. This rack is intended for installations where there is an interior space, within 300 feet of the AR500 exterior luminaires, allowing field wiring to be installed between the rack and the luminaires.





Preparing for installation

Before you begin installation, check your shipment.

Step 1: Check the shipping container for physical damage.

Step 2: If you find damage, document it to help with the claim against your shipper.

Step 3: Unpack your order and check the contents against the packing list provided with the shipment to ensure the order is complete.

Step 4: If you discover a problem please contact ETC Customer Service at 608.831.4116

Installation requirements

Note: *The installation contractor is responsible for compliance with local electrical codes.*

The AR500 remote ballast rack is not weatherproof and must be installed in an interior location, such as an equipment room, with the following environment requirements:

- clean (not dusty), temperature controlled environment (32°-104°F)
- Humidity between 30-95%, non-condensing
- restricted public access to prevent tampering

ETC provides the following for this installation:

- (2) Data Termination Preparation Kit
- (1) Hex key 3/16"X9" Looped Thandle (for AR500 luminaire adjustment)

The following tools and supplies are required, but not supplied by ETC, to complete the installation:

- #2 Phillips screwdriver
- #2 Straight slot screwdriver
- Conduit punch
- Wire cutters and strippers
- Adjustable wrench

Main Circuit breaker protection

Before beginning installation of your remote ballast rack(s), make sure you have installed a main circuit breaker cabinet or other readily available accessible input power disconnect device. See *AC Power Requirements, found on page 5* for individual rack power requirements.

WARNING: *Ballast Racks installed without an accessible power disconnect device cannot be serviced or operated safely.*

Obtaining ETC approval to energize the system

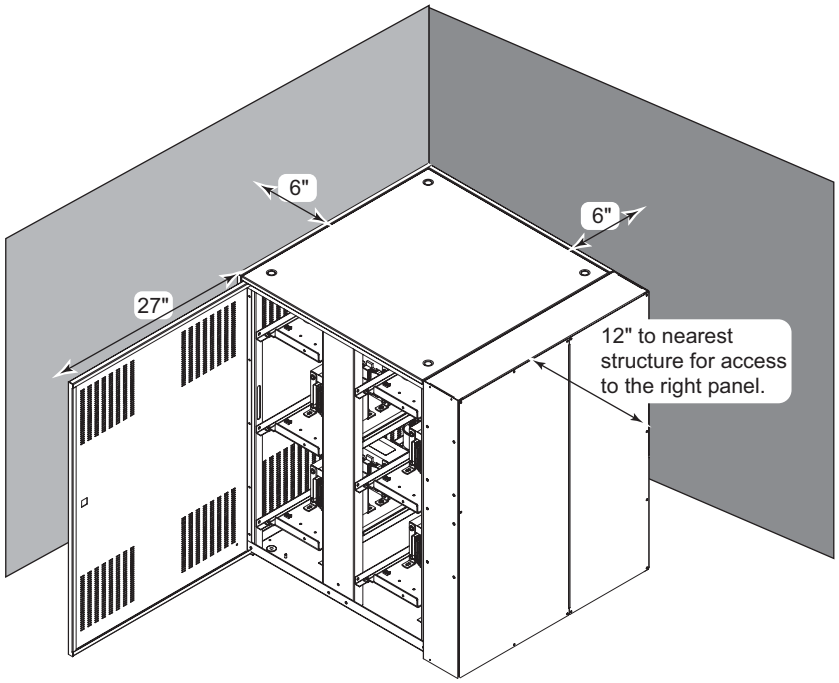
ETC approval is required to apply power to your Irideon AR500 remote ballast rack and AR500 luminaires. You may obtain pre-approval for some installations during the purchasing process, or pass a wiring inspection by an authorized ETC representative after the system is installed. Wiring errors in unauthorized energization of your system may endanger operators or cause system damage and failure.

WARNING: *Do not attempt to energize the system without proper approval. Energizing the system without ETC approval may result in serious injuries due to improper wiring.*

CAUTION: *Energizing your system without ETC approval may result in equipment damage that will void your warranty.*

Clearance and Access

The remote ballast rack is 31.25” wide, 26.75” deep and 35.125” tall. When installing the rack, provide sufficient access to the front and side door panels for maintenance, including provisions for AC and data-in, AC and data-out to the luminaires, and at least 6” clearance on the left and back sides for proper air flow with 12-27” for the front and right sides for proper maintenance access.



Weight Specification

A single remote ballast rack weighs 160 pounds without ballast plates installed. A loaded remote ballast rack, including six ballast plates, weighs approximately 380 pounds.

CAUTION: *Ensure that the floor space you have chosen for this installation can support this product.*

AC Power Requirements

Note: *The installation contractor is responsible for compliance with local electrical codes.*

The AR500 remote ballast rack is available in voltages ranging from 100VAC to 277VAC @ 60Hz. Each AR500 luminaire requires 700 watts of power at the specified voltage and frequency. A fully loaded remote ballast rack (up to six ballasts / two ballast per phase) would require 4200 watts of power at the specified voltage and frequency.

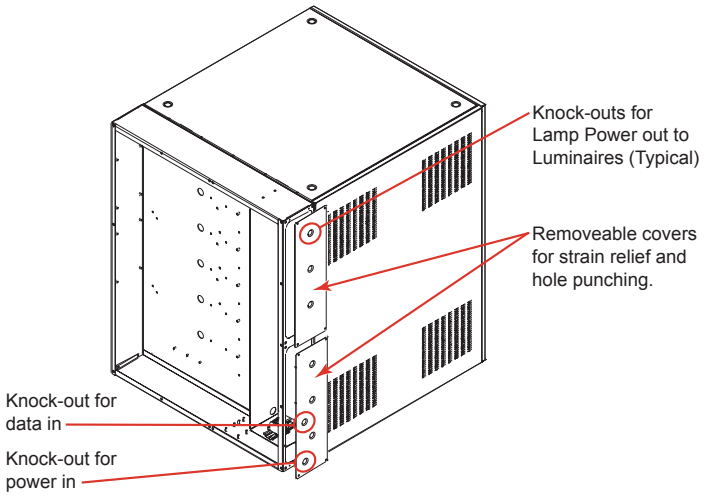
Each remote ballast rack also requires a Main Breaker, not supplied by ETC.

VAC / Hz	Phase	Current at Run
120VAC/60Hz	A	15A
	B	15A
	C	15A
208VAC/60Hz	A	13A
	B	13A
	C	13A
220/240VAC/ 60Hz	A	7A
	B	7A
	C	7A
277VAC/60Hz	A	7A
	B	7A
	C	7A

Input Power and Control Cable Preparation

The installation contractor must provide cabling for incoming power, incoming data, outgoing lamp power, outgoing motor control cable, and data through (if required) All conduit knockouts must be drilled on the removable covers provided. All drilling must be completed with the covers removed from the rack.

WARNING: *Drilling with the covers installed may cause damage to the rack which will negate warranty for this installation.*



Cable Specification

Note: *The installation contractor is responsible for compliance with local electrical codes.*

The maximum length of lamp power and motor control cable from the remote ballast rack to the AR500 luminaire cannot exceed 300 feet.

Signal Type	Cable Specification	Conduit (required)
AC Power to Remote Ballast Rack	3PH/5w or 1PH/4wire rated Per local code	Per local code
Lamp Power from Remote Ballast Rack to AR500 luminaire	3- #12AWG	YES
Data to Remote Ballast Rack	Belden 9729 (or equivalent)	YES
Data through *(to daisy chain two or more remote ballast racks)*	Belden 9729 (or equivalent)	YES
Motor control cable from the Remote Ballast Rack to AR500 luminaire	Belden 9160 (or equivalent)	YES

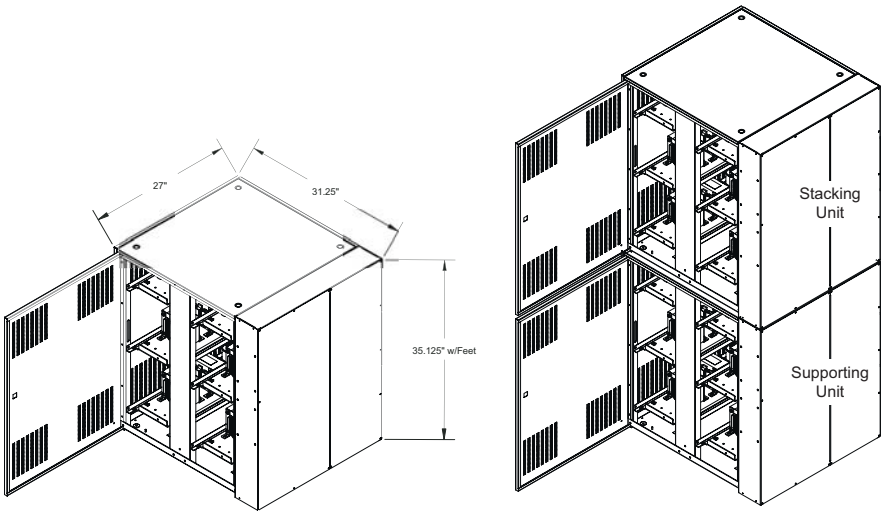
Per UL regulation, Lamp Power and Motor control cable are to be routed through separate conduit. When terminating data and AC power in a common junction box, wiring must be separated by a dividing panel.

Installation

Install the remote ballast rack

Determine where your rack(s) will be installed following the requirements for *Clearance and Access, page 4* of this manual. The remote ballast rack should be installed floor mount due to the size and weight of the unit. Double-high stacking of the ballast rack is an option if required

A single remote ballast rack, fully loaded with six ballast plates, weighs approximately 380 pounds. When double-high stacking the remote ballast racks the weight may exceed to 760 pounds. Per local code, please ensure the floor space chosen for this installation supports this weight.



Step 1: Install the remote ballast rack, resting on the four leveling feet (supplied by ETC).

Step 2: Using an adjustable wrench, adjust the leveling feet as desired.

Step 3: If more than one remote ballast rack is purchased, accommodations for double-high stacking of the remote ballast rack is possible. To double-high stack the remote ballast rack, remove the four leveling feet located on the underside of the *stacking* ballast rack by unscrewing them.

Step 4: Remove the four knock outs located on the top plate of the *supporting* remote ballast rack unit.

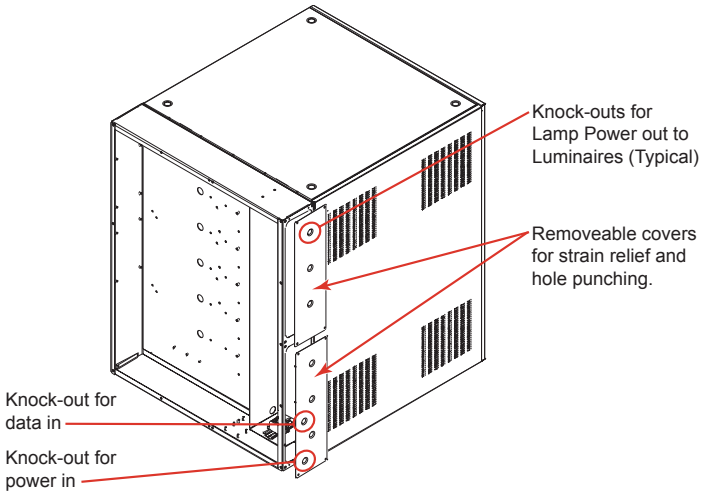
Step 5: Carefully place the *stacking* remote ballast rack on top of the *supporting* remote ballast rack.

- a: Ensure the *supporting* unit and the *stacking* unit are installed in the same orientation as pictured above.
- b: Align the four holes on each the *supporting* unit and the *stacking* unit in preparation of securing the two together.

Step 6: Secure the *stacking* unit to the *supporting* unit.

- a: Insert a bolt (3/8-16 X 1") into each of the four holes provided on the *stacking* unit, where the leveling feet were removed.
- b: Tighten each of the four bolts into the pems provided on the *supporting* unit.

Cable Access Preparation



Prepare cable access to the rack

Each conduit run should enter the back side of the remote ballast rack through the cable access panels provided. Knockouts are provided for Lamp Power out to the luminaire, AC in, and Data in to the rack. Additional access holes must be made by the installation contractor for motor control out to the luminaires and data through as required.

Note: *If your installation includes more than one remote ballast rack, duplicate the following process for each remote ballast rack.*

Step 1: Remove the two cable access panels from the back side of the ballast rack.

a: Remove the four #10 Phillips screws securing each of the cable access panels to the rack.

Step 2: Using your conduit punch, cut access holes in the cable access panels.

Note: *The installation contractor is responsible for compliance with local electrical codes.*

a: For the top and bottom cable access panels, remove the knockouts provided for each of the six Lamp Power out.

Note: *The knockouts provided for lamp power out should be used only for lamp power out. Combining motor control cable with the lamp power out of the rack negates UL regulatory and the ETC warranty for this installation.*

b: Remove the knockouts provided for AC-In and Data-In.

Step 3: Determine “How” and “Where” motor control out to the luminaires will be accomplished.

Note: *There are six motor control cables total for a fully loaded ballast rack, one to each luminaire. It is suggested that you have at least two cable access holes for the motor control out cable, one per access panel, allowing up to three motor control cables through, depending on the installation requirement.*

a: Using your conduit punch, cut access hole(s) in the cable access panels for motor control out to the luminaires.

Step 4: If you have more than one ballast rack, with the intent to daisy chain the data to a second rack, punch an additional access hole in the top panel of the first rack.

Step 5: Install strain relief fittings, grommets or conduit channel, per local code, into the holes previously made.

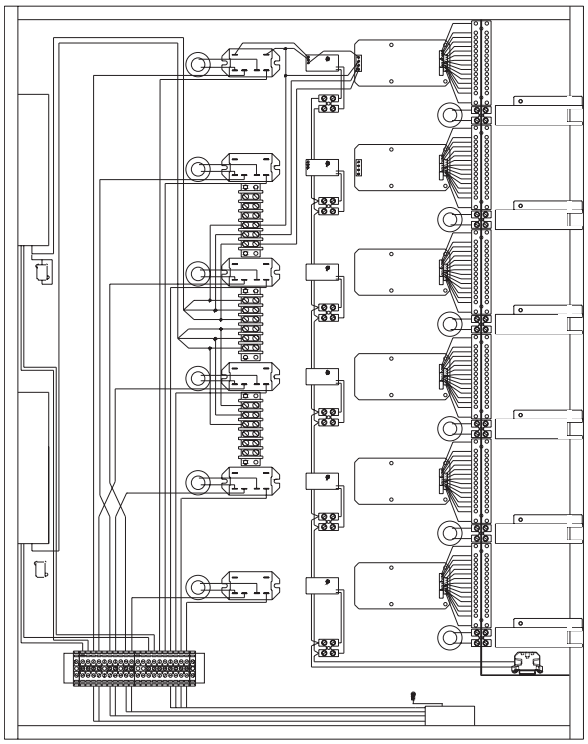
Step 6: Re-install the cable access panels.

a: Replace and secure the cable access panels to the rack by replacing the four #10 Phillips screws to on each panel.

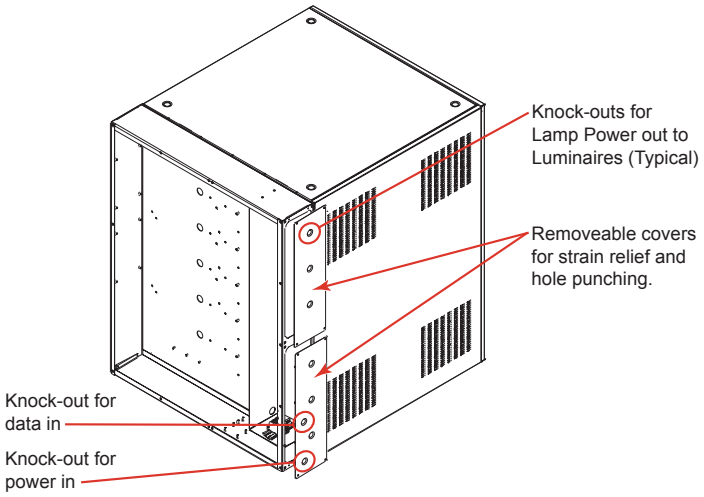
Step 7: Remove the electrical access panels (right side of rack)

a: Remove the #10 Phillips screws securing both panels to the rack.

b: Remove the two access panels found on the right side of the remote ballast rack, revealing the ballast rack electrical panel.



AC and Data input wiring



Connect AC

Incoming AC cable to the rack should comply with local code. Depending on installation requirements, the rack could be wired for 3Phase or 1Phase operation. Refer to *Cable Specification, page 6* for additional information.

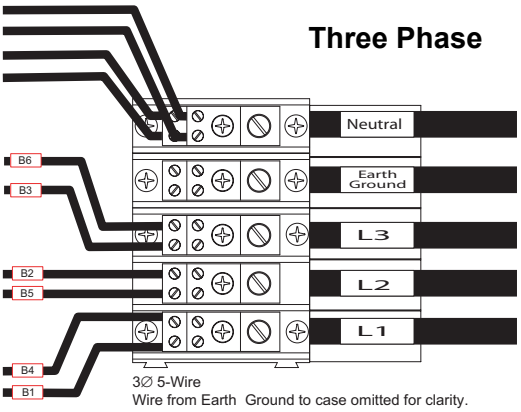
Step 1: Pull the line, neutral and ground cables to the rack through one of the holes previously prepared in the lower cable access panel.

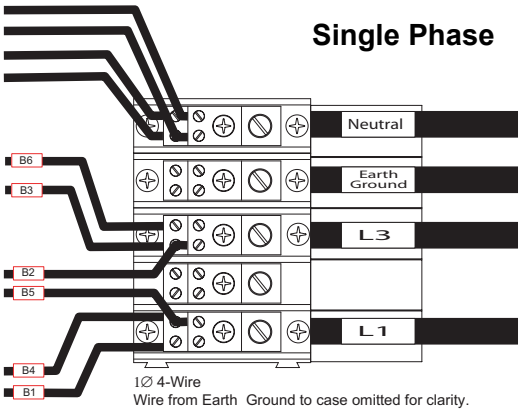
Step 2: Strip 1/2” of insulation from the end of the line phase, neutral and ground cables and attach them to the correct lugs.

Step 3: The AC terminal strip is located in the bottom right hand corner of the electrical panel. Locate the AC terminal strip labeled L1, L2, L3, Earth Ground and Neutral.

Note: *The example’s below indicate proper connection for both a three phase ballast rack and a single phase ballast rack.*

Step 4: Following the diagram for the type of load at your installation, connect the AC wires.





Note: *Dress wires neatly and avoid leaving extra wire inside the rack.*

Step 5: Tighten the lugs to the correct torque based on the cable size used:

Cable size	Torque (inch/pounds)
3-2 AWG	50in/lbs
6-4 AWG	45in/lbs
8 AWG	40in/lbs
14-10 AWG	35in/lbs

Connect Data-in and Data-through

Incoming Data and Data-through must be provided by a two shielded twisted pairs data cable. ETC recommends Belden 9729, *see "Cable Specification" on page 6* for additional information.

Step 1: Pull the Data input cable to the rack through the access hole previously prepared in the lower access plate.

Step 2: At the rack connection, where the installation cable enters, cut off the end of the data cables with 10-12 inches extra.

Step 3: Strip 6 inches of cable jacket from the control cable.

Note: *Do not untwist the wires.*

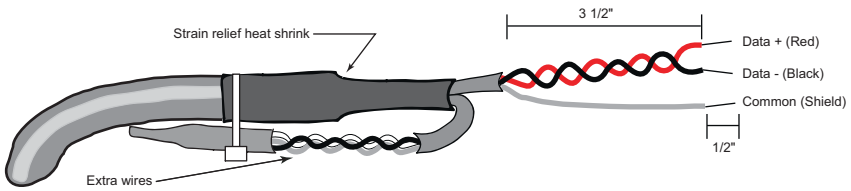
Step 4: Remove the exposed foil shielding from all the wire pairs in the cable.

Note: *An ETC supplied control cable preparation kit is supplied with each remote ballast rack. Use this kit for the following steps.*

Step 5: Cover all bare shield wires with 1/16 inch heat shrink (each twisted pair of wires in the cable should have a separate shield wire).

Step 6: Slide a 2 1/2 inch length of 1/8 inch heat shrink over the base of each set of twisted pair and shield wires (including the extra wire sets).

Step 7: Cover the last inch of any unused wire pairs, including the shield wires, with a piece of heat shrink that extends 1/2 inch beyond the end (example: the Black/ White pair, if using Belden 9729, is not used but must be prepared accordingly).

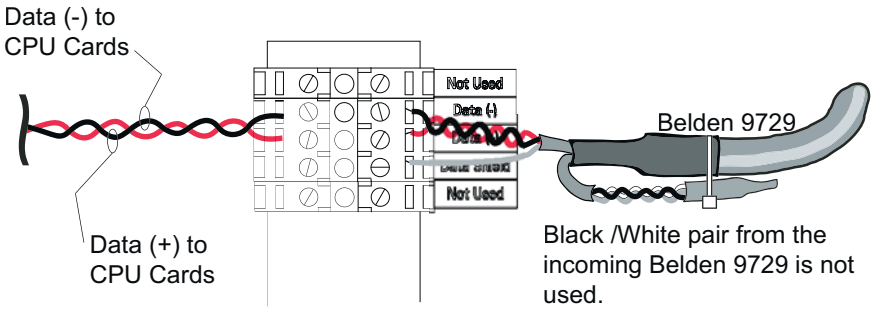


Step 8: Center a 2 1/2 inch length of 3/8 inch heat shrink over the end of the cable jacket and the bases of all the wires in the cable for strain relief.

Step 9: Bend back each unused wire set and secure it to the cable with a wire tie.

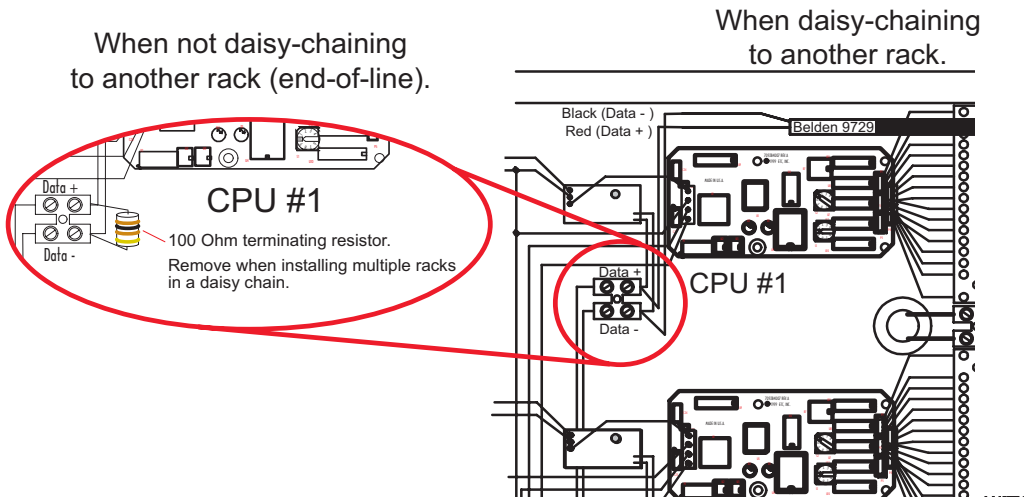
Step 10: Strip 1/4” of insulation or heat shrink from the ends of the Data +, Data - and Common wires. The Data + (black) and Data - (red) wires should remain twisted together.

Step 11: The Data input terminal strip is located in the bottom right hand corner of the electrical panel. Locate the Data input terminal strip labeled; Not Used; Data -; Data +; Data Shield; and Not Used. Connect Data +, Data - and Common wires to the data terminal strip as follows:



Note: *If your installation includes only one remote ballast rack, please proceed with Lamp Power and Motor Control wiring, page 15.*

If your installation includes more than one remote ballast rack, with the intention that the data is to be daisy-chained between racks, please follow the additional instructions below.



Step 12: Prepare (Belden 9729) Data-though cable for daisy-chaining to the additional rack.

a: Pull one Data-through cable to the 1st rack through the cable access hole previously prepared for data through.

Note: *The diagram on the previous page indicates a terminal block located next to CPU#1. This terminal block is the point which Data-though (daisy-chaining) is achieved.*

Step 13: Working from the right side of the remote ballast rack, remove the 100 Ohm resistor from this terminal block as indicated in the diagram above.

Step 14: At the connection point, where the wires are to terminate, cut off the end of the data cables with 10-12 inches extra.

Step 15: Strip 6 inches of cable jacket from the control cable.

Note: *Do not untwist the wires.*

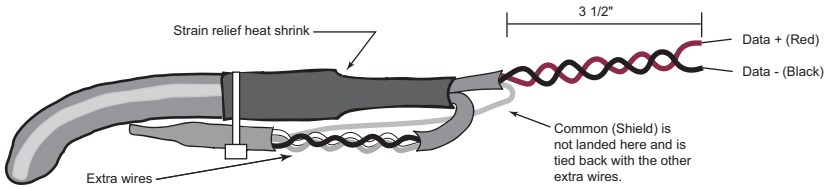
Step 16: Remove the exposed foil shielding from all the wire pairs in the cable.

Note: *An ETC supplied control cable preparation kit is supplied with each remote ballast rack. Use this kit for the following steps.*

Step 17: Cover all bare shield wires with 1/16 inch heat shrink (each twisted pair of wires in the cable should have a separate shield wire).

Step 18: Slide a 2 1/2 inch length of 1/8 inch heat shrink over the base of each set of twisted pair and shield wires (including the extra wire sets).

Step 19: Cover the last inch of any unused wire pairs, *including both shield wires,* with a piece of heat shrink that extends 1/2 inch beyond the end (example: the Black/ White pair, if using Belden 9729, is not used but must be prepared accordingly).

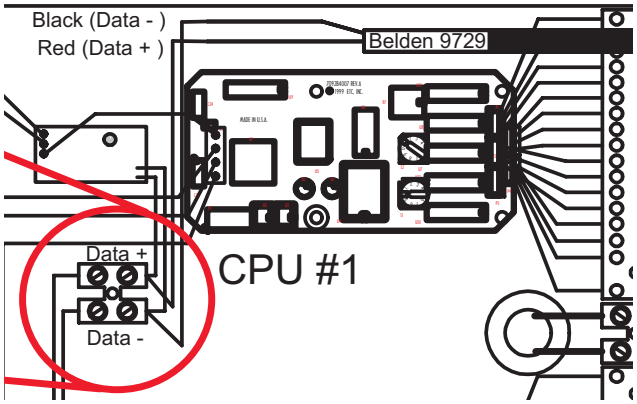


Step 20: Center a 2 1/2 inch length of 3/8 inch heat shrink over the end of the cable jacket and the bases of all the wires in the cable for strain relief.

Step 21: Bend back each unused wire set, *including both shield wires*, and secure it to the cable with a wire tie.

Step 22: Strip 1/4” of insulation or heat shrink from the ends of the Data +, Data - wires. The Data + (black) and Data - (red) wires should remain twisted together.

Step 23: Locate the daisy chain terminal strip, connect Data +, Data - wires to the data terminal strip as follows:

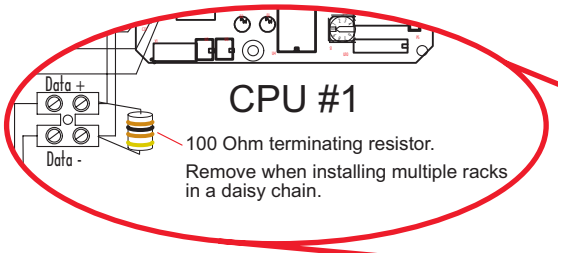


Step 24: The common wire (shield) is not landed here and should be wrapped with heat shrink and cable tied back against the data cable.

Step 25: To daisy-chain the Data input to the additional ballast rack, repeat steps 1 through 12.

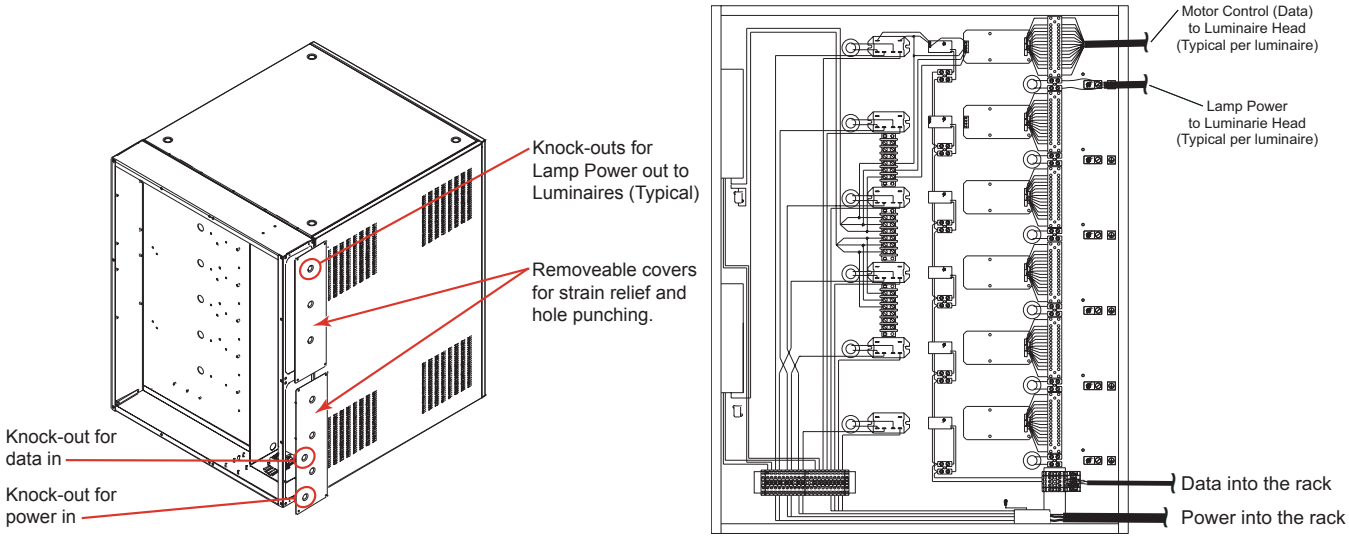
Step 26: At the last remote ballast rack in the data run ensure that the 100 Ohm resistor remains in the data-through terminal block.

When not daisy-chaining
to another rack (end-of-line).



Note: *A maximum of 5 remote ballast racks (30 AR500 luminaires) may be daisy chained on a single data run.*

Lamp Power and Motor Control wiring



Lamp Power and Motor Control cable out to the AR500 luminaire must comply with the *Cable Specification, found on page 6* of this manual. Each remote ballast rack will control and distribute power for up to six AR500 luminaires.

Connect Lamp Power Out

Located behind the right side panels of the remote ballast rack, you will find the electrical panel including six motor control output terminals and six lamp power output terminals. Each Lamp Power out terminal is barriered with a metal shield for protection between low voltage data communication and high voltage AC.

Note: *Each remote ballast rack is fully pre wired for power and control distribution of six AR500 luminaires regardless of how many AR500's are purchased.*

Also located on this panel are up to six control pcb's, one for each AR500 luminaire purchased.

Step 1: Determine how many AR500 luminaires are to be powered by this remote ballast rack.

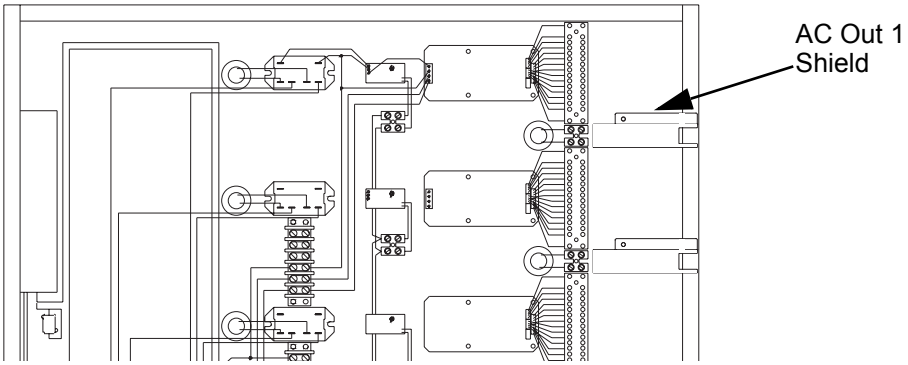
Step 2: Pull one lamp power out cable for each AR500 luminaire to the rear of the rack through each lamp power out knockout provided.

Note: *The length of cable cannot exceed 300 feet distance from the ballast rack to the AR500 luminaire.*

Step 3: At the end of each lamp power out cable, strip 1/4” of wire housing.

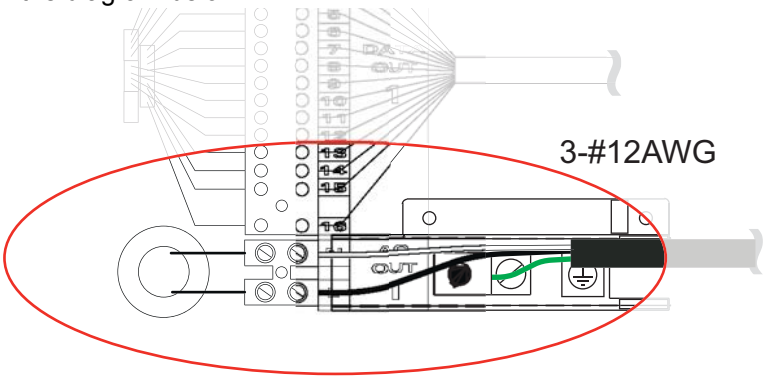
Step 4: At the right side (and top) of the electrical panel, remove the first AC shield from the ballast rack

a: Remove the screw securing the AC shield to the rack.



CAUTION: *Do not discard the AC shield and screws, they will be reinstalled after motor control wiring is complete.*

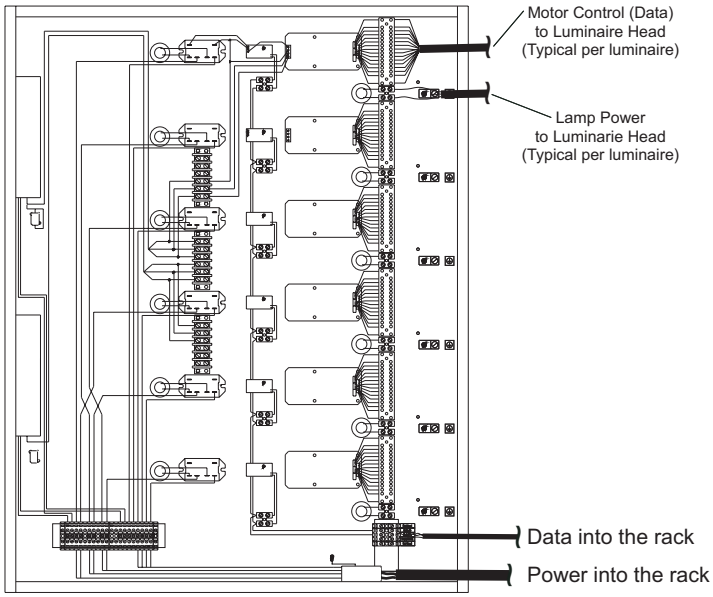
Step 5: Connect line, neutral, and ground wires to AC Out 1 terminal block as shown in the diagram below:



Step 6: Repeat steps 3 through 6 for AC Out 2, AC Out 3, AC Out 4, AC Out 5, and AC Out 6.

Connect Motor Control Out

For each AR500 luminaire, outgoing motor control must be provided by a Belden 9160 cable.



Step 1: Determine how many AR500 luminaires are to be controlled by the ballast rack.

Step 2: Determine the quantity and length of motor control cables necessary for each AR500 luminaire.

Step 3: Pull one motor control cable for each AR500 luminaire to the rack through the motor control cable access hole(s) previously prepared.

CAUTION: *DO NOT use the same knockout or conduit as is populated with lamp power cable. Lamp power and motor control must be separated at all time.*

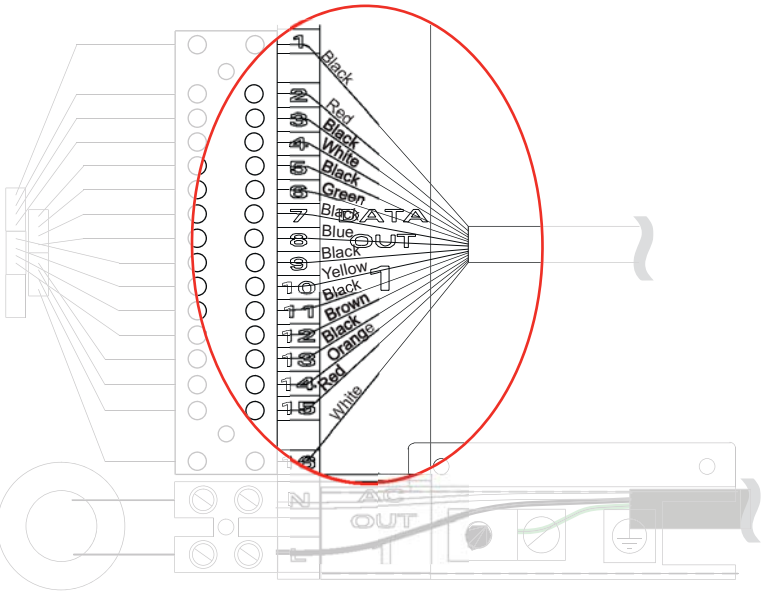
Note: *The length of cable cannot exceed 300 feet distance from the ballast rack to the AR500 luminaire.*

Step 4: Remove five inches of cable housing.

Step 5: At the end of each 16 data wires, strip 1/4” of wire housing.

Step 6: At the right side of the electrical panel, find the terminal block labeled Data Out 1.

Step 7: Install the appropriate colored wire in the appropriate terminal block position using the following table:



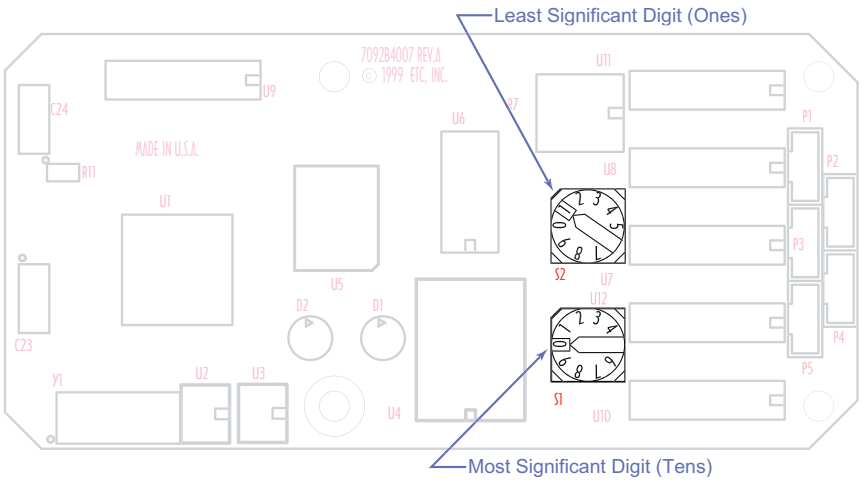
Data Out Terminal	Wire (twisted pairs)	Pair id
1	Black	pair 1
2	Red	
3	Black	pair 2
4	White	
5	Black	pair 3
6	Green	
7	Black	pair 4
8	Blue	
9	Black	pair 5
10	Yellow	
11	Black	pair 6
12	Brown	
13	Black	pair 7
14	Orange	
15	Red	pair 8
16	White	

Step 8: Reinstall the AC shield to barrier between the AC OUT (high voltage) and Data-Out 1 (low voltage).

a: Replace and secure the AC shield with the #10 screw.

Step 9: Repeat steps 3 through steps 7 for Data-Out 2, Data-Out 3, Data-Out 4, Data-Out 5, and Data-Out 6.

Addressing



Each luminaire address is set by two rotary switches located on the control cpu, on the electrical panel of the ballast rack. Depending on the quantity of AR500 luminaires purchased, each remote ballast rack may have up to six control cpu's and each cpu's must have a unique address.

Address the Composer CPU

The switch on top is the One's position and the switch below is Ten's position. For example in the illustration above, a setting of **"1"** would require the switch on top to be set to "1" and the switch on the bottom to be set to "0". Each luminaire in a system must be set to the appropriate and unique address in order to receive the proper data that controls each individual luminaire.

Each luminaire base address is set one position apart. For example, Luminaire A = address 1, Luminaire B = address 2...

Note: *Luminaire address selection typically results from the overall plans of the lighting designer. Therefore, specific addresses for each luminaire should be furnished by the lighting designer.*

Step 1: After determining specific luminaire address information from the Lighting designer, begin addressing at the first Control CPU.

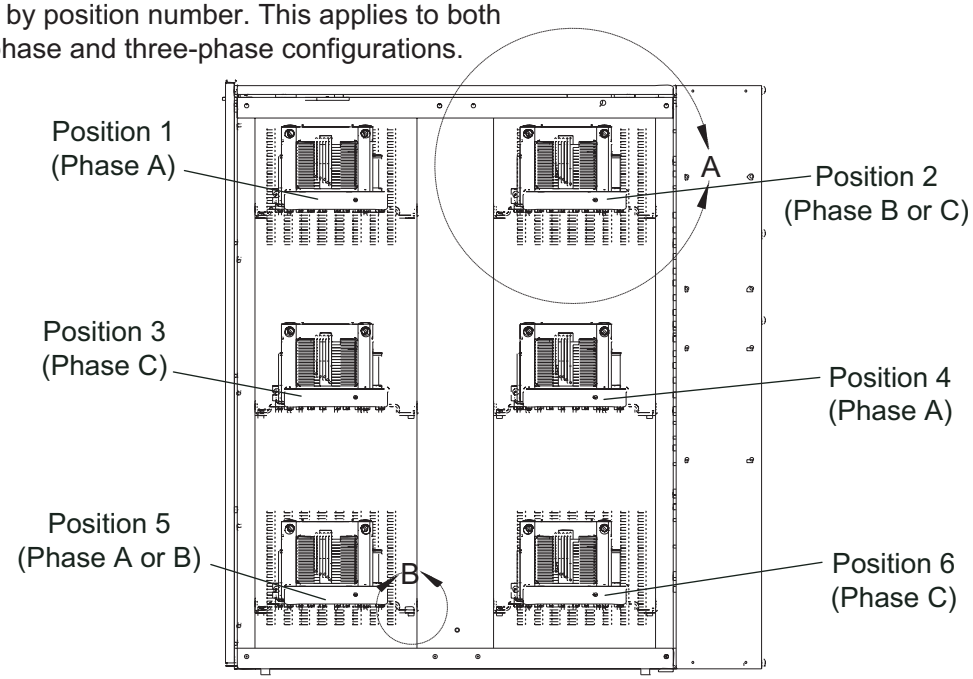
a: In the remote ballast rack, address the control cpu labeled Data Out 1.

b: Continue addressing each control cpu in the remote ballast rack.

c: If your installation includes more than one remote ballast rack, continue addressing each of the subsequent control cpu's in the remote ballast racks with the luminaire addresses provided by the lighting designer.

Ballast Plate

NOTE: The rack is wired so that phase balancing will be maintained if ballasts are installed seqentially by position number. This applies to both single-phase and three-phase configurations.



Each remote ballast rack houses up to six ballast plate assemblies. ETC offers a variety of ballast plate assemblies, which vary in voltages from 100VAC to 277VAC. Ensure that each ballast plate you are installing are the correct voltage for the service in your installation.

Note: *Since the remote ballast rack can be wired as either 3Phase or 1Phase operation, it is important to phase balance the ballast plates. For proper phase balancing, refer to the diagram above.*

Install ballast plate

Ballast plates should be installed behind the front panel of the remote ballast rack.

Step 1: Open the keyed door in the front of the remote ballast rack.

- a: Insert the key into the handle of the front door.
- b: Turn the key to unlock.
- c: Open the door, revealing six individual guided slots for the ballast plates.

Step 2: Remove the mounting screw from the guide rail of each ballast slot.

- a: Each ballast slot you will find a #10 Phillips screw installed in the railing, remove this screw.

Note: *Only remove the grounding screws from the slots that are to be populated with ballast plates.*

Step 3: Install one ballast plate in each slot, following the rules for phase balancing.

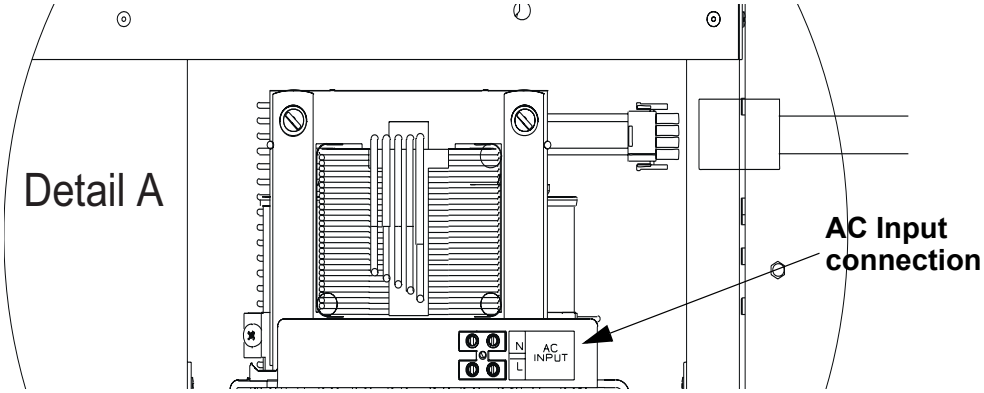
Step 4: Replace the grounding screw to secure the ballast plate in the unit.

a: In each of the ballast slots, either left or right side, line up the ballast tray with the pem hole, on the guided slots.

b: Secure #10 Phillips screw through the ballast tray into the guided slot that the screw was previously removed.

Step 5: Connect AC at each ballast plate.

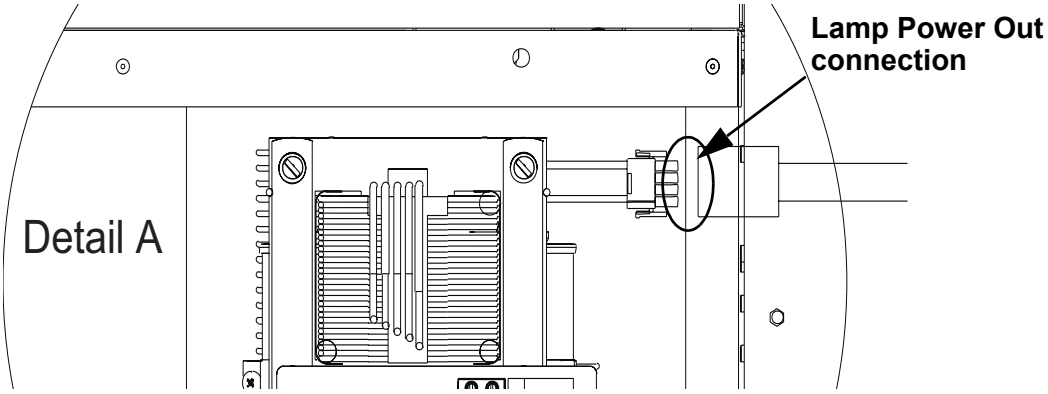
a: For each ballast plate installed connect the AC line and neutral wires to the 2 position terminal block located on the front of each ballast plate.



Step 6: Connect Lamp Power ***at each ballast plate***.

a: For each ballast plate installed, locate the 2-pin lamp power out ***connector***, located on the ballast rack to the right of each ballast plate.

b: Connect this to the lamp power out receptacle found on the ballast plate assembly.



Note: *Ensure that the polarity of this connection matches that of the ballast plate receptacle.*

Ballast Rack installation checklist

Please go over this checklist to confirm that you have correctly installed the remote ballast rack.

- Is the rack mounted on the floor, leveled as necessary?
- If double-high stacking racks, are the mounting bolts installed properly and secured?
- Is there sufficient clearance on all sides of the rack as explained in *Clearance and Access, page 4* of this manual?
- Are all cables landed and properly terminated? (Any wires not terminated must be capped off.)
- Do all cables meet specification and local code? (*see "Cable Specification" on page 6*)
- Are all Control CPU's addressed properly, each with a unique address?
- Is the last ballast rack in each data run terminated with a 100 Ohm terminating resistor?

If you have any questions about the installation of your ballast rack, please contact:

ETC Technical Services

Phone: 608.831.4116

Fax: 608.836-1736

E-mail: service@etcconnect.com

Finishing installation

After you have completed the installation and check list, you may close the front door and the right side electrical access panels.

Step 1: Close the front door of the ballast rack.

a: Close the door.

b: Turn the handle to secure the lock.

c: Insert the key into the handle of the front door and turn the key to lock.

Step 2: Close the right side access panels.

a: Find the two piece access panels and the mounting hardware.

b: Re-install the panels, one at a time, securing them to the rack with #10 screws.

Contact ETC for System Energization

ETC Approval is necessary prior applying power to your system. If you have purchased system energization from ETC, please contact your ETC representative to coordinate and schedule a technician for commissioning and training. ETC requires at least three weeks notification before commissioning date.

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