ENGLISH

BlackBox®

Power Control System

Energy Management / Power Control - Hub System For Multi-Residential or Multistage Electrical Control



Dimensions:

L: 8 ¼ ” x W: 6 ½ ” x D: 4 ¼ ”

Dimensions:

L: 210mm x W: 165mm x D: 108mm

Qaz1

c UL us
LISTED
UL 3141 UL 1741
E553792

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ENGLISH

INSTALLATION MANUAL

ELECTRICAL SERVICE SIZE TO BE MONITORED

180 - 600 Amp. Volts: 208, 240VAC or 120/208, 120/240 VAC Single or Three Phase
TO BE USED WITH BLACK BOX INNOVATIONS INC. POWER CONTROL SYSTEMS ONLY

COMPATIBLE WITH ENERGY MANAGER MODELS

PCS-240-50-100-(3R)
PCS-240-50-200-(3R)
PCS-240-100-200-(3R)
PCS-240-DUO-100-(3R)
PCS-240-DUO-200-(3R)

PATENT INFORMATION

CA 3,145,330 & US 11,870,259

SAVE THESE INSTRUCTIONS:

THIS MANUAL CONTAINS IMPORTANT INSTRUCTIONS FOR PCS-240-HUB-XXX-X-XXX THAT SHALL BE FOLLOWED DURING INSTALLATION AND MAINTENANCE OF THE PCS.



WARNING: DO NOT STORE THIS MANUAL OR OTHER COMBUSTIBLE MATERIALS INSIDE THE PCS OR OTHER ELECTRICAL PANELS

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INTRODUCTION

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SPECIFICATIONS

This device has a monitoring system that can protect an electrical distribution circuit from overloading by switching a load on or off based on its main breaker size and on what the system usage is. It does so by turning off the power to the load connected to it for the duration that the computational algorithm determines is necessary.

Device voltage	5 VDC
Device current	0.5 Amp
Electrical service to be monitored	*180-600 Amp*
Operation ambient temperature	-40°F to 104°F (-40°C to 40°C)

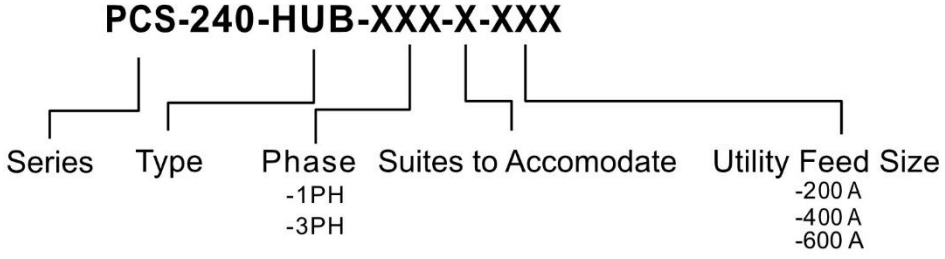
Dimensions*	**Weight***
8 ¼ "(H) x 6 ½ "(W) x 4 ¼ "(D)	5.5 lb
210mm(H) x 165mm(W) x 108mm(D)	(2.50kg)

*Dimensions and weight are approximate figures and are subject to change without notice.

Current Transformer Wiring and Terminal Specifications

Range Strip Length: 7 mm
Screw Size: M2
Screw Torque: 0.2 N·m
Wire Range: 28~16 AWG or IEC 1.5 mm2
Multi-Residential Terminal: 1.7 in-lbs (0.2 Nm) on both the Multi-Residential Hub and Power Control sides

Applicable Model Naming Convention



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Operation After Power Outage

In the event of a power outage, the device will automatically restore operation from a reset state. The algorithm will engage and determine if the current draw and other factors are adequate based on the setpoint for the determined period set by the installer and act accordingly.

IMPORTANT SAFETY INSTRUCTIONS

WARNING: These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions unless you are qualified to do so.

This system is equipped with a power control system (PCS). All PCS controlled busbars or conductors shall be protected with suitably rated overcurrent devices appropriately sized for the busbar rating of conductor ampacity.

Single source PCS shall be programmed such that the system does not exceed the limitations of the overcurrent devices in the panelboard and connected circuit. The PCS shall be coordinated with the limits defined by NEC 210.20, 705.12, or NFPA 70 2020 edition section 705.13. and relevant Canadian Electrical Code (CEC).

When using electric products, basic electrical shock and fire prevention precautions should always be followed including, but not limited to, arc-flash protection, pre-energizing electrical resistance checks, availability of fire prevention equipment, and the use of appropriate installation and testing tools.

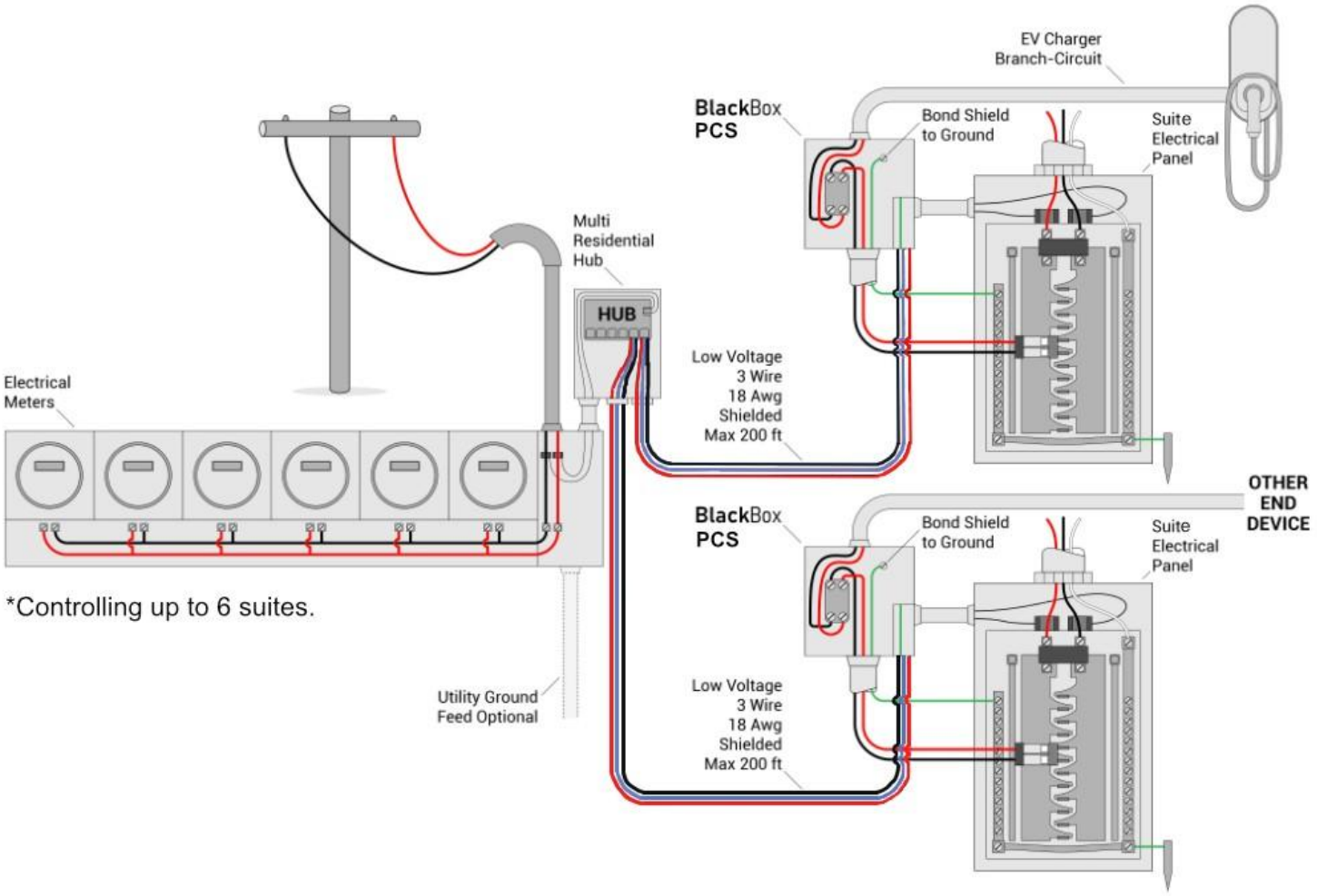
Read all instructions before using this product. Do not use this device if parts are broken, cracked, or defective, instead please contact the manufacturer. Use appropriate caution when connecting and disconnecting the device from any power source. Always make sure the device is disconnected from the power source before beginning installation or maintenance service. Installation must be completed to relevant local codes.



WARNING - Warning of a danger or a dangerous situation

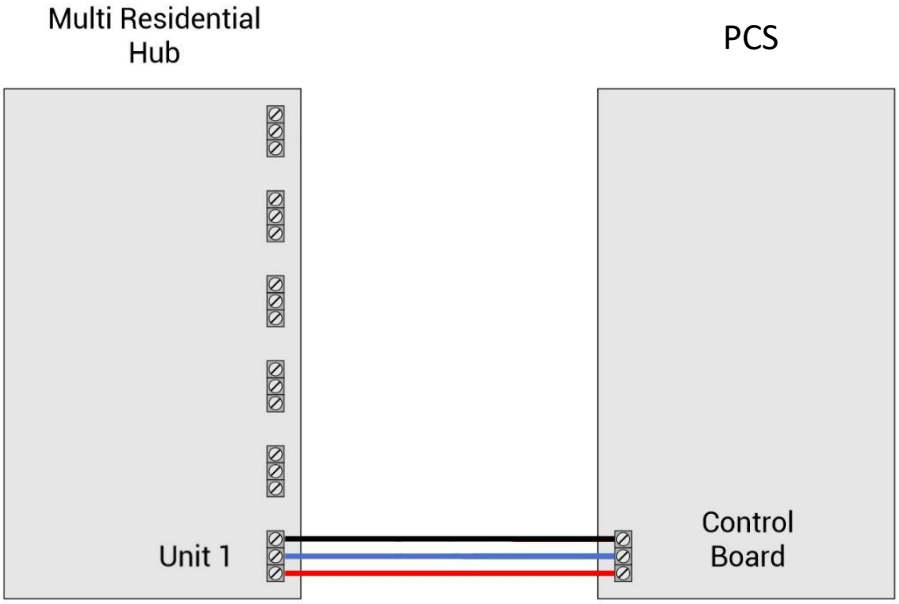
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INSTALLATION DIAGRAM



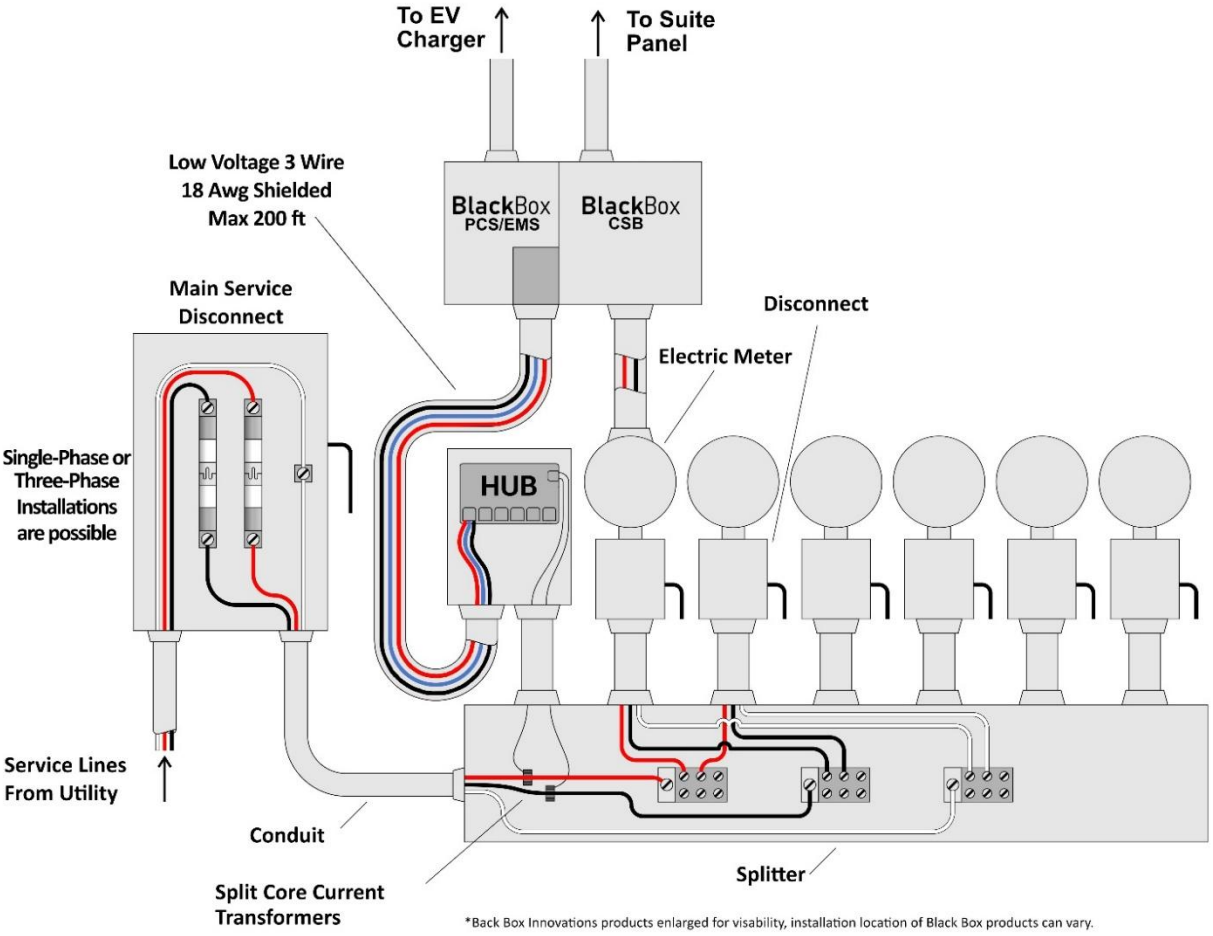
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Low Voltage Wiring Diagram



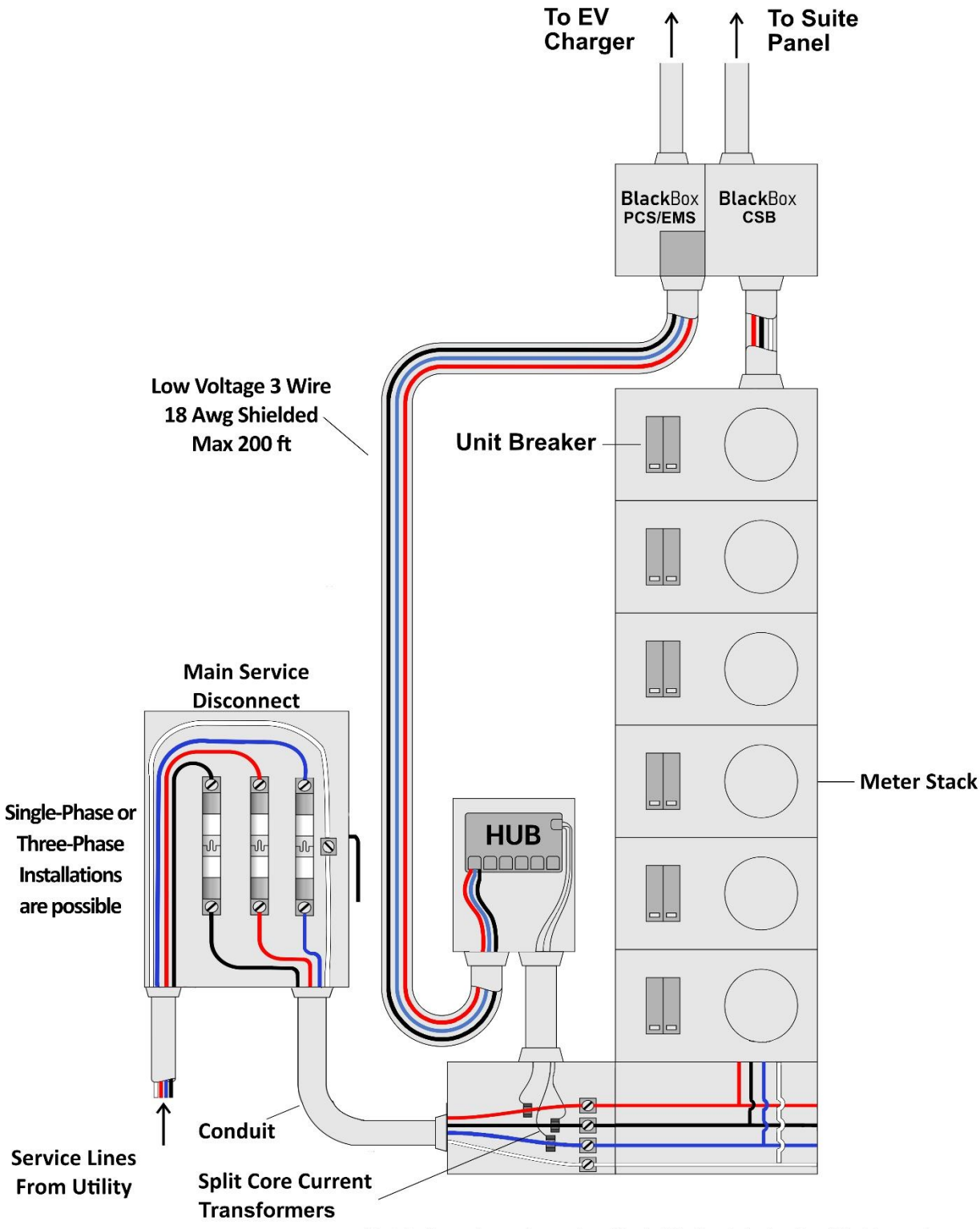
***Ensure all three terminal screws are torqued to 1.7 in-lbs (0.2 Nm) on both the Multi-Residential Hub and Power Control sides as improper connections may result in damage and/or a malfunction of the system The low voltage wires should be stripped to 5-6 mm in length. ***

Installation Example 1



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Installation Example 2



*Back Box Innovations products enlarged for visability, installation location of Black Box products can vary.

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INSTALLATION INSTRUCTIONS

STEP 1: CHECK THE CONTENTS OF THE PACKAGE

Model#: PCS-240-HUB-XXX-X-XXX
1x Multi-Residential Hub System & Enclosure, 2x (or 3x depending on device phase specification) Current transformers, 1x Bag including miscellaneous pieces, 1x Installation instructions, 6x BlackBox Hub Device Controlled Label

STEP 2: PREPARING FOR THE INSTALLATION

1. Disconnect power to all devices being worked on or within an unsafe distance of the working area.
2. Select the device installation location.
   - The recommended place for the device to be installed is directly above a junction box of the main service. See the Installation Diagram for suggested locations.

NOTE: The device controller must be mounted so that the nameplate remains visible at all times.

DO NOT install the device:
-Less than 3 feet from the ground
-In a location with a high level of risk as defined by local electrical codes or in a hazardous location. For example, nearby flammable materials, explosives or fuels, chemical products, and hazardous vapors.

STEP 3: INSTALLATION OF THE DEVICE

Ensure no dust or metal particles enter the device. Do not blow out particles when completing the installation. Instead, use a vacuum to clean out the enclosure.

1. Loosen the cover screws and remove the enclosure cover.
2. Attach the device securely to the desired location. The installation orientation must be with the drip cover up, in order to ensure rain and snow will not enter the device.
3. Install the current monitoring device wire leads from the junction box where the main electrical service lines to be monitored are to the energy manager's device control partition area. **Trim the wires as needed.**

   WARNING: Low voltage wires must be properly stripped. They must be fully and securely inserted in the low voltage PCB connector. Properly stripped low voltage wires will be completely free of insulation with copper visible between the connector and the cable insulation in the completed connection. Please see wire specifications found on page 4 of this manual.
4. Plug in blue current transformer connectors into the corresponding blue receptacles on the control board.

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5. Install current transformers on the main service wires to be monitored by clipping them onto each main line. Current transformers must be installed so that no part of them will conduct electricity from exposed live parts. Consideration must be made to the air gap and voltage of the system to ensure no electricity can pass directly to the device but only indirectly by induction through the coil of the current monitoring devices. Ensure the closing clip is secured shut and fastened with a cable tie. Fasten the current monitoring devices in place with the cable ties so they are secure and will not move around the enclosure. *Review and observe all local safety procedures when installing and working near live parts.*
6. Ensure main line lugs or connection points have not come loose with the installation of current transformers.
7. Set up dip-switches on the control board as indicated in the chart and diagram on page 12 “Figure A” later in this document or the back of the cover of the enclosure. The switches will tell the computer both the utility feed / main service current size and the end device being controlled max current rating. **All end devices and BlackBox Power Control Systems must be at or below the current rating set on the control board.**
8. Set the control board “On Delay” dial **(“FIGURE A” on page 12)** to the preferred setting. This will provide the time element for the algorithm to turn the end device(s) being controlled back on between 0-20 minutes (clockwise is greater). The manufacturer's recommended setting is about the centre of the travel or about 10 minutes.

   Set the control board “Shift Time” dial **(“FIGURE C” on page 12)** to the desired setting. This setting provides the algorithm the pattern of “ON” and “OFF” for the numbered devices to shift 1 place to the right. Thereby allowing for better equalization of access to power.

   For example if all outputs were enabled except for the first one and the shift happened, all outputs would be enabled except the second one. The output that was off was shifted from the first one to the second one and this pattern continues at each shift time interval. The dial is between 0-240 minutes (or 0-4 Hours). The manufacturer’s recommended setting is about 1 hour (or ¼ of the travel).
9. Install the low voltage 3 wire lines on each of the terminals for each suite. Refer to **“Low Voltage Wiring Diagram”** on page 7 for reference. The low voltage wires should be stripped to 5-6 mm in length in accordance with NEC, ANSI/NFPA70 and Canadian Electrical Code (CEC). Then connect the control wires to the Black Box Power Control System at the other end ensuring the connection point polarity and order are correct. Connect the shield of the control wire to the ground/bond attachment at one end only. The control voltage is under 10 V and under 500 mA. **Incorrect wiring can cause damage to the system and/or the controlled device(s).*

Ensure all three terminal screws are torqued to 1.7 in-lbs (0.2 Nm) on both the Multi-Residential Hub and Power Control sides as improper connections may result in damage and/or a malfunction of the system.

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WARNING: Low voltage wires must be properly stripped. They must be fully and securely inserted in the low voltage PCB connector. Properly stripped low voltage wires will be completely free of insulation with copper visible between the connector and the cable insulation in the completed connection. Please see wire specifications found on page 6 of this manual.

10. When safe, energize at least one of the Black Box Power Control Systems and check the Hub control board for the red light to be on, indicating power. The green LED should be solid green. If the green light is flashing refer to the "Error Code Chart" on page 12 of this manual **"Figure B"**.
11. Install included "Black Box Hub Device Controlled Label" on the Power Control System(s) being controlled to indicate it is a controlled device and occasional off times are normal. Then record the values of the utility feed / main electrical service and other appropriate specifications on the Multi-Residential Hub label.
12. Install the enclosure cover and when safe to do so ensure that each Black Box Power Control System is energized and operating appropriately.

SETTINGS

WARNING: Testing, maintenance, and troubleshooting should always be carried out by qualified personnel. Reasonable safety precautions should always be taken around electrical devices and outlets to prevent fire, electric shock, and injury to person.

Prior to adjustment, de-energize all associated circuits and verify that the selected setting corresponds to the controlled busbar or conductor characteristics, including voltage level, current rating, and operating mode.

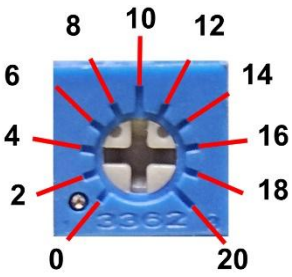
DIP Switch Selection

Use the DIP switch configuration table provided on page 12 of this manual to match the desired function, ensuring the setting aligns with the intended installation and applicable electrical safety requirements. DIP switches are configuration tools only and do not replace required passive protective devices; proper upstream overcurrent protection must be provided in accordance with NFPA 70 (NEC) and Canadian Electrical Code (CEC).

WARNING: Only qualified personnel shall be permitted to set or change the setting of the maximum operating current of the PCS. The maximum PCS operating current setting shall not exceed the busbar rating or conductor ampacity of any PCS controlled busbar or conductor.

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Figure A



On Delay Time Dial
(In Minutes)

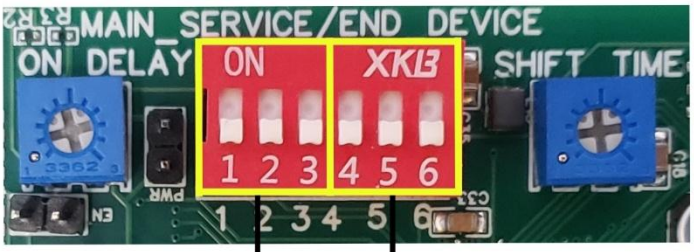
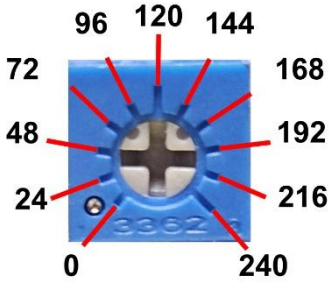


Figure C



Shift Time Dial
(In Minutes)

Utility Feed / Main Service Current Rating	DIP Switch 1	DIP Switch 2	DIP Switch 3
Settings Below are for Main Breakers Rated at 80% Continuous Load Only			
180	OFF	OFF	OFF
200	OFF	OFF	ON
400	OFF	ON	OFF
600	OFF	ON	ON
Settings Below are for Main Breakers Rated at 100% Continuous Load Only			
180	ON	OFF	OFF
200	ON	OFF	ON
400	ON	ON	OFF
600	ON	ON	ON

	End Devices Being Controlled Max Current	DIP Switch 4	DIP Switch 5	DIP Switch 6
	12	OFF	OFF	OFF
	16	OFF	OFF	ON
	24	OFF	ON	OFF
	32	OFF	ON	ON
	40	ON	OFF	OFF
	48	ON	OFF	ON
*	64	ON	ON	OFF
*	80	ON	ON	ON

*Future availability

All settings are applicable for EV chargers or other loads that tolerate switching the power off when required. When using other loads that are not referred to in this chart use the next higher current setting than the device's current rating.

SCAN HERE FOR INSTALLATION MANUAL & MAINTENANCE SUPPORT

FLASHES ERROR CODE DESCRIPTION

3	Shutdown Due to High Temperature
4	Hub Disconnection or Dry Contact Override
5	Hub Shutdown Override
6	CT is Disconnected, or Open
7	CT is Shorted

Figure B

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MAINTENANCE

WARNING: TESTING, MAINTENANCE, AND TROUBLESHOOTING SHOULD ALWAYS BE CARRIED OUT BY QUALIFIED PERSONNEL. REASONABLE SAFETY PRECAUTIONS SHOULD ALWAYS BE TAKEN AROUND ELECTRICAL DEVICES AND OUTLETS TO PREVENT FIRE, ELECTRIC SHOCK, AND INJURY TO PERSON.

Do not use any cleaning solvents or other combustibles on the devices, as this can cause risk of fire, improper device operation, or risk of electric shock and/or injury.

Operation of this device shall be verified as per CSA-343 and UL-3141 or applicable local standards. Electrical connections shall be maintained to the standard set by CSA Z463 and inspected, maintained, and re-torqued annually. The interval between maintenance cycles may need to be reduced in areas with high ambient temperature variance or dusty environments.

TROUBLESHOOTING

WARNING: TESTING, MAINTENANCE, AND TROUBLESHOOTING SHOULD ALWAYS BE CARRIED OUT BY QUALIFIED PERSONNEL. REASONABLE SAFETY PRECAUTIONS SHOULD ALWAYS BE TAKEN AROUND ELECTRICAL DEVICES AND OUTLETS TO PREVENT FIRE, ELECTRIC SHOCK, AND INJURY TO PERSON.

The Amber LED is flashing:

The amber output LED flash is a troubleshooting tool. Please refer to the “PCS Error Codes” chart on page 12 **“Figure B”.**

The end device energy manager(s) will not energize after installation:

There is an initial delay for both the Multi-Residential Hub and the energy manager when the device is powered on while the computer algorithm is checking the electrical service. The contactor on the BlackBox energy manager will not close until a computational observation time elapses. During this time the current draw on the main electrical service wires must remain below the set threshold.

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INFORMATION

This document contains important instructions which must be followed during the installation, and maintenance of this device.

Notes

After installation verify that the device is securely attached to an adequate structure in a well-ventilated location.

It is the installer's responsibility to verify that the electric power source is adequate for the use of the device.

Do not use any solvents to clean this device.

Do not paint or apply exterior finishing to this device.

Do not use this energy management system with end devices that require constant power.

CAUTIONS

The installation of the device must be done to the latest electrical code requirements.

WARNING

Read all documentation provided by the device manufacturer before using this product and follow the installation and setup procedures. Always disconnect any and all sources of power before starting work.

Do not modify, repair, or dismantle the device.

Never introduce water or any other liquids to the area around or on this device.

Do not install the device near flammable materials, explosives or fuels, chemical products, and vapors.

Do not install this device in a hazardous or wet environment or location.

Disconnect this device immediately if defective or damaged in any way and contact the manufacturer.

Any improper use of the device could result in serious injuries, death, or damage to property.

Any improper use of the device can cause damage which will void the warranty.

Never use the device above or below the temperature range of -40°F to 104°F (-40°C to 40°C).

Feedback

We are always happy to hear your feedback and we look forward to hearing from you. Please email all comments to: customerservice@blackboxinnovations.com.

You can also contact us by clicking on the "Message Us" button on our website at: www.blackboxinnovations.com or by calling us at our toll-free number: 1 (833) 325-5269.

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Limited warranty

1. Black Box Innovations Inc. warranties this device against any defects for a period of one year from the date of shipping. The warranty is limited to the components and equipment supplied by Black Box Innovations Inc.

2. Black Box Innovations Inc. may undertake repair or replacement, at the site or the manufacturing location, at its option, of the defective material only after an evaluation has been made by its representative.

3. If, in the opinion of Black Box Innovations Inc. installation has been done incorrectly, or the device is used inappropriately, or repairs have been done by unauthorized personnel other than representatives of Black Box Innovations Inc., the warranty will be automatically void.

4. Black Box Innovations Inc. will not be held liable for damages or delays and will not be required to pay the transport cost of the charge controller claimed to be defective.

5. Prior written consent must be made by Black Box Innovations Inc. before repairs, replacement, modifications, or compensation is to be made.

6. Black Box Innovations Inc. shall not be liable for any indirect damages or delays caused by inadequate workmanship, or materials on devices installed. This also applies if the installations are not made in accordance with the manufacturer's instruction, local electrical codes, as well as specifications of devices powered through this device.

7. Black Box Innovations Inc. shall not be liable for any direct or indirect damages or delays for any devices that are connected to this device that can not tolerate having supplied power switched off for any time period specified by the device or when the device is in need of repair or maintenance.

8. Any device or accessory supplied with this device to be installed or connected remotely from the charge controller will be guaranteed by the manufacturer only under the conditions mentioned in paragraphs 6 & 7 and in accordance with the rest of this document.

9. Any repairs made at the Black Box Innovations Inc. factory are warrantied for 30 days from the date of repairs.

10. Any components supplied for repairs are warrantied for the remaining of the warranty on the original product or 90 days whichever is longer.

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