# PRC-E Series Instruction Manual

**Effective August 2015**



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*Powering Business Worldwide*

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# Contents

## Notes and warnings

- Read this guide completely and carefully prior to any installation

- Failure to follow the instructions or the prescribed procedures may cause severe injury or death and/or damage to the equipment

- Qualified personnel or service technicians must perform all installation and service. Keep this guide available for those responsible for installation, programming, operation, and maintenance of the system

- All installation and wiring information contained herein is based on industry-accepted standards and practices. This information is not intended to conflict with or overrule any applicable codes or ordinances. If conflicts exist, please contact your Eaton sales office before proceeding with the installation

- Use extreme caution when servicing the system. Dangerous voltages may exist inside the units. Failure to follow any or all warnings and instructions contained herein may cause severe injury or death and/or damage to the equipment

- Some Pow-R-Command™ panelboards may be shipped from the factory with the electronic boards installed and tested. Many of the electronic components may be sensitive to static electricity. Do not handle electronic parts without proper electrostatic protection

- Document all wiring, device termination, and locations. This information will be required for system startup and programming

- Under no circumstances should any of the procedures described herein be performed on a panelboard that is powered up. Qualified personnel should perform power-up, programming, and system configuration during the system startup

- The instructions and prescribed procedures in this Installation Guide do not purport to cover all possible contingencies that may arise during installation, nor does it cover all details and variations of the system. If further information is desired regarding the particular installation of the system, please contact your Eaton sales office

- The scope of this document is limited to the use of the Pow-R-Command components and software only. For OEM applications, also refer to the OEM operating and configuration instructions

# Introduction

## Pow-R-Command system description

Pow-R-Command is an intelligent lighting and load management system that integrates branch circuit protection, control, and metering into a single panelboard enclosure. The integrated components simplify the electrical distribution and control systems design, eliminating separate equipment enclosures and associated wiring. Other benefits include reducing equipment wall space, installation labor, and total installed cost. PRC is designed to meet or exceed ASHRAE, IECC, and LEED® requirements.

Pow-R-Command panelboards use Eaton Pow-R-Line 1a and 2a lighting panelboard platforms to mount PRC-E Series electronics and solenoid operated controllable circuit breakers. Panelboard mains include 100 A to 400 A in main lug and main circuit breaker configurations. Available voltages include 120/240, 208Y/120, and 480Y/277, single-phase and three-phase. Panelboard options include controllable and non-controllable circuit breakers, 200% neutral, metering and surge protection devices (SPD).

Pow-R-Command intelligent panelboards are assembled in Master and Expansion configurations. PRC-E Series Master panelboards are designed for standalone and networked systems. PRC components include controller with low-voltage power supply, Breaker Control Bus (BCB) and solenoid operated controllable circuit breakers.

PRC Expansion Panelboards (PRCEP) are designed to directly connect to PRC-E Series Master panelboards via controller SLAN communications. PRCEP includes Breaker Control Bus (BCB) and solenoid operated controllable circuit breaker. PRC-E Series systems are scalable using both Master and Expansion panelboards to provide the right amount of control with reduced installed cost. Each PRC-E Master intelligent panelboard is capable of controlling three additional, fully loaded PRCEP panelboards. A powered PRCEP (PRCEPP) panelboard is also available for applications where a PRCEP is greater than 150 feet away from the PRC-E Series controller. The PRCEPP panelboard is a PRC Expansion Panelboard with an integrated power supply to power the BCBs in the PRCEPP panelboard and any additional PRCEP panelboards within 150 feet. The SLAN daisy-chained from the PRC-E Series Master would continue to each PRCEPP/PRCEP panelboard.

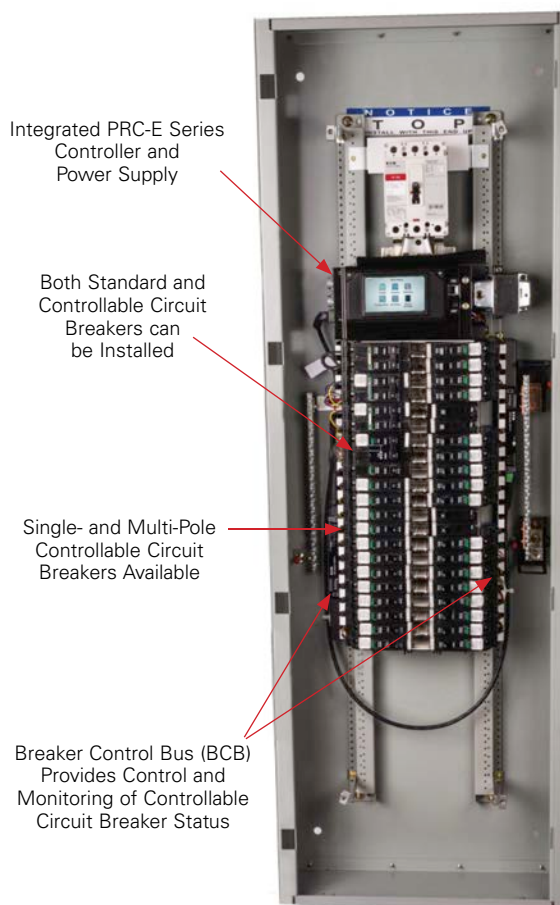**Figure 1. Pow-R-Command Intelligent Panelboard Components**



Integrated PRC-E Series Controller and Power Supply

Both Standard and Controllable Circuit Breakers can be Installed

Single- and Multi-Pole Controllable Circuit Breakers Available

Breaker Control Bus (BCB) Provides Control and Monitoring of Controllable Circuit Breaker Status

**Figure 2. Pow-R-Command Panelboard with Controller Connected to Three PRCEP Panelboards**



Master

PRCEP

PRCEP

PRCEP

SLAN    SLAN    SLAN
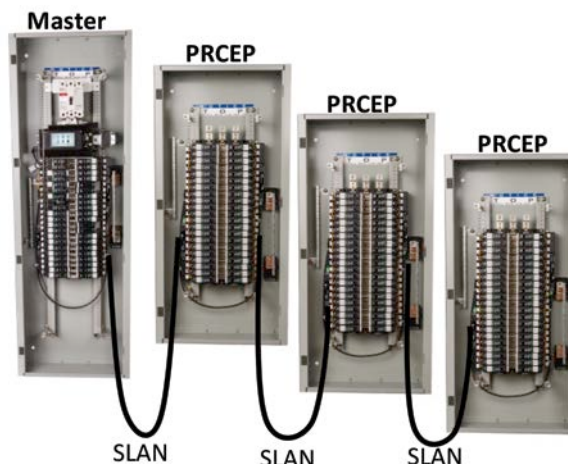
# Introduction

## System electronics

PRC2000E, PRC1500E, PRC1000E, and PRC750E controllers are referred to in this document. Specifiers and users select the controller to meet specific control and communication requirements. PRC-E Series controllers are provided in two basic configurations: integrated into Pow-R-Command intelligent panelboards and external controller cabinet.

PRC-E Series controllers include:

- Color LCD touchscreen for front panelboard programming, monitoring, and override control

- Time, occupancy, and override control

- Low voltage digital inputs to connect switches and occupancy sensors

- Analog inputs and outputs to provide dimming and daylight harvesting control (not available on PRC750E)

- Powerful peer-to-peer communications protocol to provide global commands (not available on PRC750E)

- RS-485 serial network communications (not available on PRC750E)

- PRC2000E/PRC1500E controllers include Ethernet network communications

- Local controller programming using Ethernet Maintenance Port to access controller Web pages or use Lighting Optimization Software

- PRC2000E model includes access to onboard Web pages over Ethernet network connection

- PRC2000E/PRC1500E controllers include BACnet/IP for straightforward integration with building management systems

- Ability to control up to 168 solenoid-operated controllable circuit breakers by connecting PRCEP panelboards using the controller SLAN sub-network communications port

The Pow-R-Command Breaker Control Bus (BCB) is the interface between controller and controllable circuit breakers for providing status and control. The BCB is available in 9-, 18-, and 21-circuit configurations. The required configuration would depend on the number of circuits in the panelboard. BCBs are mounted to the panelboard's interior rails and are connected to the controller's SLAN via a 4-conductor cable. Onboard circuitry signals the controllable circuit breaker solenoid to switch the circuit breaker ON or OFF. Each BCB is addressable from 1 to 8, allowing the controller to monitor and control up to 168 controllable circuit breakers. Pow-R-Command panelboard assemblies are configurable with a BCB on the left, right, or both sides of the panelboard to add flexibility in the system design.

## Controllable circuit breakers

GHQRD and BABRSP controllable circuit breakers include standard circuit protection and control. The solenoid-operated mechanism provides control, status, and a manual override. Controllable circuit breakers are available in 15–30 A, single- and two-pole configurations suitable for electrical distribution systems up to 480Y/277 Vac and 15–30 A single-pole and 15–50 A two-pole configurations for systems of 208/120 Vac and 240/120 Vac systems. Special application controllable circuit breakers include emergency lighting and plug load. Emergency controllable circuit breakers are used for controlling dual purpose emergency lighting circuits. Plug load controllable circuit breakers are designed to meet energy code requirements for switching 50% of receptacles OFF when a space is unoccupied. The intended use is in the split-receptacle applications where one outlet is switched and the other is unswitched. A factory-installed handle tie is used to meet the common disconnect NEC® requirement for shared-neutral circuit.

## Accessories

Pow-R-Command system accessories include the PRC Digital Switch (PRCDS) and the PRC Low Voltage Switch (PRCLS). These switches provide local occupant override and light level scene control. PRC Switches are available in 2-, 4-, and 6-button configurations in white, black, ivory, and almond colors. For more information, see the "Digital Switch" section of this document.

The Pow-R-Command Switch Override Controller (PRCSOC) can be used to connect digital and analog I/O to Pow-R-Command systems. This device is recommended when controller onboard digital and analog I/O has been exceeded or when there is an advantage to connecting remote I/O via a RS-485 network connection. Refer to Field Wiring Termination section of this document for more information.

## Software

Programming, monitoring, and control software includes Lighting Optimization Software (LOS), Building Graphics Software (BGS) custom graphics, and Site Server (WSS). Consult your local sales office for more information.

# Controller overview

## PRC-E Series controller overview

PRC-E controllers are shipped in two basic mounting configurations: integrated into Pow-R-Command intelligent panelboard or externally mounted in a controller cabinet.

PRC2000E/1500E/1000E controller features include:

- ARM microcontroller-based programmable lighting and energy management system intended for standalone and network applications

- Integral back-lit color LCD touchscreen display for programming, monitoring, and override control

- Ethernet Maintenance Port provides simple laptop connection using industry standard patch cable

- Preconfigured Web pages or PRC software can be used to program, monitor, and override control using the Maintenance Port

- Control options include schedule-based, occupant override, and photocell control

- Each Master panelboard controller can be connected to three Expansion panelboards via SLAN communications to control and monitor up to 168 solenoid-operated circuit breakers

- Externally mounted controller can be connected to four Expansion panelboards via SLAN communications to control and monitor up to 168 solenoid-operated circuit breakers

- Up to 120 controllers can be connected to the same Pow-R-Command RS-485 peer-to-peer

- Powerful peer-to-peer protocol and network architecture allows schedules and external wiring device signals to be broadcast over the network to control any or all of the solenoid-operated controllable circuit breakers connected to the system. This system capability eliminates the need for changing the same schedule in multiple panelboards and requiring additional wiring devices to be directly connected to specific controllers

- Eight digital inputs are available to accept dry-contact devices such as wall stations, occupancy sensors, and photocells

- Eight universal inputs can be programmed to accept either digital or analog external devices. Compatible with dry-contact devices such as wall stations, occupancy sensors, and photocells when programmed as digital inputs. When programmed as 0–10 Vdc analog inputs, devices such as indoor and outdoor photo sensors can be connected for dimming and daylight harvesting applications

- Eight analog 0–10 Vdc outputs for control of fluorescent and LED lighting fixtures equipped with 0–10 Vdc dimming circuitry to meet dimming and daylight harvesting application requirements

- Downloadable firmware via Maintenance Port or Ethernet network connection

- Compatible with existing PRC1000 systems using RS-485 communications network

PRC2000/1500E controller additional features:

- Ethernet communications

- BACnet/IP communications protocol for integrating into building management systems

- Compatible with existing PRC2000 systems

PRC2000E controller additional features:

- Remote access to preconfigured Web pages for programming, system monitoring, and override control via Ethernet network connection

- Remote controller access by connecting a PC to any controller Maintenance Port or PC connected to the network

**Figure 3. PRC-E Series Controller Low Voltage Compartment**
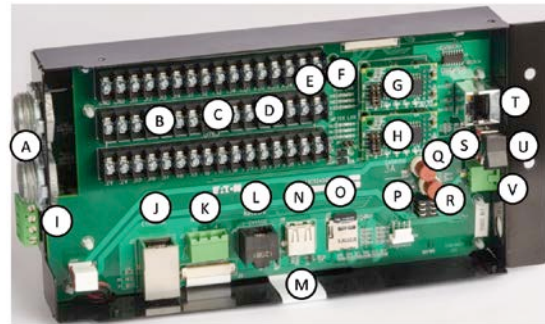


A. Low voltage cables entry
B. Digital inputs
C. Universal inputs (digital or analog)
D. Analog outputs
E. External power source (12 Vdc and Vin)
F. BCB status LEDs
G. Digital Switch Network auxiliary board (DSN)
H. Controller network auxiliary board (CNET)
I. SLAN connector
J. Ethernet network connector
K. Controller Network connector (CNET)
L. Digital Switch Network connector
M. LCD touchscreen display connector
N. USB connector
O. SD card connector
P. Service connector "factory use only"
Q. External power 1.0 A (Littelfuse Part #37211000411)
R. Internal fuse (Littelfuse Part #37211000411)
S. Status LEDs
T. Maintenance Port (Ethernet)
U. ON/OFF power switch
V. Controller power connection (Vin)

**Figure 4. PRC-E Series Front Panel**



Maintenance Port

Power Switch
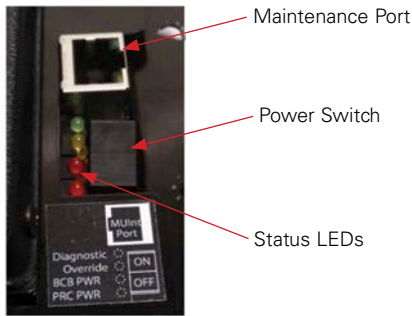
Status LEDs

- Power switch—controls the main low voltage control power to PRC controller
- Status LEDs
  - Top LED (green): Diagnostic LED—this LED cycles once per second, indicating that the controller is in normal operation. If not illuminated or illuminated constantly, the processes are not running within the controller
  - 2nd LED (yellow): Override LED—this LED indicates that a number of loads have been overridden within the controller. If this LED is lit, some or all of the circuit breakers cannot be controlled using groups, schedules, or inputs. The override must be terminated to release the loads for control
  - 3rd LED (red): BCB and External Power LED—this LED indicates the presence of power supplied to the BCB and external devices. If this LED is not illuminated, check the "External" fuse in the low voltage wiring area of the PRC-E Series controller
  - 4th LED (red): Internal power LED—this LED indicates the presence of internal power to the controller. If this LED is not illuminated, check the "Internal" fuse in the low voltage wiring area of the PRC-E Series controller (see **Figure 3** on **page 3**)

## PRC-E Series Externally Mounted Controller Cabinet

### *Externally mounted controllers*

PRC-E externally mounted controllers are available for retrofit and renovation projects when existing panelboards do not have required controller mounting space. Externally mounted controllers include controller, control power transformer mounted in a NEMA® 1 enclosure. The PRC-E externally mounted controller is connected to PRC Expansion Panelboards using the controller SLAN sub-network.

**Figure 5. PRC-E Series External Control Cabinet**



Eaton Pow-R-Line 1a and 2a lighting panelboards can be converted to Pow-R-Command Expansion (PRCEP) panelboards in the field by mounting Breaker Control Bus (BCB) and controllable circuit breakers directly to the interior.

Eaton supplies custom panelboard covers and trims with standard Pow-R-Line 1a and 2a panelboard interiors for retrofitting directly into existing panelboard boxes when installed electrical distribution equipment is from another manufacturer. This retrofit option reduces the need for disrupting existing conduits and wire while reducing overall installed cost.

Field wiring connections are discussed in the Field Wiring Termination topic on **page 5**. Field wiring termination discusses connection of power, communications, and control wiring. Additional application information can be found in low voltage wiring application examples later in this document (see **page 9**).

**Figure 6. PRC-E Series Externally Mounted Controller Cabinet with Four PRCEP Panelboards**



PRCEP

PRCEP

PRCEP

PRCEP

PRCEP
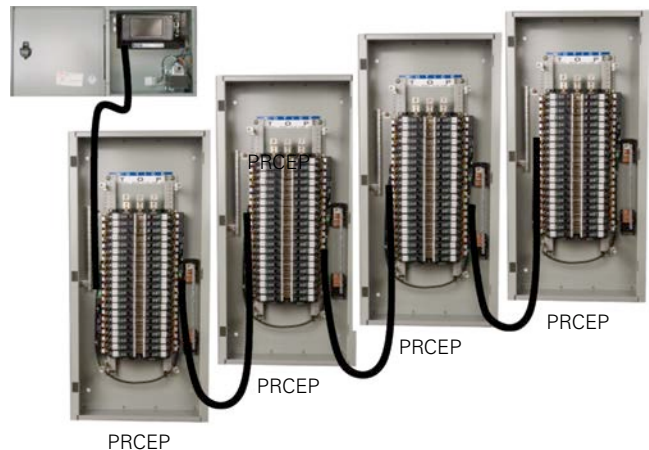
# Field wiring termination

The following topics discuss the necessary and optional wiring connections between the PRC-E Series controllers, BCB devices, and termination of the field devices, which can consist of switches, occupancy sensors, and light level sensors. The following discussion breaks the wiring into logical topics such as power, circuit breaker control, and field devices.

**Figure 7. PRC-E Series Wiring**
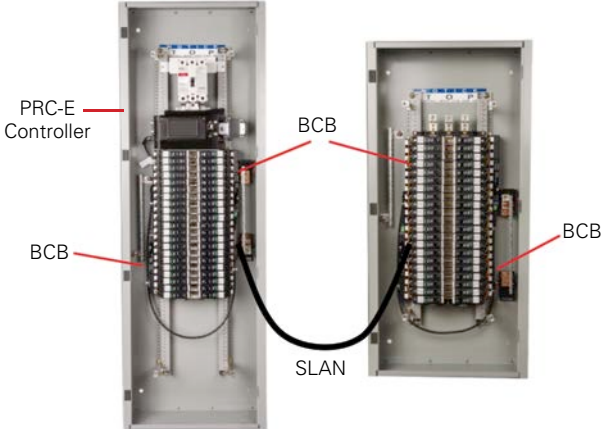


## Power Supply

The PRC-E Series electronics uses 30 Vac/Vdc control power. From this 30 V supply, all needed control voltages are generated internally. The integrated PRC-E Series controllers include a 30 Vac supply transformer that is connected to the line-to-line voltage of the panelboard (208/240/480 Vac). The PRC-E Series external controller enclosures include a 30 Vac supply transformer that is connected to the line to neutral of the panelboard (120/277 Vac). The connection to the controller transformer depends on the type of enclosure and is discussed separately below.

## Panelboard control chassis

The PRC-E Series Master Panelboard is shipped with an integral controller, which is pre-wired to the correct supply voltage for the panelboard rating.

There is no need for the personnel installing the panelboard to supply connections to the power supply of the integral controller chassis.

## PRC-E Series Externally Mounted Controller Cabinet

Personnel installing the PRC-E Series externally mounted controller cabinet are responsible for providing and terminating the power wiring. Standard configurations accommodate either 120 or 277 Vac supply power. Be certain to match the controller power to the appropriate power rating of the externally mounted controller cabinet. **Table 1** cross-references the standard transformer lead colors with the supply voltage for all supplied transformers.

### Table 1. Transformer Lead Colors/Supply Voltage—Cross Reference

| Primary | Color | Secondary | Color |
|---|---|---|---|
| COM | Black | 30 Vac | Yellow-White |
| 120 Vac | White | COM | Yellow |
| 208 Vac | Red | — | — |
| 240 Vac | Orange | — | — |
| 277 Vac | Brown | — | — |
| 480 Vac | Grey | — | — |

**Note:** The primary supply transformers are prewired in the panelboard and external control cabinet to meet the selected voltage. The secondary leads are pre-wired to the supply connector of the PRC-E Series controller and inserted into the supply socket of the controller. The yellow secondary lead is also connected to chassis ground.

## Low voltage device termination

All open area inside the PRC-E Series controller enclosure is low voltage / Class 2. No voltages above 30 Vac are permitted in this area. Inputs and outputs are designed as either dry contact or low voltage level.

No external voltages should be applied to the low voltage terminal blocks. The panelboard provides all necessary power.

Low voltage devices should be terminated using a minimum #22 AWG twisted-pair wire. Shielding is generally not required. Low voltage device cables should not be located in the same conduit with the Class 1 load wires. Be sure the wire type you use is rated properly, especially for plenum or hazardous applications.

**Note:** When wiring to the PRC-E Series controller and BCBs mounted inside the panelboard, it is necessary to observe the 600 V insulation rating of any Class 2 wiring in the panelboard gutter. If the wiring is not rated at 600 V, then any wiring passing through the gutter will need to be enclosed in conduit or other recognized material.

## Breaker Control Bus (BCB) wiring

Each BCB has two 4-pin combination power/data connectors. These connectors are shown in **Figure 8** labeled as "SLAN/power connectors." Also shown in **Figure 8** are the controllable circuit breaker connectors for plugging in BABRSP or GHQRD controllable circuit breakers and the "SLAN address switches" used to set the relative position. Additionally the BCB contains three recessed LEDs to indicate the status or condition of the BCB.

### Figure 8. PRC BCB Connectors, Switches, and Indicators
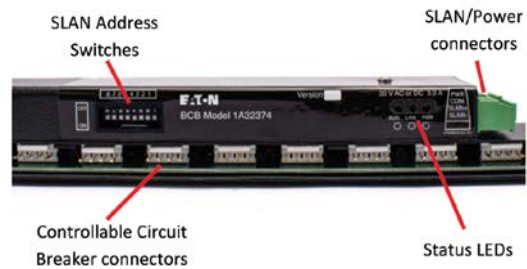


It is recommended to use 16 AWG, 4-conductor cable with 600 V insulation jacket (e.g., Alpha 1064) for interconnecting BCB modules. This cable will support a total SLAN length of 150 feet before requiring an auxiliary power source.

**Note:** Surge protection is recommended for SLAN networks in noisy environments (B&B model #485HESP or equivalent) and fiber-optic cable is recommended for outdoor, underground, or between-structure applications.

The relationship between the BCB and the controller can best be seen in the Externally Mounted Controller depiction in **Figure 9**. This diagram shows a simple daisy chain connection between the PRC-E Series externally mounted controller cabinet and the BCB modules installed in a Pow-R-Command Expansion panelboard (PRCEP). For PRC-E Series Master panelboards with integral PRC-E Series controller, the controller would be wired internally in the first panelboard (BCB 1, 2) and then to the remaining PRCEP panelboards.

### Figure 9. PRC-E Externally Mounted Controller Cabinet and PRCEP Panelboards with Left and Right BCBs
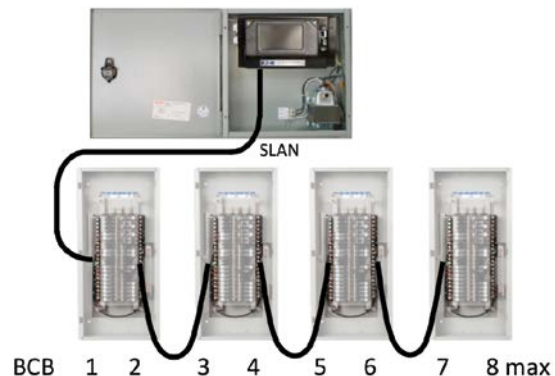
The BCBs have an alternating orientation in the panelboards. The first (left) BCB has the control module down while the right module is up. This orientation is critical to proper operation of the PRC intelligent panelboard.

**Note:** Failure to observe the proper orientation of the BCB in the panelboard will create difficulty associating the software circuit numbers with the actual controllable circuit breaker position.

The following steps will guide you through proper wiring of the BCBs and the PRC-E Series controller.

The same type cable is used between the PRC-E Series externally mounted controller cabinet and the first BCB as is used between BCB modules. Once the cable is routed, it can be trimmed and terminated with the supplied 4-pin connector.

**Step 1:** BCB SLAN/power termination.

For external controller applications, feed a free end of the recommended cable through a conduit from the control cabinet into the PRCEP panelboard. Route the cable to the BCB nearest the panelboard's entry point. Route the cable through the wiring gutters at the top, bottom, and sides of the panelboard. It is not required to use conduit for internal BCB interconnects as the cable used has a 600 V insulation rating. It is, however; recommended that the wire connection between the BCB modules inside a PRC-E Series or PRCEP panelboard be dressed and tied to prevent chaffing and minimize interference with load wires in the gutter.

**Note:** The layout shown in **Figure 9** is recommended but it is not necessary to follow the sequential order from the controller to the BCBs nor is it required to have the PRC-E Series controller at the end of the daisy-chain.

Cut the cable to length allowing for some excess to facilitate plugging and unplugging the cable for service purposes.

**Step 2:** Stripping and terminating the cable.

Locate one of the 4-pin plugs, either inserted into the BCB or in the parts bag, strip the jacket back to a maximum of 1-1/4 inches. Be careful not to nick or cut the insulation of the individual conductors. Strip each conductor to expose no more than 1/4-inch of bare wire.

Using **Figure 10** for reference, insert each colored conductor in the proper position on the 4-pin plug.

**Figure 10. BCB Connector Wire-Out**
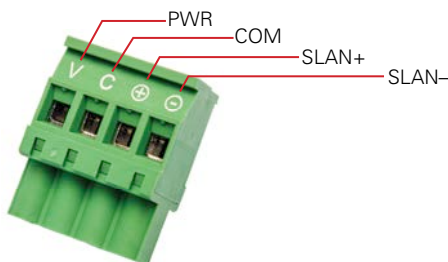


**Note:** Both connectors on the BCB have the same wire-out relationship and are internally connected. If there is any doubt about the color positions, plug one terminated end into the BCB and wire the newly installed cable to match.

**Step 3:** UL® consideration.

For UL-approved isolation of the SLAN/power connection from the high voltage section of the panelboard, the connector screw terminals must be covered.

Insulation heat-shrink tubing in lengths of 6 inches long are included in the panelboard parts bag. Cut this tubing in half and slip one length over the plug and cable prior to plugging it into the BCB. Then slip the tubing over the cable and plug so the green connector and screws are completely covered. DO NOT apply heat to heat-shrink tubing around the connector, as this will make subsequent servicing difficult. **Figure 11** shows two views of the BCB. The left view shows the wires terminated into the 4-pin plug and the 3-inch heat-shrink tubing ready to be dressed over the connection. The right view of **Figure 11** shows the completed cable termination. If this is the last BCB in the chain, place the remaining 3-inch piece of heat-shrink tubing over the unused plug. Given the inversion of the right-side BCB (invert **Figure 11**) it is recommended to place a few wraps of electrical tape around the insulation tubing and the wire to prevent the insulation from slipping off the green connectors. If only one cable is terminated to the BCB, use the tubing to insulate the unused connector as well.

**Figure 11. BCB UL Considerations**



**Step 4:** Connecting BCB modules.

Repeat Steps 1 through 3 to connect the remaining BCB modules together. Use the second connector on the BCB to continue to chain the BCB modules as illustrated in **Figure 9**.

**Step 5:** Externally mounted controller cabinet termination.

The first (or last) BCB has to be connected to the controller to get power and data. Locate one of the 4-pin plugs, either inserted into the BCB or in the parts bag, Strip the SLAN cable back to a maximum of 1¼ inches. Be careful not to nick or cut the insulation of the individual conductors. Strip each conductor to expose no more than ¼-inch bare wire.

Plug the pre-terminated end of the SLAN/power cable into the terminal labeled "PWR_COM_SLAN+_SLAN-" on the PRC-E controller enclosure. This connector is found on the left side of the PRC-E Series controller as shown in **Figure 12**.

**Figure 12.  Controller BCB Power/SLAN Connector**



**Note:** When the PRC-E Series controller and BCBs are wired as illustrated in **Figure 9**, it is important not to exceed 150 feet total length when using the recommended 16 AWG cable. If greater than 150 feet of cable is needed, an auxiliary power supply is required. This can be an integrated power supply of a PRCEPP panelboard or a PRC auxiliary power supply, CAT# PRCPS.

The BCBs in a PRCEPP are powered by the integrated power supply. The SLAN will be daisy-chained from the controller as in the normal panel using Alpha 1064 2 conductor cables.

**Figure 13.  PRCEPP Power Supply**



## BCB startup and troubleshooting

After the BCB modules are installed and wired, each BCB can be configured to communicate with the PRC-E Series controller.

**Step 1:** Addressing the BCB.

Each BCB needs a unique address assigned for reliable SLAN communications. **Figure 14** shows the recommended addressing scheme; each BCB gets an address from 1 to 8. Refer to **Figure 8** to locate the SLAN address switches and reference **Figure 14** for positioning of the individual switches to achieve the required value. Be careful to observe the switch number as labeled so as to avoid reversing the values due to top and bottom module location. This chart is also located on the label affixed to the BCB.

**Figure 14.  BCB Addressing Chart**



**Note:** Switches 6 through 8 are not used for the PRC-E Series application and should be left in the OFF position.

**Step 2:** Power on and verification.

Apply power to the PRC-E Series controller and verify that power is routed to each connected BCB. Observe the "PWR" (power) LED on each BCB and confirm that it is illuminating red.

If the power LED does not illuminate on any BCB, verify that there is power from the PRCE controller. This can first be done by a visual check of the power status LEDs on controller. See the "PRC-E Series Front Panel" section on **page 4**. If there is power at the controller, then verify that all 4-pin connectors are wired correctly.

The following is a brief discussion of the three status LEDs used to indicate activity and operation of the BCB.

**PWR:** The PWR LED will illuminate whenever the BCB has sufficient power to operate. If this LED is off, then the other two status LEDs will not illuminate either. Check the wiring to ensure that power is delivered to the BCB in question.

**LAN:** The LAN LED will blink whenever data is being sent to the BCB via the SLAN. This LED simply implies that SLAN communication is present. If the LAN LED is not blinking, make sure the PWR LED is lit, and then check the SLAN wiring for crossed or shorted connections.

**RUN:** The RUN LED will blink on and off at regular one second intervals when the BCB is properly wired and communicating with the controller. If the RUN LED blinks twice in succession and is then off for three seconds, there is a problem with the BCB communication.

**Note:** If a BCB is addressed to 0, no addressing, the Run status LED will indicate as normal. BCB addressing should be verified if there are issues.

## PRC-E Series controller wiring

The PRC-E controller handles the communication of direct controllable circuit breaker command and status through the onboard SLAN port. In addition to controlling circuit breakers, the PRC-E Series controller has low voltage inputs and outputs, which can be used for switches, occupancy sensors, photocells, dimmable fluorescent ballasts, and LED drivers.

To access the controller low voltage compartment, loosen the two LCD display captive screws (**Figure 15**) until the unit can be opened downward using the hinge on the bottom. It is recommended that the power switch be placed in the OFF position before any wiring is pulled into this compartment or before any connections are made.

**Note:** It is not recommended that the LCD display be fully removed, however, if it must be fully removed; consult the PRC technical support line to receive assistance with removal and the reinstall.

**Figure 15. Low Voltage Compartment Access**



Captive Screws

Located in the low voltage compartment are the connectors for Ethernet (PRC2000E and PRC1500E only), Controller Network (CNET) (not available on PRC750E), Digital Switch Network (DSN) (not available on PRC750E), Micro SD, and low voltage I/O. For more information on the Ethernet and Controller Network (CNET) connections, see the "Network overview" section on **page 12**. For more information on the DSN, see the "Digital Switch" section on **page 81**. The USB port is for system level storage. The Micro SD card is used for programming backup and historical data storage.

**Figure 16. PRC-E Class 2 Wiring Compartment**



Ethernet RJ-45    Controller Network    Digital Switch Network RJ-45    USB MicroSD    Low-voltage I/O connectors
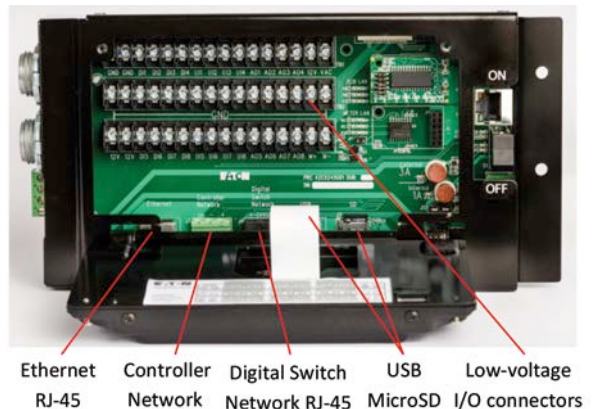
There are also three rows of screw-terminal connector strips. These rows are combined into logical blocks as illustrated in **Figure 17**.

**Figure 17. Low Voltage Wiring Terminals**
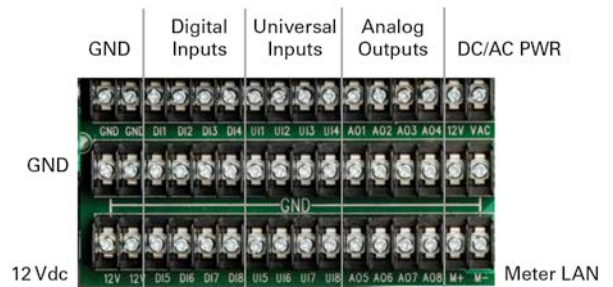


## Low voltage inputs and outputs

Each PRC-E Series controller has a number of low voltage input and output connections. These general purpose points can be used for a variety of applications including override switches, dimmable fluorescent ballasts and LED drivers, photocell dry-contact, photosensors analog level for daylight harvesting, rheostats, occupancy sensors, and for interfacing with other control systems like security or building control. In addition to the input and output terminations, the controllers also provide terminals for external device supply power. There is a terminal for the power supply voltage (PWR) for convenient connection to the 30 Vac or Vdc supply power (1 A max.) and 12 Vdc terminals (12 V) that have a maximum of 500 mA available. Each group of input, output, and power points is labeled in **Figure 17** and each group is discussed separately in the following sections. Also, be aware that this topic is purposely kept generic due to the many different possible applications.

# Notes and warnings

## Digital inputs

The controller includes 8 digital inputs (DI 1-8). A dry-contact is placed between the input connection point and one of the ground (GND) connectors. There is a 5 Vdc wetting voltage on these inputs. The input can be defined at startup in a variety of maintained and momentary contact configurations. The configuration is dependent upon the type of closure wired to the input.



The above is a schematic illustration showing two types of dry-contact inputs. Notice there is no control voltage, merely a simple switch closure. 18 AWG wire is recommended with a 500 foot maximum.
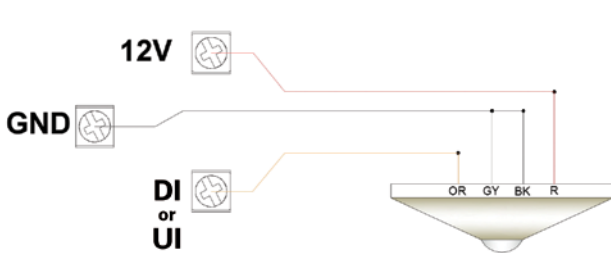


The above schematic illustrates an occupancy sensor with relay output connected to a digital input. The sensor can be powered from the controller, as shown, from the 12 Vdc 500 mA maximum power supply connection within the controller or from an external power source. Reference PRCE Input/Output drawing for field devices.

## Universal inputs

Universal input points can be defined as digital input points or as analog input points. If used as a digital input point, a dry contact should be placed between the input point and the common point on the connector. There is a 12 Vdc wetting voltage on these inputs. The input can be defined in a variety of maintained and momentary contact configurations. If used as an analog input point, the input is a 0–10 Vdc input. The input is defined at commissioning for the required function and conversion of engineering units.



The above schematic demonstrates the use of the digital component of the universal input.
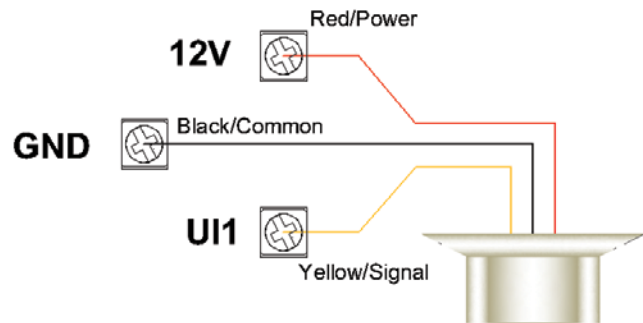


The above schematic illustrates a 0–10 V analog level photo sensor connected to a universal input. Reference PRCE Input/Output drawing for field devices.

## Analog outputs

Analog output points are used as control for dimmable fluorescent ballasts and dimmable LED drivers. The output is 0–10 Vdc with a maximum current of 80 mA sink or maximum 40 mA source. Consult fluorescent ballast and LED driver data sheets or with the manufacturers of the products for maximum current requirements for the device prior to purchase and install. For compatibility verification, please contact the Eaton Lighting Control Technical Support group.
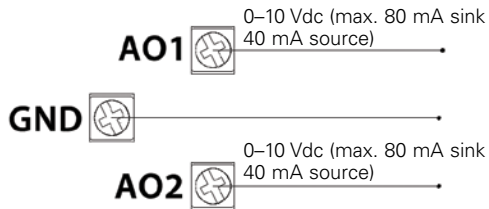


The above schematic demonstrates the connection of the analog output.

---

### ⚠ CAUTION

**TO AVOID DAMAGE TO THE PRCE CONTROLLER OUTPUTS OR OTHER EQUIPMENT, THE NEGATIVE (–) CONNECTION SHOULD BE COMPLETED PRIOR TO THE POSITIVE (+) CONNECTION OF THE ANALOG OUTPUT.**

---
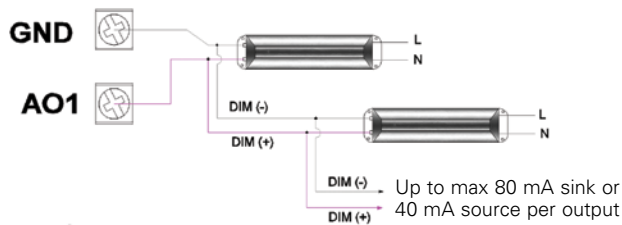


0–10 V dimming fluorescent ballast or LED driver connection to analog output.

## Switch Override Controller

The Pow-R-Command Switch Override Controller (PRCSOC) can be used to connect digital and analog I/O to PRC systems. This device is recommended when controller onboard digital and analog I/O has been exceeded or when there is an advantage to connecting remote I/O via a RS-485 network connection. The PRCSOC is supplied with the controller, termination board, 120/277 Vac power supply in a NEMA 1 enclosure (consult factory for alternative methods of adding digital and analog I/O).

**Figure 18. Switch Override Controller in External Cabinet**

The PRCSOC is connected to the PRC system via the CNET controller network (see **Figure 18**). Status and command signals are sent to the PRC system using Pow-R-Command peer-to-peer protocol.

The PRCSOC features include:

- 60 low voltage two-wire switch inputs for connecting wall stations, occupancy sensors, and control relay outputs from building management systems

- Eight low voltage two-wire universal (digital or analog) inputs. Analog field devices like light level sensors with 0–5 Vdc outputs can be connected for dimming and daylight harvesting applications

- Three low voltage 0–10 Vdc analog outputs for controlling fluorescent and LED light fixtures equipped dimming circuitry. Maximum of 40 devices per output with required dimmer cable (part number 926C162G01)

- 16 low voltage two-wire 24 Vdc outputs to power status LEDs (20 mA maximum)

- Available option to add 32 low voltage two-wire 24 Vdc outputs to power status LEDs (20 mA maximum)

- External 15 Vdc power source for powering occupancy and light level sensors and PRC auxiliary devices (200 mA maximum)

- Connects to PRC RS-485 controller network

- Communicates to the PRC system using Pow-R-Command peer-to-peer protocol

- Configurable using PRC Lighting Optimization Software

- Provided in a NEMA 1 enclosure

- 120/277 Vac supply voltage

- Not compatible with PRC750(E) controllers

| Catalog Number | Description | Part Number |
|---|---|---|
| **PRCSOCC** | PRC SOC in an ext. cabinet, 120 V /277 V | 42C4780G01 |
| **PRCSOCEC** | PRC SOC in an ext. cabinet, no power supply | 42C4780G02 |
| **PRCSOCECO** | PRC SOC in an ext. cabinet, 120 V / 277 V with pilot output card | 42C4780G03 |

# Controller Network (CNET) overview

The PRC-E Series controllers have RS-485 controller network (CNET) and Ethernet communications capabilities providing remote programming, monitoring, and override functions. Using the Pow-R-Command peer-to-peer communications protocol, each controller connected to the CNET network can transmit and receive messages among the connected controllers. Not available in PRC750E controllers.

**Note:** Configuring the controller with a unique network address, between 1 and 120, is required before establishing communications over the network.

A PRC-E controller address configuration can be accomplished by using the following methods:

- Optional backlit color LCD touchscreen display (refer to "LCD Touchscreen Display Programming" section on **page 17** of this document)

- Personal computer direct connection to controller Maintenance Port (refer to "Connecting personal computer to controller Maintenance Port" section on **page 15**

See **Figure 19** for controller color LCD touchscreen display and Maintenance Port locations.

**Figure 19. PRC-E Series Controller**

## RS-485 (CNET) network

Controllers are connected to a PRC RS-485 network using the RS-485 connector located in the low voltage compartment. PRC1000E, PRC1500E, and PRC2000E controllers include the CNET communications module on the controller (not available on the PRC750E controller). See **Figure 20**.

**Figure 20.  PRC RS-485 CNET Connection**
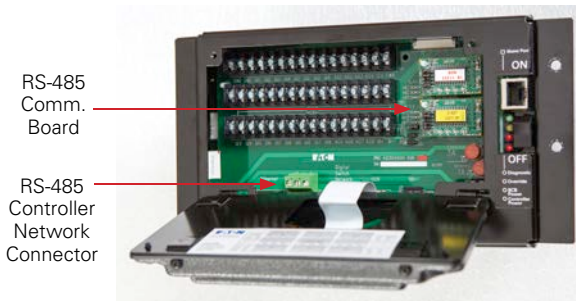


Pow-R-Command RS-485 network uses a two-wire, half-duplex network in a daisy-chained architecture. The connector provided in the controller low voltage compartment is for connecting the network in and out cables. The network operates independently of each controller, meaning that a controller can be powered down and the network will remain intact and operational.

Following are some general guidelines for installing the Pow-R-Command RS-485 controller network:

- Maximum of 120 controllers total

- Each controller configured with a unique network address

- Only BELDEN 3105A or equivalent cable should be used

- Maximum overall length of the RS-485 network should not exceed 4000 feet. If this limit is exceeded, a repeater may be required

- Surge protection is recommended for networks in noisy environments (B&B model # 485HESP or equivalent)

- Fiber-optic cable is recommended for outdoor, underground, or between-structure applications

- Uniform network polarity must be maintained

All controllers in the system must be connected in a daisy chain; loops, stars, and stubs are not allowed.

The end of the RS-485 network requires a 120 ohm end-of-line (EOL) termination. The CNET communications module provides a jumper for applying the terminating EOL resistor in the controller. By default, the jumper is not connected. To add the resistor, place the jumper across the 5th set of posts marked with a "T". See **Figure 21** controller network jumpers.

**Figure 21.  CNET Module**



1st and 2nd row—Weak or Low Bias jumper (Connected)

3rd and 4th row—Strong or High Bias jumpers

5th row—Terminating Resistor (Disconnected Position)
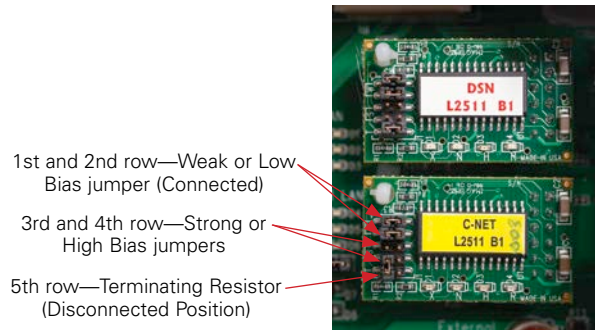
One end of the cable shield must be connected to the ground.

**Note:** The shield should only be connected to a service ground at one location to prevent a ground loop or common mode voltages from disrupting communications or cause damage to the controller circuitry.

No network cable splices are allowed. The RS-485 controller network is a low-power application and splices can be detrimental to the performance and reliability of the network.

Controller network access is accomplished by installing an Ethernet Interface Module between the PRC controller network and personal computer. Network access requires the personal computer to be loaded with Pow-R-Command Lighting Optimization Software (PRCLOS).

## Ethernet Interface Module

The Ethernet Interface Module (EIM) allows access to the PRC controller network when using a PC connected directly to the EIM Ethernet port or connected on a facility's Ethernet network. See **Figure 22**. These same messages can optionally be tunneled across the Ethernet, providing access to the entire PRC controller network.

**Figure 22.  PRC Ethernet Interface Module (EIM) (Part # 926C160G04)**



Controller RS-485 CNET Network    PRC Diagnostic Port    Ethernet Port

See **Figure 23** for typical RS-485-to-Ethernet network using a EIM network access device.

**Figure 23. Ethernet to RS-485**
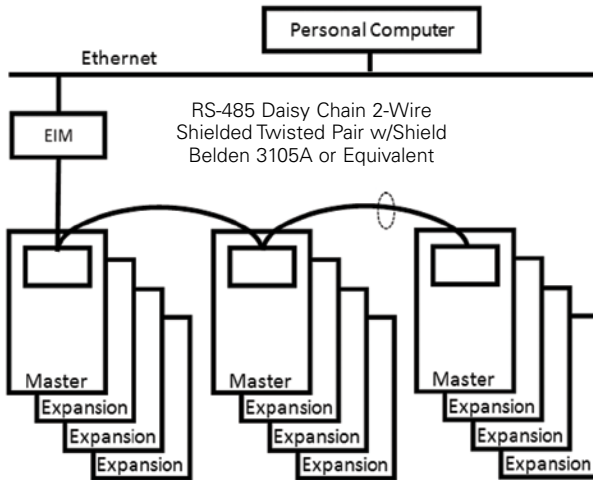


Configuring the EIM with a unique IP address, subnet mask and IP gateway is required before establishing communications with the Ethernet network. Consult factory for information.

The EIM includes the following features:

● Network time and location synchronization

● 250 Global Time Schedules

● 30 Holidays

● Global Alarm Table

The EIM comes in a desktop enclosure and is connected to Ethernet and PRC RS-485 networks. A personal computer with PRC software can be located anywhere on the Ethernet network. The EIM will communicate at 10Base-T and must have a fixed IP address assignment on the Ethernet network. On the front of the EIM are connectors for CAT5, a removable RS-485 network connection (Belden 3105A network cable), and a 4-pin network diagnostic connection for local access to the device. The EIM is powered by using the provided +15 Vdc power supply that plugs into any standard wall outlet. It also has an On/Off switch, power indicator LED and communication indicator LED. Pow-R-Command Lighting Optimization Software (PRCLOS) is required to access the system.

## Ethernet network

The PRC1500E and PRC2000E controllers are connected to an Ethernet network by using the RJ-45 connector located in the low voltage compartment. See **Figure 24**.

**Figure 24. PRC-E Ethernet RJ-45 Port**



See **Figure 25** for a typical Ethernet network architecture.

**Figure 25. Ethernet**
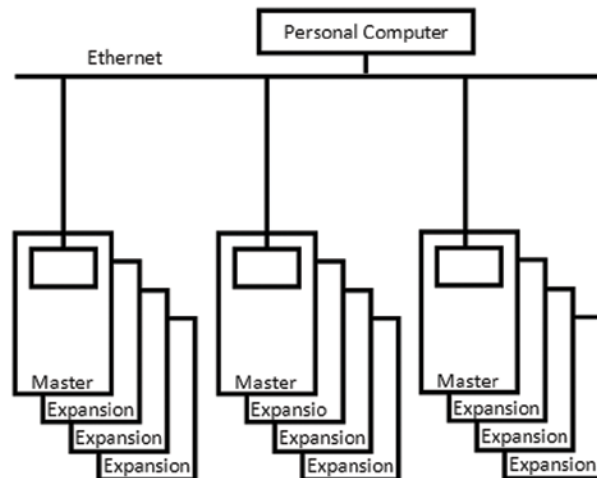


**Note:** Configuring the controller's network parameters are required before establishing communications over the network.

Controller configuration can be accomplished by using the following methods:

● Optional backlit color LCD touchscreen display (refer to "LCD touchscreen display programming" on **page 17**)

● Personal computer direct connection to controller Maintenance Port (refer to "Connecting personal computer to controller Maintenance Port" section on **page 15**

Once the controller is configured with required network parameters, a personal computer on the network can establish communications with the controller.

## Connecting personal computer to controller Maintenance Port

Connecting a personal computer to the controller Maintenance Port allows the user to program, monitor, and override the system using the onboard preconfigured Web pages or Pow-R-Command Lighting Optimization Software (LOS). The personal computer is physically connected to the controller Maintenance Port using a standard Ethernet patch cable.

**Figure 26. Controller Maintenance Port Connection**



PRC-E Maintenance Port

Before logging into the controller, the personal computer must be set to obtain an IP address automatically. This can be done using Microsoft® Windows® by following these steps:

**Step 1.** Select "Start"



**Step 2.** Select "Control Panel"
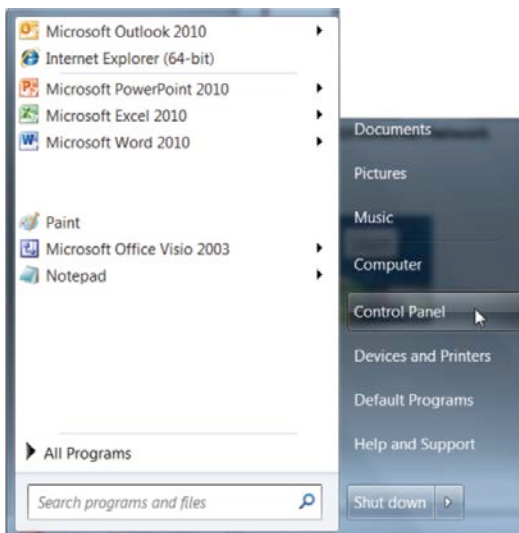


**Step 3.** Select "Network and Sharing Center"
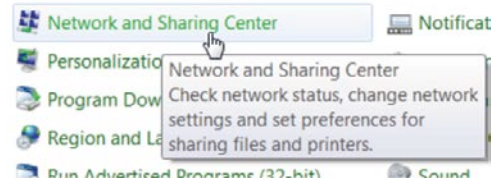


**Step 4.** Select "Change Adapter Settings"
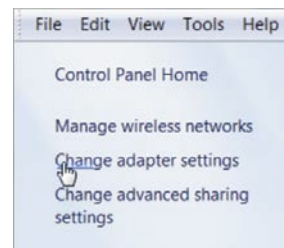


**Step 5.** Select "Local Area Connection"
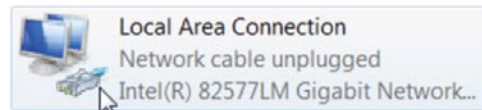


**Step 6.** Select "Internet Protocol Version" and "Properties"
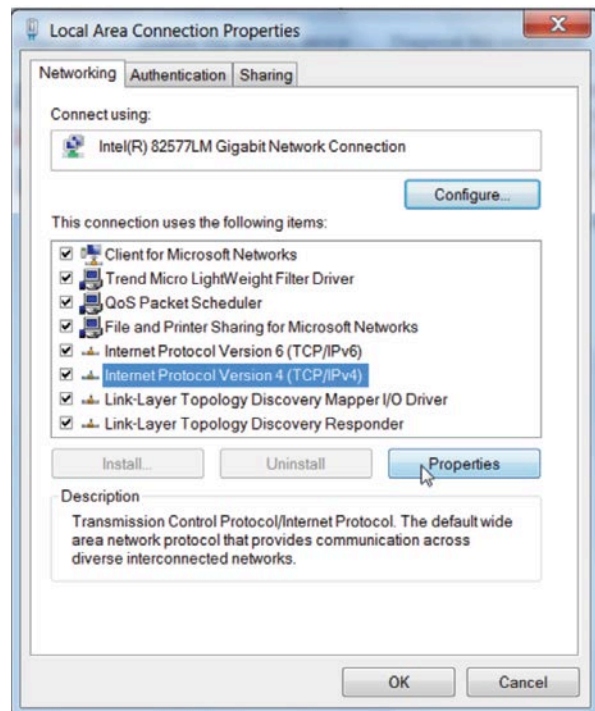
# Ethernet network

**Step 7.** Select "Obtain IP Address Automatically"
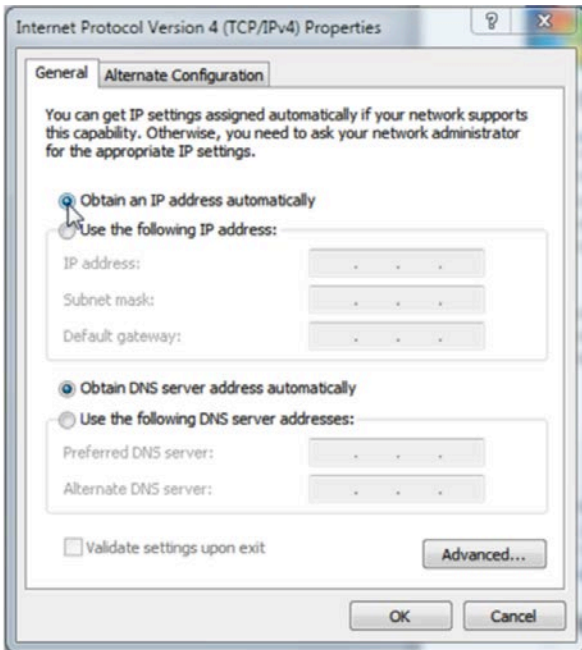


**Step 8.** Click "OK". Close the network adapter.

**Step 9.** Each controller Maintenance Port is preconfigured with the fixed IP address set at 192.168.222.1. Once the Ethernet patch cable is connected between the personal computer and the PRC controller front Maintenance Port, the user can login to the controller by opening a standard Web browser and typing 192.168.222.1 into the browser's address bar (also know as the location bar or URL bar) and pressing the "Enter" button.



The PRC splash screen should open. In a few moments, the User Name and Password dialog will open.



**Step 10.** Type the user name and password in the appropriate box and click "OK".

- Default user name:     admin

- Default password:     admin



A splash screen will open.



After the splash screen, the Breaker status Web page will open.

Refer to the "Web page programming" section on **page 46** for additional information on programming and configuration of Network IP of the PRC1500E and the PRC2000E controllers using the Web pages.

# LCD touchscreen display programming



## Introduction

The PRC-E Series controllers are equipped with a 2.25" x 3.75" resistive LCD touch screen. The touch screen has graphic icons that are used to navigate through the menus of the controller, input data, configure the controller, and initiate commands to control functionality. Throughout this manual the word "touch" or "tap" will be used to describe the action of choosing the icon on the LCD touch screen.

**Note:** Some icons have touch time delays to help alleviate errors due to multiple button presses.

The following LCD instructions follow the process of the initial commissioning of a panelboard. Each screen will be covered, but not in the order as displayed. LCD access can be secured by an optional Pin-code which can be set in the software.

**Note:** The BCB installation, addressing and correct cabling is crucial to the successful control of the controllable circuit breakers. See the "BCB installation" section on **page 78** for further information on cabling and correct state of the status LEDs on the BCB.

In the idle state, the LCD will have a blank screen.

## Log-in

Tap the LCD screen of the PRC-E controller.

This will "wake up" the LCD display. A splash screen will briefly appear, then the "Intro" screen will display. This screen displays following information:

- Name and Description of the controller
- IP address of the controller
- Status of groups A through P
- Controller type, Address, and Firmware revision
- Time, Day, and Date
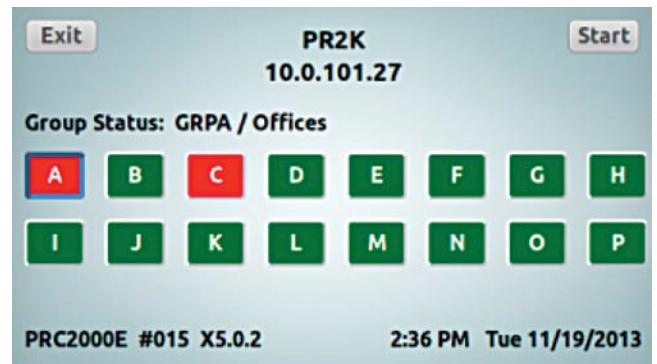


In the top right corner, the "Intro" screen will have a button called "Log-In", if a pin-code for the LCD has been previously set, or "Start", if a Pin-code has not been set.

If the "Log-In" button is present,

Tap "Log-in" button.



This will display the "Enter Pin-code" screen.

# LCD touchscreen display programming

Tap numbers to input the Pin-code.

After the input is complete, press "Enter" button. Upon successful entry, the "Main Menu" will be displayed.

If the "Start" button is present, tap the "Start" button.



This will display the "Main Menu" screen.



**Note:** The Breaker Control Buses (BCBs) must be properly addressed and all necessary SLAN wiring must be terminated before continuing the following steps.

## Panelboard configuration

On initial commissioning or in the case of a newly added PRCEP panelboard to a system, the panelboard(s) must be configured in the controller.

The panelboard configuration is made up of the BCB's address, 1–8; the type, left or right position within a 42-circuit, 30-circuit, 18-circuit, or column panelboard and the panelboard location.

By default, the panelboard configuration uses the BCB addresses to set up a 42-circuit panelboard. The odd addresses are assigned as left BCBs and the even addresses are assigned as right BCBs.

From the "Main Menu", tap the "Configuration" icon.
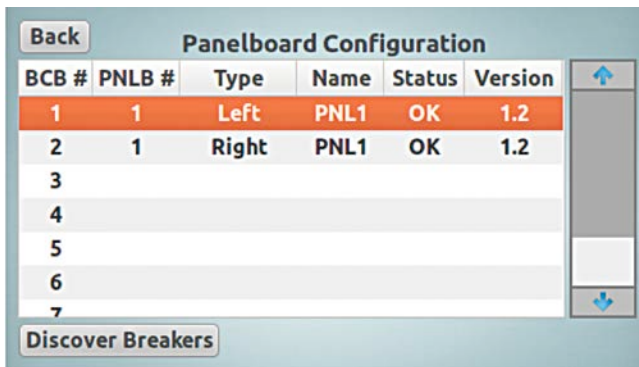


This will display the "Configuration" menu screen.



Tap "Panelboards" icon.



This will display the "Panelboard Configuration" screen.
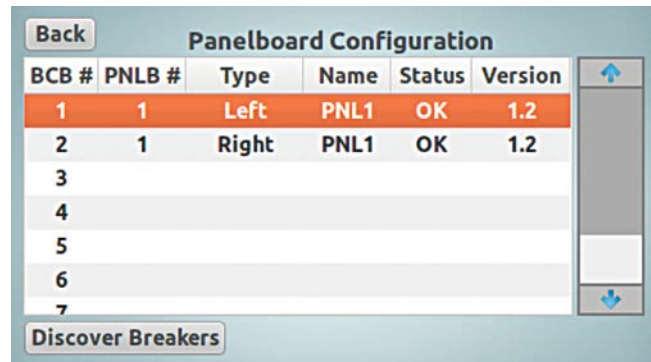


This screen displays the number of the BCBs connected to the controller. If there are 4 BCBs connected to the controller, there should be 4 in this list.

**Note:** If there are missing BCBs on the list, check the addressing of the BCBs and the cabling and connections between the BCBs.

Initially, the Panelboard number, Name and Type of some BCBs may be blank.

**Note:** For the 30-circuits, 18-circuits, and Column panelboards, the "Discover Breakers" action must be performed after the BCBs are correctly configured. For 42-circuits panelboards, the "Discover Breakers" action will automatically configure the BCBs so manual configuration is not necessary.

Table 2 shows the default settings that will be applied to the connected BCBs in 42-circuits panelboards.

**Table 2. Default BCB Addressing Auto-Configuration**

| Address | Type | Panelboard | Name |
|---------|------|------------|------|
| 1 | Left | 1 | PNL1 |
| 2 | Right | 1 | PNL1 |
| 3 | Left | 2 | PNL2 |
| 4 | Right | 2 | PNL2 |
| 5 | Left | 3 | PNL3 |
| 6 | Right | 3 | PNL3 |
| 7 | Left | 4 | PNL4 |
| 8 | Right | 4 | PNL4 |

If required, these default settings can be edited to meet the current panelboard layout.

To edit the configuration of a BCB, in the "Panelboard Configuration" screen, tap the row of the BCB.



This will display the "Configure BCB…" screen.



In this screen, the "Panelboard" number, "Type" (position), and "Name" can be edited. If any changes are made in this screen, the "Save" button will turn "red" to signify that changes need to be saved.

The "Panelboard" number can be 1 through 8, the "Type" depends on the BCB position and type of panelboard and the "Name" can be any 4-character alphanumeric input for the panelboard identification. See the list of panelboard types and their descriptions for details.

**Table 3. Panelboard Types**

| Type | Circuit Breaker Numbers | Panelboard |
|------|------------------------|------------|
| Left | Odd-numbered (1–41) | 42-circuit |
| Right | Even-numbered (2–42) | 42-circuit |
| Left-18 | Odd-numbered (1–17) | 18-circuit |
| Right-18 | Even-numbered (2–18) | 18-circuit |
| Left-30 | Odd-numbered (1–29) | 30-circuit |
| Right-30 | Even-numbered (2–30) | 30-circuit |
| Top | Sequential (1–21) | 30 and 42-circuit column |
| Bottom | Sequential (22–42) | 42-circuit column |
| Top-9 | Sequential (1–9) | 9-circuit column |
| Bottom-30 | Sequential (22–30) | 30-circuit column |

Once all the BCB configuration edits are complete, tap the red "Save" button to save the changes or the Back button to disregard changes.



To leave the page without saving changes, just tap the "Back" button.
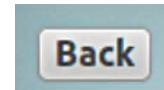


Tap the "Back" button to return to the "Panelboard Configuration" screen.

Once all the panelboard configuration edits are complete, the "Discover Breakers" command must be initiated.

## Discover breakers

The controllable circuit breakers in the panelboards must be discovered by the PRC-E controller. The "Discover Breakers" command must be initiated at the commissioning of the system, after any addition of controllable circuit breaker(s) in a panelboard(s), after any addition of PRCEP panelboard(s) to a system or after a panelboard configuration change. During this discovery process, the BCBs in the master panelboard, and all PRCEP panelboards connected to it, will be scanned for the presence of controllable circuit breakers. The presence of each controllable circuit breaker is captured and stored in the controller's database. The BCB addressing is critical for this process to be successful. In the Master and Expansion panelboards, each BCB should have a unique address of 1–8. See the "BCB addressing" section on **page 48**.

# LCD touchscreen display programming

To initiate a "Discover Breakers" command, from the "Main Menu" screen, tap the "Configuration" icon.
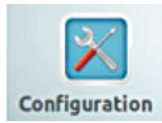
This will display the discovery confirmation page.

This will display the "Configuration" menu screen.

Tap "Panelboards" icon.
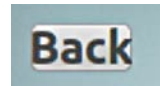
This will display the "Panelboard Configuration" screen.

Tap the "Confirm Discover Breakers" icon.

There will be a message displayed "Please Wait… Discovering Breakers".

Once this is complete, tap the "Back" button.

This will display the "Panelboard Configuration" screen.

Tap the "Back" button.

Tap the "Discover Breakers" button in the left bottom corner of the screen.
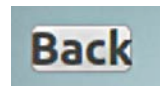
This will display the "Configuration" screen.

Tap the "Back" button.

This will display the "Main Menu" screen.

## Breakers / Select Panelboard Screen

To see all of the controllable circuit breakers installed in the panelboards, display the "Breakers" screen.

From the "Main Menu", tap the "Breakers" icon.



This will display the "Breakers / Select Panelboard" screen.
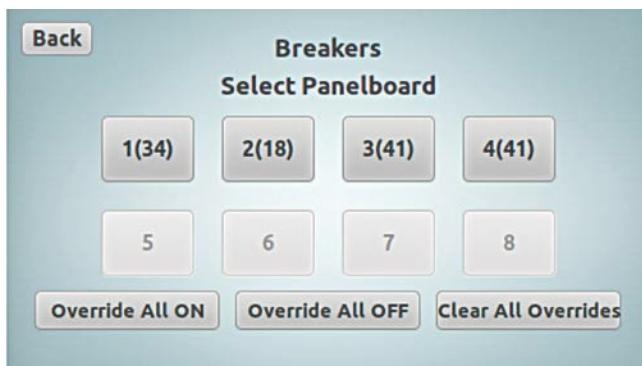


This screen displays the panelboard numbers, and—in parenthesis—the quantity of controllable circuit breakers discovered in each panelboard.

**Note:** On the bottom of the screen there are three override action buttons present; if activated, the action of these buttons will affect ALL the controllable circuit breakers in ALL the panelboards connected to the controller. See "Overriding Breakers in all Connected Panelboards" for details.

To see all the controllable circuit breakers and their status for the selected panelboard, tap the panelboard button in the "Breakers / Select Panelboard" screen.



This will display the "Breakers" screen for that particular panelboard.



The "Breakers" screen displays all controllable circuit breakers that were discovered (configured) by their position in the panelboard. If a number is greyed-out, there was no controllable circuit breaker discovered in that position. This screen can be compared with the physical panelboard layout to find issues.

**Note:** If there is a controllable circuit breaker that is physically installed but was missed during the discovery process, check the pigtail connector and wiring from the controllable circuit breaker to the BCB to verify that it is plugged in correctly and cabling or connector is not damaged. After the issue is corrected, the "Discover Breakers" process must be reinitiated.

## Breaker button indications

The "Breakers" screen buttons indicate various states of the controllable circuit breaker using the color of the Background, Border, and the Number.

The button Background color indicates the ON/OFF feedback status from the controllable circuit breaker.

**Note:** The feedback status is received from the controllable circuit breaker. If the main handle is "OFF", the status feedback will always be "OFF".

A green background indicates that the controllable circuit breaker has a feedback status of "OFF".
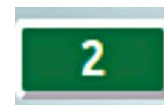
# LCD touchscreen display programming

A red background indicates that the controllable circuit breaker has a feedback status of "ON".



The button border color indicates the override status of the controllable circuit breaker.

A white border indicates normal operation status of the controllable circuit breaker (in-service).



A yellow border indicates that the controllable circuit breaker is in override (out-of-service).



**Note:** If a controllable circuit breaker is in "Override", it cannot be commanded from a schedule, switch input, or any other control means other than another override command. The override must be cleared to return the controllable circuit breaker to normal operation.

The circuit number color indicates whether there is a mismatch between the controller's last commanded state and the controlled circuit breaker feedback status.

A white circuit number indicates that the commanded state and feedback status match and there are no issues.



A red circuit number with green background indicates that the commanded state is "ON" but the feedback status is "OFF".



**Note:** The main handle of the controllable circuit breaker being in the "OFF" position can create the above condition.

A green circuit number with red background indicates that the commanded state is "OFF" but the feedback status is "ON".
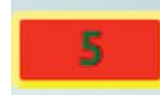


**Note:** Manually moving the control handle of the controllable circuit breaker to the "ON" position can create this condition.

## Overriding controllable circuit breakers

An override command can be sent from the controller to each individual controllable circuit breaker, panelboard, or to all the panelboards connected to the PRC controller.

There is a yellow LED next to the power switch on the PRC-E controller that indicates that an override is active within the controller.

**Note:** Verify that all of the main handles of the controllable circuit breakers are in the "ON" position. If some are to be left in the "OFF" position, take note of these so they can be disregarded when the status mismatch indicators are active.



Main Handle

Override ON Handle (Green)

Override Handle "ON" position
Red stripe visible at the top

Override Handle "OFF" position
No red stripe visible
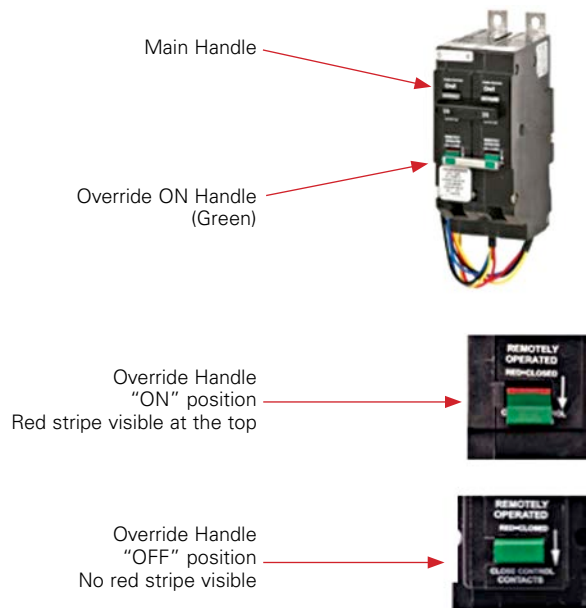
**Overriding all the breakers in an individual panelboard**

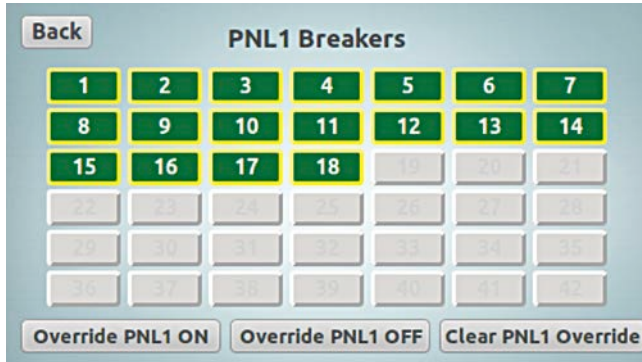**Note:** A panelboard "Override OFF" will turn "OFF" all controllable circuit breakers in the selected panelboard. If there are controllable circuit breakers that must be left "ON" for any reason, an individual controllable circuit breaker override should be done instead of a panelboard override.

From the "Main Menu" screen, tap the "Breakers" button.



This will display the "Breakers / Select Panelboard" screen.
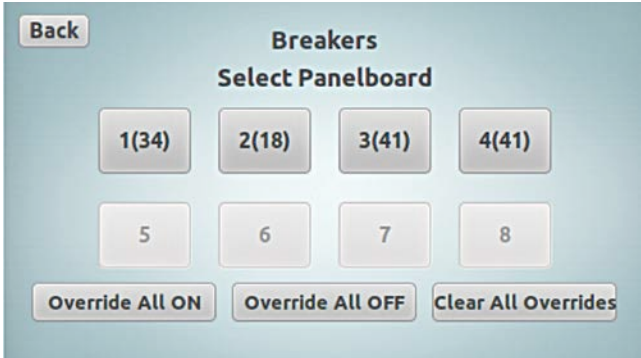


Tap the panelboard button of the preferred panelboard,



This will display the "Breakers" screen for the selected panelboard.
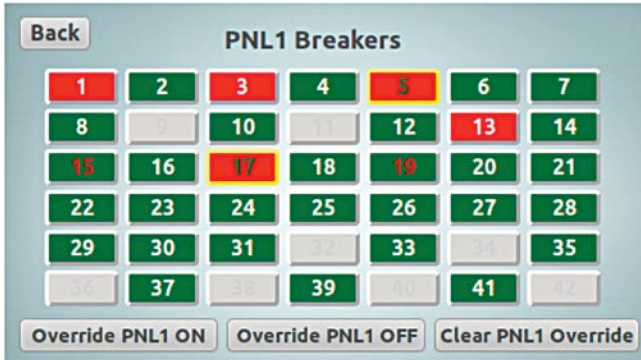


**Override ON panelboard**

**Note:** An "Override ON" button will override "ON" all controllable circuit breakers in selected panelboard. If there are controllable circuit breakers that must be left "OFF" or in-service for any reason, an individual controllable circuit breaker override should be done instead of a global panelboards override.

Tap "Override ON" button to initialize all controllable circuit breakers handles in the panelboard selected to the "ON" position.



All circuit breaker buttons on the LCD display should have a red background with yellow borders after the "Override ON" command. If some of the backgrounds are green, see the "Breaker Button Indications" section of this guide for further information.



You may also visibly verify that all controllable circuit breaker handles are in the "ON" position.

**Note:** The yellow "Override" LED on the PRC controller will illuminate indicating an override is active.

**Override OFF panelboard**

**Note:** An "Override OFF" button will override "OFF" all controllable circuit breakers in selected panelboard. If there are controllable circuit breakers that must be left "OFF" or in-service for any reason, an individual controllable circuit breaker override should be done instead of a global panelboards override.

Tap "Override OFF" button to override "OFF" all the controllable breakers in selected panelboard.

# LCD touchscreen display programming

All circuit breaker buttons on the LCD display should have a green background with yellow borders after the "Override OFF" command. If some of the backgrounds are red, see the "Breaker Button Indications" section of this guide for further information.



You can visibly verify that all controllable circuit breaker handles are in the "OFF" position.

**Note:** The yellow "Override" LED on the PRC controller will illuminate indicating an override is active.

## Clear overrides—panelboard

**Note:** All of the controllable circuit breakers in all the selected panelboard will return to their last commanded normal in-service state which may be the "ON" or "OFF" position. If there are controllable circuit breakers that must be left in override for any reason, an individual controllable circuit breaker clear override should be done instead of a panelboard clear override.

Tap "Clear Override" button to clear override for all the controllable circuit breakers in selected panelboard and return them to normal in-service state.



**Note:** The yellow "Override" LED on the PRC-E controller will turn off.

## Overriding all the breakers in ALL connected panelboards

From "Main Menu" screen, tap the "Breakers" button.

This will display the "Breakers / Select Panelboard" screen.
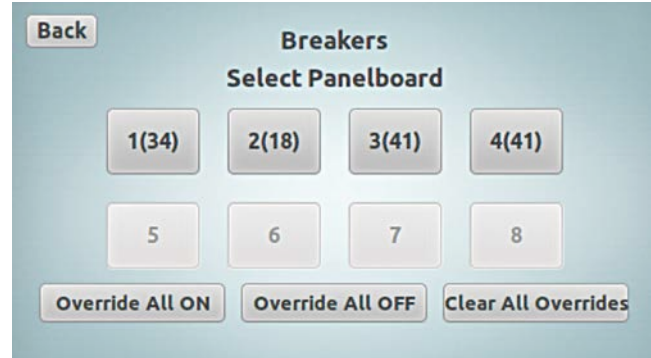


## Override all ON

**Note:** The "Override All ON" button will override "ON" all controllable circuit breakers in all panelboards connected to the controller. If there are controllable circuit breakers that must be left "OFF" or in-service for any reason, an individual controllable circuit breaker override should be done instead of a global panelboards override.

In the "Breakers / Select Panelboard" screen, tap "Override All ON" button to override "ON" ALL the controllable circuit breakers in ALL the panelboards connected to the controller.
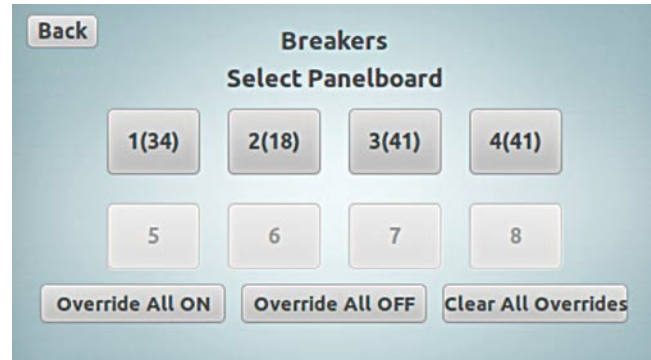




This initializes the controllable circuit breaker handles in all connected panelboards to the "ON" position.

You can visibly verify that all controllable circuit breaker handles are in the "ON" position.

Each panelboard status can be viewed by navigating to the individual "Breakers" screen for particular panelboard. This is done by tapping the panelboard button to display the "Breakers" screen. Tap the "Back" button to return to the "Breakers / Select Panelboard" screen.

**Note:** The yellow "Override" LED on the PRC-E controller will illuminate indicating an override is active.

## Override ALL OFF

**Note:** An "Override All OFF" button will turn "OFF" all controllable circuit breakers in all panelboards connected to the controller. If there are controllable circuit breakers that must be left "ON" or in-service for any reason, an individual controllable circuit breaker override should be done instead of a global panelboards override.

Tap "Override ALL OFF" button to override "OFF" all the controllable circuit breakers in all panelboards connected to the controller.
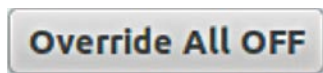


You can visibly verify that all controllable circuit breaker handles are in the "OFF" position.

Each panelboard status can be viewed by navigating to the individual "Breakers" screen for particular panelboard. This is done by tapping the panelboard button to display the "Breakers" screen. Then, tap the "Back" button to return to the "Breakers / Select Panelboard" screen.

**Note:** The yellow "Override" LED on the PRC-E controller will illuminate indicating an override is active.

## Clear "Override All"

**Note:** All of the controllable circuit breakers in all the connected panelboards will return to their last commanded normal in-service state which may be the "ON" or "OFF" position. If there are controllable circuit breakers that must be left in override for any reason, an individual controllable circuit breaker clear override should be done instead of a global panelboards clear override.

Tap "Clear All Overrides" button to clear override for all the controllable circuit breakers in all panelboards connected to the controller and return them to normal in-service state.
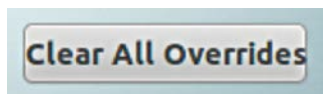


**Note:** The yellow "Override" LED on the PRC-E controller will turn off.

## Overriding an individual circuit breaker

From the "Main Menu" screen; tap the "Breakers" button.
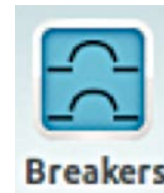


This will display the "Breakers / Select Panelboard" screen.
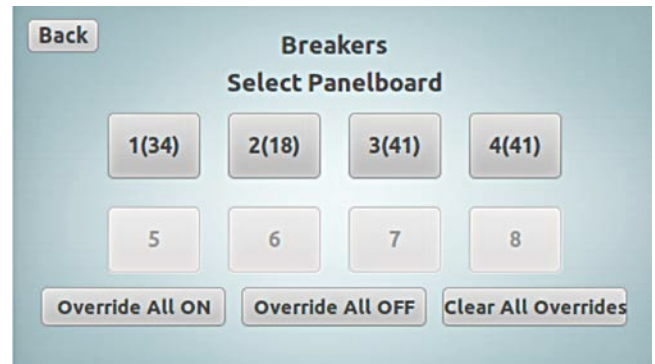


Tap the desired panelboard button.



This will display the "Breakers" screen for the selected panelboard.



Tap the controllable circuit breaker number to be overridden.

# LCD touchscreen display programming

This will display the "Breaker" configuration screen.



This screen is covered in more detail in the "Breaker Configuration" section of this document, but for now, the "Status" of the controllable circuit breaker is displayed on this screen beside the "Name" edit box. This status field has following format:

## Feedback: Commanded State Status

**Feedback:** ON/OFF feedback status reported by the circuit breaker;

Commanded State: last ON/OFF command issued to the controllable circuit breaker;

**Status:** "IN" – in service (normal)
"OUT" – out of service (overridden).

The normal status of the controllable circuit breaker could be "ON: ON IN" or "OFF: OFF IN."

## Override ON—circuit breaker

Tap "Override ON" button to override selected circuit breaker "ON".
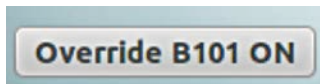


The selected controllable circuit breaker status should display "ON: ON OUT".



In the "Breakers" screen for the selected panelboard, the individual controllable circuit breaker button background should now be red with a yellow border around it, denoting an override is activated for this controllable circuit breaker.

**Note:** The yellow "Override" LED on the PRC-E controller will illuminate indicating an override is active.

## Override circuit breaker OFF

Tap "Override OFF" button to override the selected controllable circuit breaker "OFF".
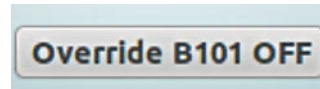


The selected controllable circuit breaker's status should display "OFF: OFF OUT".



In the "Breakers" screen for selected panelboard, the individual controllable circuit breaker button background should now be green with a yellow border around it, denoting an override is activated for this controllable circuit breaker.

**Note:** The yellow "Override" LED on the PRC-E controller will illuminate indicating an override is active.

## Clear circuit breaker override

Tap "Clear Override" button to clear override for selected controllable circuit breaker and return it to normal in-service operation.
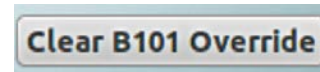


The selected controllable circuit breaker status should display "ON: ON IN" or "OFF: OFF IN", depending on the last command issued to the circuit breaker while it was under the override. The yellow border around the circuit breaker box will change to white confirming that the circuit breaker is in the normal state.

**Note:** The yellow "Override" LED on the PRC controller may remain "ON", if other controllable circuit breakers in the panelboards are in override.

## Breaker configuration
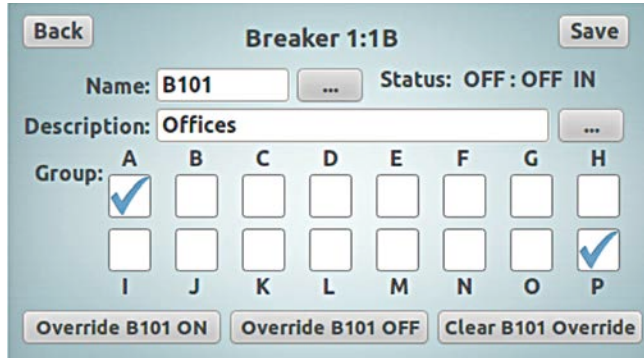


The "Breaker Configuration" Screen displays the attributes of the individual controllable circuit breaker. The screen displays the controllable circuit breaker address and "Status" field for reference only. The "Name", "Description", and "Group" fields are editable.

The "Name" is an alphanumeric input that can be up to 4 characters in length. Multiple circuit breakers can be given the same name. This name can then be used to control those circuit breakers as a group using schedules.

To edit the "Name", tap the text entry field or ellipsis button.



This will display the alphanumeric keyboard.

Tap the characters/numbers buttons to type the chosen text and tap the "Enter" button to accept.



The "Description" is an alphanumeric input that can be up to 20 characters in length.

To edit the "Description", tap the text entry field or ellipsis.



This will display the alphanumeric keyboard.

Tap characters/numbers buttons to type the chosen text and tap the "Enter" button to accept.

## Grouping association

Groups are logical groupings of controllable circuit breakers with a single point of control means.

There are 16 default groups, groups A through P that can be easily programmed to create zones of controllable circuit breakers. From the "Breaker Configuration" screen, you can quickly add a controllable circuit breaker to a group.

To add the selected circuit breaker to the group, tap the corresponding checkbox for the group to add a check-mark.

**Note:** See the "Group Configuration" section of this document for more details on scheduling and input association for the group.

If any changes are made in the "Breaker" screen, the "Save" button will turn "red" to signify that changes need to be saved.

Once all the circuit breaker configuration edits are complete, tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.



## Date, time, and location configuration

The date, time, and location can be set through the Date/Time Icon under the "Configuration" screen.

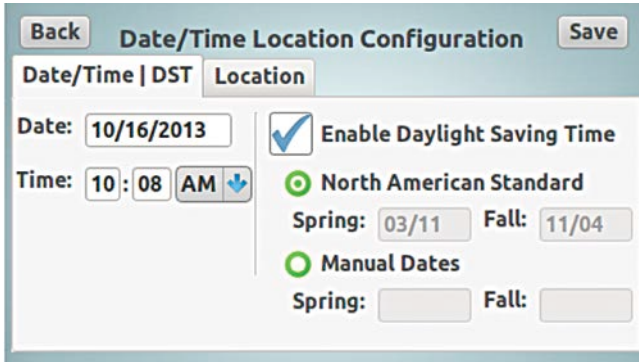From the "Main Menu" screen, tap the "Configuration" icon.
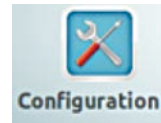


Tap the Date/Time icon.

This will display the "Date/Time Location Configuration" screen.
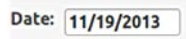


## Setting the date, time, Daylight Savings Time

### Date and calendar

Once in the "Date/Time Location Configuration" screen, the "Date/Time | DST" tab is selected by default.

Tap the date entry field,



This will display the calendar screen tool.



There are multiple ways to edit the elements using this calendar.

### Scrolling through Month/Year

Tap the arrows beside the Month/Year; this will move the month/year forward and backwards.



### Selecting month

Tap the current month on the calendar,



This will display a drop down list with each month listed.

Tap the required month to choose.



### Selecting the year

Tap the current year on the calendar;



This will display an edit box with up and down arrows.

Tap the up/down arrows to change the year accordingly.

### Setting the date

Once the month and year are selected,

Tap the appropriate day to finish setting the date.

If any changes are made in the "Enter Date" screen, the "Enter" button will turn "red" to signify that changes need to be accepted.

To leave the page without accepting changes,

Tap the "Back" button.

Once all the date configuration edits are complete,

Tap the red "Enter" button to accept the changes, and return to the "Date/Time Location Configuration Screen".
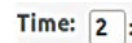


**Note:** Notice that the "Save" button in the top right corner of the "Date/Time Location Configuration" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

### Setting the time

To set an hour,

Tap the hour entry field.

This will display the numeric keypad.

Tap the numbers to input the hour value.

Tap the "Enter" button to accept the entry.

To set minutes, tap the minute entry field.

: 33

This will display the numeric keypad.

Tap numbers to input the minutes value.

Tap the am/pm dropdown and choose the correct time of day.

AM ⬇

Tap the "Enter" button to accept the entry.

**Note:** Notice that the "Save" button in the top right corner of the "Date/Time Location Configuration" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

## Setting Daylight Savings Time (DST)

To Enable DST, tap the Enable DST box to add a checkmark, if one is not already entered.

✓ Enable Daylight Saving Time
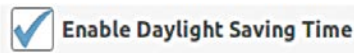
To use the North American Standard, tap the radio button for this selection. The Daylight Savings dates for the North American Standard are automatically calculated, and no customer entry is required. This is most used selection, and it does not require user to come back to this screen year after year to reset the dates.

⊙ North American Standard
Spring: 03/11  Fall: 11/04
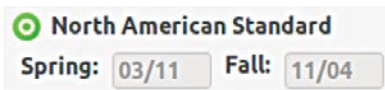
If user requires manual date entry, tap the "Manual Dates" radio button.

⊙ Manual Dates
Spring: 03/10  Fall: 10/20

Tap the "Spring" date entry field,
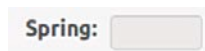
Spring: [        ]

This will display the calendar screen tool.

Choose the date for the Spring DST change. See the above details on how to use the calendar.

Tap the "Fall" date entry field.

Fall: [        ]

This will display the calendar screen tool.

Choose the date for the Fall DST change. See the above details on how to use the calendar.

**Note:** When manual dates are entered, it will be required that a user edits the date any time it changes for a particular year.

**Note:** Notice that the "Save" button in the top right corner of the "Date/Time Location Configuration" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

Once all the Date/Time | DST configuration edits are complete, tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.
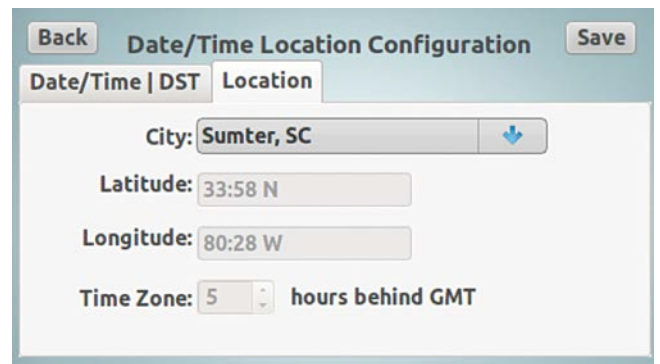
Save

## Setting the location

The location coordinates are used to automatically calculate the Sunrise and Sunset times for a given area.

Tap the Location tab in the "Date/Time Location Configuration" screen.

Location

This will display the tab for Location entry.

| Back | Date/Time Location Configuration | Save |
| --- | --- | --- |

Date/Time | DST  **Location**

City: Sumter, SC ⬇
Latitude: 33:58 N
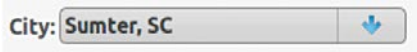Longitude: 80:28 W
Time Zone: 5 ⬍ hours behind GMT
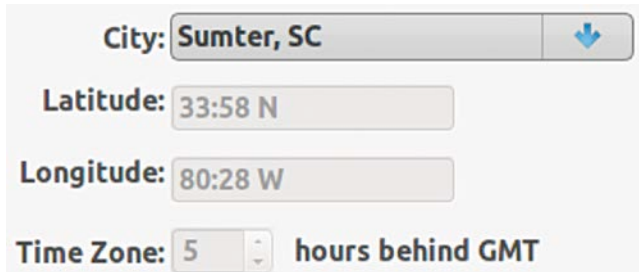
# LCD touchscreen display programming

## Common location entry

A list of common cities is included for quick configuration.

Tap the City field.

This will display a dropdown list of the common cities.

City: Sumter, SC ⬇

Tap to choose the city in your vicinity. The location coordinates will be automatically inserted in the appropriate fields.

City: Sumter, SC ⬇
Latitude: 33:58 N
Longitude: 80:28 W
Time Zone: 5 ⬍ hours behind GMT

Once the Location configuration edits are complete,

Tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.

Save

## Manual location entry

If there is no city in the list in close proximity of your location, manual coordinate inputs can be entered. You can find out your coordinates from the local newspaper, Google Maps, etc.

Tap the City field.

This will display a dropdown list of the common cities.

City: Sumter, SC ⬇
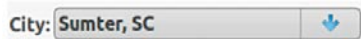
Tap to choose "Manual Location".

City: Manual Location ⬇
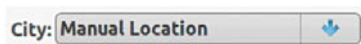
Tap the Latitude entry field.

Latitude: 33:40 N

This will display the alphanumeric keyboard to input the Latitude coordinates.

Once done editing the field, tap the "Enter" button to accept changes.

Next, tap the Longitude entry field.

Longitude: 84:24 W

This will display the alphanumeric keyboard to input the Longitude coordinates.

Once done editing the field, tap the "Enter" button to accept changes.

Tap the up down arrows beside the Time Zone field to input the Time Zone hours behind GMT.

Time Zone: 5 ⬍ hours behind GMT

**Note:** Notice that the "Save" button in the top right corner of the "Date/Time Location Configuration" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

Once all the Location configuration edits are complete, tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.

Save

## Controller RS-485 CNET configuration

Each PRC-E Series controller must have a unique RS-485 CNET address when networked with other PRC controllers. The address range is 1 to 120. Also, a 4-character alpha-numeric name can be assigned to identify the controller on the network and a 20-character description can be input. Pow-R-Command Lighting Optimization Software is used for remote programming, monitoring and override control. PRC750E does not include network connections.

From the "Main Menu" screen, tap the "Configuration" icon.
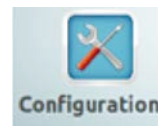
Configuration

Tap the "Controller" icon.

Controller

This will display the "Controller Configuration" screen.



## Editing controller name

Tap the "Name" entry field or ellipsis.



This will display the alphanumeric keyboard.

Tap character/number buttons to input the chosen controller name.

Tap the "Enter" button to accept.

**Note:** Notice that the "Save" button in the top right corner of the "Controller Configuration" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

## Editing controller description

Tap the "Description" field or elipsis.



This will display the alphanumeric keyboard.

Tap character/number buttons to input chosen controller description.

Tap the "Enter" button.

**Note:** Notice that the "Save" button in the top right corner of the "Controller Configuration" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

## Editing controller address

Tap the address arrow,



This will display a dropdown list of address numbers.

Scroll through the list and Tap the number to select required address.

Once the controller configuration edits are complete, tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.



## Controller Ethernet network configuration

PRC1500E and PRC2000E controllers include Ethernet communications. Each controller must have a static IP address, Subnet Mask and gateway assigned to connect across most Ethernet networks. The MAC address, which is a unique device identifier embedded in the device, is also displayed and is used in some network configurations to improve network security. Pow-R-Command Lighting Optimization Software is used for remote programming, monitoring and override control.

Remote access to pre-configured Web pages is only available on the PRC2000E controller.

Pow-R-Command Lighting Optimization Software is used for remote programming, monitoring, and override control.
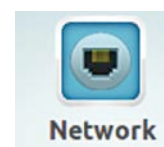
## IP address configuration

### ⚠ WARNING

**NETWORK CONFIGURATION INFORMATION SUCH AS IP ADDRESS, SUBNET MASK, AND GATEWAY SHOULD BE OBTAINED FROM IT DEPARTMENT PRIOR TO CONNECTING CONTROLLER TO NETWORK.**

From the "Main Menu" screen, tap the "Configuration" icon.
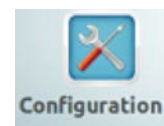


Tap the "Network" icon.

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This will display the "Network Configuration" Screen.



Tap the first octet field of the "IP Address",

This will display the numeric keypad.

Tap the numbers to input the first octet of the IP address.

Tap the "Enter" button to accept the changes.

Continue through the other octet entry fields to complete the editing of the full IP address.

## NetMask configuration



To set the "NetMask", tap the corresponding octet entry fields and follow the same procedure as the IP addressing.

## Gateway configuration



To set the Default "Gateway", tap the corresponding octet entry fields and follow the same procedure as the IP addressing.

## SOAP port configuration



The "Soap Port" is used for Web page data updates. A port must be opened on the intended network for Web page data access. The default port is 8080 but can be edited.

Tap the "Soap Port" entry field.

This will display the numeric keypad.

Tap number buttons to input the SOAP port value.

Tap the "Enter" button when complete.

**Note:** Notice that the "Save" button in the top right corner of the "Network Configuration" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

## UER settings

The Universal Ethernet Router (UER) is a built in protocol used for communications between PRC-E Series controllers over the Ethernet network. The "System ID" is the port used for communication with a range of 1 to 65535 and the "Security Mask" is the encryption mask to setup separate logical networks on a single Ethernet, range 1 to 65535. All the controllers required to communicate on the same logical network must have the same "System ID" and "Security Mask" settings.

Tap the "Enable UER" box to input a checkmark; this will enable UER communication over the Ethernet.



To edit the "System ID" value, tap the "System ID" entry field.



This will display the numeric keypad.

Tap the number buttons to input the "System ID" value.

Tap the "Enter" button to accept the changes.

To edit the "Security Mask" value, tap the "Security Mask" entry field.



This will display the numeric keypad.

Tap to input the "Security Mask" number.

Tap the "Enter" button to accept the changes.

**Note:** Notice that the "Save" button in the top right corner of the "Network Configuration" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

Once the network configuration edits are complete, tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.
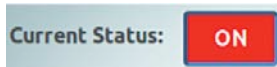


## Group configuration

Groups are logical grouping of controllable circuit breakers with a single point of control means. They are used to create and control zones of controllable circuit breakers. There are 16 default groups preconfigured in the PRC-E Series controller for easy programming, designated by letters A through P. Groups can have controllable circuit breakers associated and can be controlled by time schedules or controller inputs.

From the "Main Menu" screen, tap the "Groups" icon.
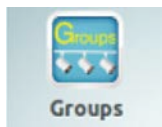


This will display the "Groups / Select Group" screen.
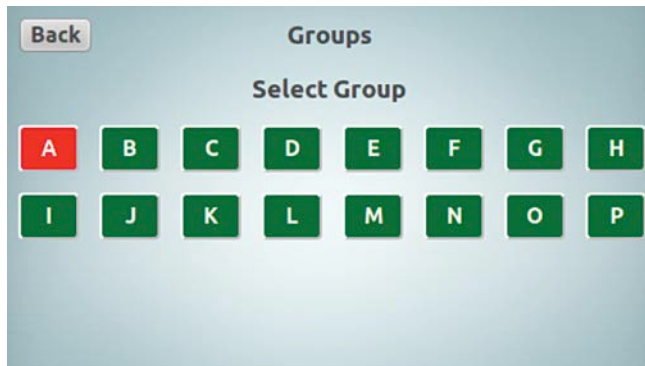


## Status of all groups

In the "Groups / Select Group" screen, the group buttons show the current status of each group using a color code.

An "ON" group status is the group letter with a red background.



An "OFF" group status is the group letter with a green background.



## Group configuration screen

In the "Groups" screen, tap the group letter box.



This will display the "Group" configuration screen for the specific group to be edited.



In the "Group" configuration screen, the current group's attributes are displayed. The group's letter and point address (displayed at the top of the screen), the status of the group, (displayed using the color coded button with the red background denoting ON and the green background denoting OFF), the name of the group, and the description of the group.

## Editing the group name

To edit the name of the group, tap the Name entry textbox or the ellipsis.
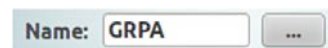


This will display the alphanumeric keyboard.

Tap the character/numbers buttons to input chosen group name.

Tap the "Enter" button to accept the changes.

## Editing the group description

To edit the Description of the group, tap the Description entry textbox or the ellipsis.



This will display the alphanumeric keyboard.

Tap character/numbers buttons to input chosen group description.

# LCD touchscreen display programming

Tap "Enter" button to accept the changes.

**Note:** Notice that the "Save" button in the top right corner of the "Group" configuration screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

Once the group configuration edits are complete, tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.



## Manual control of group

There is also a manual ON/OFF control for the group included on the "Group" configuration screen.

To turn ON the group, tap the "ON" button.
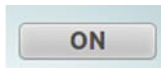


The group turns ON and the background of the status icon turns red.



To turn OFF the group, tap the "OFF" button.
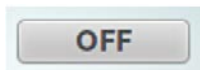


The group turns OFF and the background of the status icon turns green.
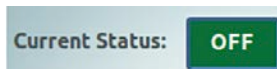


## Adding controllable circuit breakers to a group

In the selected group's "Group" configuration screen,



tap the "Breakers" button.
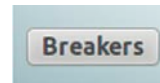


This will display the "Associate Breakers with Group" screen.
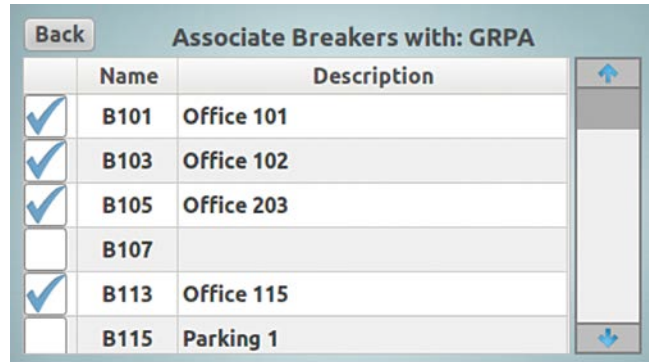


In the "Associate Breakers with Group" screen, a checkmark beside the controllable circuit breaker name denotes an associated controllable circuit breaker in the specified group.

### Associate a circuit breaker with a group

To associate a controllable circuit breaker to the selected group, tap the checkbox next to the target circuit breaker to add a checkmark.

## Remove a circuit breaker from a group

To remove a controllable circuit breaker from the selected group, tap the checkbox next to the target circuit breaker to remove a checkmark.

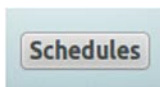| | B113 | Office 115 |
|---|---|---|

## Associating a schedule with a group

A group schedule is a time based control of a group. The group schedule screen is a quick and easy way to create "ON" and "OFF" actions for the selected group.
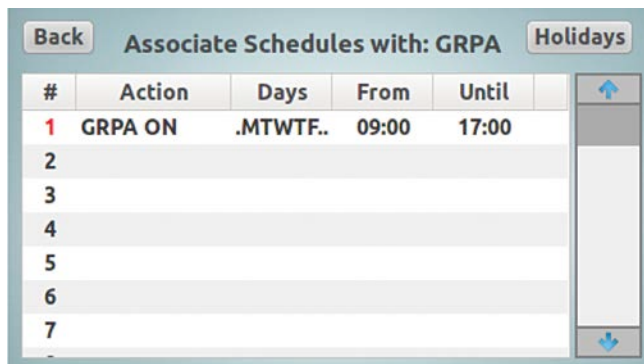
In the selected group's "Group" configuration screen,



tap the "Schedules" button.



This will display the "Associate Schedules with Group" screen for the selected group.



Listed in this screen are all the schedules for the selected group only.

**Note:** Some schedules may be listed on higher numbered lines, scrolling down may be required to view all schedules.

See the "Creating Time Schedules" section of this document for more details on the schedule screens, creating and removing schedules.

## Associating an input with a group

An Input can be associated to a Group to control it "ON" and "OFF". This action, in turn, commands all of the controllable circuit breakers associated with that particular group "ON" and "OFF". There are 16 inputs available for associations; 8 Digital inputs and 8 Universal inputs. An input can be associated with a single group or multiple groups.
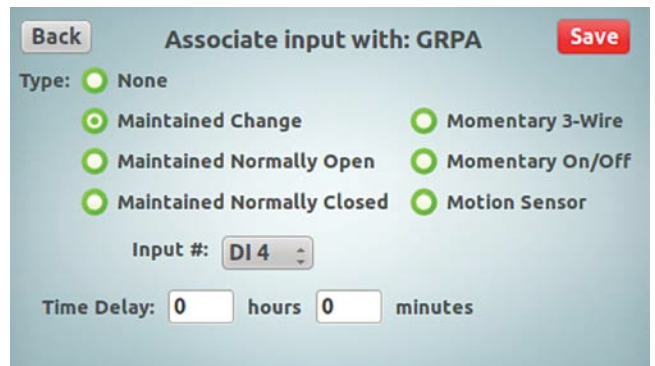
In the selected group's "Group" configuration screen,



tap the "Inputs" button.
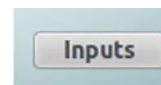


This will display the "Associate Input with Group" screen for the selected group.



Tap the radio button beside the "Type" to choose the input type required.

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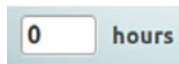Tap the "Input #" textbox,

Input #: DI 4

This will display the dropdown box list of inputs.

Tap one of the available entries to choose the input to use for the group control.

The "Time Delay" is a time value set for the group when the switch is activated. After the timer delay expires, the group will be commanded "OFF", for example, if the time delay is set for 10 minutes, when the input is closed, the group will turn "ON", then, when the time delay reaches 0 the group will turn "OFF". For "Maintained" type switches, it does not matter that the switch remains closed; the group will turn OFF after the time delay expires.

To set the time delay, tap the "Hours" entry textbox.

0    hours

This will display the numeric keypad.

Tap the number buttons to input the value of hours for the time delay timer.

Tap the "Enter" button to accept the input.

Tap the "Minutes" entry textbox.

0    minutes

This will display the numeric keypad.

Tap the number buttons to input the value of minutes for the time delay timer.

Tap the "Enter" button to accept the input.

**Note:** Notice that the "Save" button in the top right corner of the "Associate Input with Group" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

Once the input configuration edits are complete, tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.

Save

## Creating time schedules

Schedules are ON/OFF actions programmed to control points within the Pow-R-Command system. A point can be a flag, controllable circuit breaker, or group. The schedule can be by the day-of-the-week, time-of-day, the date, and/or astro time. This can be done as a one time day/date entry, a daily or weekly action, or a one-shot On or Off event.
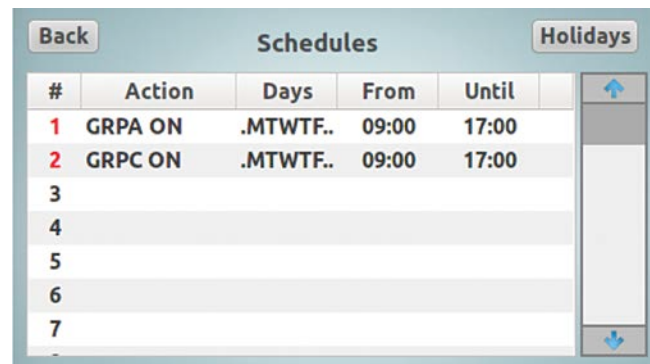
## Entering schedules

**Note:** If you are creating a simple schedule for a group, the group's "Associate Schedules with Group" configuration area may be used instead of general "Schedules" configuration area.

In the "Main Menu" screen, tap the "Schedules" icon.

Schedules

This will display the "Schedules" screen.

| Back | Schedules | | | Holidays | |
|---|---|---|---|---|---|
| # | Action | Days | From | Until | |
| 1 | GRPA ON | .MTWTF.. | 09:00 | 17:00 | |
| 2 | GRPC ON | .MTWTF.. | 09:00 | 17:00 | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |

From the "Schedules" screen, individual schedules can be added, edited, deleted, and the status of the schedule can be viewed. The holiday list can be updated and edited as well.

Each line in this screen is a separate schedule entry. The # is the schedule number. The number's text color changes to red when the schedule is "active".

The "Action" field displays a command (or a part of the command with a trailing ellipses) activated at the "From" time of the schedule; this command is reversed at the "Until" time of a standard schedule. If the schedule is configured as an "Event", it only issues the command at the "From" time, and there is no "Until" time specified, so there will not be a reversal of the action.

The "Days" field displays the days of the week that the schedule will activate. This includes Sunday(S), Monday(M), Tuesday(T), etc. and Holiday(H).

"From" is the start time of the schedule, start of the commanded action.

"Until" is the end time of the schedule, end of the commanded action.

**Note:** In the "Schedules" screen, the "From" and "Until" times are displayed in the military format. When entering the time schedules in the "Edit Schedule" screen, the times are entered in the standard format (am/pm).

In the "Schedules" screen, tap on the line of the schedule that needs to managed.

| # | Action | Days | From | Until |
|---|--------|------|------|-------|
| 1 | GRPA ON | .MTWTF.. | 09:00 | 17:00 |
| 2 | | | | |

This will display the "Edit Schedule" screen.



### Action of the schedule

The "Action" is the command that is sent at the "From" (start time) of the schedule and reversed at the "Until", (end time) of the schedule. The "Action" command is formatted using the name or address of the point in the controller and the command separated by single space character, for example GRPA ON or 1F ON, B101 OFF or 1:1B OFF. There can be multiple commands in the "Action" field, but they must be separated by the single space character for example "GRPD ON B127 ON".

**Note:** When in the "Associate Schedule with Group" configuration area, the only command allowed is <the selected group> <ON> which is automatically entered in the "Action" field, and can not be changed. The general "Schedules" configuration area allows combination entry of the multiple commands.

Once in the "Edit Schedule" screen, tap the "Action" line.



This will display the alphanumeric keyboard.



Tap character/number buttons to input the name or address of the point to control, tap the space bar and then input the command, for example, "GRPH OFF", "B101 ON," or "1:27B ON".

To find the name or address of the point you can look in the following screens.

Circuit breaker points; The controllable circuit breaker address is made up of the panelboard #: the controllable circuit breaker position in the panelboard. For example, "3:12B" is the #12 circuit breaker in the #3 panelboard).

From the "Main Menu" screen, tap "Breakers"—tap on panelboard—tap the number of the circuit breaker of interest.



The controllable circuit breaker address is located at the top of the screen, for example, "1:1B"; the name is the 4-character text in the name textbox, for example, "B101".

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From "Main Menu" screen, tap "Groups"—tap the button of the group of interest.



The address is located at the top of the screen, for example, "1F"; the name is the 4-character text in the name textbox, for example, "GRPA".

Tap the "Enter" button to accept the "Action" edit when complete.

## Fixed date schedule entry

A "Fixed Date" Schedule is a schedule that will operate only during one single date.

**Note:** Since the "Fixed Date" schedule has only month and day specified, it will activate every year on the same date. Care must be taken managing these schedules on the yearly basis.

In the "Edit Schedule" screen, tap the radio button to select the "Fixed Date" schedule.



Tap the entry textbox.

This will display the "Enter Date" calendar screen.



Choose the single date for the schedule to activate.

When the date is selected, the "Enter" button will turn red indicating that the changes need to be accepted. Tap the red "Enter" button to accept the changes and return to the "Schedules" screen.



**Note:** Notice that the "Save" button in the top right corner of the "Edit Schedule" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

## Periodic schedule entry

A "Periodic" schedule will operate every week on each day selected.

In the "Edit Schedule" screen, tap the radio button to select the "Periodic" schedule.



Tap the checkbox to add a checkmark below each day that the schedule is to activate.

## Absolute or relative time

Absolute time scheduling is the use of the actual hour and minute of the day to issue the commands.

Relative time scheduling uses the location set in the controller to calculate the time of the Sunrise and Sunset for each day. This time is then used to calculate "ON" and "OFF" times for the schedules along with additional "OFFSET". The offsets are setup as hours and minutes; the "OFFSET" limit is 7 hours and 59 minutes.

Available time options are:

- Absolute
- Before Sunrise
- After Sunrise
- Before Sunset
- After Sunset

## Setting an absolute time schedule

In "Edit Schedule" screen, tap the hours entry box for the "From" time.
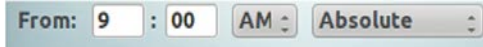
From: 9 : 00 AM ⌄ Absolute ⌄

This will display the numeric keypad.

| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 9 |
| Clear | 0 | << | Enter |

Tap the corresponding numbers to input the "From" hour required.

Tap the "Enter" button.

In "Edit Schedule" screen, tap the minutes entry box for the "From" time.

From: 9 : 00 AM ⌄ Absolute ⌄

This will display the numeric keypad.

| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 9 |
| Clear | 0 | << | Enter |

Tap the corresponding numbers to input the "From" minutes required.

Tap the "Enter" button.

Tap the AM/PM dropdown to and choose the required time.

"Absolute" will be displayed by default; if not, tap the dropdown box and select "Absolute" from the list.

If the schedule has "From" and "Until" times in the "Absolute" format, continue to enter "Until" time following above procedure.

**Note:** Notice that the "Save" button in the top right corner of the "Edit Schedule" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

Once the time schedule edits are complete, tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.

Save

## Setting a relative sunrise / sunset schedule

The following example will show a typical Sunset to Sunrise schedule.

In the "Edit Schedule" screen, next to the "From" time the "Absolute" will be displayed by default;

Tap the text dropdown box and—in our example—select "Before Sunset" from the list. This action will remove AM/PM settings that are not used in this case.

Before Sunset ⌄

Tap the hours entry box for the "From" time.

From: 3 :

This will display the numeric keypad.

| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 9 |
| Clear | 0 | << | Enter |
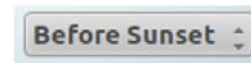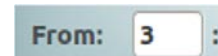
Tap the corresponding numbers to input the number of "OFFSET" hours required.

Tap the "Enter" button.

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In "Edit Schedule" screen, tap the minutes entry box for the "From" time.

: 00

This will display the numeric keypad.

Tap the corresponding numbers to input the number of "OFFSET" minutes required.

Tap the "Enter" button.

If the schedule has "From" and "Until" times in the relative format, continue to enter "Until" time following above procedure. Make sure to select correct entry—the offset time will be "After Sunrise" in our example.

Until: 2 : 00    After Sunrise

**Note:** Notice that the "Save" button in the top right corner of the "Edit Schedule" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

Once the time schedule edits are complete, tap the red "Save" button to save the changes.

Save
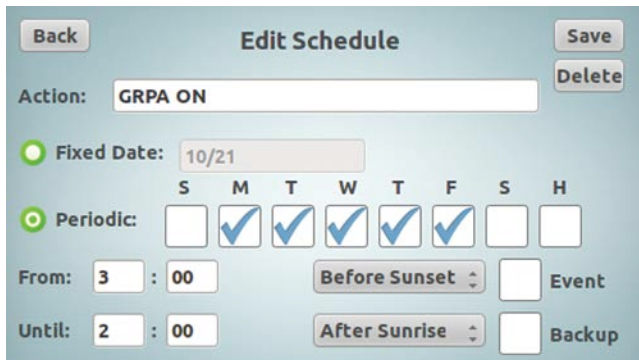
To leave the page without saving changes, just tap the "Back" button.

**Note:** The time schedules "From" and "Until" times can be mixed between an absolute format, and any of the relative formats, for example, the time schedule can start from a relative time (i.e.: Before/After Sunset) and end at an absolute time (i.e.: 11:30 pm).

## Creating an event

An "Event" is a schedule that has only a start action ("From"). It is created just like a normal schedule except there will be no ending time.

In the "Edit Schedule" screen, tap the checkbox beside "Event" to add a checkmark.

Event          ✓ Event

Once the checkmark is added, the "Until" time will then be greyed-out becoming unaccessible.

From: 9 : 00  AM   Absolute   ✓ Event
Until: 5 : 00  PM   Absolute     Backup

Tap the hours entry box for the "From" time.

From: 9 :

This will display the numeric keypad.

Tap the corresponding numbers to input the "From" hour required.

Tap the "Enter" button.

In "Edit Schedule" screen, tap the minutes entry box for the "From" time.

: 00

This will display the numeric keypad.



Tap the corresponding numbers to input the "From" minutes required.

Tap the "Enter" button.

Tap the AM/PM dropdown to and choose the required time.



If the"Event" requires a relative start time, follow the "Setting Relative Sunrise / Sunset Schedule" procedure to enter proper "From" start time for the schedule.

**Note:** Notice that the "Save" button in the top right corner of the "Edit Schedule" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

Once the time schedule edits are complete, tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.



The "Schedules" screen will now display the schedule with an "Action", "Days", and a "From" time with no "Until" time.
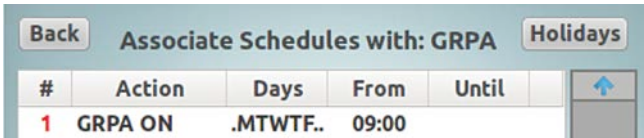


## Creating a backup schedule

Backup schedules are only used in networked systems with a master device. In this case, the master device will provide most of the system scheduling to maintain centralized control. Master devices that can enable this feature include the PRC5000 and the Ethernet Interface Module (EIM). However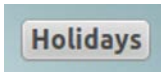, if the Network is down or the master device has lost connection, the system will still have a means of control. The backup schedules are part of the distributed control feature of the Pow-R-Command system. If a schedule is flagged as a "Backup" in the PRC-E Series controller, it will only run when the connection to the master device has been lost for an extended period of time. If master device does not exist on the network, the controllers will always be in backup mode.

To create a backup schedule, first create the required schedule following the above procedures.

To specify the schedule as a "Backup", tap the "Backup" checkbox to add the checkmark.



Once the time schedule edits are complete, tap the red "Save" button to save the changes



This schedule is now a backup schedule and will now display the schedule with a "B" in the last column of the list indicating that it is a backup schedule.
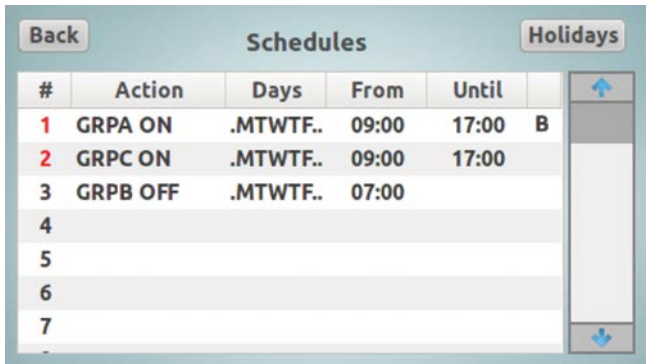
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## Holidays—selecting a day as a holiday

A "Holiday" is a special day that does not follow the typical daily operational criteria of the system. A holiday can be selected for any month/day of the year and up to 30 holidays can be created in the PRC-E Series controller. A 20-character alphanumeric description can be added to designate the holiday. When a day is selected as a holiday, it is no longer considered a standard day of a week.

**Note:** Since the "Holiday" has only month and day specified, it will activate every year on the same date. Care must be taken managing holidays on the yearly basis.

## Selecting a Day as a Holiday

In the "Schedules" screen, tap the "Holidays" button.
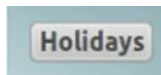
This will display the "Holidays" configuration list screen.

Tap the first empty line.

This will display the "Edit Holiday" configuration screen.
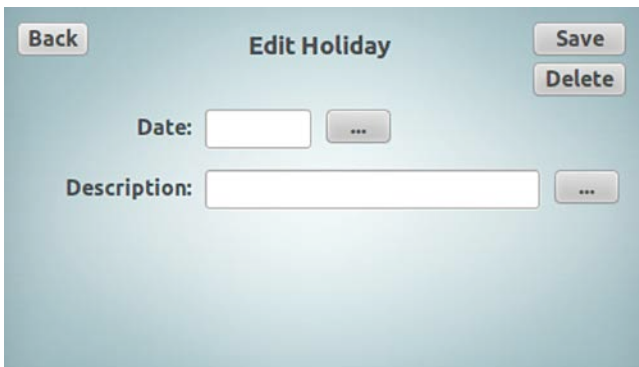
Tap the "Date" entry field or ellipsis.

This will display the calendar tool.

Tap the date to set up as a holiday; see "Setting the Date, Time, and Daylight Savings Time" procedure for calendar operation details.

Tap the red "Enter" button to accept the date.

Tap the "Description" textbox or ellipsis.

This will display the alphanumeric keyboard.

Tap letters/numbers buttons to enter the description desired.

Tap the "Enter" button, when the description is complete.
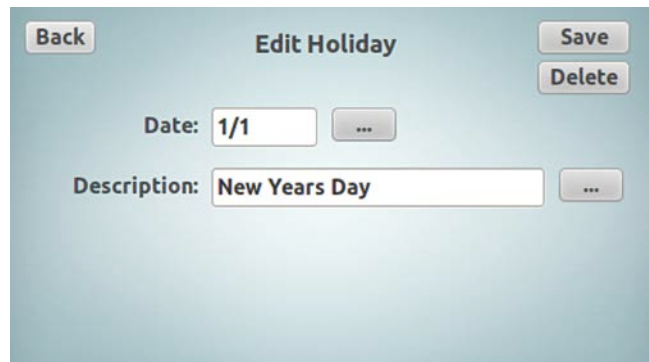
Once the holiday edits are complete, tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.

This will display the "Edit Holiday" configuration screen.

Tap the "Delete" button.

The holiday will be removed from the list.

## Deleting a Holiday

In the "Schedules" screen, tap the "Holidays" button.

This will display the "Holidays" screen.

Tap the "Holiday" line to delete.

## BACnet network configuration

The PRC1500E and PRC2000E controllers have native BACnet/IP capabilities. The attributes needed for BACnet system communication are set using the BACnet configuration screen. These settings should be supplied by the BACnet integrator.

From the "Main Menu" screen, tap the "Configuration" icon.
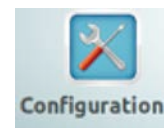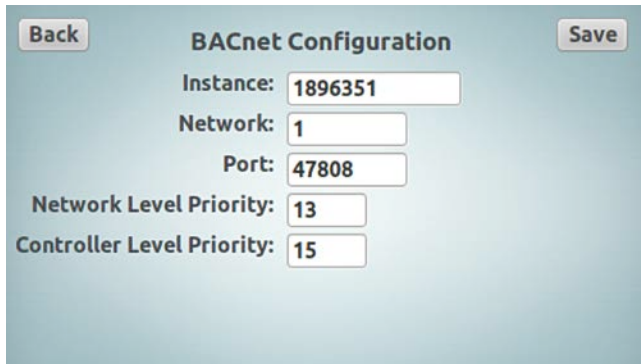
Tap the "BACnet" icon.

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This will display the "BACnet Configuration" screen.



The "Instance" is a unique identifier for the PRC-E controller on the BACnet system.

The "Network" is a routing setting that signifies what part of the system this PRC-E Series controller will be associated.

The Port is the communication port setting. This is used for the BACnet communications from the PRC-E Series controller.

Priority levels are set to achieve certain level of command importance in the BACnet system operation. A smaller number indicates a higher priority level.

In the PRC-E Series controller:

- The Network Level Priority (default is 13) indicates override (out-of-service) setting
- The Controller Level Priority (default 15) indicates normal (in-service) setting

To edit the BACnet/IP attributes, tap the corresponding entry fields.

Use the displayed keypad to tap to input the data.

Tap the "Enter" button to accept the edits.

**Note:** Notice that the "Save" button in the top right corner of the "BACnet Configuration" screen did turn red, indicating that there are some changes to the configuration in this screen. The changes were accepted, but not yet saved in the controller until the red "Save" button is tapped.

Once the BACnet configuration edits are complete, tap the red "Save" button to save the changes. To leave the page without saving changes, just tap the "Back" button.
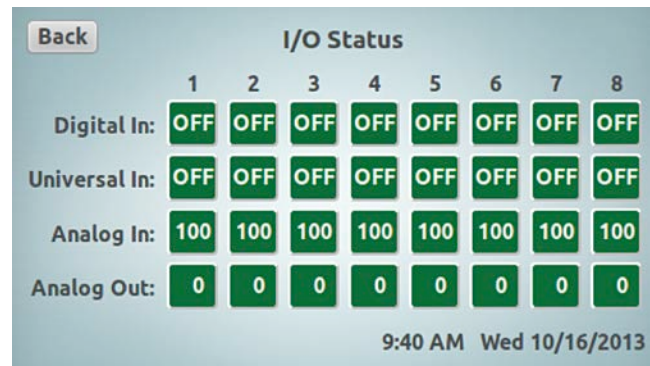


## I/O status

The I/O status displays current status/levels of the digital and analog inputs and outputs in the PRC-E controller.

From the "Main Menu" screen, tap the "I/O Status" icon.



This will display the "I/O Status" Screen.



The digital inputs have green backgrounds with "OFF" text when they are open and a red background with "ON" text when the inputs are closed. If overridden, the background color will be yellow.

The universal inputs can be configured as digital (dry-contact) inputs or analog (voltage level) inputs.

If configured as digital inputs, the "Universal In" will have green backgrounds with "OFF" text when they are open and a red background with "ON" text when the inputs are closed.

If configured as analog inputs, the "Analog In" displays the percentage of the voltage range applied to the input. The background color is green in the normal status. If overridden, the background color will be yellow.

The "Analog Out" displays the percentage level of the analog output. The background color is green in the normal state. If overridden, the background color will be yellow.

## Digital Switch configuration

Pow-R-Command Digital Switches are programmable devices that have onboard I/O to receive inputs from occupancy sensor and photo sensors, and an analog output to control 0–10 V dimmable ballasts and LED drivers. See the "Digital Switch" section on **page 81** for more information.

The "Digital Switches" screen displays a list to the DSN devices connected to the controller.

In the "Main Menu" screen, tap the "Digital Switches" icon.



This will display the "Digital Switches" screen.



This Screen displays the PRC Digital Switch Information only.

The number "#" is the unique Digital Switch address. The address range is 1 to 99.

The switch "Description" is an alphanumeric description of the switch.

The Version" is the firmware version of the PRC Digital Switch.

The "Type" is the number of buttons on the switch. The types available are 2-button (2-B), 4-button (4-B), and 6-button (6-B).

# Web page programming

## Introduction

PRC-E Series controllers include embedded Web pages that can be accessed by a computer (PC) through the Maintenance Port using a standard browser. The PRC2000E controller also provides remote access to these Web pages using the Ethernet network connection. The pre-configured Web pages can be used for configuration, monitoring, and override control of the controller.

## PC settings

The PRC-E Series controller uses the TCP/IP protocol to communicate on its Maintenance and Ethernet network ports. The PRC-E controller has an editable static IP address on the Ethernet port and a built-in Dynamic Host Configuration Protocol (DHCP) server on the Maintenance Port to assign IP addresses automatically.

## Accessing Web pages from the Maintenance Port

The Maintenance Port of the PRC-E controllers have a built-in DHCP server. Most PCs are configured to receive IP addresses automatically from a DHCP server, therefore, the connection could be as simple as connecting an Ethernet patch cable from the controller Maintenance Port to the PC Ethernet port and the PC will obtain an IP address from the PRC-E controller.

If DHCP is not the IP network configuration setting on your PC, the network configuration will need to be edited for successful connection to the controller.

See the "Ethernet Connection" section of this document for information on a common PC network configuration (see **page 15**).

If further assistance is needed, contact your IT support.

Once connected and an IP address is received, the PRC-E controller can be accessed using any standard Web browser. The Maintenance Port of the PRC-E controller has a default IP address of 192.168.222.1.

## Connecting to the controller through the Maintenance Port

Connect the PC to the Maintenance Port using a standard patch cable, open your Web browser of choice.

Type 192.168.222.1 in the address field.



For further instruction, see the "Logging into the PRC-E Web Page" section of this document (see **page 15**).

## Accessing the Web page from the Ethernet network connection (PRC2000E only)

When using the Ethernet network connection to connect the PRC-E controllers, a controller static IP address must be used for this network connection. The PRC2000E controller default static IP address is 10.0.222.1. This can be changed using the LCD touchscreen display, the Web page through the Maintenance Port (See the "Maintenance Port Access" section on **page 15**) or Ethernet port of the PRC2000E using the default IP address.

A standard Ethernet patch cable can be used when directly connecting the PC to the PRC2000E controller. The PC must be configured with a static IP address within the same network as the PRC2000E controller. For the default IP address network connection, a usable address would be 10.0.222.100 for the PC configuration. See the "Ethernet Connection" section of this document or contact your IT support for further assistance (see **page 15**).

## Connecting to the controller through the Ethernet port

Once the PRC2000E controller and PC are set up with the correct IP address configuration, connect the PRC2000E Ethernet port to the PC or building's Ethernet network.

Open your Web browser of choice.

In the address field, type the address of the PRC2000E controller, the default 10.0.222.1 or the new address, if assigned.

## Logging into the PRC-E Web page

After entering the IP address of the PRC-E controller into the address field of your browser, the secure login Web page should open.



**Note:** PRC Web Interface requires Adobe Flash Player.

Type the User name and password in the appropriate box and click "OK".

Default User name: admin

Default password: admin



A splash screen will open briefly.

The panelboards "Breakers" page will be the initial Web page.



The Web pages are formatted in folder form. There are tabs across the top of the Web page used to navigate to other Web pages.



This guide is written in the order of an initial commissioning, so the Web pages will not be covered in the order of the tabs but all aspects of each will be covered. There are visible and some context menu elements on each Web page.

## Panelboard configuration

**Note:** The Breaker Control Buses (BCBs) must be properly addressed and all necessary SLAN wiring must be terminated before continuing the following.

On initial commissioning or in the case of any newly added PRCEP panelboard(s) to a system, the panelboard(s) must be configured in the controller.

The panelboard configuration is made up of the panelboard location; 1–8, the "Type" of panelboard; 42-circuit, 30-circuit, 18-circuit standard or column panelboard, the BCB's address; 1–8, the position within the panelboard; left side or right side, and the name of the BCB.

By default, the panelboard configuration uses the BCB addresses to set up a 42-circuit panelboard. The odd addresses are assigned as left BCBs and the even addresses are assigned as right BCBs.

To configure the panelboards:

Click the "System Configuration" tab.

# Web page programming

There are lower level tabs located on this Web page.

Click the "Panelboards" tab.



This will open the "Panelboard Configuration" screen.
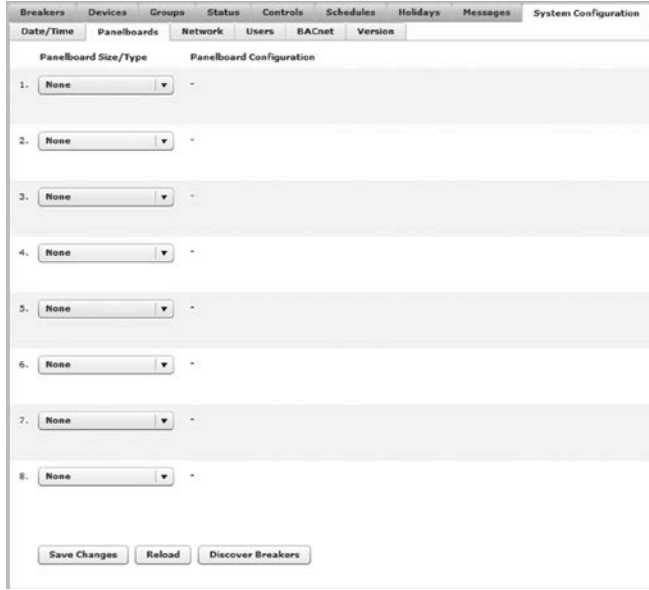


**Note:** The screen list may be blank or incomplete until a "Discover Breakers" command has been issued.

This screen displays the BCBs connected to the controller and the configuration of the panelboards. If there are four BCBs connected to the controller, there will be four listed in this screen as left or right.

## Discover breakers

The controllable circuit breakers in the panelboards must be discovered by the PRC-E controller. The "Discover Breakers" command must be initiated at the commissioning of the system, after any addition of controllable circuit breaker(s) in a panelboard(s), after any addition of PRC Expansion (PRCEP) panelboard(s) to a system or after a panelboard configuration change. During this discovery process, the BCBs in the Master panelboard, and all PRCEP panelboards connected to it, will be scanned for the presence of controllable circuit breakers. The presence of each controllable circuit breaker is captured and stored in the controller's database. The BCB addressing is critical for this process to be successful. In the Master and PRCEP panelboards, each BCB should have a unique address of 1–8. See the "BCB Addressing" section of this document.0

To initiate a "Discover Breakers" command, click the "Discover Breakers" button at the bottom of the "Panelboard Configuration" Web page.



During the "Discover Breakers" initiation the mouse pointer changes to a wait timer.



Once complete, the "Panelboard Configuration" screen will become active again and any BCBs discovered will be displayed in the list.
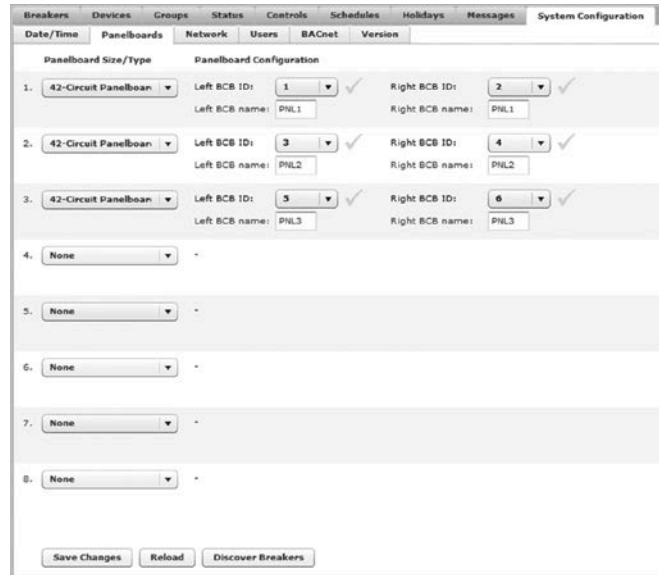


By default, the BCBs are configured as 42-circuit panelboards. The table below shows the default settings that will be applied to the connected BCBs in 42-circuits panelboards.

## Default BCB addressing auto-configuration

| Panelboard | Type | BCB ID (Address) | BCB Name |
|---|---|---|---|
| 1 | Left | 1 | PNL1 |
| 2 | Right | 1 | PNL1 |
| 3 | Left | 2 | PNL2 |
| 4 | Right | 2 | PNL2 |
| 5 | Left | 3 | PNL3 |
| 6 | Right | 3 | PNL3 |
| 7 | Left | 4 | PNL4 |
| 8 | Right | 4 | PNL4 |

If required, these default settings can be edited to meet the current panelboard layout.
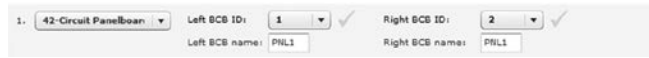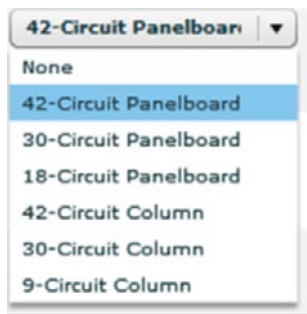


The above figure displays the configuration for #1 panelboard as a 42-circuit panelboard with a left BCB addressed #1 and a right BCB addressed #2 with the name PNL1.

### Editing the size or type of a panelboard

Click the "Panelboard Type/Size" button of the panelboard that needs to be updated.
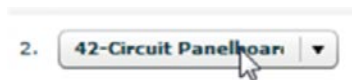


This will open the dropdown list for the Type/size.



Choose the correct panelboard from the list.

### Editing the BCB panelboard configuration

Click the "BCB address" button of the BCB that needs to be updated.



This will open the dropdown list for the BCB addresses.



Choose the address for the BCB or choose "None" if there is not a BCB in this position in the panelboard.

### Editing the name of the BCB

Click the name text box.
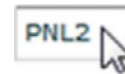


The textbox opens for edit and can be edited with up to a 4-character alphanumeric name.

### Configuring a new panelboard

If there is a BCB in a panelboard that is not listed correctly, this can be edited.

First the BCB address will need to be removed from the current panelboard.

Click the BCB textbox to open the dropdown box.



Click "NONE" to remove BCB from this panelboard.

# Web page programming

Click the panelboard text box that the BCB will be added.
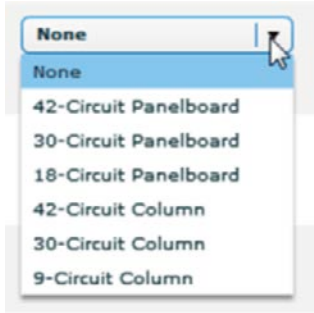


This will open the dropdown list.

Click to choose the "Type/Size" of the panelboard.



Click the "BCB ID" address textbox in the appropriate side of the panelboard.



This will open the dropdown list.



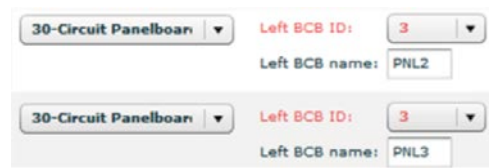Click to choose the address of the BCB in the panelboard.



Click the "BCB name" text box.



Use the keyboard to enter the 4-character name.



**Note:** If two BCBs are given the same address, the position ID text and the "BCB ID" number will turn red to indicate that there is an issue with the addressing.



To accept the panelboard configuration edits, click "Save Changes".



Once all the panelboard configuration edits are complete, the "Discover Breakers" command must be initiated.

Click the "Discover Breakers" button.
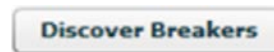
## Breakers screen

Click the "Breakers" tab.



This will open the "Breakers" Web page.



The "Breakers" screen displays all controllable circuit breakers that were discovered (configured), they are displayed by their position and the panelboard they are configured in. If a number is greyed-out, there was no controllable circuit breaker discovered in that position. This screen can be compared with the physical panelboard layout to find issues.

**Note:** If there is a controllable circuit breaker that is physically installed but was missed during the discovery process, check the pigtail connector and wiring from the controllable circuit breaker to the BCB to verify that it is plugged in correctly and cabling or connector is not damaged. After the issue is corrected, the "Discover Breakers" process must be reinitiated.

## Breaker configuration

The "Breaker" screen displays the panelboards and the individual controllable circuit breaker. The panelboards are chosen by using the "Panels" button across the top of the circuit breaker layout. By default panelboard 1 is displayed.

To navigate to a different panelboard, click the panelboard number button.



This will display the layout for the panelboard chosen.

The breaker screen displays the attributes of the controllable circuit breakers. The "Name", "Description", and "Group" association are editable.

## Editing breaker attributes

Double-click the text box of one of the attributes of the chosen circuit breaker.



This opens the "Edit Point" window for the chosen circuit breaker.
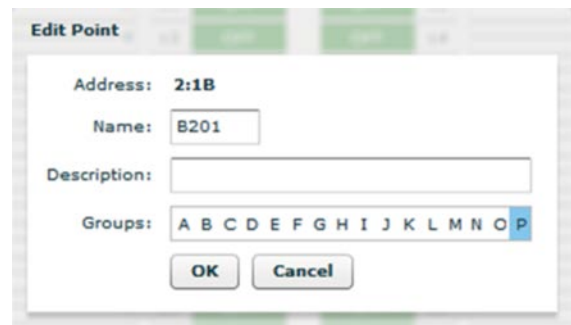


The "Name" is an alphanumeric input that can be up to four characters in length. Multiple controllable circuit breakers can be given the same name. This name can then be used to control those controllable circuit breakers as a group using schedules.

To edit the name, click the "Name" text box and type in the chosen text.



The "Description" is an alphanumeric input that can be up to 20 characters in length.

# Web page programming

To edit the description, click the "Description" text box and type in the chosen text.



The "Groups" are logical associations to create zones for a single point of control for multiple circuit breakers. There are 16 preconfigured groups.

To add a circuit breaker to a group, click the group letter(s) to associate the circuit breaker.



See the "Groups" section of this document for more information.

After edit are complete, click the "OK" button to save the changes.

## Breaker status and override

### Breaker status

The controllable circuit breaker status is located in the center field of the panel layout. The circuit breaker "Status" indicates the various states of the controllable circuit breaker using text and background colors.
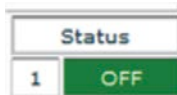


**Note:** There is a legend located at the bottom of the layout explaining the text, background colors, and flashing activity states.

The number displayed is the position in the panelboard where the circuit breaker is configured. In a standard panelboard, this would be odd numbers on the left and even on the right side. In a column panelboard this would be sequential from top to bottom but the Web page is still laid out side-by-side.

The text in the "Status" indicates the commanded state of the circuit breaker.



The button background color indicates the ON/OFF feedback status from the controllable circuit breaker.

**Note:** The feedback status is received from the controllable circuit breaker. If the main handle is "OFF", the status feedback will always be "OFF".

A green background indicates that the controllable circuit breaker has a feedback status of "OFF".



A red background indicates that the controllable circuit breaker has a feedback status of "ON".



A flashing background color indicates there is a mismatch between the last commanded state and the feedback status of the controlled circuit breaker.

A flashing green background indicates that the commanded state is "ON" but the feedback status is "OFF".

A flashing red background indicates that the commanded state is "OFF" but the feedback status is "ON".

## Overriding a controllable circuit breaker

A controllable circuit breaker can be overridden "ON" or "OFF" manually using the Web page. The normal state of the circuit breaker is In-Service, but when overridden, it is placed "Out of Service". Out of Service means that the controllable circuit breaker cannot be commanded from a schedule, switch input, or any other control means other than another override command. The override must be "Terminated" to return the controllable circuit breaker to normal operation (In-Service).

Double-click the ON/OFF status icon for the selected controllable circuit breaker to override.



This opens the "Point Status" window.



This screen displays the controllable circuit breaker address, name and commanded state. It also has manual control buttons for the selected circuit breaker.

## Override ON—circuit breaker
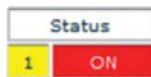
Click the "Override ON" button.

**Override On**

The selected controllable circuit breaker status should display "ON" with a message in red stating "Out of Service".
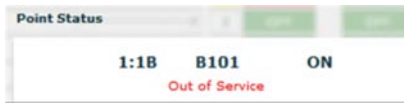
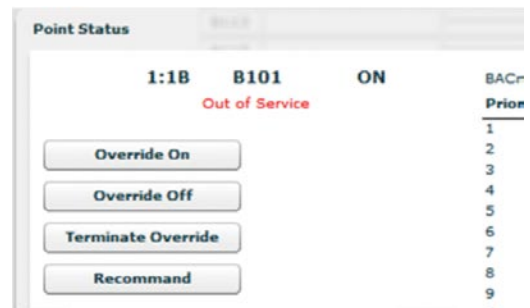| Point Status | | | | |
|---|---|---|---|---|
| 1:1B | B101 | ON | | |

Out of Service

Click the "Close" button.

In the "Breakers" screen, the controllable circuit breaker status button background should now be red with the "ON" text denoting the last command was an "ON" command and the feedback indicates that it is "ON". The circuit number should now have a yellow background. This yellow background denotes an override is active for the selected controllable circuit breaker.

| Status | |
|---|---|
| 1 | ON |

## Override OFF—circuit breaker

From the breakers" screen,

Double-click the ON/OFF status icon for the controllable circuit breaker selected to override "OFF".

This opens the "Point Status" screen.

Click the "Override Off" button.

**Override Off**

The selected controllable circuit breaker status should display "OFF" with a message in red stating "Out of Service".
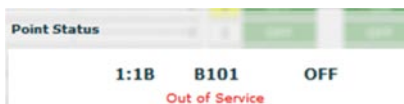
| Point Status | | | |
|---|---|---|---|
| 1:1B | B101 | OFF | |

Out of Service

Click the "Close" button.

In the "Breakers" screen, the controllable circuit breaker status button background should now be green with the "OFF" text denoting the last command was an "OFF" command and the feedback status is "OFF". The circuit number should now have a yellow background. The yellow background denotes an override is active for the selected controllable circuit breaker.

**Note:** The yellow "Override" LED on the PRC-E controller will be illuminated indicating an override is active.
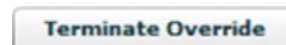
## Clear circuit breaker override

From the Breakers" screen, double-click the ON/OFF Status icon for the controllable circuit breaker selected to terminate the override.

This opens the "Point Status" screen.

| Point Status | | | | |
|---|---|---|---|---|
| 1:1B | B101 | ON | BACn |
| | Out of Service | | Prior |

Override On
Override Off
Terminate Override
Recommand

Click the "Terminate Override" button.

**Terminate Override**

This clears the override. The red "Out of Service message should no longer be shown.

Click the "Close" button.

In the "Breakers" screen, the circuit number should now have a white background denoting no override active on the circuit breaker.
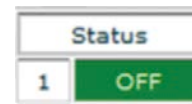
| Status | |
|---|---|
| 1 | OFF |

# Web page programming

## Breaker screen group buttons

Across the top of the "Breakers" Web page there are buttons for group status and manual control.

Groups are logical associations of controllable circuit breakers that provide a single point of control. There are 16 default groups, designated by the letters A through P, that can be easily programmed to create zones of controllable circuit breakers. By default all circuit breakers are initially associated with Group P.
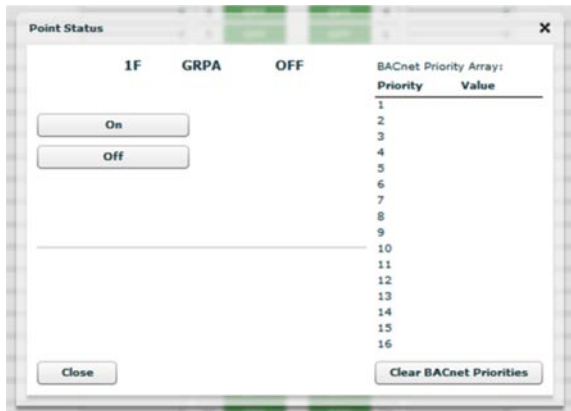
See the "Groups" section of this document for more information on configuring the groups.

## Manual control of groups

To manually control a group, double-click the group name button.

This will open the "Point Status" screen for the group.

The "Point Status" screen displays the point address, point name and status at the top.

To manually control the chosen group, click the "ON" or "OFF" button to turn on the group or turn off the group respectively.

All controllable circuit breakers associated with the group will follow the control of the group.

## Date, time, and location

The date, time, and location can be set through the Date/Time Icon under the "System Configuration" screen.

Click the "System Configuration" tab.

The "Date/Time" screen tab is displayed by default. If not, click the "Date/Time" tab.

This will open the "Date/Time", Location, and Daylight Savings Time screen.
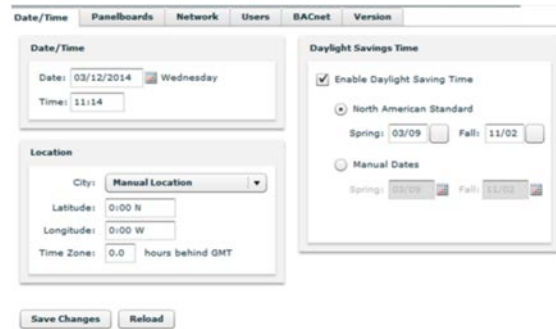
## Setting the date

Click the date text box.

This opens it for edit. Type in the date in the "mm/dd/yyyy" format.

OR

Click the calendar tool button.

This opens the calendar tool.



Click the left/right arrows to move from month to month; click the up/down arrow beside the year to move from year to year.

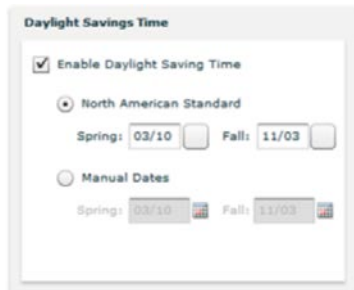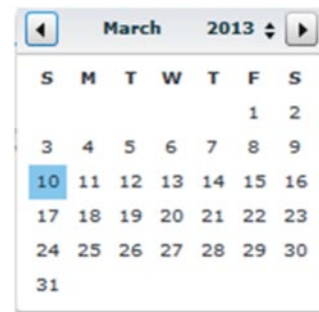Then, click to choose the required date.

**Setting the time**

Click the time text box.



This opens it for edit. Type in the time required in the 24 hour "hh:mm" format.

**Enabling daylight saving**

To enable DST, click the enable DST box to add a checkmark, if one is not already entered.



To use the North American Standard, click the radio button for this selection. The Daylight Savings dates for the North American Standard are automatically calculated, and no customer entry is required. This is the most common selection. This selection does not require a user to return to this screen every year to reset the dates.



If manual date entry is required, click the "Manual Dates" radio button.



Click the "Spring" date entry field.



This opens it for edit. Type in the date in the "mm/dd" format.

OR

Click the calendar tool button.



This opens the calendar tool.



Click the left/right arrows to move from month to month; click the up/down arrow beside the year to move from year to year.

Then, click to choose the required date.

# Web page programming

Click the "Fall" date entry field or calendar tool button.

Fall: 11/03

See the above details on how to enter date.

**Note:** When manual dates are entered, it will be required that a user edits the date any time it changes for a particular year.

## Setting the location

The location coordinates are used to automatically calculate the sunrise and sunset times for a given area.
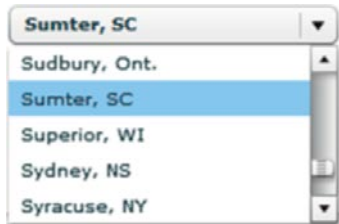
## Common location entry

A list of common cities is included for quick configuration.

Click the city field.

City: Sumter, SC

This will display a dropdown list of the common cities.

Sumter, SC
Sudbury, Ont.
Sumter, SC
Superior, WI
Sydney, NS
Syracuse, NY

Scroll down the list and click to choose the city in your vicinity. The location coordinates will be automatically inserted in the appropriate fields.

Location
City: Sumter, SC
Latitude: 34:00 N
Longitude: 80:30 W
Time Zone: 5 hours behind GMT
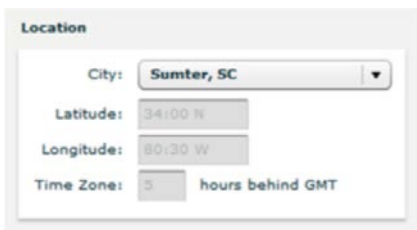
Once the Date/Time, DST and/or Location configuration edits are complete, click the "Save Changes" button to save the changes.

Save Changes

## Manual location entry

If there is no city in the list in close proximity of your location, manual coordinate inputs can be entered. You can find out your coordinates from the local newspaper, Google Maps, etc.

Click the "City" field.

City: Sumter, SC

This will display a dropdown list of the common cities.

Manual Location
Manual Location
Abilene, TX
Akron, OH
Albany, NY
Albuquerque, NM

Click to choose "Manual Location".

City: Manual Location

Click the "Latitude" entry field.

Latitude: 34:00 N

This will open the textbox for edit.

Input the latitude coordinates.

Click the "Longitude" entry field.

Longitude: 80:30 W

This will open the textbox for edit.

Input the Longitude coordinates.

Click the "Time Zone" entry field.

Click the up/down arrows beside the time zone field to input the time zone hours behind GMT.

Time Zone: 5 hours behind GMT

This will open the textbox for edit.

Input the time zone hours behind GMT.

Once all the Location configuration edits are complete, click the "Save Changes" button to save the changes.

## Controller RS-485 CNET configuration

Each PRC-E Series controller must have a unique address when networked with other PRC controllers. The address range is 1 to 120. Also, a 4-character alphanumeric name can be assigned that can be used to identify the controller on the network along with a 20-character alphanumeric description of the controller.

Click the "System Configuration" tab.

**System Configuration**

Click the "Version" tab within this Web page.

**Version**

This opens the controller setting Web page.

Controller

Name: _____

Description: _____

Address: [ 1 ▼ ]

### Editing the controller name

Click the "Name" text box.

Name: _____

This opens it for edit. Type in the chosen 4-character name for the controller.

### Editing the controller description

Click the "Description" text box,

Description: _____

This opens it for edit. Type in the chosen 20-character description for the controller.

## Editing the controller "Address"

Click the "Address" text or dropdown arrow.

Address: [ 1 ▼ ]

This opens a dropdown list of addresses.

[ 39 ▼ ]
1
2
3
4
5

Scroll down the list and click to choose the address needed for the controller.

Once all the controller configuration edits are complete, click the "Save Changes" button to save the changes.

**Changes are pending!** [ Save Changes ]

**Note:** A red "Changes are pending!" message indicates that a change was made and has not been saved.

## Controller Ethernet network configuration

PRC1500E and PRC2000E controllers include Ethernet communications. Each controller must have a static IP address, Subnet Mask and gateway assigned to connect across most Ethernet networks. The MAC address, which is a unique device identifier embedded in the device, is also displayed and is used in some network configurations to improve network security.

Click the "System Configuration" tab.

**System Configuration**

Click the "Network" tab within this Web page.

**Network**

# Web page programming

This opens the network configuration page.



## IP address configuration

Click the "IP Address" text box.



This opens it for edit. Type in the chosen IP address for the controller.

## Netmask configuration

Click the "Netmask" text box.



This opens it for edit. Type in the chosen netmask for the controller.

## Gateway configuration

Click the "Gateway" text box.



This opens it for edit. Type in the chosen Gateway for the controller.

## Soap port configuration

The "Soap Port" is used for Web page data updates. A port must be opened on the intended network for Web page data access. The default port is 8080 but can be edited.

Click the "Soap Port" text box.



This opens it for edit. Type in the chosen soap port for the controller.

## UER settings

The Universal Ethernet Router (UER) is a built-in protocol used for communications between PRC-E Series controllers over the Ethernet network. The "System ID" is the port used for communication with a range of 1 to 65535 and the "Security Mask" is the encryption mask to setup separate logical networks on a single Ethernet, range 1 to 65535. All the controllers required to communicate on the same logical network must have the same "System ID" and "Security Mask" setting.



To enable the UER, click the "Enable UER" checkbox to add a checkmark.



Click the "System ID" textbox.



This opens it for edit. Type in the non-zero System ID number. Zero in this field disables UER functionality.

Optionally, click the "Security Mask" textbox.



This opens it for edit. Type in the Security Mask number.

Once the network configuration edits are complete, click the "Save Changes" button to save the changes.
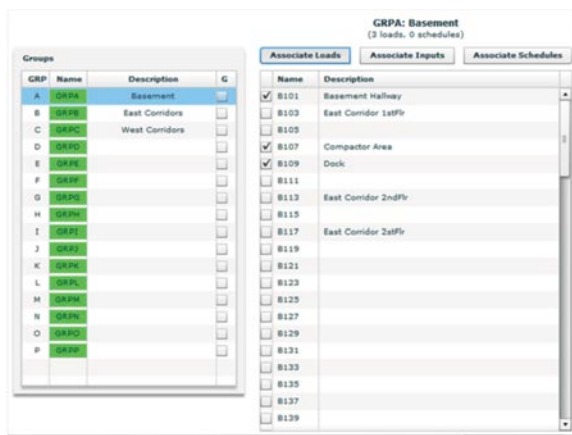
## Group configuration

Groups are the logical associations of controllable circuit breakers with a single point of control. They are used to create and control zones of controllable circuit breakers. There are 16 default groups preconfigured in the PRC-E Series controller designated by letters A through P. Groups can have controllable circuit breakers associated and can be controlled by time schedules or controller inputs.

Click the "Groups" tab.
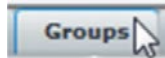


This opens the "Groups" configuration Web page.



In the "Groups" screen, the parameters for each group configuration can be accessed and edited. The group names, descriptions, circuit breaker associations, input associations, schedules and breaker names can be updated on this screen. Additionally, manual control of the groups can also be accomplished from this page.

## Status of all groups

The 16 group names have a colored background that show the current status of each group using a color code.

An "ON" group status is the group name with a red background.



An "OFF" group status is the group name with a green background.
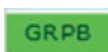


## Editing the group name and description

Double-click the description of the chosen group to edit.



This will open the point edit screen for that group.
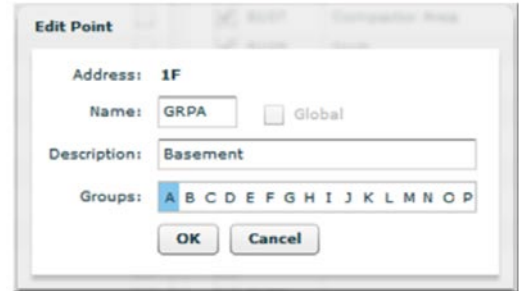


## Editing the group name

To edit the Name of the group, click the "Name" textbox.



This opens the texbox for edit. Type in the 4-character name.

## Editing the group description

A description is optional, but if entered it helps to identify the function of a group.

Click the "Description" textbox.



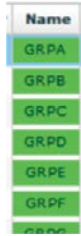This opens the texbox for edit. Type in the 20-character description.

**Note:** Do not change the association of the group by clicking a letter.
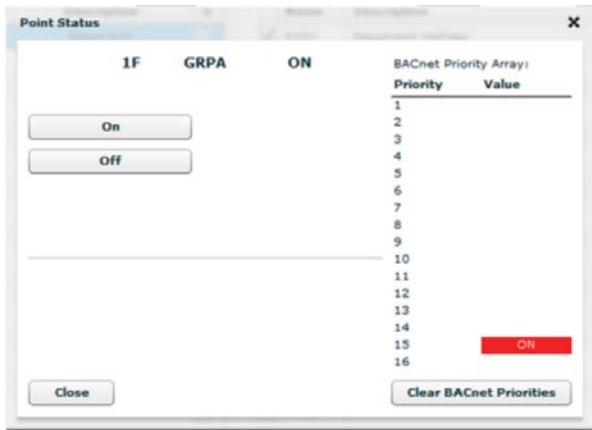
Click "OK" to accept the changes.

## Manual control of a group

There is also a manual ON/OFF control of a group.

Double-click the group name button.



This opens the group "Point Status" screen.



This screen displays the group point address, name and the current feedback status. The PRC2000E will also display BACnet Priority Array as shown above.

To turn ON the group, click the "ON" button.



The group status will show "ON".

**1F     GRPA     ON**

To turn OFF the group, click the "OFF" button.



The group status will show "OFF".

**1F     GRPA     OFF**

## Adding controllable circuit breakers to a group

Click the "Associate Loads" button on the "Groups" screen.



The lower pane of the Web page will list all the discovered circuit breakers. The listing order is odd numbered circuit breakers are listed first then the even numbered are listed.
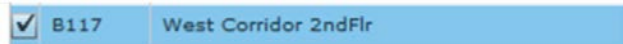


To associate a circuit breaker to a group, click the selected group name.
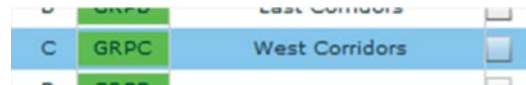


The background of the selected group turns blue and the name of the group displays at the top of the screen.

**GRPC: West Corridors**
(1 load, 0 schedules)

Click the checkbox beside the selected circuit breaker(s) to add a checkmark to associate the circuit breaker(s) to the group.



The number of circuit breakers associated will be displayed at the top of the Web page.

**GRPC: West Corridors**
(1 load, 0 schedules)

**Remove a controllable circuit breaker from a group**

Click the checkbox beside the selected circuit breaker(s) to remove the checkmark to unassociate the controllable circuit breaker(s) from the group.



The change in the number of circuit breakers associated will be displayed at the top of the Web page.
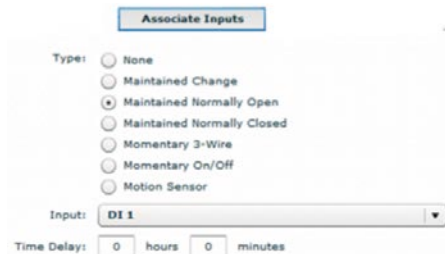
**GRPC: West Corridors**
(0 loads, 0 schedules)

**Associating an input with a group**

An Input can be associated to a group to control it "ON" and "OFF". This action, in turn, commands all of the controllable circuit breakers associated with that particular group "ON" and "OFF". There are 16 inputs available for associations; 8 digital inputs and 8 universal inputs. An input can be associated with a single group or multiple groups.

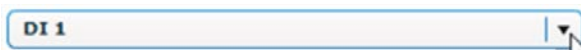Click the "Associate Inputs" button in the "Groups" Web page.

**Associate Inputs**

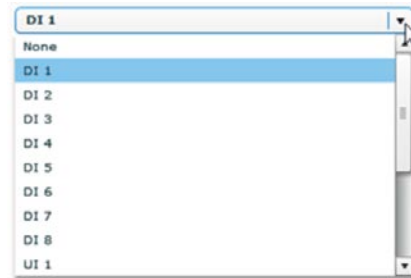The lower pane of the Web page will display the setup screen for the input for the selected group.



Click the radio button of the type of input.

 Maintained Normally Open

Click the "Input" textbox to open the dropdown list of digital and universal inputs.

DI 1

Scroll through and click to choose the two-wire input connected to the controller.



The "Time Delay" is a time value set for the group when the switch is activated. After the timer delay expires, the group will be commanded "OFF". For example, if the time delay is set for 10 minutes, when the input is closed the group will turn "ON", then, when the time delay reaches 0 the group will turn "OFF". For "Maintained" type switches, it does not matter that the switch remains closed; the group will turn OFF after the time delay expires. The Time Delay limit is 7 hours and 59 minutes.

To set a time delay, click the hours textbox.

Time Delay: 0 hours

This opens the box for editing.

Input the number of hours for the time delay.

Click the "Minutes" textbox.

0 minutes

This opens the box for editing.

Input the number of minutes for the time delay.

**Creating time schedules**

Schedules are ON/OFF actions programmed to control points within the Pow-R-Command system. A point can be a flag, controllable circuit breaker, or group. The schedule can be by the day-of-the-week, time-of-day, the date, and/or astro time. This can be done as a one time day/date entry, a daily or weekly action, or a one-shot On or Off event.

# Web page programming

## Entering schedules

**Note:** If you are creating a simple schedule for a group, the group "Associate Schedules" configuration area may be used instead of general "Schedules" configuration area.

Click the "Associate Schedule" for the selected group or click the "Schedules" tab across the top of the Web page.



This displays the schedules list page.



From the "Schedules" list screen, individual schedules can be added, edited, deleted, and the status of the schedule can be viewed.

Each line in this screen is a separate schedule entry. The # is the schedule number.

The "Action" field displays a command (or a part of the command with the trailing ellipses) activated at the "From" time of the schedule; this command is reversed at the "Until" time of a standard schedule. If the schedule is configured as an "Event', it only issues the command at the "From" time, and there is no "Until" time specified, so there will not be a reversal of the action.

The "Days" field displays the days of the week that the schedule will activate. This includes Sunday(S), Monday(M), Tuesday(T), etc. and Holiday(H).

"From" is the start time of the schedule, the start of the commanded action.

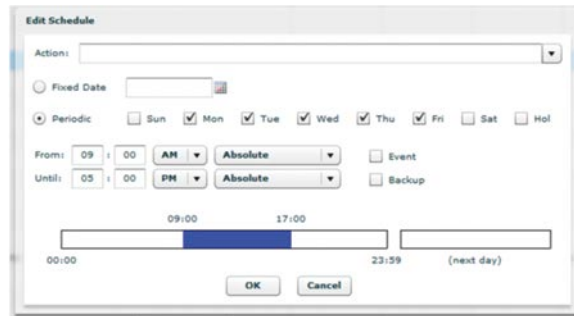"Until" is the end time of the schedule, the end of the commanded action.

"Flags" indicate the status of the schedule. "A" indicates that it is an active schedule currently running, and "B" indicates that the schedule is a backup schedule.

**Note:** In the "Schedules" screen the "From" and "Until" times are displayed in the military format. When entering the time schedules in the "Edit Schedule" screen, the times are entered in the standard format (am/pm).

In the "Schedules" screen, double-click on the line of the schedule that needs to be edited. This could be any empty line or an existing schedule line.



This will display the "Edit Schedule" screen.



## Action of the schedule

The "Action" is the command that is sent at the "From" (start time) of the schedule and reversed at the "Until", (end time) of the schedule. The "Action" command is formatted using the name or address of the point in the controller and the command separated by single space character, for example, "GRPA ON", or "1F ON", "B101 OFF" or "1:1B OFF". There can be multiple commands in the "Action" field, but they must be separated by the single space character, for example, "GRPD ON B127 ON".
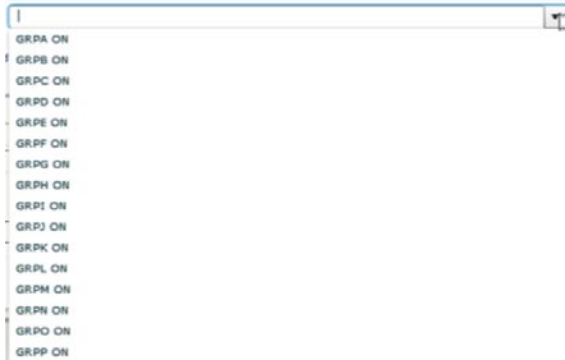
**Note:** When in the "Groups" tab in the "Associate Schedule" configuration area, the only command allowed is <the selected group> <ON> which is automatically entered in the "Action" field, and cannot be changed. The general "Schedules" configuration area allows combination entry of the multiple commands.

Once in the "Edit Schedule" screen, the "Action" line has a dropdown list that has an "On" command for each group.

To use this feature, click the dropdown arrow beside the "Action" textbox.
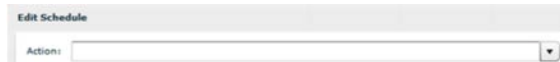
This will open the groups dropdown list.

GRPA ON
GRPB ON
GRPC ON
GRPD ON
GRPE ON
GRPF ON
GRPG ON
GRPH ON
GRPI ON
GRPJ ON
GRPK ON
GRPL ON
GRPM ON
GRPN ON
GRPO ON
GRPP ON

Click to choose the group to turn On.

If the "Action" command needs to be manually entered, click the "Action" textbox.

**Edit Schedule**

Action:

This opens it for edit.

Type in your command. For example, "GRPF OFF". This example command will turn group "F" OFF at the "From" time then back ON at the "Until" time. Another example is "B101 ON". This example will turn On any circuit breaker with the name B101 at the "From" time and turn it Off at the "Until" time.

Action:  **GRPF OFF**

## Fixed date schedule entry

A "Fixed Date" schedule is a schedule that will operate only during one single date.

**Note:** Since the "Fixed Date" schedule has only month and day specified, it will activate every year on the same date. The care must be taken managing these schedules on the yearly basis.

To create a "Fixed Date" schedule, click the "Fixed Date" radio button.
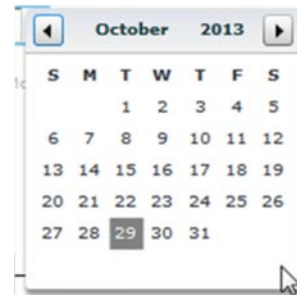
Fixed Date

Click the entry textbox.

Fixed Date

Enter the Date in the "MM/DD/YY" format.

OR

Click the calendar tool icon.

This will open the calendar tool.

| ◀ | October | | | 2013 | | ▶ |
|---|---|---|---|---|---|---|
| S | M | T | W | T | F | S |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

Use the left/right arrows to navigate through the months.

Click to choose the date required.

# Web page programming

## Periodic schedule entry

A "Periodic" schedule will operate every week on each day selected.

To create a "Periodic" schedule, click the "Periodic" schedule radio button.



Click the checkbox to add a checkmark beside each day that the schedule is to activate.



## Absolute or relative time

Absolute time scheduling is the use of the actual hour and minute of the day to issue the commands.

Relative time scheduling uses the location setting in the controller to calculate the time of the sunrise and sunset for each day. This time is then used to calculate "ON" and "OFF" times for the schedules along with an optional "OFFSET". The offsets are setup as hours and minutes; the "OFFSET" limit is 7 hours and 59 minutes.

Available time options are:

- Absolute
- Before sunrise
- After sunrise
- Before sunset
- After sunset

## Setting an absolute time schedule

To enter the "From" hour of the schedule, click the "From" hours time textbox.



This opens the textbox for editing.
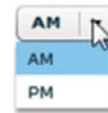
Enter the hour in 12h standard format.

To enter the minutes, click the minutes textbox for the "From" time.



This opens the textbox for editing.

Enter the minutes required.

Click the AM/PM dropdown to choose the required time.



To enter the "Until" hour of schedule, click the "Until" hours time textbox.



This opens the textbox for editing.

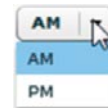Enter the hour in 12h standard format.

To enter the minutes, click the "Until" minutes time textbox.



This opens the textbox for editing.

Enter the minutes required.

Click the AM/PM dropdown to and choose the required time.



Once the time schedule edits are complete, click the "OK" button to save the changes.

## Setting a relative sunrise/sunset schedule

The following example will show a typical sunset to sunrise schedule.

In the "Edit Schedule" screen, next to the "From" time the "Absolute" will be displayed by default; click the text dropdown arrow.
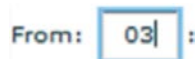
The dropdown list opens.

Click to choose the relative time of day.

In our example, select "Before Sunset" from the list. This action will remove AM/PM settings that are not used in this case.

Click the "From" hours textbox.

Enter the number of "OFFSET" hours required.

Click the "From" minutes textbox.

Enter the number of "OFFSET" minutes required.

If the schedule has a Relative time format on both "From" and "Until" times, continue to enter "Until" time following above procedure. Make sure to select correct entry—the offset time will be "After Sunrise" in our example.
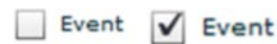
Click the "OK" button to save the changes.
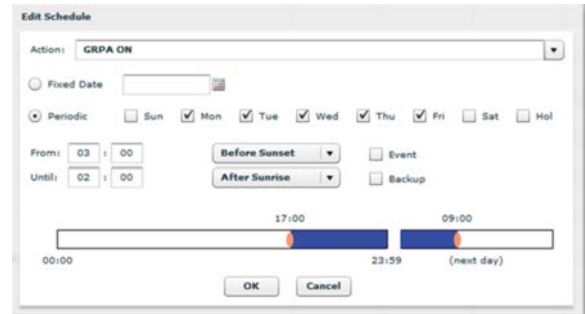
## Creating an event

An "Event" is a schedule that has only a start action ("From"). It is created using the same steps as a normal schedule except there will be no ending time.

To create, click the checkbox beside "Event" to add a checkmark.

Once the checkmark is added, the "Until" time will then be greyed-out becoming unaccessible.

Click the hours entry box for the "From" time.

Enter the "From" time hours in the textbox.

Click the minutes entry box for the "From" time.

Enter the "From" time minutes in the textbox.

Click the AM/PM dropdown to and choose the required time.

If the "Event" requires a relative start time, follow the "Setting Relative Sunrise/Sunset Schedule" procedure to enter proper "From" start time for the schedule.

Click OK to accept the changes.

The "Schedules" list screen will now display the schedule with an "Action", "Days", and a "From" time with the "Until" time displaying the text "Event".



## Creating a backup schedule

Backup schedules are only used in networked systems with a master device. In this case, the master device will provide most of the system scheduling to maintain centralized control. Master devices include the PRC5000 and the Ethernet Interface Module (EIM). However, if the network is down or the master has lost connection, the system will still have a means of control. The backup schedules are part of the distributed control feature of the Pow-R-Command system. If a schedule is flagged as a "Backup" in the PRC-E Series controller, it will only run when the connection to the master device has been lost for an extended period of time. If there is no master device, the controllers will always be in Backup Mode.

To create a backup schedule, first create the required schedule following the above procedures.

To specify the schedule as a "Backup", click the "Backup" checkbox to add the checkmark.



Click the "OK" button to accept the changes.

This schedule is now a backup schedule and will now display the schedule with a "B" in the "Flag" column of the list indicating that it is a backup schedule.



## Creating holidays

A "Holiday" is a special day that does not follow the typical daily operational criteria of the system. A holiday can be selected for any month/day of the year and up to 30 holidays can be created in the PRC-E Series controller. A 20-character alphanumeric description can be added to designate the holiday. When a day is selected as a holiday, it is no longer considered a standard day of a week. For a schedule to activate on a holiday, a check mark must be placed in the holiday checkbox.



## Selecting a day as a holiday

Click the "Holiday" tab.
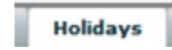


This opens the "Holidays" Web page.



The Holiday page has a calendar tool for choosing the date and also lists the date and description of the date that is configured as a holiday.

To specify a date as a holiday, use the button at the top of the screen to choose the month or use the left/right arrows to scroll through the months.

Click the date required for the holiday.

The date is labeled with "HOL" and placed in the holiday list.



To add a description, click the textbox next to the date added.



This opens the box for edit.

Type the description of the holiday in the textbox.

Click off of the textbox to accept.



**Note:** Since the "Holiday" has only the month and day specified, it will activate every year on the same date. Care must be taken managing holidays on the yearly basis.

## Deleting a holiday

Click the "Holiday" tab.



This opens the "Holidays" Web page.

Use the calendar tool to scroll and find the date of the holiday to remove.

Click the date which is labeled "HOL"



This will remove holiday indicator and the date and description from the holiday list.



## BACnet network configuration

The PRC1500E and PRC2000E controllers have native BACnet/IP capabilities. The attributes needed for BACnet system communication are set using the BACnet configuration screen. These attributes must be provided by the BACnet integrator.

Click the "System Configuration" tab.



Click the "BACnet" tab within this Web page.



This opens the "BACnet Configuration" page.



The "Instance" is a unique identifier for the PRC-E controller on the BACnet system.

The "Network" is a routing setting that signifies what part of the system this PRC-E Series controller will be associated.

The Port is the communication port setting. This is used for the BACnet communications from the PRC-E Series controller.

Priority levels are set to achieve certain level of command importance in the BACnet system operation. A smaller number indicates a higher priority level.

In the PRC-E Series controller:

- The Network Level Priority (default is 13) indicates override (out-of-service) setting
- The Controller Level Priority (default 15) indicates normal (in-service) setting

## Editing the BACnet/IP attributes

Click the corresponding entry fields and input the required data for this setting.

Click the "Save Changes" button to save edits.

## I/O status

The I/O status displays current status/levels of the digital and analog inputs and outputs in the PRC-E controller.

Click the "Status" tab.



This will display the "Physical I/O" screen.

# Web page programming

The digital inputs will have green backgrounds with "OFF" text when they are open and a red background with "ON" text when the inputs are closed. In the normal state, there will be a white filled box beside the status box and yellow filled if it is overridden.



The universal inputs can be configured as digital (dry-contact) inputs or analog (voltage level) inputs except on the PRC750E controller, which has only digital inputs available.

If configured as digital inputs, the "Universal In" will have green backgrounds with "OFF" text when they are open and a red background with "ON" text when the inputs are closed. In the normal state, there will be a white filled box beside the status box and yellow filled if it is overridden.
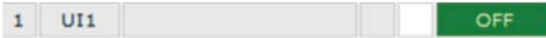


If configured as analog inputs, the "Analog In" displays the percentage of the full scale voltage applied to the input. The background color is green in the normal status. In the normal state, there will be a white filled box beside the status box and yellow filled if it is overridden.



The "Analog Out" displays the percentage level of the analog output. In the normal state, there will be a white filled box beside the status box and yellow filled if it is overridden.

## Controls

Controls are logical statements that utilize the inputs to control the groups.

**Note:** From the Web page, a control can be created to command a group only. If another type of point control is needed, PRC Lighting Optimization software (PRCLOS) will be required.

To create a control, click the "Controls" tab.



This opens the "Control" list.



Listed are controls created to command internal points, i.e., circuit breakers, groups, outputs, etc.

## Control configuration

The "Type" refers to the input type.

Type options:

- Maintained change
  - Reverses group status on input state change
- Maintained normally open
  - Group action commanded on input closure and reversed when open
- Maintained normally closed
  - Group action commanded when input is open and reversed when closed
- Momentary three-wire
  - Two inputs are used, one for the ON command and the other for the OFF command
- Momentary On/Off
  - After a momentary closure of input, the state of the output will be reversed
- Motion sensor

The "Switch(es)" refers to the input or inputs used to control the action.

Switch options:

- DI 1–8
- UI 1–8

The "Group" is the commanded group and the action to be taken. When using the Web page the only available action is "On".
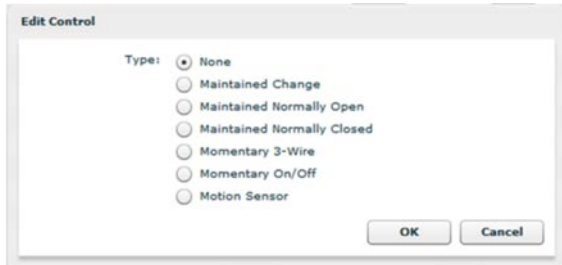
Group options:

- GRPA ON, GRPB ON,…GRPP ON

## Editing or creating a new control

Double-click the line of the control.

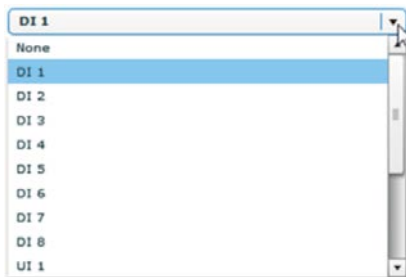This opens the "Edit Control" Web page.

Click the radio button of the type of input.

Click the "Input" textbox to open the dropdown list of digital and universal inputs.

Scroll through and click to choose the two-wire input connected to the controller.

## Setting a time delay

The "Time Delay" is a time value set for the group when the switch is activated. After the timer delay expires, the group will be commanded "OFF". For example, if the time delay is set for 10 minutes, when the input is closed the group will turn "ON", then, when the time delay reaches 0 the group will turn "OFF".

**Note:** For "Maintained" type switches, it does not matter that the switch remains closed; the group will turn "OFF" after the time delay expires.

To set a time delay, click the hours textbox.
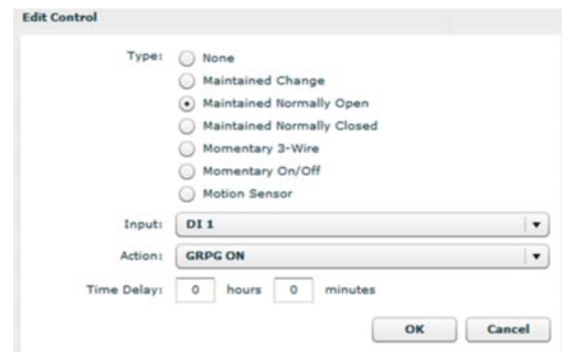
This opens the box for editing.

Input the number of hours for the time delay.

Click the "Minutes" textbox.

This opens the box for editing.

Input the number of minutes for the time delay.

## Digital switch configuration

Pow-R-Command Digital Switches (DS) are programmable devices that communicate over the proprietary Digital Switch Network (DSN) that is included on the PRC1000E, PRC1500E and PRC2000E. The DS is available in 2-, 4-, and 6-button configurations. Each has onboard I/O to receive inputs from occupancy sensor and/or photo sensors, and an analog output to control 0–10 V dimmable ballasts and LED drivers. This dimming could be closed loop or step dimming using a button-activated control scheme. See the "Digital Switch" section on **page 81** for more information.

The "Devices" screen displays a list to the digital switch network devices connected to the host controller.

Click the "Devices" tab.



This opens the devices Web page.



**Note:** Each PRC digital switches must be given a unique address number of 1 to 99 using the rotary switches on each. See the "PRC Digital Switch" section of this document (see **page 81**).

On this left of this screen, a table is displayed with the PRC digital switch devices that are connected to the DSN network and their basic attributes.



**Note:** If a Digital Switch does not show in the table, right-click the address line of the DS and choose "Refresh" in the context menu. This should repeat the search for the Digital Switch.
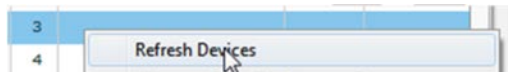


The number in the "#" column contains the unique Digital Switch address. The address range is from 1 to 99.

The switch "Description" column is an editable 20-character alphanumeric description that could describe the area controlled or purpose of the switch.

The "Version" column contains the firmware version of the PRC Digital Switch.

The "Type" column contains the number of buttons on the switch. The types available are 2-button (DSN 2-B), 4-button (DSN 4-B) and 6-button (DSN 6-B).

**Note:** If a red "X" appears beside the number field, this indicates that no switch was found during a search.

To program the PRC Digital Switch, click the digital switch line in the table to be programmed.
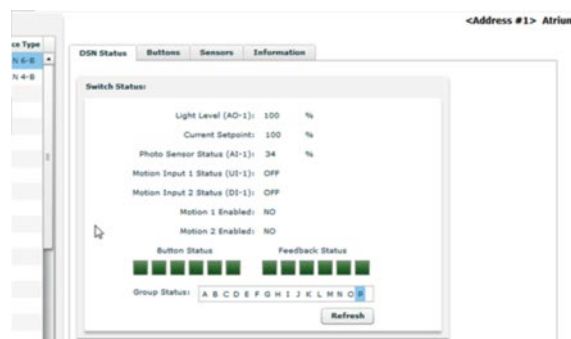


This should display a tabular PRC Digital Switch status/configuration page in the right pane.

The DSN status should be the default tab.

Click the "DSN Status" tab, if needed.



**Note:** If any programming edits are made, accept pending changes before choosing another tab.

This screen is populated from the status of the onboard I/O and buttons of the PRC Digital Switch and the group status from the PRC controller.

- Light level (AO-1)
  - Current percentage value of the analog output; this value represents 0 to 10 Vdc output to dimming ballasts

- Current setpoint
  - % value of the dimming setpoint

- Photo sensor status (AI-1)
  - % value of the analog Input; this value represents 0 to 10 Vdc from the photocell ①

- Motion input 1 status (UI-1)
  - On/Off status of the dry-contact switch from the motion sensor ①

- Motion input 2 status (DI-1)
  - On/Off status of the dry-contact switch from the motion sensor ①

① "AI" input of the switch can be programmed to accept analog signal level (AI) or On/Off dry-contact (UI).

① "DI" input can be utilized only for the 2- and 4-button switches; 6-button switch uses the "DI" for the 6th—bottom button.
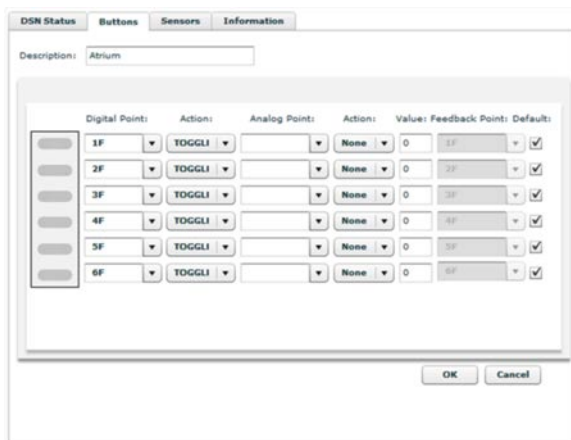
## Button configuration

Click the "Buttons" tab.
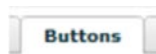


This displays the button programming page for DSN.

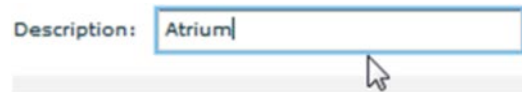Each button on the switch will have a configuration line.



From this Web page, the DSN description, button actions for controlled points and button feedback can be programmed.

## Editing the description

Click the "Description" text box.



This opens it for edit. Type in the chosen 20-character alphanumeric description for the switch.



## Setting the button digital point control

Each button can be individually programmed to control different points or the same point with different dimming levels. The digital points can be individual circuit breakers, groups of circuit breakers (Flag 1F-16F) or any other digital points used in the controller for logical control statements.

## Editing the digital point

Click the "Digital Point" drop down arrow of the button to be programmed.



This opens the dropdown list for a quick pick of the internal motion sensor input enabling and the PRC controller system flags, 1F-56F. The MOT_EN1 and MOT_EN2 are covered under the "Digital Switch Sensors" heading later in this section.
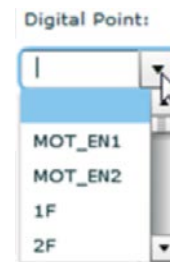


Click the required point to select.

To enter an individual circuit breaker point, click the "Digital Point" text box of the button to be programmed, this opens the textbox for edit.

# Web page programming

Input the selected circuit breaker address using the keyboard.

**Note:** The circuit breaker address must be written in the "Panel":"Breaker#""B" format, which is "1:1B"-"8:42B" (example- Panel 1/Breaker 17 would be written as 1:17B or Panel 2 (expansion panelboard connected to controller)/breaker 3, would be written as 2:3B.
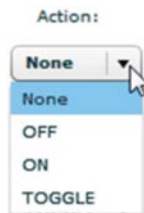
Digital Point:

2:3B ▼
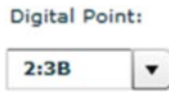
Next, a button press action must be assigned to the button.

## Setting the digital point action

Click the "Action" dropdown arrow next to the button to be programmed.
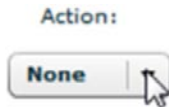
Action:

None

This opens the dropdown list for a quick pick of the actions available.

Action:

None ▼
None
OFF
ON
TOGGLE

Click to select the required action.

The actions are:

**None**: No digital point action upon button press, however, the analog point can still be set.

**Off**: The digital point is commanded Off when the button is pressed, if its current status is Off, there will be no change.

**On**: The digital point is commanded On when the button is pressed, if its current status is On, there will be no change.

**Toggle**: The digital points current state will be reversed. If at the button press the point is On, it will be commanded Off, and if at the button press the point is Off, it will be commanded On.

## Setting the button analog point control

The analog point settings can control the analog output of the switch, the calculated points ("C" points) of the controller or the analog outputs of the controller. The digital switch analog output control is listed as "LIGHT_LVL." This setting is a numeric value representing the percentage of the 0–10 V output or setpoint for the light level. For more information on the setpoint, see the "Digital Switch Sensor" section of this guide.

The "C" points, 1C–32C, are values that can be passed to the PRC-E controller. These points are numeric values that can be used in calculations and other complex logic controls in the controller. The PRC-E controller analog output, 1O–8O, can also be set directly from the switch. This setting is a numeric value representing the percentage of the 0–10 V output.
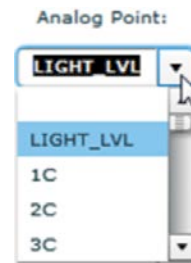
The analog point values can be "set to," "incremented by," or "decremented by" the amount entered in the "Value" input box.

## Editing the analog points

Click the "Analog Point" dropdown arrow of the button to be programmed.

Analog Point:

LIGHT_LVL ▼

This opens the dropdown list for a quick pick of the "LIGHT_LVL" or "C" points.

Analog Point:

LIGHT_LVL ▼

LIGHT_LVL
1C
2C
3C ▼

Click to select the required analog point.

To choose an analog output in the controller, click the "Analog Point" textbox of the button to be programmed.

Analog Point:

▼
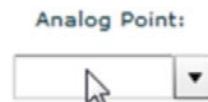
This opens the textbox for edit.

Input the selected analog point address using the keyboard.

2O ▼

## Setting the analog point "Action"

Click the analog "Action" dropdown arrow next to the button to be programmed.

This opens the dropdown list for a quick pick of the actions available.

Click to select the required action.

**None**: No analog point action commanded.

**Set**: The analog point chosen will be set to the setting in the "Value" input box.

**Inc**: Increment; the analog point chosen will be incremented by the setting in the "Value" input box.

**Dec**: Decrement; the analog point chosen will be decremented by the setting in the "Value" input box.

## Setting the analog point adjustment "Value"

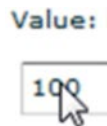Click the "Value" input box of the button to be programmed.

This opens the input box for edit.

Input the required numeric value for the analog adjustment using the keyboard. Remember, this value will be used by the analog action to adjust the selected analog point. This will be the set value of the analog output or the setpoint of the closed-loop feedback from the photocell.
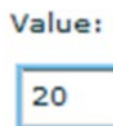
The "Feedback Point" controls the indicator LED of each button. An active button command can illuminate the LED of that button. This point can be a circuit breaker, flag, analog point (value), etc.

"Default" is checked by default. With this active, the digital switch feedback point textbox is inaccessible. The default point will be set as follows:

**Digital point**: If the digital point action is set and there is no analog setup, the button will illuminate when the digital point is ON.

**"LIGHT_LVL"**: If the "LIGHT_LVL" point is selected and the "Set" analog action is selected, the button will illuminate when the digital switch analog output is equal to the set value.

If any other analog actions are selected, the default will be blank.

To edit the default feedback indication point, uncheck the default box.

Click the "Feedback Point" dropdown arrow next to the textbox of the button to be programmed.

This opens the dropdown list for a quick pick of some common points.

If the point required is not in the list, the textbox can be edited using the keyboard to enter the address.
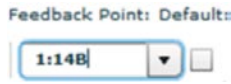
To edit the "Feedback" textbox, click the "Feedback Point" textbox of the button to be programmed.

This opens the textbox for editing.

# Web page programming

Input the required numeric value for the feedback point address using the keyboard.

**Feedback Point: Default:**

`1:14B`

**Note:** Care must be taken to ensure that the action for the press of the button actually changes the state of the feedback point.

After a change is made the message "Changes are Pending" will display in red next to the "OK" button.

To save changes, click the "OK" button to apply the program changes to the Digital Switch.

Changes are pending!   OK   Cancel
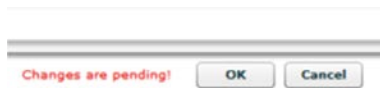
Example 1. This programming example is a 6-button switch programmed to turn ON and OFF a circuit breaker supplying an area. Also, there is step dimming setup to dim fixtures connected to the digital switch analog output in this area. There is no photo sensor or occupancy sensor used in this example.

| Digital Point: | Action: | Analog Point: | Action: | Value: | Feedback Point: | Default: |
|---|---|---|---|---|---|---|
| 1:10B | ON | LIGHT_LVL | Set | 100 | LIGHT_LVL | ✓ |
| 1:10B | ON | LIGHT_LVL | None | 75 | LIGHT_LVL | ✓ |
| 1:10B | ON | LIGHT_LVL | Set | 50 | LIGHT_LVL | ✓ |
| 1:10B | ON | LIGHT_LVL | Set | 25 | LIGHT_LVL | ✓ |
| 1:10B | ON | LIGHT_LVL | Set | 10 | LIGHT_LVL | ✓ |
| 1:10B | OFF | LIGHT_LVL | Set | 55 | LIGHT_LVL | ✓ |

**Note:** When controlling fluorescent ballasts, the analog point value of the OFF button should not be set to zero. The setting should be greater than 50% so the fluorescent tubes will have sufficient voltage to strike while the output ramps up. The OFF button value should be set to a unique value, if it is set equal to any of the other steps, both buttons will illuminate when either is activated.

## Digital Switch sensors

The PRC Digital Switches with 2, 4, an 6 buttons have a universal input locally on each switch and the 2- and 4-button switches have an additional digital input locally on the switches. Also a 0–10 V analog output is available on each switch for dimming.

To access the switch sensor input/output configuration, click the "Sensors" tab.
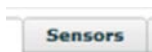
**Sensors**

This displays the configuration page for the inputs and output of the selected digital switch.
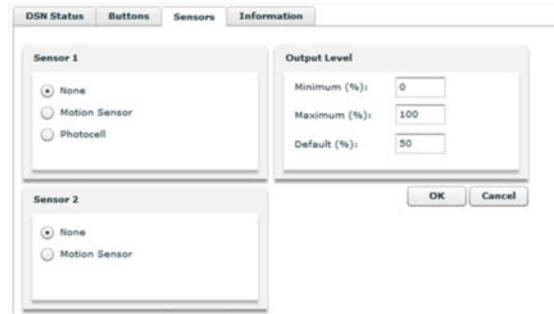
**Sensor 1**: This is the onboard universal input which is labeled "AI" on the switch terminal block. A motion sensor or toggle switch dry-contact can be connected to this input to control the lights in the area or an analog photo sensor with 0–10 V range can be connected.

**Sensor 2**: This is the onboard digital input that is available on the 2- and 4-button models only. It is labeled as DI on the switch terminal block. This input can be connected to any dry-contact input when set to motion sensor.

**Output level**: The analog output level can be setup to be trimmed at a maximum and a minimum level and an initial default level.

## Setting sensor 1 as a motion sensor dry-contact input

The motion sensor is a maintained type of the input. The digital point is turned ON in the host PRC-E controller when the input is closed, and turned OFF when the input is open.

Click the radio button beside motion sensor.

⊙ **Motion Sensor**

After the motion sensor radio button is chosen a point input box will appear.

⊙ **Motion Sensor  Point:**

This point will be controlled point when the input is turned ON and OFF. This point could be an individual circuit breaker, a group of circuit breakers or a system flag.

Click the dropdown list arrow beside the input box.
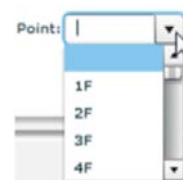
**Point:**
1F
2F
3F
4F

This opens the dropdown list for a quick pick of some common points.
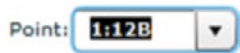
Scroll down the list and choose the point required.

If the required point is not listed, it can be entered using the keyboard.

To edit the "Point" value manually, click the "Point" textbox.

This setup is identical for sensor 1 and 2 except the enable point "MOT_EN1" or "MOT_EN2" must be selected.

This opens the box for editing.

Input the required alpha numeric value for the feedback point address using the keyboard.

Scroll and click to choose the "MOT_EN#" point that is being required.

The digital point controlled by the switch button is now the digital point that was specified in the motion sensor "Point" input box under the "Sensors" tab.

For example, if the point is set to "1:12B", the circuit breaker in position 12 of the first panel will be commanded ON when the universal input has a dry-contact closure.

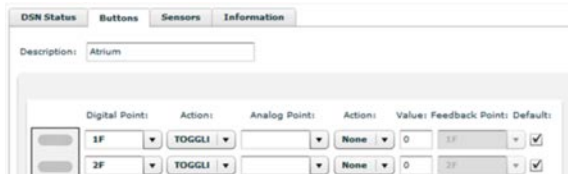### Enabling and disabling the motion sensor input

The motion sensor inputs can be enabled and disabled using the MOT_EN1 and MOT_EN2 internal switch point from the "Buttons" configuration tab. These points can be turned ON to enable and turned OFF to disable each motion sensor input. This feature can be used for setting up a occupancy sensing with an override OFF scheme.

### Setting up motion enable "MOT_EN_" point

Click the "Buttons" tab.

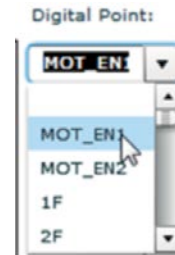This displays the button programming page for the DSN.

Click the "Digital Point" dropdown arrow of the button to be programmed.

This opens the dropdown list for a quick pick of the internal motion sensor input enabling.

### Setting the motion sensor enabled or disabled

The action of MOT_EN# digital point is now to enable the motion sensor input when it is ON and to disable it when OFF.

To set the action to enable the motion sensor input, click the "Action" dropdown arrow next to the button to be programmed.
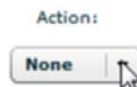
This opens the dropdown list for a quick pick of the actions available.
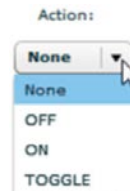
Click to select the ON action.

This button will now enable the motion sensor input to control the digital point ON and OFF in the host controller.

# Web page programming

To set the action to disable the motion sensor input, click the "Action" dropdown arrow next to the button to be programmed.

**Action:**

None

This opens the dropdown list for a quick pick of the actions available.

**Action:**

None
- None
- OFF
- ON
- TOGGLE

Click to select the OFF action.

This button will now disable the motion sensor input of the switch and the digital point in the host controller will turn OFF. The motion detector will now have no control of the point. The motion sensor must be enabled with a press of the ON button that was programmed.
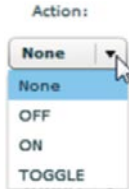
| | MOT_EN1 | ▼ | ON | ▼ | | ▼ | None | ▼ | 0 | MOT_EN1 | ▼ | ☑ |
| | MOT_EN1 | ▼ | OFF | ▼ | | ▼ | None | ▼ | 0 | MOT_EN1 | ▼ | ☑ |

This usage of the motion sensor can be used in conjunction with step dimming in the 2-, 4-, and 6-button Digital Switch and closed-loop dimming in the 2- and 4-button Digital Switch.

| Digital Point: | | Action: | | Analog Point: | | Action: | | Value: | Feedback Point: | | Default: |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MOT_EN1 ▼ | | ON ▼ | | LIGHT_LVL ▼ | | Set ▼ | | 80 | LIGHT_LVL | ▼ | ☑ |
| MOT_EN1 ▼ | | ON ▼ | | LIGHT_LVL ▼ | | Set ▼ | | 60 | LIGHT_LVL | ▼ | ☑ |
| MOT_EN1 ▼ | | ON ▼ | | LIGHT_LVL ▼ | | Set ▼ | | 25 | LIGHT_LVL | ▼ | ☑ |
| MOT_EN1 ▼ | | OFF ▼ | | LIGHT_LVL ▼ | | Set ▼ | | 55 | LIGHT_LVL | ▼ | ☑ |

## Setting sensor 1 as a analog Input

Click the "Sensors" tab.

**Sensors**

Click the radio button beside photocell.

**Sensor 1**
- ○ None
- ○ Motion Sensor
- ◉ Photocell

The internal analog point "LIGHT_LVL" in the button configuration section now converts to a setpoint for closed-loop dimming control.

| LIGHT_LVL | ▼ | Set | ▼ | 9 |

After the button is pressed, this value is loaded as the setpoint and then it is compared to the photocell feedback. The analog output of the switch is adjusted accordingly to drive the light level up or down until either the setpoint, the minimum setting or the maximum setting level is reached.

| Digital Point: | | Action: | | Analog Point: | | Action: | | Value: | Feedback Point: | | Default: |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MOT_EN1 ▼ | | ON ▼ | | LIGHT_LVL ▼ | | Set ▼ | | 13 | LIGHT_LVL | ▼ | ☑ |
| MOT_EN1 ▼ | | ON ▼ | | LIGHT_LVL ▼ | | Set ▼ | | 9 | LIGHT_LVL | ▼ | ☑ |
| MOT_EN1 ▼ | | ON ▼ | | LIGHT_LVL ▼ | | Set ▼ | | 2 | LIGHT_LVL | ▼ | ☑ |
| MOT_EN1 ▼ | | OFF ▼ | | LIGHT_LVL ▼ | | Set ▼ | | 5 | LIGHT_LVL | ▼ | ☑ |

**Switch Status:**

| | | |
|---|---|---|
| Light Level (AO-1): | 29 | % |
| Current Setpoint: | 9 | % |
| Photo Sensor Status (AI-1): | 6 | % |

See the status screen above.

The light level is the output setting of the DS analog output; 29% of the 0–10 V.

The current setpoint is the value set by pressing the button on the Digital Switch; 9%.

The photo sensor status is the feedback level from the photocell connected to analog input on the Digital Switch; 6%.

The action taken by the Digital Switch would be to increase the light level (AO) until the photo sensor status is ±1% of the setpoint. This adjustment is slowly ramped for a seamless transition.

**Switch Status:**

| | | |
|---|---|---|
| Light Level (AO-1): | 51 | % |
| Current Setpoint: | 9 | % |
| Photo Sensor Status (AI-1): | 9 | % |

The intensity of the light of controlled light fixtures will depend on the amount of light received by the photocell connected to the analog input of the switch. Care must be taken to assure the correct light level at the work surface. The feedback percentage of the photocell is dependent upon many factors. Things such as: type of light fixtures, colors, textures, reflected light, or shadows, just to name a few, can make a difference in the reflected light level.

The closed-loop control can only control the local switch analog output.

### Setting the minimum, maximum, and default output levels

A "Minimum" and "Maximum" output level can be set for comfort, safety or to clamp the dimming level for extra energy savings. The "Default" level is the analog output setting that will be set at initial startup or after power loss situations.

To edit the "Minimum" value, click the "Minimum" input box.

**Output Level**
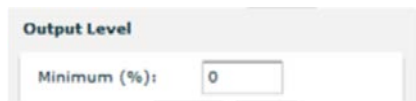
Minimum (%): 0

This opens the box for editing.

Input the required numeric value for minimum percentage for the feedback level from the photocell.

To edit the "Maximum" feedback level value, click the "Maximum" input box.

Maximum (%): 100

This opens the box for editing.

Input the required numeric value for the maximum percentage for the feedback level from the photocell.

To edit the "Default" feedback level value, click the "Default" input box.

Maximum (%): 100

This opens the box for editing.

Input the required numeric value for the default setpoint percentage for the feedback level from photocell at for power up.

### Setting sensor 2 as a motion sensor dry-contact input

The "Sensor 2" digital input is only available on the 2-button and 4-button digital switches.

The motion sensor is a maintained type of input that controls a digital point in the host PRC-E controller. The digital point is turned ON when the input is closed, and turned OFF when the input is open. The "MOT_EN2" is the internal switch point to enable and disable "Sensor 2" input.

For instruction on programming, please see the "Setting Sensor 1 as a Motion Sensor Dry-Contact Input" section of this guide.

### Digital switch hardware and firmware information

To access the hardware and firmware version information, click the "Information" tab in the digital switch configuration screen.

**Information**

This displays the hardware type and firmware version information page.

**Hardware**

Device Type: DSN 4-Button (0x98-2)
Part Number: 1016-4150

**Firmware**

Version: 1.6.0
Build Date: Mar 16 2011

## Appendix A: Breaker Control Bus (BCB) installation

The BCB is designed to fit easily into the Eaton PRL1a and PRL2a panelboard models. The standard 1a/2a application can be converted to a PRCEP panelboard by installing one or two BCB modules. A factory-produced PRCEP panelboard should contain one or two pre-installed BCB modules. A factory-installed SLAN cable will be included to connected right and left BCBs. If this was not a factory-ordered option, it will be necessary to install the BCB into the Pow-R-Line 1a/2a panelboard containing BABRSP or GHQRD circuit breakers. BCB kits were developed for these retrofit applications. Pre-made BCB-to-BCB SLAN cables can be selected from the table below.

| Description | Catalog Number |
|---|---|
| Controller-to-BCB / 42-circuit panelboard | **PRCSLAN42** |
| Controller-to-BCB / 30-circuit panelboard | **PRCSLAN30** |
| Controller-to-BCB / 18-circuit panelboard | **PRCSLAN18** |
| Controller-to-BCB / 42-circuit w/right-side BCB only | **PRCSLAN42R** |
| Controller-to-BCB / 30-circuit w/right-side BCB only | **PRCSLAN30R** |
| Controller-to-BCB / 18-circuit w/right-side BCB only | **PRCSLAN18R** |
| BCB-to-BCB / 42-circuit panelboard | **PRCSLAN42B** |
| BCB-to-BCB / 30-circuit panelboard | **PRCSLAN30B** |
| BCB-to-BCB / 18-circuit panelboard | **PRCSLAN18B** |

### BCB retrofit kits

BCB retrofit kits include a BCB, mounting screws, and connector covers. The BCB unit is interchangeable between the left side and right side of the panelboard, therefore the retrofit kit is configured to cover one side of a 42-, 30-, or 18-circuit panelboard. The BCB kits available are in 21-, 15-, and 9-circuit configurations. An example of use, a 30-circuit panelboard with controllable circuit breakers on both sides would require two 15-circuit retrofit kits.
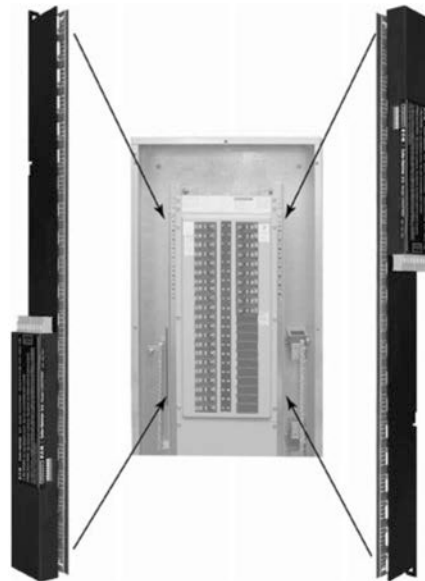
**Figure 27. 15-Circuit Breaker BCB Retrofit Kit**

**DISCONNECT THE MAIN POWER FROM THE PANELBOARD. THE FOLLOWING PROCEDURES REQUIRE REMOVAL OF PROTECTIVE COVERS AND SHIELDS RESULTING IN POSSIBLE EXPOSURE TO DANGEROUS AND/OR DEADLY VOLTAGES!**

**Figure 28. BCB Orientation**



The BCB is designed to fit either side of a Pow-R-Line 1a or 2a panelboard. The PRC-E Series Web browser interface, color LCD touch screen, or optional Lighting Optimization Software (LOS) is used to configure the BCB for proper association with circuits in the panelboard. Refer to the "LCD Programming" and Web page programming sections of this documentation for assistance with configuring and orienting the BCB.

**Step 1.** Remove the trim piece.

Different designs and options have different trim pieces. It is beyond the scope of this document to describe each possibility. Please refer to the Instruction Leaflet provided with the panelboard.

**Step 2.** Remove the deadfront cover.

Remove the four screws holding the perforated frame to the panelboard chassis. **Figure 29** shows a typical detail of the top-left screw to be removed. There should be an identical screw at, or near, each corner of the deadfront cover.

| Description | Catalog Number |
|---|---|
| Breaker control bus (BCB)—21 circuits—retrofit kit | **PRC1000BCB-21R** |
| Breaker control bus (BCB)—15 circuits—retrofit kit | **PRC1000BCB-15R** |
| Breaker control bus (BCB)—9 circuits—retrofit kit | **PRC1000BCB-9R** |

**Figure 29.  Deadfront Cover Removal**
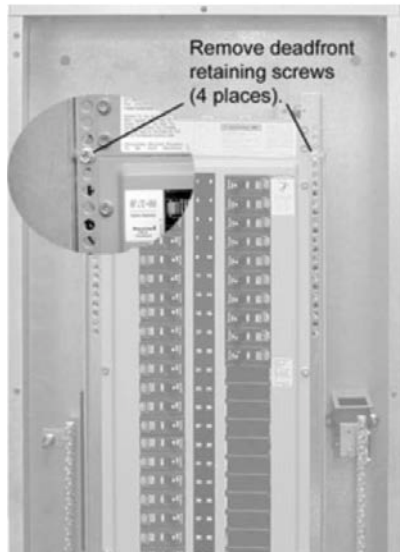


The following steps describe installation of a left-side (odd-numbered circuit breakers) BCB into the 1a or 2a panelboard. It is essential that the positioning and orientation in the chassis be precisely as described herein. Improper location of the BCB may cause problems when trying to connect the circuit breaker pigtails to the BCB and improper orientation will cause configuration difficulties.

**Step 3.** BCB upper mount.

**Figure 30** shows the proper installation point for the top-most rail mounting screw. Notice the small arrow pointing to the hole. This hole is located just below the buss support bracket and left of the number-one circuit breaker position. It may prove helpful to mark the hole with a piece of tape or a marking pen.

**Figure 30.  The BCB Upper Mounting Hole**
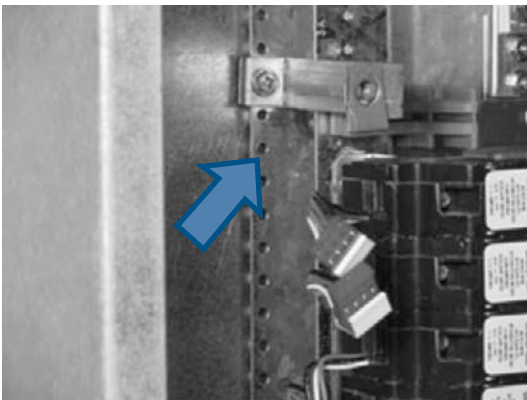


Take care to obey the BCB orientation shown in the above figure; use one of the supplied screws to hold the BCB in place loosely. The general rule is that the control box extends into the wire gutter of the panelboard.

**Step 4.** BCB lower mount.

The BCB is fastened to the "C" channel by two screws (provided). Let the BCB hang freely down the channel to locate the bottom-mounting hole.

**Figure 31.  Locating the BCB Lower Mounting Hole**
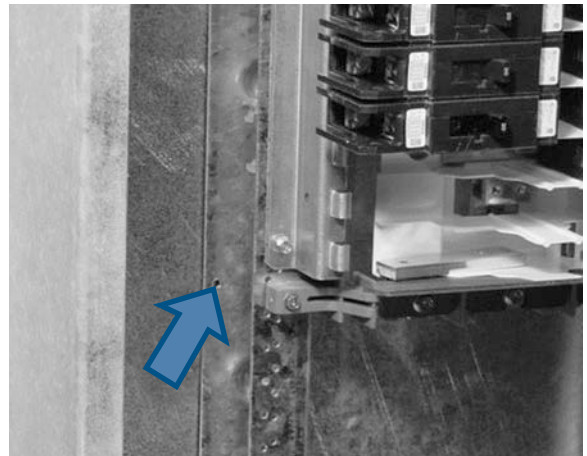


**Note:** There may not be a hole for the bottom mounting screw. If the hole is present then it should be in the vicinity of the small arrow shown in **Figure 31**. If the hole is not present, it may be necessary to use the BCB as a guide to locate the hole. This can be accomplished by loosely screwing the BCB into the top hole and then using the BCB mounting to locate the hole. It may be easier to apply masking tape to the chassis to make your mark more visible. Once the location is determined, remove the BCB from the panelboard and drill the hole using a #29 drill bit and install as scripted

**Step 5.** Finishing up.

To complete the mechanical fastening of the BCB to the Pow-R-Line panelboard, make sure all circuit breaker pigtails are clear from any pinching or jamming. Tighten the top and bottom mounting screws. Finally, verify that any branch circuit wiring is clear of the newly installed component.

# Appendix A: Breaker Control Bus (BCB) installation

**Step 6.** Plug in the controllable circuit breakers.

The last step is to connect each controllable circuit breaker pigtail to the appropriate port on the BCB. This is done here as a means of verifying proper placement of the BCB in the panelboard. If any controllable circuit breaker pigtails do not reach the matching BCB circuit position, then it will be necessary to relocate the BCB up or down to accommodate all controllable circuit breakers. The odd numbered controllable circuit breakers can be seen plugged onto the BCB in **Figure 32**.

**Figure 32.  Circuit Breakers Connected to BCB**
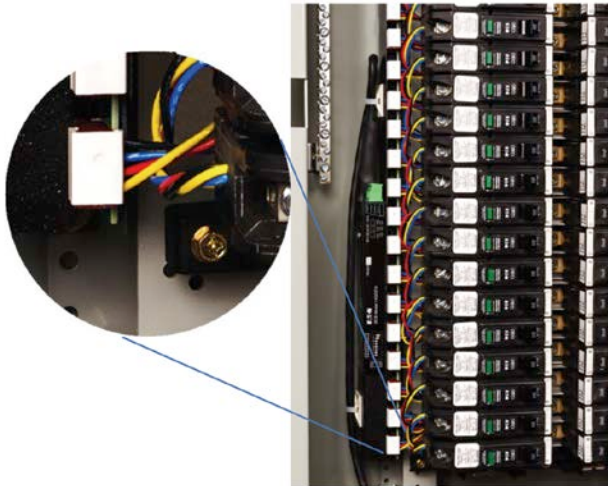


To install the right-side BCB, follow Steps 3 to 6 using **Figure 30** through **Figure 32** for reference to locate the holes in the right side "C" channel.

**Note:** The view in **Figure 32** shows all controllable circuit breakers plugged onto the BCB. If there are spaces left by blank positions or uncontrolled circuit breakers, place one of the included dummy-plugs over the unused controllable circuit breaker termination positions.

**Step 7.** Replace the deadfront cover.

Reverse the procedure described in Step 2 to replace the deadfront cover over the circuit breakers.
**Important:** Do not replace the trim, as additional connections to the BCB are required as described in the "Wiring" section of this document.

## Digital Switch network wiring

Each Pow-R-Command Digital Switch (PRCDS) on the digital switch network (DSN) is powered by the Pow-R-Command controller. The DSN requires adding a PRC Power Injector (PRCDSNPI) when more than 15 PRCDS are connected or total DSN cable length exceeds 500 feet. Due to the power being supplied to the switches on the same CAT-6 cable as the communication network, 23-gauge CAT-6 wiring is required.

CAT 6 RJ-45 connectors should be used to make connections to each switch. All CAT-6 connections will be made using the T-568B wiring standard. The PRC1000E/2000E have an integrated RJ-45 jack in the low-voltage connection compartment for connection to the DSN network.

## RJ-45 Connector pin-out for T-568B

- PIN 1: Orange/white wire—terminated to SN+
- PIN 2: Orange—terminated to SN–
- PIN 3: Green/white—terminated to 24 Vac common
- PIN 4: Blue—terminated to 24 Vac
- PIN 5: Blue/white—terminated to 24 Vac
- PIN 6: Green—terminated to 24 Vac common
- PIN 7: Brown/white—terminated to 24 Vac common
- PIN 8: Brown—terminated to 24 Vac common

**Figure 33. Digital Switch Hardware Overview**
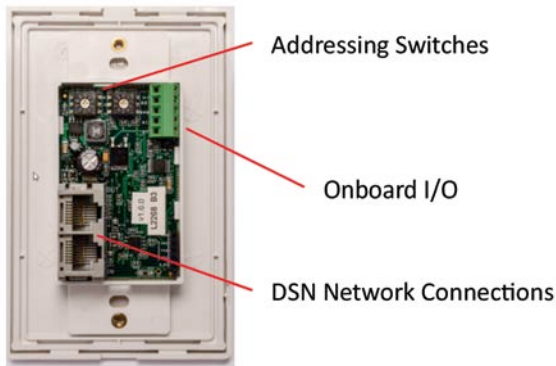


**Figure 34. Lighting Control in a Typical Building**
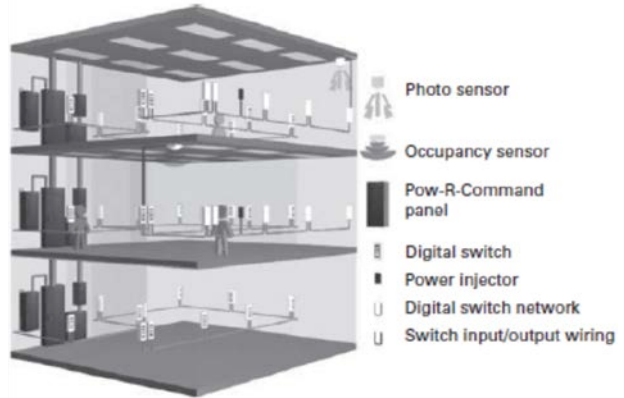


## Switch addressing and network connections

Each PRCDS on the controller DSN requires a unique address between 1-99. This is done using the two rotary switches found on the back of each PRCDS. See **Figure 33**.

Network/power connections to each switch will be made through the RJ-45 connections found on the back of each Digital Switch. See **Figure 35**. These connections are daisy-chained between each switch

**Figure 35. Digital Switch Address Rotary Switches**
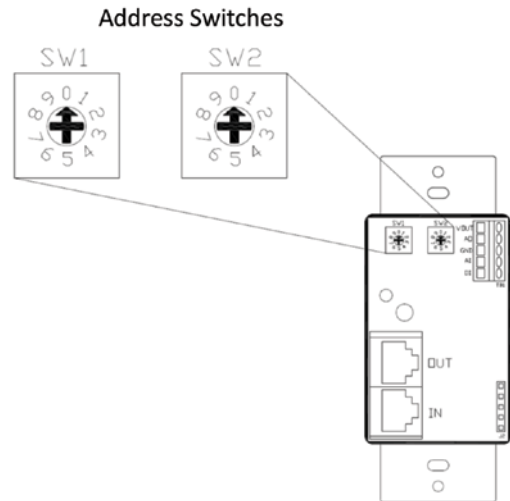
## Power injector

Due to the current draw requirements of each switch and connected field devices like occupancy/photo sensors and dimmable fluorescent and LED lighting equipped with 0–10 Vdc control circuitry, to operate correctly, a PRC Power Injector (PRCDSNPI) may be required for proper operation. The PRCDSNPI is required after each 15 PRCDS or when the DSN length exceeds 500 feet. DSN connections to the power injector are done in the exact same fashion as each digital switch. The PRCDSNPI includes a separate dual voltage 120/277 Vac power supply connection. Make sure to connect to an unswitched branch circuit.

**Note:** The power injector does not need a network address.

**Figure 36.  DSN Power Injector**



**Figure 37. Typical PRC1000E/1500E/2000E Digital Switch Network (DSN)**
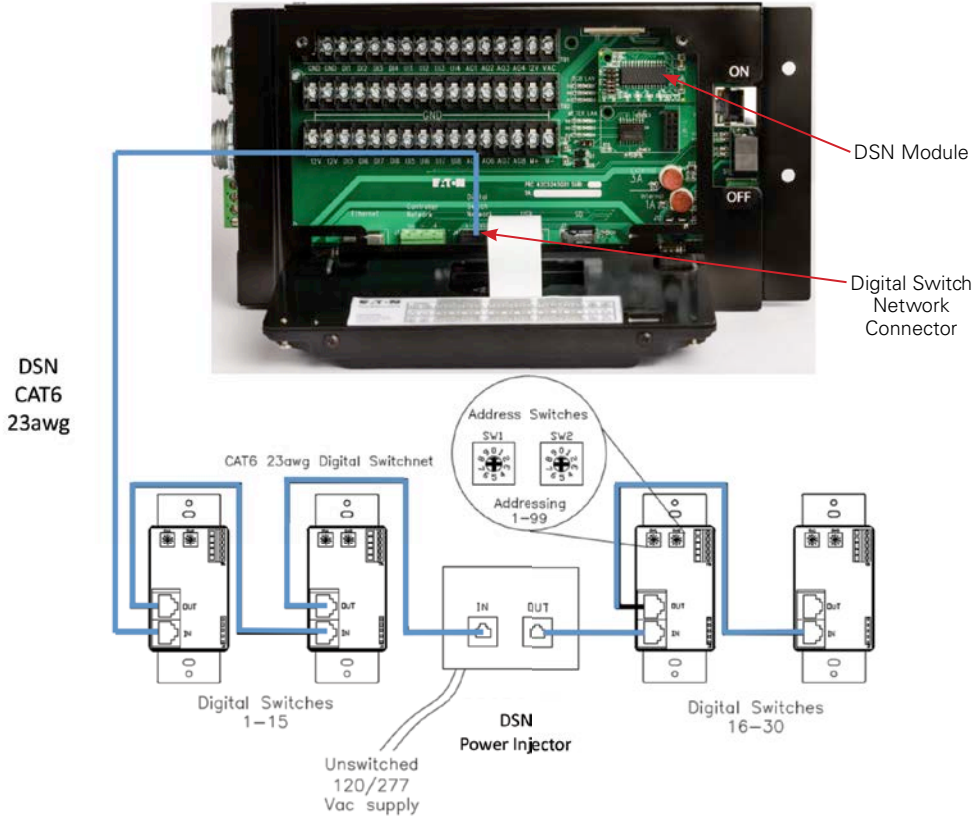
## Digital Switch field devices connections

### Input wiring

Each Digital Switch has one analog input (AI) and one digital input (DI). The digital input requires a dry contact closure between the DI terminal and GND terminal. This input is typically connected to a low voltage occupancy sensor or any device with dry-contact output.

**Note:** Digital input option is not available on 6-button digital switches.

The analog input accepts 0–10 Vdc signal from external devices.

The AI is typically connected to interior/exterior photo sensors to monitor light levels

### Output wiring

Each Digital Switch has one analog output (AO) to directly control analog devices. The analog output provides 0–10 Vdc signal. This output is typically used to control fluorescent and LED lighting equipped with 0–10 Vdc dimming control circuitry. Up to 20 fluorescent ballasts or 10 LED drivers can be controlled.

## External device power

Each digital switch includes a 12 Vdc/20 mA output (VOUT) for connecting field devices such as, occupancy sensors and photo sensors.

**Note:** The power output of the switch has limited current capabilities. Connecting devices that require the higher current to this output will disable operation of the switch.

**Table 6. Digital Switch I/O Configuration**

| Pushbutton Configuration | Analog Input | Analog Output | Digital Input | 12 Vdc Output |
|---|---|---|---|---|
| 2-button | ■ | ■ | ■ | ■ |
| 4-button | ■ | ■ | ■ | ■ |
| 6-button | ■ | ■ | — | ■ |

**Figure 38. Typical Digital Switch Field Devices Wiring**
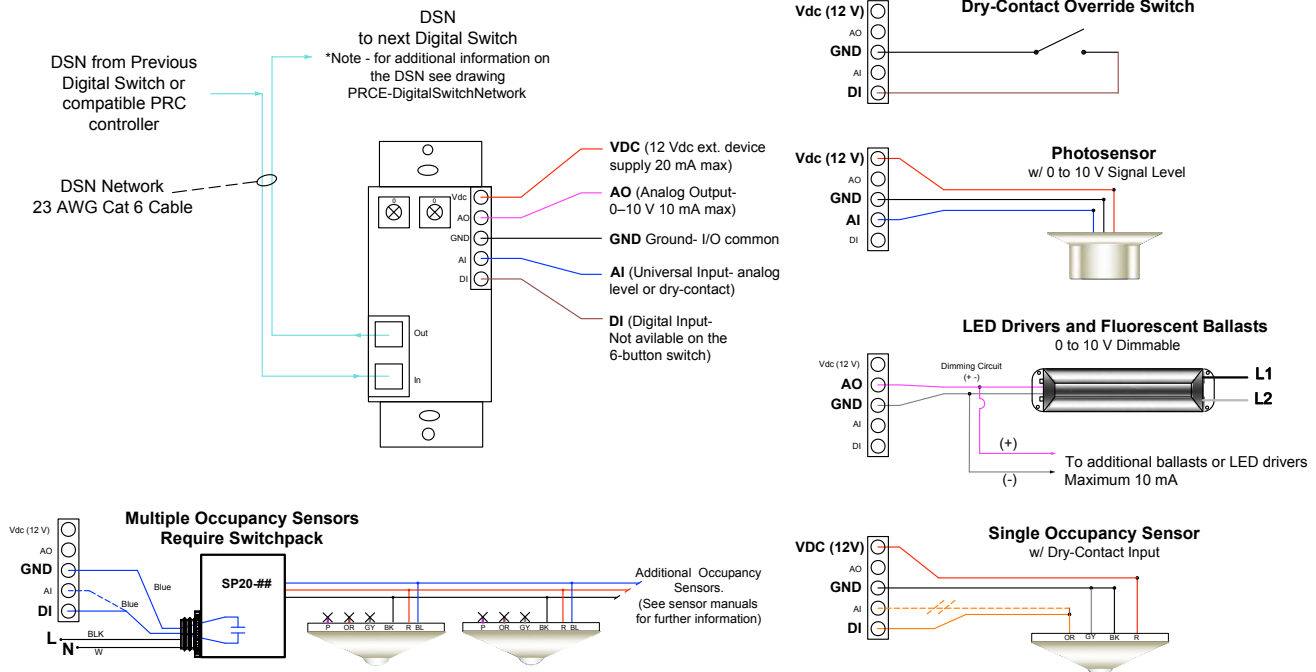
## Labeling

Digital Switch labeling is a factory option.

**Table 7. Digital Switch Labeling**

| DS Color | Font Style | Font Color | Title Letters | Button Letters |
|---|---|---|---|---|
| Almond | Helvetica | Black | 16 | 4 |
| Black | Helvetica | White | 16 | 4 |
| White | Helvetica | Black | 16 | 4 |

## Programming and configuration

The Pow-R-Command Digital Switch can be programmed and configured utilizing the PRC-E controller integrated Web page, or Lighting Optimization Software (LOS). Each configuration parameter is easily set through a user-friendly "point and click" interface. From the interface, the user will have the ability to change a number of switch parameters. See the "Web Page Programming" section of this document for more information.

## Specifications

### Electrical

- 24 V / 100 mA AC power is provided to each switch through the CAT-6 network cable

### Operating environment

- Designed for indoor environment
- Operating temperature: –10 °C to +40 °C (14 °F to 104 °F)
- Relative humidity: 10% to 90% noncondensing
- Atmosphere: non-explosive and non-corrosive
- Vibration: stationary application—NEMA Level A

### Certifications

- FCC and UL approved

**Figure 39. Digital Switch Labeling Example**



## Digital Switch network installation

### Installing RJ-45 connector to 23 AWG CAT6 cable

In order to complete installation of Pow-R-Command Digital Switches (PRCDS) the installer must first pull 23-gauge CAT6 network cable from the Pow-R-Command controller to each PRCDS forming a daisy chain network architecture. Once the cable is pulled into each switch box the installer is ready to install RJ-45 connectors to the cable following T-568B standard for Ethernet twisted pair cables. Cable installation kits that include tools and connectors are available at electronics stores. It is recommended that tools specifically designed for making Ethernet cables be used to help ensure good connections while saving the installer time. The following items will be required for this step:

1. RJ-45 connectors: These connectors can be purchased at most electronic stores and computer stores and usually come in bulk packages. It's always a good idea to get more than you expect you will need.

2. Crimping tool: These tools are often purchased at electronic stores. To create a network cable you will need a crimper that is capable of crimping a RJ-45 cable (not just a RJ-11 cable, which looks similar to a RJ-45).

3. CAT6 stripper or knife: If you plan on making several network cables you should also consider getting a wire stripper capable of stripping CAT6. If you do not plan on creating many network cables a knife will suffice. For simplicity and to prevent potential issues we recommend a wire stripper.

4. Professional electricians scissors designed for use in electrical, telephone and datacomm service applications are recommended. These types of scissors are ergonomically designed with large ring to provide more power while reducing fatigue and wrist strain. Their bottom blades feature serrated teeth for gripping cable and wire.

**Figure 40. Typical Cable Installation Kit**

Once you have the necessary equipment needed to create your own T-568B network cables the installer is ready to install RJ-45 connectors to the cable. Connectors are simple to install by following these steps:

1. Strip the cable jacket back at least one-half inch to expose the inner wires. Don't be worried about stripping too much of the network cable jacket off since you can always trim the wires later if necessary.

2. Separate the ends of the cable then place them into the connector following the T-568B standard. See **Figure 41**. Push the cable all the way into the connector. Don't worry about the excess wire coming out the other end of the connector as it will be cut off after using the crimping tool.

3. Use the crimping tool to attach the connector and cut off excess wire using scissors.

4. Do these steps for each side of the cable. Once both ends of the cable have been completed you are now ready to test your cables.

**Figure 41.  RJ-45 Connector and Standard T568B Cable Wiring**
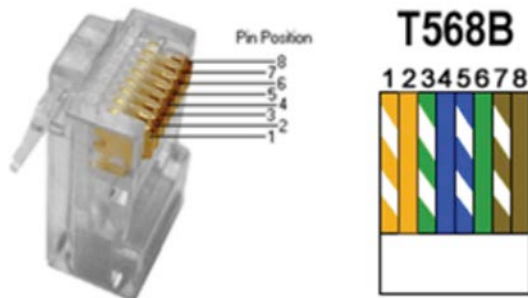


**Testing RJ-45 connectors**

Testing network cables will require a hand-held meter designed for verifying the integrity of Ethernet twisted pair cables. These types of testers are designed for one-person testing of installed cable. Reasonably priced units are available at electronics stores. Testing is simple and straightforward. Simply follow these steps:

1. Inserts one end of the cable into the meter and attaches the remote adapter on the other end.

2. Press the meter test button.  The meter will test the twisted pair cable for opens, shorts, reversed, crossed, and split pairs.

3. Repeat RJ-45 connector installation steps and repeat testing for cables not passing initial testing.

4. The installer is now ready to connect cables to digital switches and install them into the switch box.

**Figure 42.  Typical Network Cable Tester**



Meter

## Appendix C: BACnet integration

### Overview

PRC1500E and PRC2000E controllers provide a BACnet/IP integration path to building automation system, allowing a user to monitor and switch controllable circuit breakers and control fluorescent and LED lighting equipped with 0–10 V dimming control circuitry from a BACnet controller using BACnet/IP protocol.

The PRC-E controller has been designed for the simplest configuration possible in stand-alone circuit breaker panelboard applications. After the Pow-R-Command PRC-E circuit breaker panelboard is installed and energized, connect to the panelboard via the provided Ethernet port to obtain all of its configuration and status information. PRC-E controller point types are automatically mapped to BACnet objects as shown in the table below.

**Table 8. Point Integration into BACnet Protocol**

| Point Type | Address Format | Address Space | BACnet Object Type | Formula | Examples PRC | BACnet |
|---|---|---|---|---|---|---|
| Flag group | xF | 1F–64F | Binary value | x | 1F | BV-1 |
| Breaker | x:yB | 1:1B–8:42B | Binary output | 100x + y | 2:1B | BO-201 |
| Digital input | 1:xI | 1:1I–1:8I | Binary input | x | 1:1I | BI-1 |
| Analog input | 1:A | 1:1A–1:8A | Analog input | x | 1:1A | AI-1 |
| Analog output | x0 | 10–80 | Analog output | x | 10 | AO-1 |

### Configuration and integration

The BACnet settings of the PRC-E controllers can be edited using the embedded Web pages of the controller, PRC Lighting Optimization Software, or the Color LCD Touchscreen (See LCD programming guide).

The BACnet configuration setting available are listed in the table below.

| Ethernet | Default | BACnet | Default |
|---|---|---|---|
| IP address | 10.0.222.1 | Instance | — |
| Netmask | 255.255.0.0 | Network | 1 |
| Gateway | 10.0.0.1 | Port | 47808 |
| | | External (LAN) Priority* | 13 |
| | | Internal (LAN) Priority* | 15 |

The BACnet configuration settings are supplied by the Building Automation System integrator.

### Controller Connection

If the system has been commissioned and connected to the building Ethernet backbone, the IP address assigned can be used to access the Web pages from any PC on the network using a standard Web browser.

If the system has not been connected to the building Ethernet and commissioned with a static IP, the controller will need to be connected to locally using an Ethernet cable to the controller Ethernet network RJ-45 connector or Maintenance Port RJ-45 connector.

**Figure 43. PRC-E Ethernet RJ-45 Connectors**
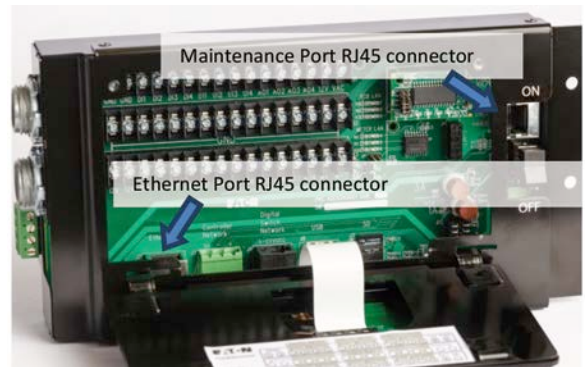


The Pow-R-Command PRC-E BACnet panelboard is configurable via Web interface using a standard Web browser from the PRC Ethernet port or Maintenance Port.

Connect to the PRC-E controller using either Ethernet or Maintenance Port.

Open the Web page of the PRC-E controller by entering it IP address in the chosen Web browser. See "Web Page Programming" guide for detailed instructions on Ethernet connections.

### BACnet setting

The PRC1500E and PRC2000E controllers have native BACnet/IP capabilities. The attributes needed for BACnet system communication are set using the BACnet configuration screen. These setting must be provided by the BACnet integrator.

Once connected to the PRC-E controller Web page:

**Step 1.** Click the "System Configuration" tab.

**Step 2.** Click the "BACnet" tab within this Web page.
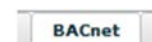
# Appendix C: BACnet integration

**Step 3.** This opens the "BACnet Configuration" page.

Instance: 800
Network: 1
Port: 47808
External (LAN) Priority: 13
Internal (UUC) Priority: 15

[ Save Changes ]  [ Reload ]

- The "Instance" is a unique identifier for the PRC-E controller on the BACnet system

- The "Network" is a routing setting that signifies what part of the system this PRC-E controller will be associated

- The "Port" is the communication port setting. This is used for the BACnet communications from the PRC-E controller

Priority levels are set to achieve certain level of command importance in the BACnet system operation. A smaller number indicates a higher priority level.

In the PRC-E controller:

- The "External"—Network Level Priority (default is 13) indicates override (out-of-service) setting

- The "Internal"—Controller Level Priority (default 15) indicates normal (in-service) setting

To edit the BACnet/IP attributes,

**Step 4.** Click the corresponding entry fields and input the required data for each.

: 47808

**Step 5.** Click the "Save Changes" button to save edits.

[ Save Changes ]

Many BACnet/IP clients can automatically discover devices, objects and properties within the panelboard. The most commonly used BACnet objects in the Pow-R-Command PRC-E panelboard are binary outputs and binary values, although there are many other types of objects supported.

Physical controllable circuit breakers connected to BCBs are represented as BACnet Binary Output objects with instance numbers of 101 through 842. The instance number is the panelboard number multiplied by 100, added to the controllable circuit breaker number within the panelboard. For example, the first circuit breaker in the first panelboard will be binary output 101. The 42nd controllable circuit breaker in the first panelboard will be binary output 142. The second controllable circuit breaker in the third panelboard will be binary output 302, and so on.

The commanded state of the controllable circuit breaker is reflected in the BACnet Present Value property (property 85) and feedback actual status is reflected in the Feedback Value property (property 40). Writing to the Binary Output object turns individual circuit breakers ON and OFF; if the priority level assigned to the command is above 15, it will put them out-of-service. Relinquishing all priority levels will restore the circuit breaker to in-service.

In many applications, loads are controlled and grouped directly out of the BACnet client equipment. If the grouping is done at the BACnet client workstation, care should be taken that commands are not sent from the client to the server device constantly, and faster than they can be processed by the server. The client should wait for the BACnet confirmed service response before sending another BACnet circuit breaker command.

It is common to command the controllable circuit breakers only on change. It is also possible to configure controllable circuit breakers into groups in the Pow-R-Command panelboard, and then configure the BACnet client devices to control the corresponding group flag. If group flags are used for scheduling, group objects appear as BACnet Binary Value objects with instance number of 1 through 16.

If digital inputs (switches, motion sensors or photocells for example) have been configured, these will appear as BACnet Binary Inputs objects.

Analog inputs and outputs (light level sensors, temperatures, dimming ballast outputs, etc.) are translated in a similar manner.

After installing and configuring the device, the system can be queried from a BACnet operator workstation. This process varies greatly from one vender's client workstation to another. The system integrator should be familiar with this process for the specific workstation in question. If no workstation is available, there are a couple of freeware and demo BACnet explorer programs available on the Internet that can be used for testing. Try the following URLs:

http://www.polarsoft.biz/products.html

http://www.chipkin.com/a/resources/BACnet/

http://www.cimetrics.com/products/proddetail.php?prod=B5001

## Protocol Interface Conformance Specification (PICS)

### BACnet Standardized Device Profile:

Smart Actuator (B-SA)

### BACnet Interoperability Building Blocks (BIBBS) Supported

| Name | Designation |
|---|---|
| Data Sharing – ReadProperty – B | DS-RP-B |
| Data Sharing – WriteProperty – B | DS-WP-B |
| Device Management – Dynamic Device Binding – B | DM-DDB-B |

### Standard Object Types Supported

| Object Type | Create | Delete | Optional Properties | Writeable Properties |
|---|---|---|---|---|
| Binary Input | No | No | Inactive_Text Active_Text | |
| Binary Output | No | No | Inactive_Text Active_Text Feedback_Value | Present_Value |
| Binary Value | No | No | Priority_Array | |
| Inactive_Text | | | | |
| Active_Text | Present_Value | | | |
| Analog Input | No | No | | |
| Analog Output | No | No | Priority_Array | Present_Value |
| Analog Value | No | No | Priority_Array | Present_Value |
| Device | No | No | | |

### Miscellaneous characteristics

- Data link layer options: BACnet IP (Annex J)

- Segmentation capability: None

- Character sets supported: ANSI X3.4

## Basic integration tips:

- When integrating, it is important to make sure that the commands sent are "If Once." Otherwise it is possible to set up a system that constantly energizes the solenoids for the circuit breakers

- Set the status read times to be a few minutes for the entire panelboard unless specifications dictate otherwise. PRC-E controllers do not support Change Of Value (COV) subscription; BACnet client must poll for the values of the objects on the periodic bases

- Remember that two states can be read from each circuit breaker: "Present Value" and "Feedback Value"

  - Present Value refers to the last command sent to the controllable circuit breaker

  - Feedback Value refers to the current feedback status from the circuit breaker

  - By default, many workstations only query the Present Value

# Appendix D: Firmware updates

## PRC-E Firmware update procedure

The Pow-R-Command Series E controller allows firmware upgrade using the Ethernet connection. The firmware in the PRC-E controller can be easily upgraded using an Internet browser to upload the firmware update file to the controller. The following procedure explains in detail the process of updating the firmware in the PRC-E controller. Any available Internet browser might be used for the process.

## What are firmware update files

The firmware files are compressed archive files with the name "**update.tgz**", containing the latest fixes and improvements to the operation of the PRC-E controller. The word update might be followed by the firmware descriptor and version, but the firmware update file name will always start with "**update**" and end with "**.tgz**".



Sample firmware update file name.

## Where to store firmware update files

Once you receive the firmware update file, it can be saved on any media (i.e.: local hard drive, of the computer, USB drive, network drive, etc.) that can be accessed by the computer performing the firmware upgrade process.

## How to connect to the PRC-E controller

To upgrade firmware in the PRC-E controller, you will have to connect to the particular device over the local Ethernet network or through the front Maintenance Port. The PRC2000E and PRC1500E controllers can be connected to the local Ethernet network; to connect to any other type of PRC-E controller (PRC1000E, PRC750E), you must use front Maintenance Port.

When you are connecting to the PRC2000E or PRC1500E controller over the Ethernet network, make sure that you have access to the same network that these controllers are connected to.

When connecting to the PRC-E controller through the front Maintenance Port, please make sure that the wireless portion of your computer network is disabled, and the computer's network configuration is set to accept DHCP assigned address. Connect a patch cable between the computer and the front Maintenance Port of the PRC-E controller.

All PRC-E controllers Maintenance Ports are configured with a fixed IP address set at 192.168.222.1. Connecting to the controller webpages is accomplished by opening the Internet browser and typing the fixed IP address into browser address bar. The controller will prompt the user for connection credentials required before performing the firmware upgrade.

## Connection credentials

Before you can connect to the PRC-E controller, you will be presented with the window asking for your credentials. The default credentials are:
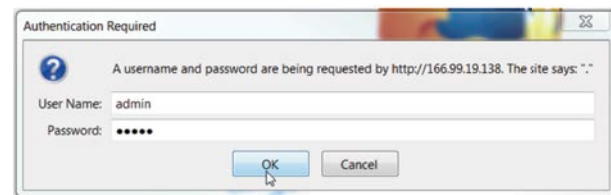
User Name: **admin**

Password: **admin**

When asked, type user name and password in the according fields (**Figure 44**), and click on the OK button or press Enter key to connect to the PRC-E controller. The user name and password are case sensitive.

Only users with admin rights will be able to upgrade the firmware in the PRC-E controllers.

**Figure 44. Enter User Name and Password**



## Accessing the Upgrade Device Firmware webpage

**Note:** 166.99.19.138 is a sample IP address of the PRC-E controller used for the demonstration purposes; substitute this entry with the IP address of the PRC-E controller you want to connect to, displayed here as: <xxx.xxx.xxx.xxx>. If the PRC2000E controller is connected to the local Ethernet network, the firmware upgrade might be performed from any location on this network.
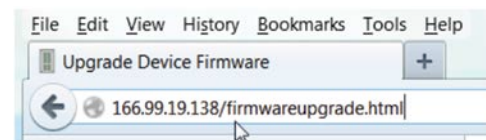
## Direct access to the Upgrade Device Firmware webpage

### Connecting to the PRC2000E controller over the Ethernet network

When connected to the PRC2000E controller over the network, you can directly open the firmware upgrade webpage in your Internet browser. Open the Internet browser, and in the Address field type (**Figure 45**):

**<xxx.xxx.xxx.xxx>/firmwareupgrade.html**

**Figure 45. Connect to the PRC2000E/PRC1500E controllers through the Ethernet network**
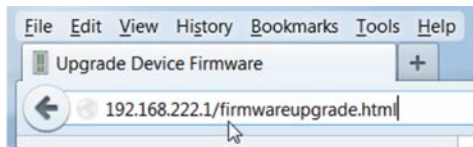


Press Enter key to continue to access the Upgrade Device Firmware webpage.

### *Direct access to firmware upgrade from the front Maintenance Port*

If you are connecting to the PRC-E controller over the front Maintenance Port, the IP address of the PRC-E controller will always be: 192.168.222.1. The PRC-E controller shall automatically assign the IP address to the computer connected to the front Maintenance Port. Open the Internet browser, and in the Address field type (**Figure 46**):

**192.168.222.1/firmwareupgrade.html**

**Figure 46. Connect to the PRC-E controller through the front Maintenance Port**



Press Enter key to continue to access the Upgrade Device Firmware webpage.

### Link access to the Upgrade Device Firmware webpage

When you are connected to the PRC-E controller webpages, you can access the Upgrade Device Firmware webpage using a link built into the System Configuration webpage. This way you do not need to remember the direct address/name of the Update Device Firmware webpage.

### *Connecting to the PRC2000E/PRC1500E controllers over the Ethernet network*

Open the Internet browser, and in the Address field type the IP address of the controller you are trying to connect to (**Figure 47**):

**<xxx.xxx.xxx.xxx>**

**Figure 47. Connect to the PRC2000E/PRC1500E controllers through the Ethernet network**
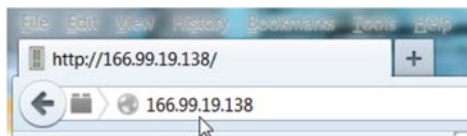


Press Enter key to continue with the connection to the controller.

### *Link access to firmware upgrade from the front Maintenance Port*

If you are connecting to the PRC-E controller over the front Maintenance Port, the IP address of the PRC-E controller will always be: 192.168.222.1. The PRC-E controller shall automatically assign the IP address to the computer connected to the front Maintenance Port. Open the Internet browser, and in the Address field type (**Figure 48**):

**192.168.222.1**

**Figure 48. Connect to the PRC-E controller through the front Maintenance Port**
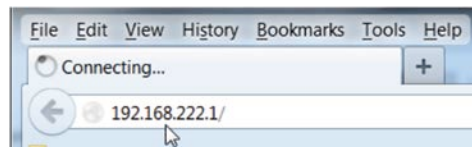


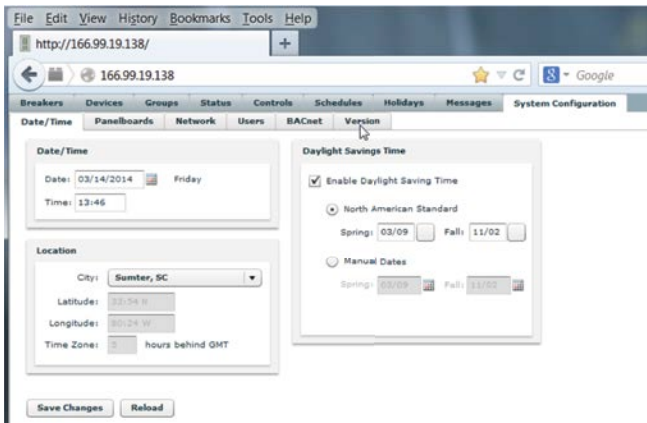Press Enter key to continue with the connection to the controller.

Once connected to the PRC-E controller, you will be presented with the main webpage—Breakers. Click on the System Configuration tab (**Figure 49**), and then on the Version tab (**Figure 50**).

**Figure 49. Main webpage of the PRC-E controller**
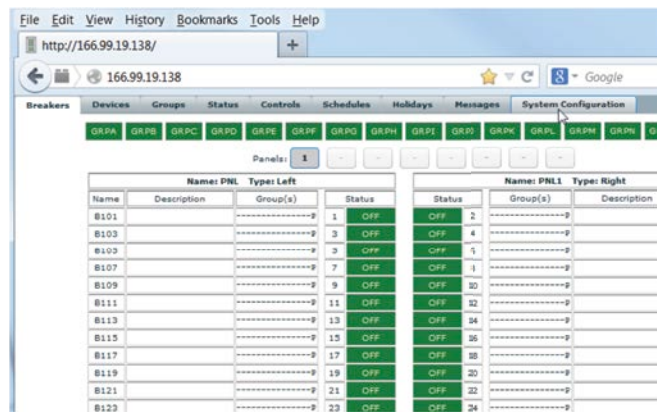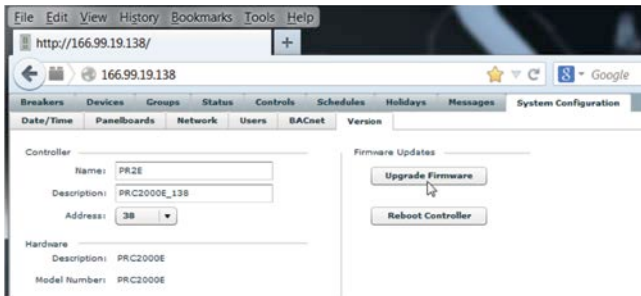
# Appendix D: Firmware updates

**Figure 50. System Configuration webpage**



On the Version webpage, locate Firmware Updates area. Click on the Upgrade Firmware button to access Upgrade Device Firmware webpage (**Figure 51**).

**Figure 51. Version webpage**
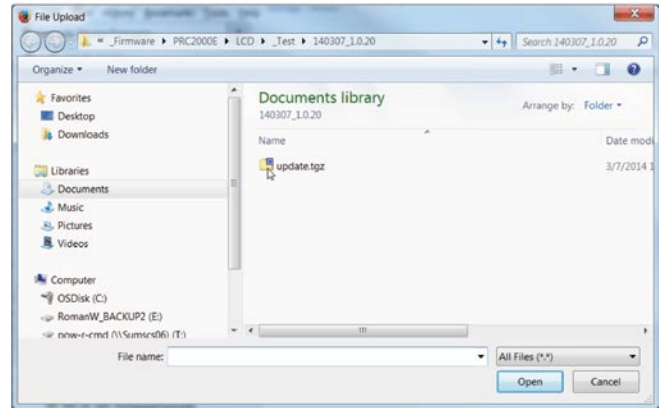


## Locate firmware update file

Once you entered the correct connection credentials in the previous step, you will be presented with the window asking for the location of the firmware update file. Click on the Browse button to open the File Explorer (**Figure 51**).

**Figure 52. Locate firmware update file**



Find the firmware update file in the previously saved location, click on the name of the file, and then click on the Open button or double-click on the file's name to continue to the next step (**Figure 52**).

**Figure 53. Select firmware file for the upgrade**



## Import selected firmware update file to the PRC-E controller

When the file and destination directory have been selected, you are ready to upload the firmware update file to the PRC-E controller. Please notice that the file destination location—Firmware Upgrade Directory—radio button is checked by default; you cannot change that selection. Press Import Now button to continue (**Figure 54**). The firmware update file will be copied to the Firmware Upgrade Directory in the PRC-E controller.

**Figure 54. Import selected firmware update file to the controller**

## Review the file transfer results

The upload of the firmware update file to the PRC-E controller should not take more than several seconds. If by any chance you encounter communication difficulties over the network, and you cannot connect to the controller at this moment, just press the back button on your browser, and repeat the last steps of the process. Upon successful file upload, you will be presented with conformation window (**Figure 55**).

**Figure 55. Result of the firmware update file transfer to the PRC2000E/PRC1500E controllers**



After the firmware update file is successfully uploaded into the PRC-E controller, close the Upgrade Device Firmware webpage (**Figure 56**.)

**Figure 56. Close Upgrade Device Firmware webpage**



## Reboot the controller

To finalize the firmware upgrade process, the controller must be rebooted. There are two ways the PRC-E controller can be rebooted:

1.  On the Version webpage, locate Firmware Updates area. Click on the Reboot Controller button to reboot the PRC-E controller (**Figure 57**). The firmware upgrade will be performed automatically by the controller during the boot-up process. You will be disconnected from the controller during the boot-up process.

**Figure 57. Reboot controller**
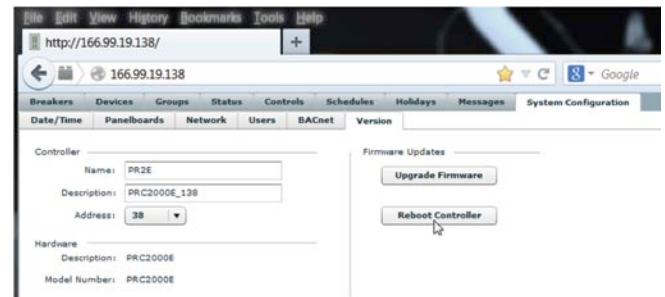


2.  Turn off the power to the PRC-E controller for a couple of seconds and turn it back on. The firmware upgrade will be performed automatically by the controller during the bootup process.

You should use caution when upgrading the firmware in the controller operating at the occupied site. If PRC-E controller had any logic programmed in, the upgrade process will not change any programmed logic, but during the upgrade process, the controller might be reset to the default values, which might cause some logic to be re-evaluated. This might cause temporary disruption in the service, some erroneous alarms to appear, and, in extreme cases, some breakers to change the state. It is recommended to perform firmware upgrades after normal operating hours. Controller shall operate normally after the firmware upgrade is finished.

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