Kele AUTOPHOS

APK INSTALLATION GUIDE

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

APK INSTALLATION GUIDE

Instructions contained in this Installation guide should be performed only by qualified persons in accordance with local and national codes. Kele, Inc and its affiliates assume no responsibility for any consequences related to the improper use of this manual.

- Guidelines for Mounting APK-kits Within a Relay Panel
- Mounting locations within the panel are limited by the interior area provided.
- Install mounting plates in a location near or central to the relays or circuit breakers it will interface with. Twelve inch pigtails are available as an option to splice with wires from relays.
- Distances between ribbon cable sockets of the electronic boards must not be greater than the lengths of ribbon cable that connect them.
- If using two interface boards instead of one, be sure to differentiate between boards A and B.
- Mount plates such that cross-board wiring (relay interface wires lying across boards) is minimized.

APK-kits provide the flexibility to mount anywhere within the low voltage section of the existing lighting control panel. APK-kits do not fit all panels that contain compatible relays. Appendix A illustrates electronic board mounting configurations for most panels that are compatible with APK-kits. Some legacy panels are not listed. If your installation contains panels not included on these pages, please contact Kele, Inc to determine if your panels are compatible. If you are upgrading a panel that is listed in Appendix A, you may use the mounting configuration illustrated for that panel to obtain a mounting location and orientation for each board of the APK-kit. The mounting configurations shown there are recommendations and do not have to be followed.

The configurations were developed using certain parameters that determine where and how APK-kits are installed in the lighting panels. See “Guidelines for Mounting APK-kits Within a Relay Panel” below. Directions for installing the modules within a relay panel follow.

Each APK-kit comes with one or two interface boards. Additional boards can be ordered separately for panels with up to 60 relays. Whether using Appendix A or the guidelines listed above to mount the Kits, it is helpful to be able to distinguish the difference between the interface boards when mounting. Each RIB (Relay Interface Board) board is designed to interface with a specific group of relays. This installation guide designates each interface board per kit as “A” or “B”. Board A interfaces relays 1-16 (1-30 for APK4) and B interfaces 17-32.

There is no way to assign such names in the controller software to notify the controller where the inputs are coming from; the controller is able to distinguish inputs from each board through the ribbon cable sockets. Figures 1 A-C shows the locations of these sockets on the LMB and interface boards for each kit type.

The APK2, APK3, APK5 Series Kits all follow the same design for ribbon cable connections. Examine the RIB boards of your kit. Notice, the ribbon cable socket is shifted between board A and B. Each position is labeled “1-16” or “17-32”. The APK4 kit uses only one RIB board.

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Overview

The APK (AUTOPHOS RETROFIT KIT) series provide the flexibility to mount anywhere within the low voltage section of the existing lighting control panel. APK's do not fit all panels that contain compatible relays. Appendix A illustrates electronic board mounting configurations for most panels that are compatible with APK's. Some legacy panels are not listed. If your installation contains panels not included on these pages, please contact Kele, Inc to determine if your panels are compatible. If you are upgrading a panel that is listed in Appendix A, you may use the mounting configuration illustrated for that panel to obtain a mounting location and orientation for each board of the APK. The mounting configurations shown there are recommendations and do not have to be followed. The configurations were developed using certain parameters that determine where and how APK's are installed in the lighting panels. See “Guidelines for Mounting APK's Within a Relay Panel” below. Directions for installing the modules within a relay panel follow.

The APK’s are designed to upgrade existing lighting control relay panels without having to replace entire relay panels. The APK Series includes the APK2, APK3, APK4, and APK5. These Kits are designed to upgrade lighting control systems utilizing the following relays shown in Table 1 below:

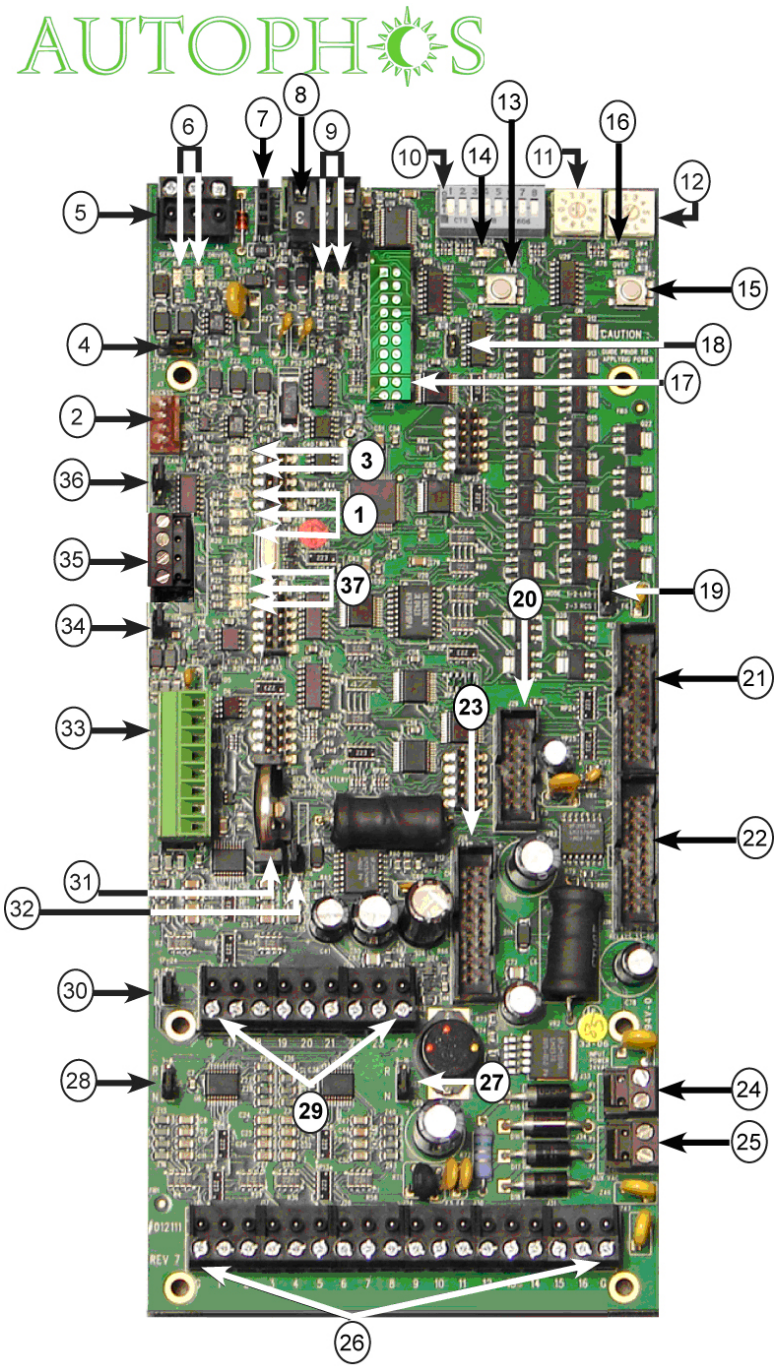
TABLE 1

PANEL TYPE	APK2 2-Wire	APK3 3-Wire	APK4 4-Wire	APK5 5-Wire
General Electric		RR7		RR9
Horton Controls		RR7		RR9
Wattstopper		RR7		RR9
Lithonia Lighting		RR7		RR9
Douglas	WE-6161/6162/69172/6221	RR7	WR-6172	
ILC	2R7,2PC	2R7	2PC	2R9
MicroLite		RR7	MLR-020	
Johnson Controls “ILC”		RR7	JCI-ILC	
Touch-Plate		RR7	3000/4000-PL	

Installing APK’s involves working only with low voltage electronics and wiring. The installer does not need to remove relay panels nor relays. Only the electronics and wires connected to the relays need to be removed and replaced with Kele, Inc kit. The following pages of this install guide discuss how to install each of these Kits into the relay panels they were designed to integrate with.

APK Components

All APK’s include a Lighting control Main Board controller (LMB) and two Relay Interface Boards (RIB). The controller is programmed using Kele LPPK Software. The LMB communicates with the relay through the RIB boards. Communications with the interface boards are through one or more ribbon cables supplied with the kit. APK2, APK3, and APK4 Series use RIB boards with 16 relay output capacity. Two boards give a maximum capacity of 32 relays. The APK5 uses one RIB board with a relay capacity of 30. In relay applications requiring more than the provided capacity, additional RIB boards and cables can be ordered (APK2X, APK3X, APK4X, APK5X).

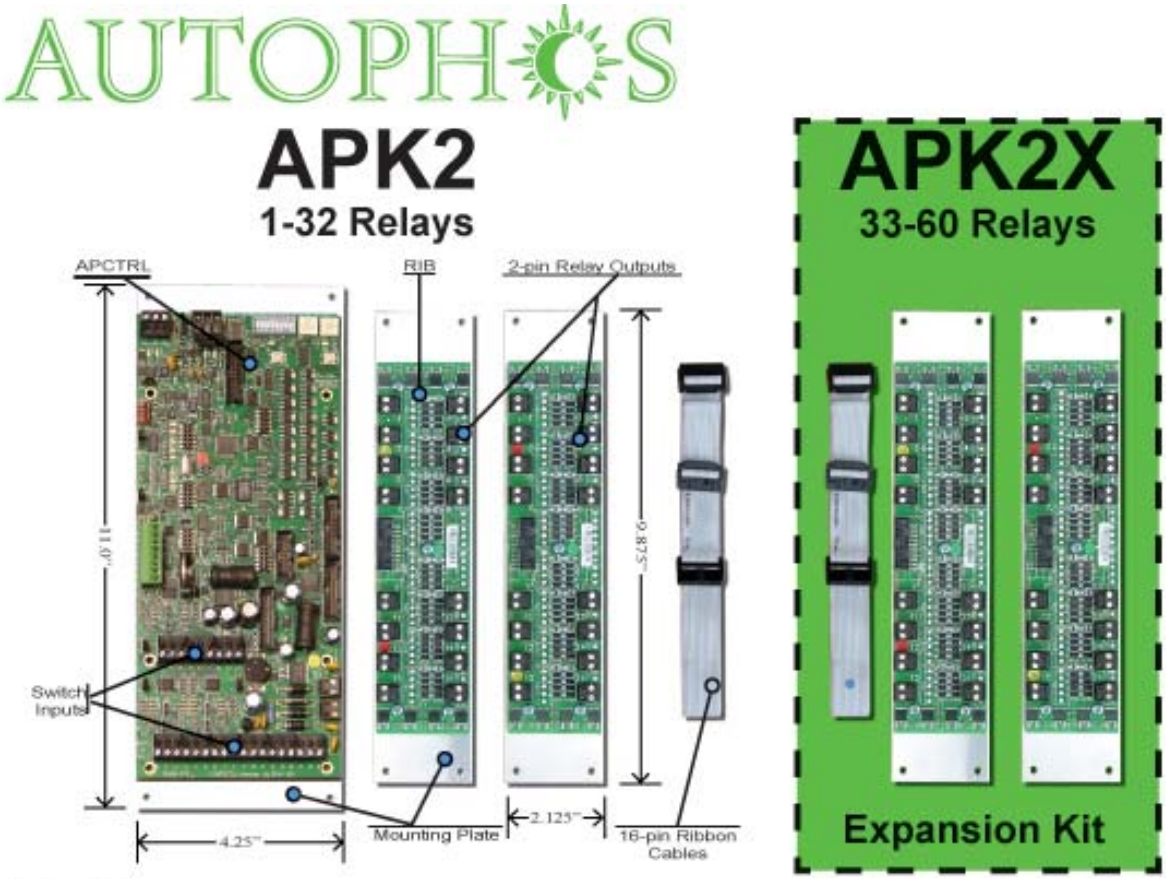


1. Power LED, Run LED, Error LED
   Power LED should be on solid as long as AutoPhos controller is connected to 24VAC. Run LED should always be blinking for normal processor activity. Error LED will briefly blink during power up or memory upload then should go to off and remain off show processor memory in normal state.
2. Access Port is used for firmware flash upgrades in the field. Use cable APT for this purpose.
3. Access Rx and Tx LEDs show, receive and transmit activity on the 5-pin Access port.
4. Not used on this control platform
5. Not used on this control platform
6. Not used on this control platform

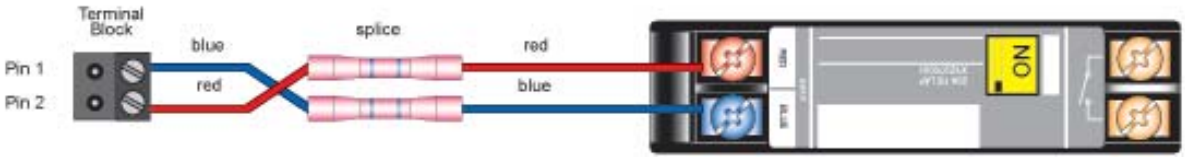
7. BTS485 socket receives BTS-485 terminating resistor when (rarely) needed on a 485 network.
8. EIA-485 Network Port is the main port used for RS485 communications with the building automation system. On board isolation circuitry provides 500-volt isolation for the RS485 communication network. The terminal blocks can be removed from the AutoPhos controller for easy installation or for quick replacement of an AutoPhos controller.
9. EIA-485 Network Port Rx and Tx LEDs show receive and transmit activity on the RS485 network.
10. Multifunction Dip Switch (Hundreds, SW1) is used to set address and baud rate for AutoPhos controller on the RS485 network. #1-6 are for baud rate settings. For address >99, #7 Up = 200, #8 Up= 100. (#8 ignored when #7 is up, maximum address is 255)
11. Rotary Switch (Tens, SW3) is used to set address 1-99 for AutoPhos controller on RS485 network.
12. Rotary switch (Units, SW4) is used to set address 1-99 for AutoPhos controller on RS485 network.
13. Auto Button (SW2) is used to return AutoPhos controller outputs to pre-override state (Auto Mode) after Over Button is used. Pressing Auto will return AutoPhos controller to pre-override state and will allow execution of serial commands that were stored during override mode.
14. Auto Button LED shows solid ON when AutoPhos controller is not in override state or override-expired state. LED blinking warns that there is no .LPX file loaded into firmware.
15. Over Button (SW5) is manual override of AutoPhos controller outputs. Press to override all outputs ON and press again to override all outputs OFF. AutoPhos controller will not execute serial commands while in override mode. Serial commands received during override mode are stored until AutoPhos controller is returned to Auto mode by pressing Auto button. With no button activity, AutoPhos controller will go to “override-expired” state after approximately 15 minutes and be able to execute subsequent incoming serial commands. To return AutoPhos controller outputs to full Auto mode, press Auto button at any time.
16. Over Button LED shows solid ON when all outputs are in manual override, blinking when all outputs are in manual override OFF. LED is off when AutoPhos controller is in Auto mode.
17. Legacy Port is not a field-accessible feature.
18. Format Pins can be shorted together to erase memory only if address set to zero. Do not use unless instructed to do so by technical support. Lost items will be BACnet control programs and .lpk file (from the configuration software). These can be restored through use of Lighting Panel Configuration Software (APSoft) with AppLoader programming tools.
19. AutoPhos controller/RCS Jumper is used to enable AutoPhos controller to control various legacy products.
20. RCS 14 Pin Port receives a 14-pin ribbon cable to control legacy products and retrofit kits. **DO NOT hot swap** this cable.
21. 20 Pin Socket for Outputs 1-32 receives single ribbon cable including both relay 1-16 and relay 17-32 output cards. 20-pin cable may have 16-pin connector on other end depending on type of relay interface card. **DO NOT hot swap**. Ribbon cable may be disconnected to “disable” outputs while programming or testing AutoPhos controller processor.
22. 20 Pin Socket for Outputs 33-60 receives single ribbon cable including both relay 33-48 and relay 49-60 output cards. 20-pin cable may have 16-pin connector on other end depending on type of relay interface card. (These 3rd and 4th RIB cards are identical to 1st and 2nd RIB cards). **DO NOT hot swap**. Ribbon cable may be disconnected “disable” outputs while programming or testing AutoPhos controller processor.
23. LEXP Socket provides connection of up to three optional input expansion modules using 20-pin ribbon cable. **DO NOT hot swap** this cable.
24. Input Power 24VAC transient protected, surge suppression to 1.8 joules. The terminal block can be removed from the AutoPhos controller for easy installation or for quick replacement of an AutoPhos controller.

25. Aux Power Tap for 24VAC accessories, runs off of input power, is interchangeable with input power pins.
26. Switch Inputs 1-16 for hard wire “home run” style override switches and occupancy sensors. The terminal blocks can be removed from the AutoPhos controller for easy installation or quick replacement of the entire controller. AutoPhos controller has 24 onboard input connections.
27. Jumper for Switch Inputs 9-16 for provides capability to select the AutoPhos Controller to power its inputs or allow an external power source to power its inputs. Occupancy sensors that use 24VDC to power the sensor are typical applications that are externally powering an input. Jumper in the “N” position configures the inputs to be dry contact and powered by the AutoPhos controller. Jumper in the opposite position configures the inputs to be externally powered by up to 24VDC. Each jumper affects only its respective eight inputs only. There is one jumper for each of the AutoPhos controller Controller’s eight inputs.
28. Jumper for Switch Inputs 1-8 (See above)
29. Switch Inputs 17-24 (See above)
30. Jumper for Switch Inputs 17-24 (see above)
31. Battery Holder for battery replacement type CR-2032, 3 volt. Battery does not function as long as AutoPhos controller is powered. Battery is for backup of the real time clock and BACnet control programs during a power outage. All other programming is held in non-volatile memory.
32. Battery Jumper disengages battery same as if removing the battery. See previous entry.
33. Analog Inputs 1-6 provides 6 inputs for accepting 0-5 VDC signals from photo sensors such as Lumisys LS5 series. Power (5V) and return (G) are also provided to power the sensors from the AutoPhos controller.
34. Not used on this control platform
35. AutoPhos Digital Addressable Switch Network Port receives the 4-wire (Belden #1502P or equivalent) network for addressable override switches. The terminal blocks can be removed from the AutoPhos controller for easy installation or for quick replacement of an AutoPhos controller.
36. Jumper for AutoPhos Digital Addressable Switch Network switches the port from between two modes. Typically never touched.
37. AutoPhos Digital Addressable Switch Network Rx,Tx and Busy LEDs show the network outbound/inbound communication and processor activity.

APK KIT EXAMPLE:



Relay Wiring



An Example of a APK kit (APK2). The Expansion kit is an optional expansion from 32 relays to 60 relays. Note that the APK4 is standard with 30-relay interface expandable to 60-relay interface with optional expansion kit.

The APK (AUTOPHOS RETROFIT KIT) series provide the flexibility to mount anywhere within the low voltage section of the existing lighting control panel. APK's do not fit all panels that contain compatible relays. Appendix A illustrates electronic board mounting configurations for most panels that are compatible with APK's. Some legacy panels are not listed. If your installation contains panels not included on these pages, please contact Kele, Inc to determine if your panels are compatible. If you are upgrading a panel that is listed in Appendix A, you may use the mounting configuration illustrated for that panel to obtain a mounting location and orientation for each board of the APK. The mounting configurations shown there are recommendations and do not have to be followed. The configurations were developed using certain parameters that determine where and how APK's are installed in the lighting panels. Directions for installing the modules within a relay panel follow.

The APK4 distinguishes Board A and B differently (B ordered separately as APK4X for up to 60 relay outputs) from the APK2, APK3, and APK5 series kits. Board A possesses two ribbon cable sockets: a 14-pin socket labeled “CPU” for communications with the AUTOPHOS Controller AUTOPHOS, and a 20-pin socket,

labeled “AUX OUT”, to communicate with Board B. Board B possesses only one ribbon cable socket for input from Board A. Refer to the APK4 installation for each board.

Removing the Existing Lighting Control System

WARNING! Switch OFF high voltage power to the existing lighting control relay panel before conducting any procedures described below

1. Cut existing low voltage wiring. Do not cut existing relay control wires too short. Wires can be cut as needed later when connecting them to the interface boards. See section, “Connecting Relays” on page 11.
2. Unbolt and remove existing controller electronics.

Mounting Electronic Boards Within the Relay Panel

CAUTION! The installer should be grounded before handling any electronic circuit boards. Static discharge can damage sensitive components. Handle carefully as components are also fragile.

1. Determine the mounting orientation and location of all electronic boards.
2. Use Appendix A or the guidelines listed to determine the best configuration to mount the modules within the panel.
3. Mount the AUTOPHOS Controller with its plate into the relay panel. Using the mounting holes provided in the plate, install the AUTOPHOS Controller into the panel using self-tapping screws. Keep the board clear of any metal shavings.
4. Mount interface Board A into the relay panel. Mount Board A in the position and orientation determined in Step 1. As with the AUTOPHOS CONTROLLER, Board A contains four mounting holes. Use self-tapping screws. Keep the board clear of any debris or metal shavings during installation.
5. Mount interface Board B (if required) into the relay panel. Follow the same procedure as with Step 3 for Board A.

Connecting Ribbon Cables

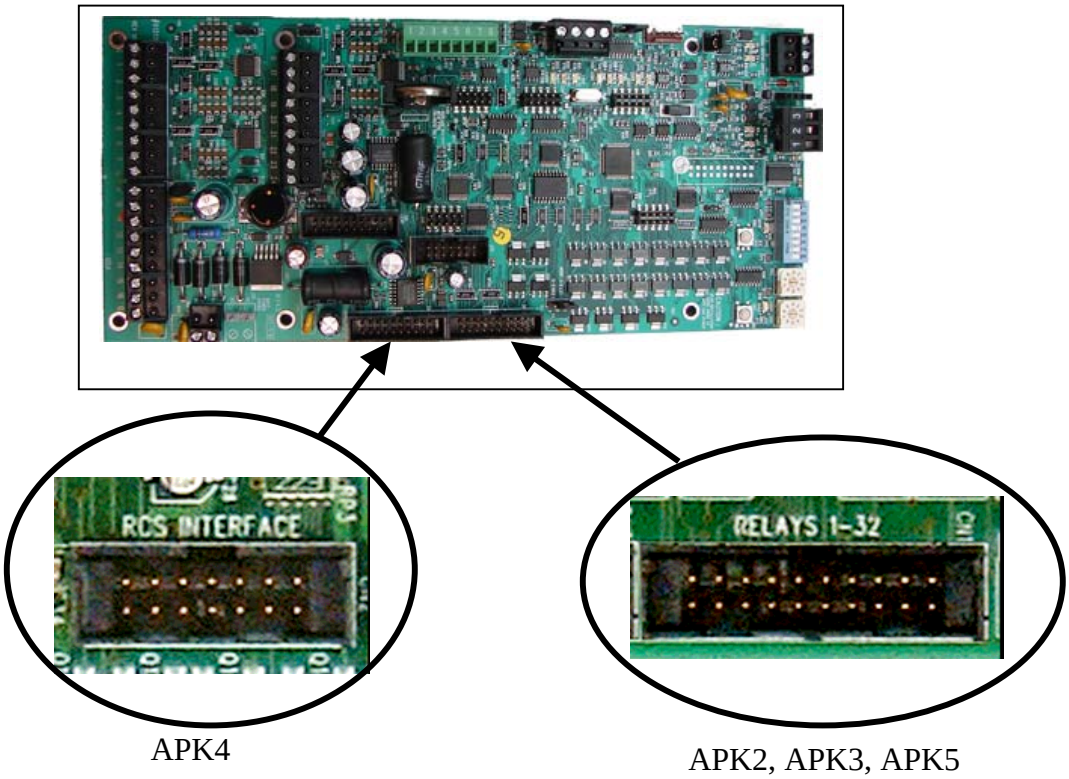
Each conversion kit is supplied with its own ribbon cable set. The pin count for each ribbon cable varies with each kit model. Pin counts and lengths of the cable are provided in Table 2 below.

TABLE 2		Length (Inches)	Length (Inches)
Product Code	Pin Count	AUTOPHOS Controller to RIB-A	RIB-A to RIB-B
APK2	16	16	18
APK3	20	16	18
APK4	14	6	N/A
APK5	16	16	18

CAUTION! Disconnect power from AUTOPHOS CONTROLLER before installing or removing APK-kit ribbon cables. Failure to do so could result in board and/or relay damage.

I**MPORTANT:** Ribbon cable connectors are keyed to fit slots on corresponding connector sockets on electronic boards. Do not force connectors into board sockets in the wrong orientation. Be sure keys and slots match. Do not insert the connector at angle to avoid damaging pins within the socket.

1. If you have already connected power to your APK-kit, disconnect power.
2. Refer to Figure 1 for 24 VAC power location to your AUTOPHOS CONTROLLER.
3. Verify ribbon cable pin counts according to Table 2. Verify that your cable has the correct pin count before attempting to install the cable. Generally, the ribbon cables are not hot-swappable under power.
4. Refer to Figures 3. Insert ribbon cable connectors into appropriate sockets. APK2, APK3, and APK5 series kits come with one 34" daisy chain ribbon cable. This ribbon cable possesses three female connectors: one for the AUTOPHOS Controller and one for each interface board. To connect ribbon cables for APK2, APK3, and APK5 kits, connect the end connector of the 16" section of cable into the AUTOPHOS Controller socket labeled "RELAYS 1-32". Next plug the middle connector into RIB-A into the socket labeled "1-16". Connect the last connector into the Board B socket labeled "17-32".



APK4 APK2, APK3, APK5

FIGURE 3

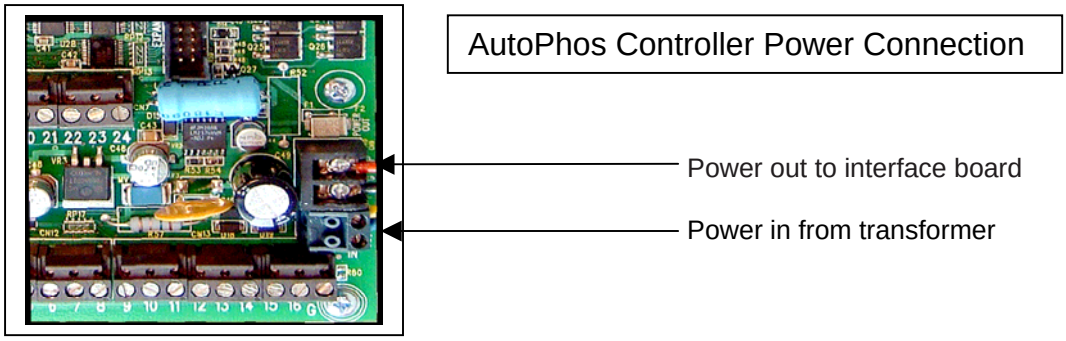
The APK4 comes with 2 separate ribbon cables (see Table 2 and associated note). Connect one end of the 14-pin, 6 inch cable into the socket on the AUTOPHOS Controller labeled "RCS INTERFACE" (Figure 3). If your application requires expansion cable Cat #235018, insert the male end of the expansion cable connector into the other end of the 6 inch cable. Connect the female end of the expansion cable into the socket labeled "CPU" on RIB-A (see APK4 Wiring). If you are not using the expansion cable, connect the other end of the 6 inch ribbon cable into the socket labeled "CPU" on RIB-A (see Figure 1c). Connect one end of the 20-pin cable into the socket labeled "AUX OUT" on RIB-A, and connect the other end into the corresponding 20-pin socket on RIB-B. Refer to Figure 11A. Also refer to **APK4 Power connections** that follow.

Connecting Power to AUTOPHOS Controller Board

All APK-kit require 24VAC power supply. For transformer power requirements refer to Table 3. Power wires from the transformer should be 18 AWG stranded.
A terminal block is provided for incoming power connection to the controller. This terminal block is located near the switch inputs at the bottom right of the controller. See Figure 16. All APK-kit transformer to controller power connection locations are the same.

1. Terminate power wires onto provided terminal block.
   Remove the terminal block from the location given in Figure PWR.
   Terminate wires as shown.
2. Place terminal block onto location given in Figure PWR.
   Before plugging power into the AUTOPHOS Controller ensure that the proper transformer is used (see Figure 6). Once power is supplied to the AUTOPHOS CONTROLLER, LED1 should blink, indicating normal operating status. If this is not the case, be sure all power wires are

Figure PWR



Connecting Power Wires between AUTOPHOS Controller and RIB Interface Boards

APK2, APK3, and APK5 interface boards receive their power through the ribbon cable. They do not need separate power wire connections. APK4 will require separate power connections as discussed below.

Note: All APK-kits, *EXCEPT* the APK4, require 30VA transformer minimum to supply power. APK4 requires 40VA minimum. For reference, use Table 3 for power requirements for each APK-kit.

TABLE 3

Product Code	Transformer
APK2	30VA minimum
APK3	30VA minimum
APK4	40VA minimum
APK5	30VA minimum

APK4 Relay Board Power connections (not required for APK2, APK3, APK5)

The APK4 does not supply power through the ribbon cables; it requires separate power wire connections to each RIB. Instructions for connecting power wires for the APK4 follow. See Figure 3 for power connections. Power wires should be 18AWG stranded. The APK4 uses a two-wire power supply. Power is routed from the transformer to the AUTOPHOS CONTROLLER, and then it is daisy chained from the AUTOPHOS Controller to RIB-A and then to the optional RIB-B (APK4X). The 'power out' connections on the AUTOPHOS Controller and RIB-A use a non-removable terminal block and 'power in' connections use a removable 2-pin terminal

block. Since RIB-B is the last board in the chain, there is no need for an outgoing power connection. Therefore, it does not have a non-removable block.

1. Obtain and cut wires for power connections between APK4 boards. Use a different color for each wire. The length of wires needed depends on the orientation of the RIBs when mounted. Cut a section of the two wires long enough to connect power terminals RIB-A and RIB-B. The remainder can be cut as needed for the connection between AUTOPHOS Controller and RIB-A.

2. Terminate wires. Wire termination points are labeled “P” for power and “G” for ground. Terminate one wire between “P” on the non-removable terminal block and “P” on the removable terminal block on other board. Use the same color for all “P” connections between the boards. Then, connect the wires between “G” points. Follow this procedure for all power connections between boards. The power connection to RIB-A and between RIB -A and RIB-B is highlighted in Figure 4. For power-out and power-in connections on the AUTOPHOS CONTROLLER, see Figure 1.

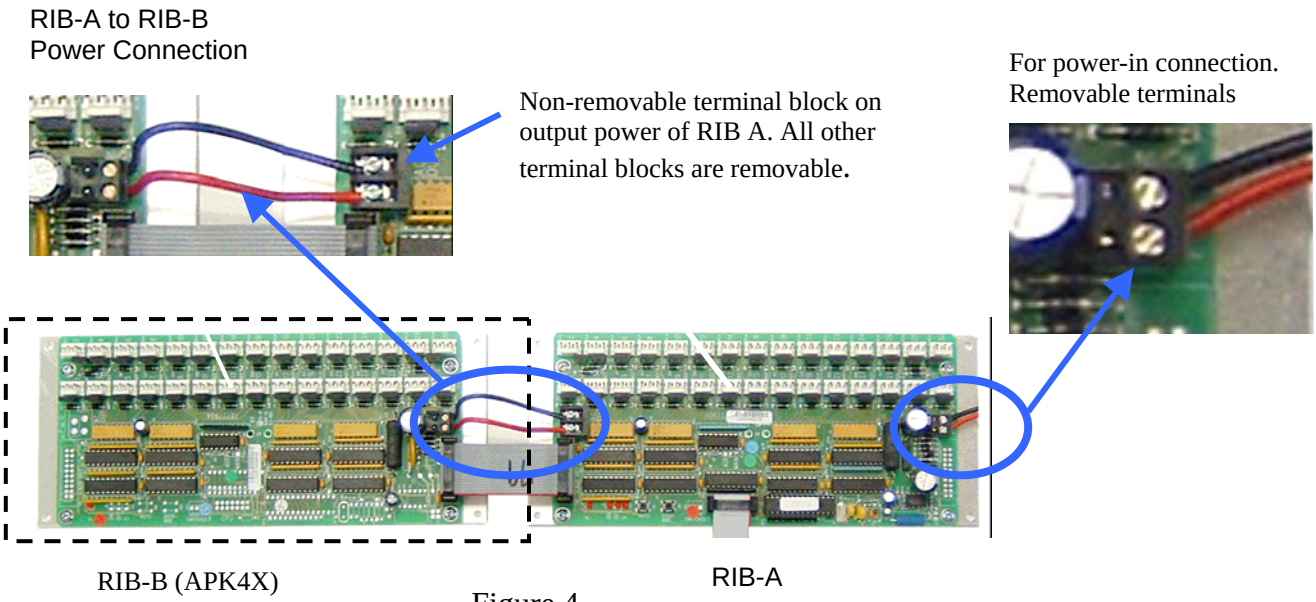


Figure 4

CONNECTING RELAYS

OPTIONAL PIGTAILS FOR APK3, APK4, and APK5

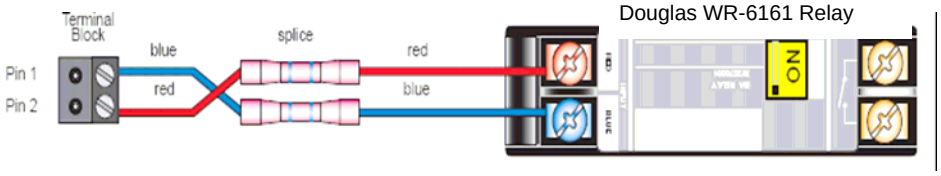
Using the optional pre-assembled pigtails will reduce labor cost and installation time.

Part Number	Description
APKPT3	12", 3-Wire Pigtail for use with APK3
APKPT4	12", 4-Wire Pigtail for use with APK4
APKPT5	12", 5-Wire Pigtail for use with APK5

APK2 CONNECTING RELAYS

The APK2 is designed to interface with Douglas, Aromat, and Matsushita relays. Unlike the APK3 and APK5, the APK2 uses a 2-wire terminal block connection. Use appropriate length of 20AWG 600V stranded color coded wires for interface communication with the relays (Figure 5 gives recommended colors for interface wires). Kele, Inc recommends the use of butt splice connectors to connect relay wires to the interface wires.

Figure 5



1. Obtain two pieces 20 AWG stranded wire and two butt splice connectors.
2. Splice wires according to Figure 5 (Start with relay #1).
3. Insert blue wire into pin #1 on provided terminal block in relay position 1 and the red wire into pin #2. Figure 6A shows the pin layout of the RIB board. Notice how Pin 1 and Pin 2 swap positions when comparing inputs on the two sides of the board.
4. Be sure connector is seated over both pins. Use Figure 6A, 6B, and 6C to properly install the terminal block. Repeat Steps 1 through 3 for all relays.

APK2 RIB Pin Layout

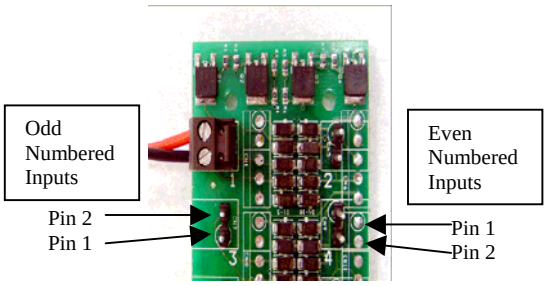


Figure 6A

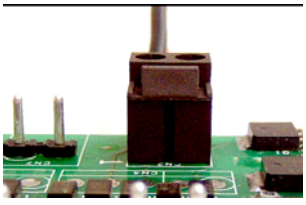


Figure 6B

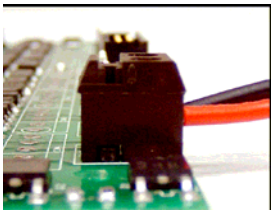
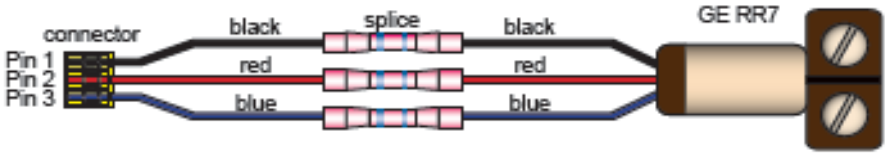


Figure 6C

APK3 CONNECTING RELAYS

The APK3 is designed to convert relay panels containing GE RR7 or ILC 2R7 relays. Both relay types use 3-wire control. Relay wires connect to the APK-kit relay interface board. Butt splice connectors are provided to connect the relay wires to the pigtails (Refer to figure 7). This kit comes standard with pigtails and butt-splice connectors. Special timesaving pigtails may be ordered. Refer to the following section for installation details.

Figure 7



1. Starting with relay #1, use butt splice connector to splice each wire of the relay to that of the pigtail.
2. Insert the pigtail connector onto relay interface board.
3. Pay attention to relay numbering. Relay #1 should be connected to pins for relay #1 on the interface board. Connect as shown in Figure 8A, 8B and 8C. Continue in order for all relays 1-16 on RIB-A. Relays 17-32 connect to positions 1-16 on RIB-B.

APK3 RIB Pin Layout. Properly installed connector

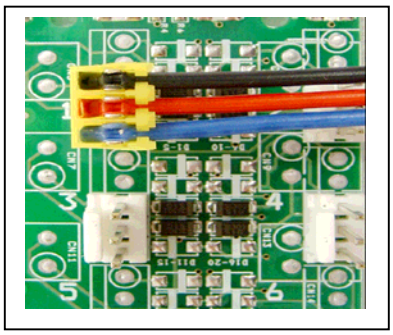


Figure 8A

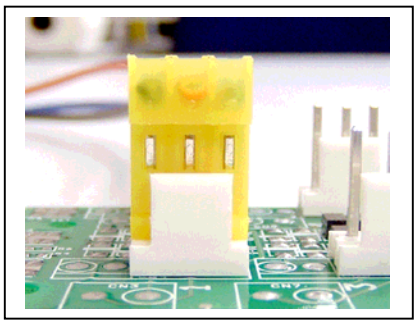


Figure 8B

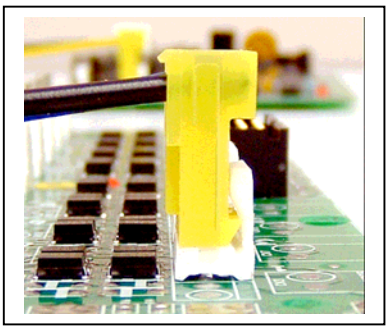


Figure 8C

Installing Time-Saving Pigtails for APK3 Installation and Wiring Instructions

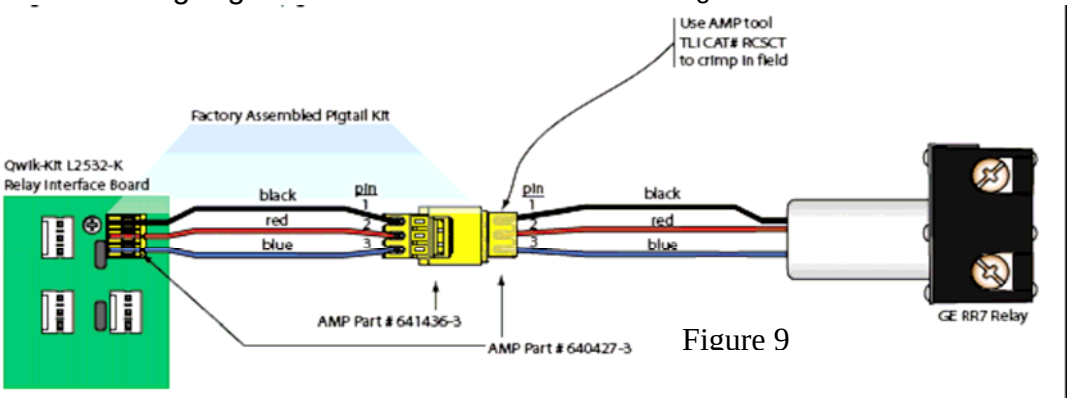


Figure 9

1. Cut existing relay wires as close to the connector (far from the relay) as possible to maximize relay wire length.

Pin Color
1 Black
2 Red
3 Blue

2. Crimp AMP connector Part # 640427-3 onto the relay wires in order of:
3. Insert female connector (Part # 641436-3) of provided pigtail onto relay connector crimped in step 2.
4. Plug connector at other end of pigtail onto the interface board.

APK4 CONNECTING RELAYS

The APK4 interfaces with Microlite MLR-020 and Touchplate 3000 relays. MicroLite and Touchplate relays use 4-wire control. This kit comes standard with pigtails and butt-splice type connectors. Special time-saving pigtails with 4-wire connectors may be ordered. See Installing Time-Saving Pigtails for APK4 (the next page in this document) for additional details. In order to interface with these relays, the four wires of the relay must be spliced into three wires from the APK4 pigtails. Figure 10 shows how to splice the wires correctly. Both relay types use two yellow wires with each wire paired with a red or brown wire. Figure 10 is consistent with that arrangement. Do not swap the two yellow wires of the ML relay.

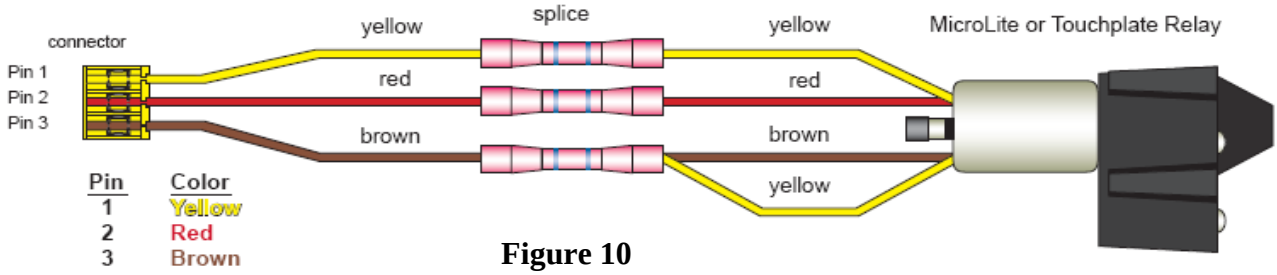


Figure 10

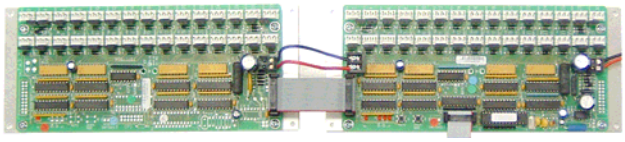
1. Beginning with relay #1, splice each wire of the relay to that of the pigtail. Refer to Figure 11B.
2. Insert the connector onto its terminal on the interface board. Be sure the connector of the pigtail is inserted in the proper orientation. Figure 11B gives the pin layout of the RIB boards. This pin layout holds for all inputs.
3. Continue in order for all relays 1-30 on RIB-A. Relays 31-60 connect to positions 1-30 on RIB-B.

The APK4 distinguishes Board A and B differently (B ordered separately) from the APK2, APK3, and APK5 series kits. Refer to Figures 11A and 11B. Board A possesses two ribbon cable sockets: a 14-pin socket labeled “CPU” for communications with the AUTOPHOS Controller, and a 20-pin socket, labeled “AUX OUT”, to communicate with Board B. Board B possesses only one ribbon cable socket for input from Board A. Figure 11B illustrates each board.

APK4 RIB A & Optional B

RIB B (optional) RIB A

Figure 11A



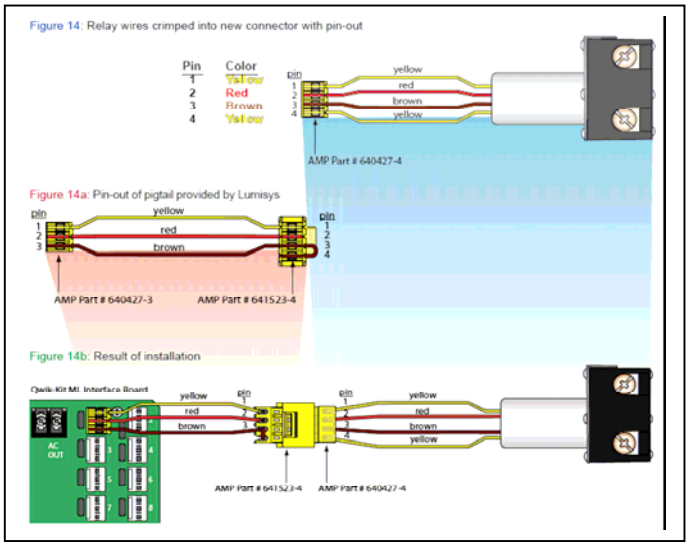


Figure 11B

APK5 CONNECTING RELAYS

The APK5 is designed to interface with the GE RR9 and ILC 2R9 relays. These relays use 5-wire control. Relay wires connect to the APK-kit relay interface board. Butt splice connectors are provided to connect the relay wires to the pigtails. See Figure 12B for wire schematic. This kit comes standard with pigtails and butt-splice connectors. Special timesaving pigtails may be ordered.

Starting with relay #1, splice each wire of the relay to that of the pigtail. Refer to Figure 12A, 12B, 12C. Insert the pigtail end connector onto relay interface board.

APK5 RIB Pin Layout

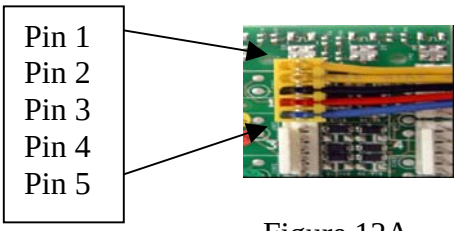


Figure 12A

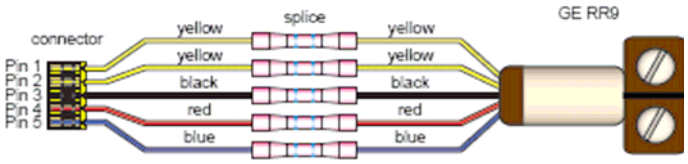


Figure 12B

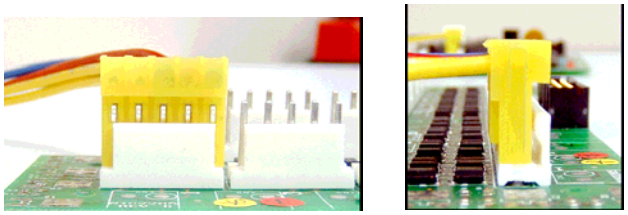


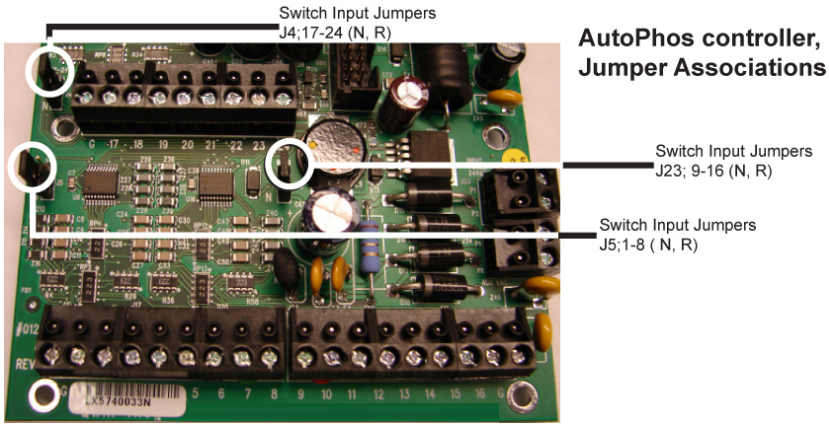
Figure 12C Properly Installed APK5 Connector

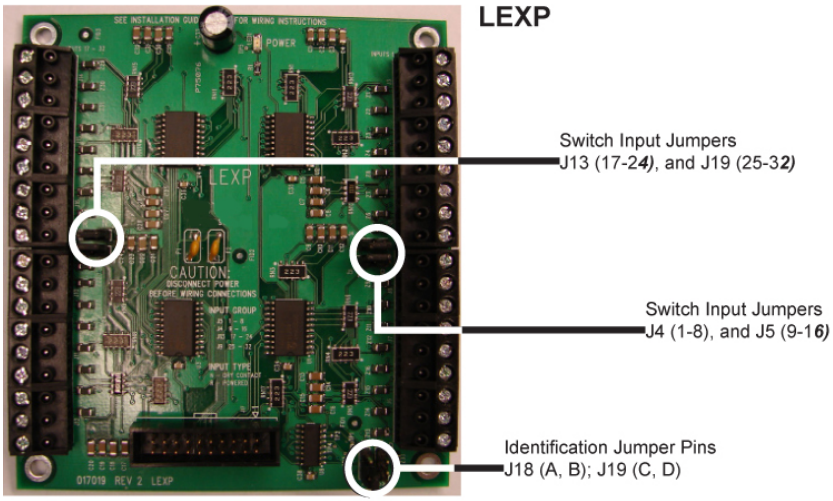
1. Starting with relay #1, splice each wire of the relay to that of the pigtail. Refer to Figure 7.
2. Insert the pigtail end connector onto relay interface board.

Be sure the connector is seated over all 5 pins. Use Figure 8, 9A and 9B to ensure the connector is installed properly according to the boards pin layout. All relay connectors are installed in the same orientation. Continue in order for all relays 1-16 on RIB-A. Relays 17-32 connect to positions 1-16 on RIB-B. Use zip ties to organize and neaten the wires.

Switch Inputs and Jumpers on AutoPhos controller and LEXP

Switch input connections are made on the AutoPhos controller main processor card, The AutoPhos controller. The AutoPhos controller comes standard with 24 programmable inputs. Input expansion cards (LEXP) increase input capacity and are higher in increments of 32. Note LEXP cards are jumper addressed A, B, C and D at the factory. Always power down the AutoPhos controller before connecting or removing card. *Never Hot Swap*





The inputs can be set in software as Momentary on, Momentary off, Momentary on/off, Maintained, Linked, or State change. Each section has an accompanying jumper that sets whether its associated eight inputs will be up to 24 VDC or dry (0 VDC).

Each jumper set has 3 pins, one of which is labeled “N”. The “N” jumper is for setting the switch inputs for dry contact. The “up to 24” pin of the jumper pin is not labeled. Figure 4 shows how to place jumpers properly.

The jumper must be set before wiring.

Note If one switch input is dry, the entire section of eight switch inputs must also be dry contacts, and the associated jumper must be in the “dry” position. If one switch input is externally powered 5 to 24 VDC, the entire section of eight switch inputs must also be 24 VDC, and the associated jumper must be in the “24” position.

CAUTION! Before handling any components on the circuit board, the installer should be grounded to prevent damaging the board.

1. Disconnect power to the controller.
2. Remove the power harness on the controller by lifting on its terminal block.
3. Set jumpers.
4. See explanations and Figure 15 and Table 4 above.
5. Connect the switches to the controller.
6. Connect one end of the switch or contact to terminal “G” and the other to any terminal 1-24. Momentary switches which have both an On and Off contact will require two switch inputs on the controller. See Figure 15 for sample wiring diagrams for each input type. Switch input terminal blocks are screw type. Land wires by unscrewing, inserting the stripped wire, and tightening the screw.
7. Reconnect power to the controller.

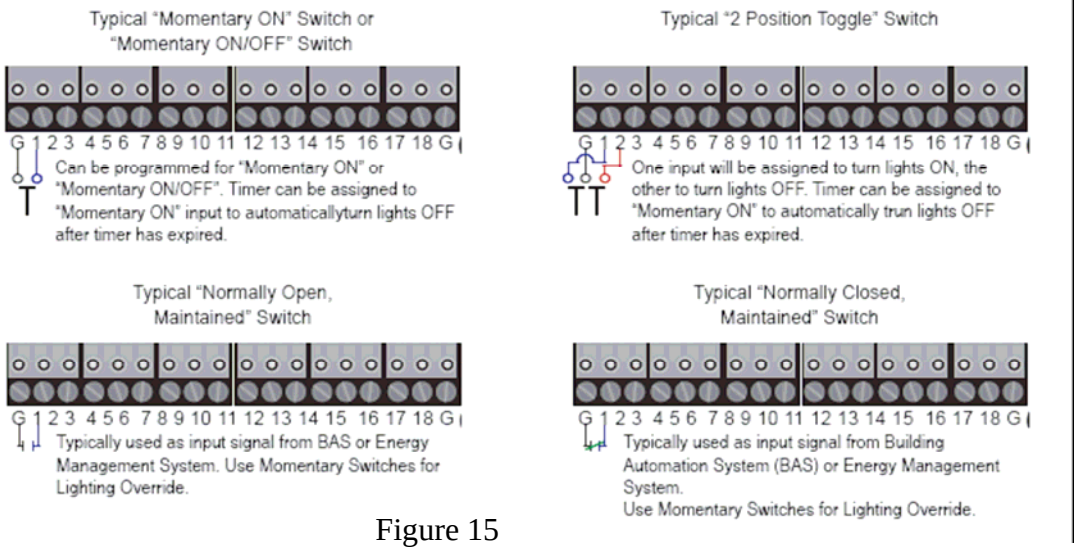


Figure 15

CAUTION! The AutoPhos Controller is an electrostatic sensitive device. Before handling any components on the circuit board, the installer should be grounded to prevent damaging the board.

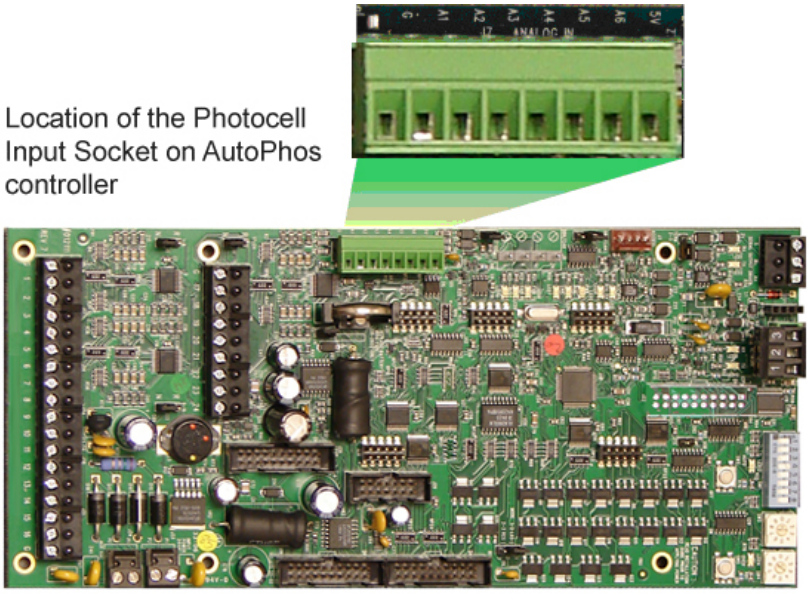
Process for changing Jumper Settings Safely

1. Remove power to the controller. Remove the yellow/blue power harness by lifting on its terminator block.
2. Set jumpers.
3. Connect the switches to the controller. Connect one end of the switch or contact to terminal “G” and the other to terminal “1-24”. Momentary switches which have both an ON and OFF contact will require two switch inputs on the controller. Switch input terminal blocks are screw type. Land wires by unscrewing, inserting the stripped wire, and tightening the screw.
4. Reconnect power to the controller.

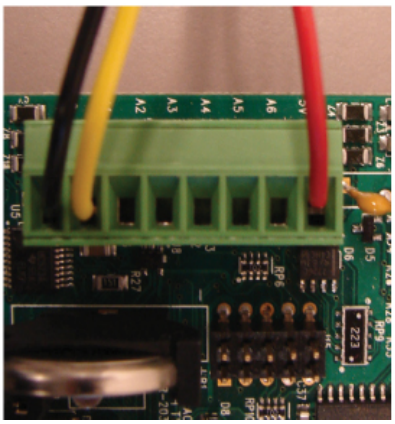
Analog Inputs

The AutoPhos controller comes with six inputs for the Analog type, 3-wire, 0-5 volt photocells. The photocell is powered by 5V from the AutoPhos controller. The power circuit includes the Red (5V hot) and the Black (ground) wires. The yellow wire carries the 0-5V input signal from the photocell which is then scaled to a value used by the Panel Configuration Software (Part #: APSoft).

Location of the Photocell Input Socket on AutoPhos controller



Example of single photocell installed on AutoPhos controller



1. After installing the Photocell, splice extension wires to photocell wires. If possible use the same color wires provided with the photocell. A maximum of 500 feet of wire total is allowed, measured from the photocell to the AutoPhos controller socket. Use 18-22AWG wire.
2. Remove power from AutoPhos controller.
3. Join red wires from all sensors into pigtails and terminate in single termination point mAPKed “5V” on AutoPhos controller main board.
4. Connect each yellow signal wire from each sensor into individually mAPKed A1-A6 on AutoPhos controller main board.
5. Join black wires from all sensors into pigtails and terminate in single termination point mAPKed “G” on AutoPhos controller main board.
6. Reconnect power to the AutoPhos controller.

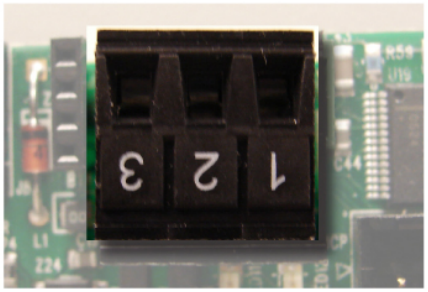
Connecting the RS-485 Network. Configuration Details
EIA-485 Port and BTS485 Socket

The APK-kit is capable of being networked to a Building Automation System over a two or three wire RS-485 communication network. A terminal block is provided to connect the two communication wires plus the shield wire. (Refer to Figure 16). Use 18 AWG stranded 600V insulated wire. The RS-485 connection location and labeling is illustrated in Figure 16.

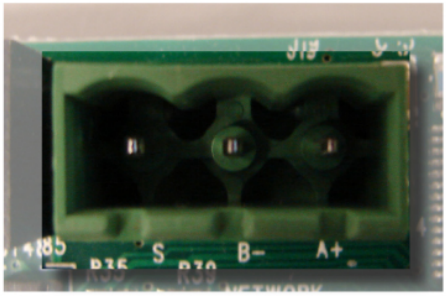
1. Disconnect power to the APK-kit AUTOPHOS CONTROLLER.
2. Connect incoming and outgoing transmit “+” to “A+” on the RS-485 connector. As with switch inputs, a screw type terminal block is provided.
3. Connect incoming and outgoing transmit “-” to “B-” on the RS-485 connector.
4. When a shield wire is used, either splice incoming and outgoing shield wires together or connect to “S” on the RS-485 connector.
5. Reconnect power to the AUTOPHOS CONTROLLER.

The AutoPhos controller is capable of being networked to a Building Automation System over a two or three wire EIA-485 communication network. A terminal block is provided to connect the two communication wires plus the shield wire. (EIA-485 wires are not provided by default.) Use 18 AWG stranded 600V insulated wire, twisted pair with shield. The EIA-485 connection location and labeling is illustrated in Figure 17.

EIA-485 Connector Input Detail



EIA-485



W/O Block; showing shield, (-) and (+) pins

Figure 17

Using the Dip and Rotary Switches. Refer to Figure 18

* AutoPhos controller must be power-cycled for changes to take effect

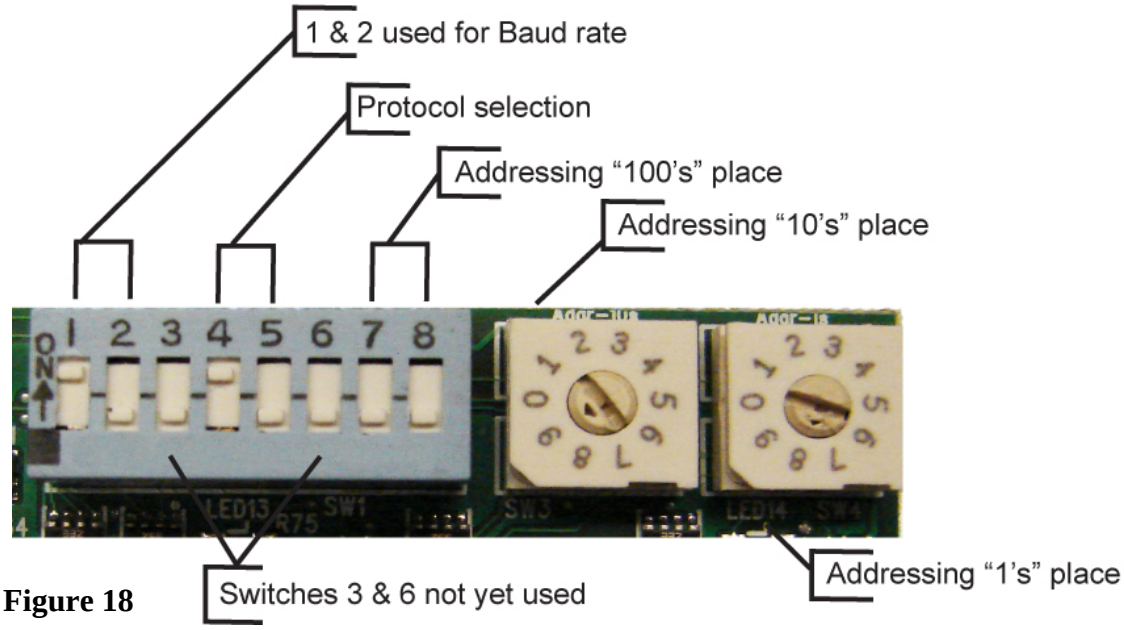


Figure 18

Addressing - Dip switches #7, #8 and Rotary Switches

For addressing 1-99, just use the rotary switches:

SW3 is the 1's. SW4 is the 10's. Leave dip switch #7 and #8 down, (Off).

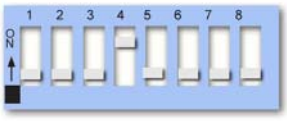
For address 100-255, add the dip switch settings:

Dip switch 7 On = 100

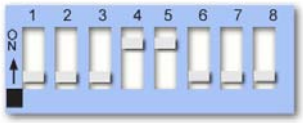
Dip switch 8 On = 200 (#7 is ignored when #8 is On)

Protocols - Dip Switches #4 and #5

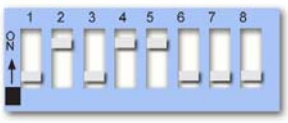
ASCII Protocol - **N2 (at 9600 BAUD)**



BACnet MSTP Protocol (**at 9600 BAUD)**



BACnet MSTP Protocol (**at 19200 BAUD)**

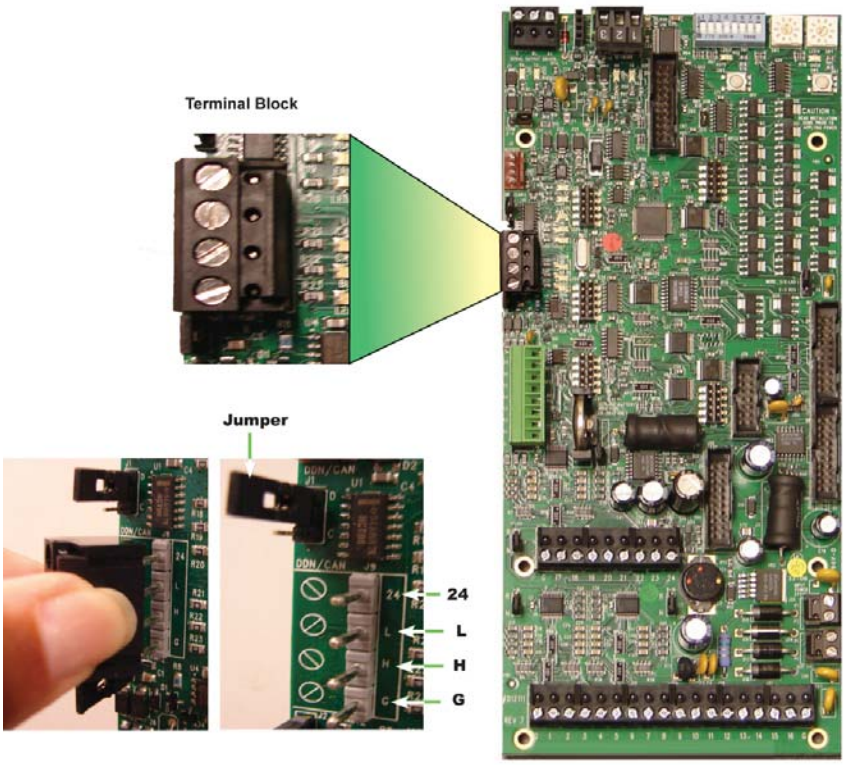


BACnet MSTP Protocol (**at 38400 BAUD)**

BACnet MSTP (**at 76800 BAUD)**

AutoPhos Addressable Switch Network Port and Jumpers

Make all connections before applying power to the AutoPhos controller main board. Connect the network of switches to the AutoPhos controller port mAPKed DDN/CAN and set the jumper to DDN (upper 2 pins) as shown in picture below. Remove terminal block to view PCB mAPKings designating pins " 24, I, H, and G". The AutoPhos controller can be used to loop power up to 8 two button AutoPhos Addressable Switch Network switches or up to 16 one-button AutoPhos Addressable Switch Network switches. For higher quantities of switches, use 24VCD auxiliary power supply.



OPTIONAL EXPANSION PARTS

Part Number	Description
APK2X	Expands APK2 up to 60 relay control
APK3X	Expands APK3 up to 60 relay control
APK4X	Expands APK4 up to 60 relay control
APK5X	Expands APK5 up to 60 relay control

APK2X, APK3X, and APK5X. These kits extend the APK to drive 28 more relays. The parts consist of another A and B card, mounting plates, pigtails and cable as in the basic 32 output kit. (see Appendix B) The extender cards are cabled the same way as the basic cards. The ribbon cable is plugged into the second socket on the AUTOPHOS Controller labeled "Relays 33-60". The second A card is labeled 1-16 but services relays 33-48. The second B card is labeled 17-32 but services relays 49-60.

APK4X

These kits extend the APK4 to drive 30 more relays. The extended B RIB card is cabled in a similar way as the basic A RIB card. The parts consist of another RIB (RIB B) card and mounting plate, a 20-pin ribbon cable, pigtails and a short power connector.

Troubleshooting the AutoPhos controller

Symptom > **Outputs Will Not Turn On**

Check:

1. Verify power is connected to the AutoPhos controller. There should be LEDs illuminated.
2. Verify there is at least 24 VAC present to the secondary of the transformer supplying power to the AutoPhos controller. Use a voltmeter to check the power.
3. Check to see if Maintained input priority for the group to that is not responding to control commands is not set to Maintained Off Priority or Maintained On/Off Priority.
4. Verify that the output ribbon cable connector is properly seated.
5. Press the OVER push button to see if all the relays will turn on. If so, then the output portion of the AutoPhos controller is operating properly.
6. Verify that the connector to output (relay or Circuit breaker) is properly seated.
7. Use APSoft to verify that the AutoPhos controller sees the input change state. Use an alligator clip or shorting wire to test the input terminal by shorting the input to “G”. An X should appear on the APSoft View Input State screen.
8. Verify the input jumpers are in the correct location.

Symptom > **Controller not Communicating or Communication LED TX / RX Not Blinking**

Check:

1. Verify the APSoft cable or network cable is connected correctly.
2. If you are using APSoft verify that the correct communication port is selected.
3. Verify the AutoPhos controller is addressed properly.

Symptom > **System Status LED 2 not ON**

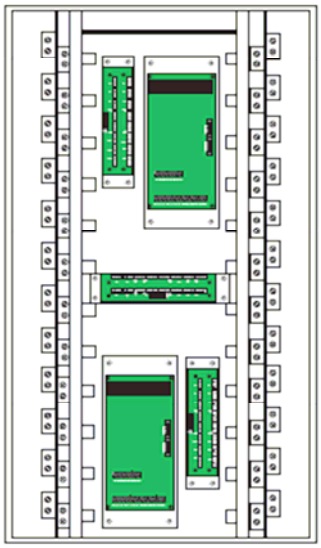
Check:

1. Verify power is connected to the AutoPhos controller. There should be LEDs illuminated.
2. Verify there is at least 24 VAC present to the secondary of the transformer supplying power to the AutoPhos controller.
3. Use a voltmeter to check the power.

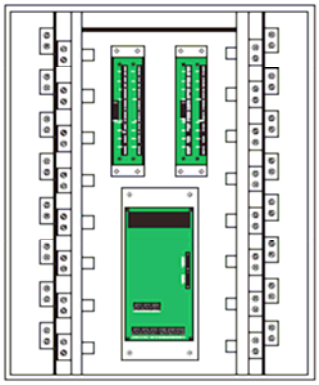
Appendix A: APK Compatible Panels and Mounting Configurations

Lithonia Lighting Panelmax 1000 with GE RR7 or RR9 type relays

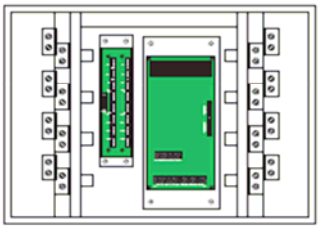
LCP1 LV 48



LCP1 LV 32

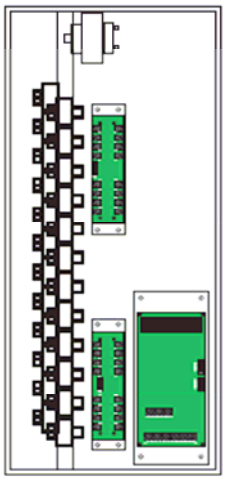


LCP1 LV 16

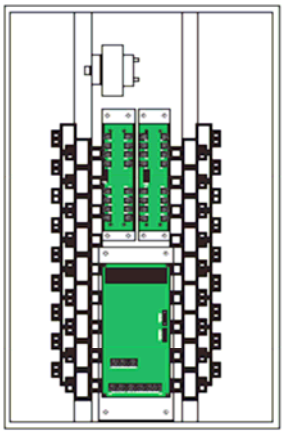


Douglas Lighting Controls with WR-6221 type relays

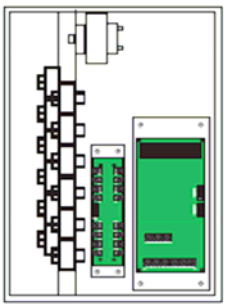
WE2-C24B



WE3-C36B - Kit compatible with 32 relay configuration only



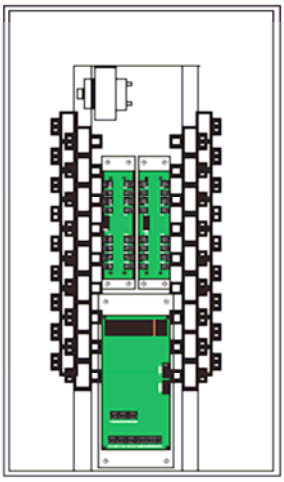
WE1-C12B



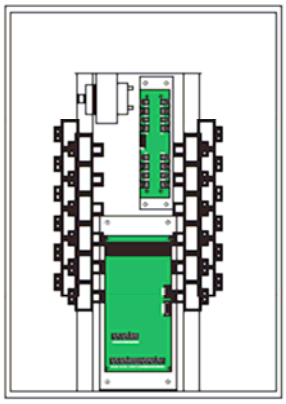
Appendix A (Cont): APK-kit Compatible Panels and Mounting Configurations

Douglas Lighting Controls with WR-6221 type relays (Continued)

WE4-W36B - Kit compatible with 32 relay configuration only

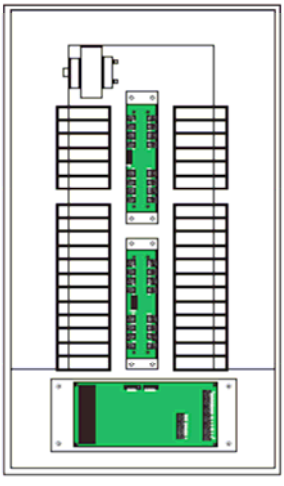


WE3-W24B

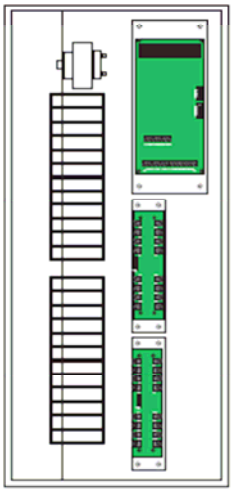


Douglas Lighting Controls with WR-6161 or WR-6162 or WR-6172 type relays

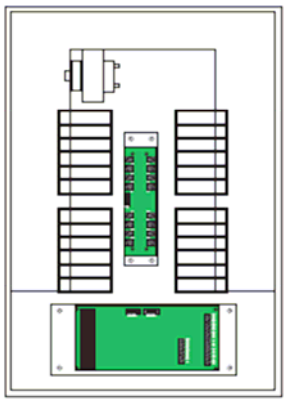
PWE4-W36M - Kit Compatible with 32 pole configuration only



WE2-C24M



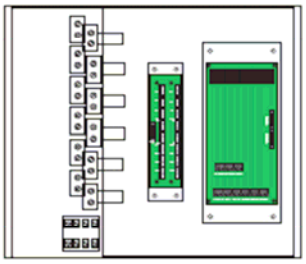
PWE3-W24M - Kit Compatible with 16 pole configuration only



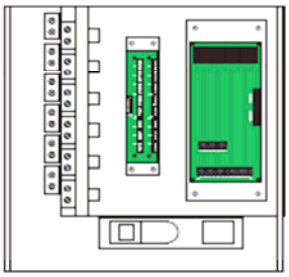
Appendix A (Cont): APK-kit Compatible Panels and Mounting Configurations

GE, Wattstopper/Horton Controls relay panels with GE RR7 or RR9 type relays

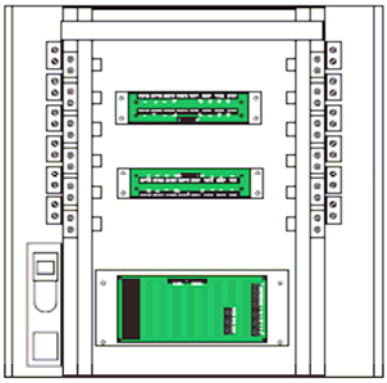
Wattstopper LP8 Peanut Panel



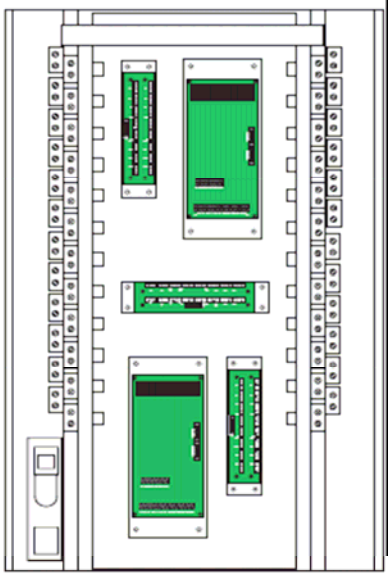
Wattstopper - HTUB12 with HINxxy12BC
GE - RTUB12 with RINTER0012RC



Wattstopper - HTUB24 with HINxxy24BC
GE - RTUB24 with RINTER0024RC



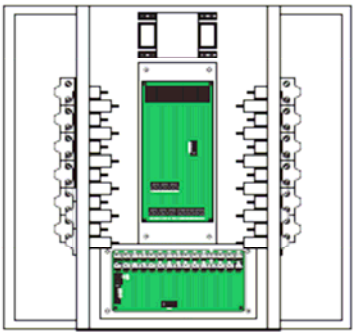
Wattstopper - HTUB24 with HINxxy24BC
GE - RTUB48 with RINTER0048RC



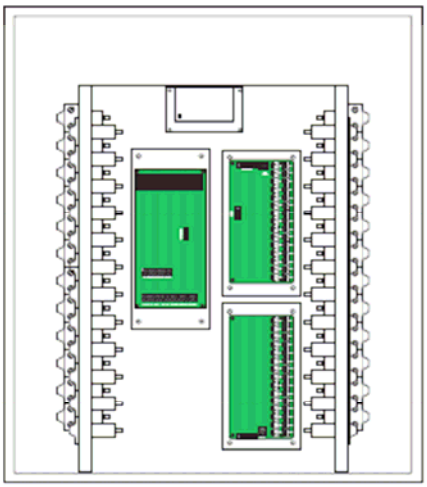
MicroLite 600 and 1000 Series Panels with MLR-020 relays

Note: Qwik-Kit™ L2930-K installation within a 600H/1000H panel requires ordering an extension ribbon cable Cat #235018.

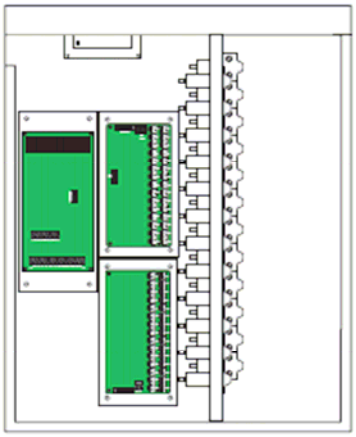
600/1000H Panel



600M / 1000R Panel



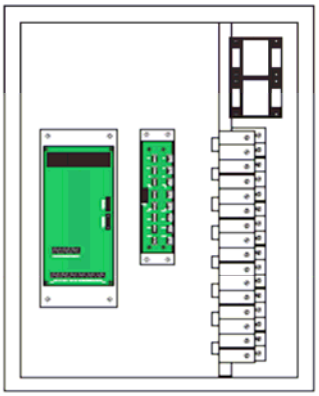
600/1000P Panel



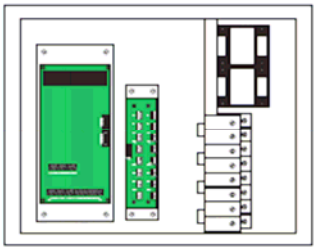
Appendix A (Cont): APK-kit Compatible Panels and Mounting Configurations

ILC LightMaster Panels with 2R7 or 2R9 relays

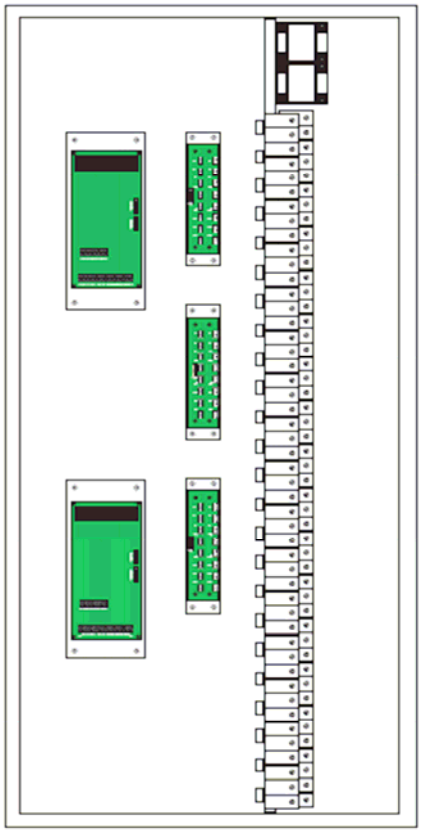
LM-16-16



LM-08-08



LM-40/48-40/48



LM-24/32-24/32