

PROLON



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## QUICK START GUIDE

BLUETOOTH, NETWORK CONTROLLER, DIGITAL THERMOSTAT,  
TREE-COM AND BACNET EQUIPMENT BRIDGE

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### System Requirements

The PL-485-BT can be used from various platforms, but in all cases, the following is required:

- Prolon Focus Application (free - see below for details)
- Bluetooth 4.0 LE capable device (integrated or via dongle)

### Minimum operating system for Bluetooth

- iOS 12
- Android 5.0 (Lollipop)

### Package Contents

- PL-485-BT Converter
- USB Cable
- CAT5 Cable

### Installing Prolon Focus Application

Obtain the free Prolon Focus App from the appropriate source:

- Windows: Prolon's website: [www.proloncontrols.com](http://www.proloncontrols.com)
- iOS: Apple App Store (Search for Prolon Focus)
- Android: Google Play Store (Search for Prolon Focus)

### Connecting Using Bluetooth 4.0 LE

To communicate to the PL-485-BT over Bluetooth, you must first pair it with your device. The pairing process varies with the device you are using. Please view the Hardware Guide at [www.proloncontrols.com](http://www.proloncontrols.com) for more details. The default pairing code is "**000000**".

### Connecting Over USB (Windows Only)

The PL-485-BT requires drivers on the computer for it to function. The drivers are included along with the Prolon Focus Application. If your computer still cannot locate the drivers, please direct it to manually search in the Prolon installation folder, in the 'Drivers' subfolder.

### Power & Charging

The PL-485-BT is equipped with a rechargeable Lithium-Ion battery. It charges via the USB port. It is also equipped with an ON/OFF button. The switch must be in the ON position for the converter to operate as a communications device (Bluetooth or USB). When the converter is not being used, switch to the OFF position to conserve battery life. The converter's battery can still be charged even when the switch is in the OFF position.

Upon Power-Up, the POWER LED will be ORANGE for a brief period of time (approx. 45 sec) while the battery level is being calculated internally. After this period, the POWER LED will be:

- Blinking RED when USB unplugged
- Solid RED when USB plugged and charging
- Solid GREEN when USB plugged and the battery has been fully charged

### Connecting the RS485 Side

Connect the A (+) and B (-) screw terminals to the wires of appropriate polarity on the RS485 bus, using appropriate RS485 cabling. Connect the GND screw terminal to RS485 GND reference as needed.

Alternatively, the PL-485-BT is equipped with an RJ45 jack that carries the same RS485 A (+), B (-) and GND signals among the eight pins within the jack (see Figure below for pinout). This port is very practi-

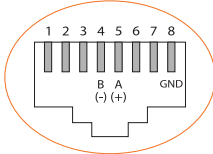
## Bluetooth (PL-485-BT)

cal since it can be used to quickly connect to Prolon controllers that are equipped with a similar RJ45 jack using a standard CAT5 cable (included). This approach saves time since there is no need to cut and strip wires.

**Note:** The RJ45 jack is NOT an ETHERNET port. The PL-485-BT does NOT SUPPORT ETHERNET.

The RS485 TXD and RXD LEDs blink briefly as bytes are being transmitted or received respectively over the RS485 line, but do not indicate the validity or comprehension of these bytes by the equipment.

The RS485 circuitry in the PL-485-BT is electrically isolated from the USB circuitry, thereby avoiding any potentially hazardous GND loops with your PC.



### Battery Precautions

- Do not attempt to replace the battery. It is built-in and not changeable.
- Charge your converter using a certified computer, powered hub or power supply.
- Charge the battery in accordance with the instructions supplied with this guide.
- Use only the charger cable that shipped with your product to charge the battery.

### Regulatory and Safety Notices

Model Name: PL-485-BT

USA: Federal Communications Commission (FCC) Statement  
This device complies with part 15 of the FCC Rules.

#### Operation is subject to the following two conditions:

1. This device may not cause harmful interference and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

#### FCC Warning:

Changes or modifications not expressly approved by Prolon Inc. could void the user's authority to operate the equipment.

**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

## Bluetooth (PL-485-BT)

- Consult the dealer or an experienced radio/TV technician for help.

To comply with FCC/IC RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

### FCC ID: 2AK90-485BT20

### Canada: Industry Canada (IC) Statement

IC Notice to Users English/French in accordance with RSS GEN Issue 3:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

### IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limit set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

### Déclaration d'exposition à la radiation:

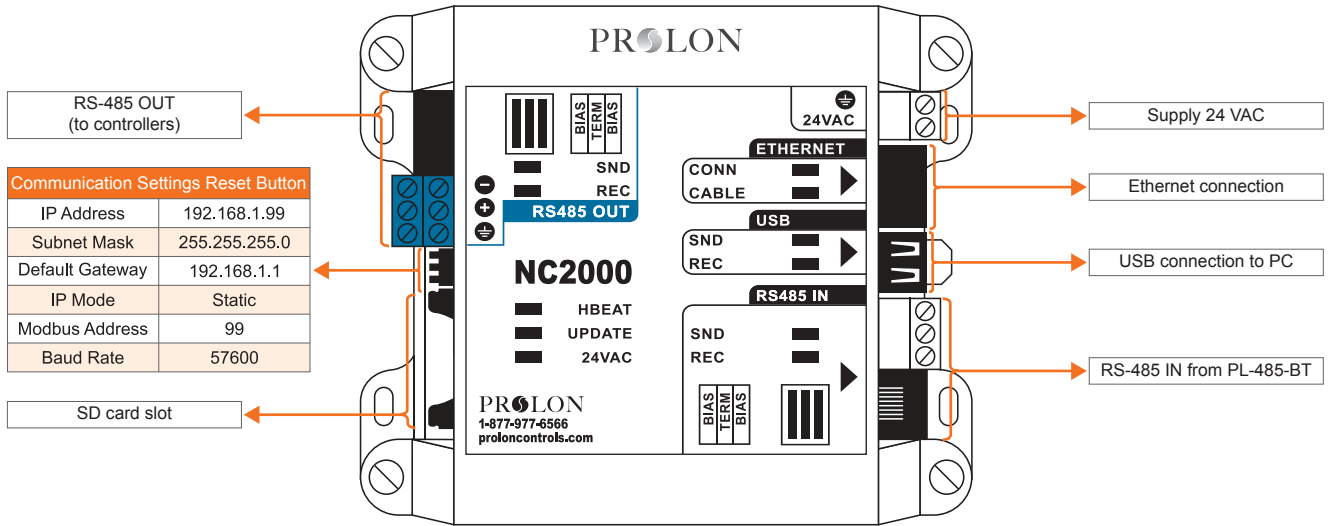
Cet équipement respecte les limites d'exposition aux rayonnements IC définies pour un environnement non contrôlé. Cet équipement doit être installé et mis en marche à une distance minimale de 20 cm qui sépare l'élément rayonnant de votre corps.

L'émetteur ne doit ni être utilisé avec une autre antenne ou un autre émetteur ni se trouver à leur proximité.

CAN ICES-3 (B)/NMB-3(B)

IC : 22455-485BT20

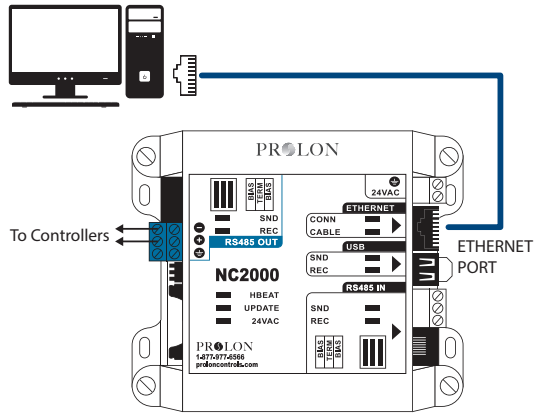
# Network Controller (PL-NC2000)



Default Modbus address	Default net settings
99	DHCP

# How to Connect a Computer to Prolon Controllers

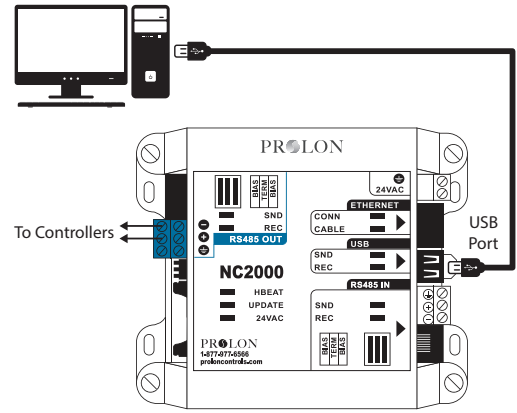
## IP Connection



PL-NC2000 (Network Controller)

Use this method to connect to a PL-NC2000 over an IP Connection.  
**NOTE:** The computer and the PL-NC2000 must be on the same subnet to communicate. Use a CAT5e cable.

## USB Connection

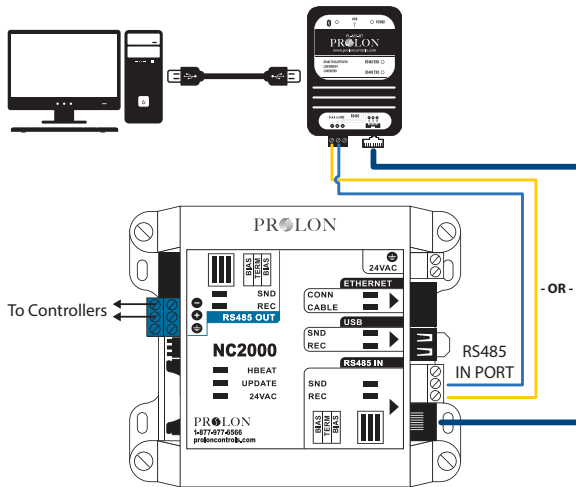


PL-NC2000 (Network Controller)

Use this method to connect to a PL-NC2000 with a USB cable. **NOTE:** Use a Type-A to Type-A USB Cable. (Available only for Windows based computers.)

# How to Connect a Computer to Prolon Controllers

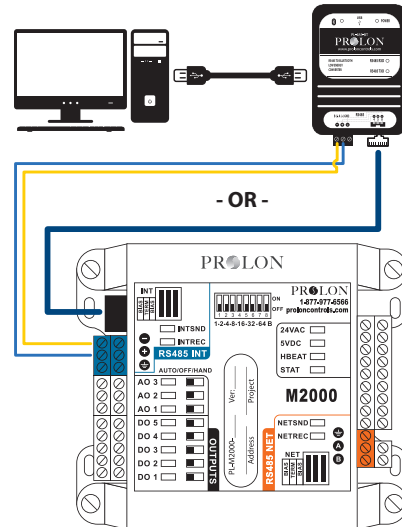
## PL-485-BT Connection



PL-NC2000 (Network Controller)

Use this method to connect to a PL-NC2000 using the PL-485-BT converter. **NOTE:** USB Cable (Type A to Type B) and CAT5e cable are provided with PL-485-BT converter.

**IMPORTANT:** The PL-485-BT converter can be used to connect a PC/ Mobile device to ANY Prolon controller. This example only shows connections to PL-M2000-XXX and PL-NC2000.



PL-M2000-XXX (Unit Controller)

Use this method to connect to a PL-M2000-XXX using the PL-485-BT converter. **NOTE:** USB Cable (Type A to Type B) and CAT5e cable are provided with PL-485-BT converter.

# Digital Sensor (PL-T1100)

## Installation

1. Open casing to remove back cover by pushing on the tab located underneath the thermostat. (See Figure 1)
2. Pull wire(s) through central hole of back cover.
3. Screw in the back cover to the wall.
4. Connect wires:
  - If using twisted pair wires:
    - Pull out screw terminal block.
    - Remove 1 cm insulation from each wire.
    - Connect the wires to the terminal blocks and reconnect the terminal blocks. (See Figure 2)
  - If using CAT5 cable:
    - Plug the cable into the RJ45 jack of the T1100 (if CAT5 cable is opened at the controller, refer to Figure 3 for pinout of the T1100's RJ45 jack).
5. Reconnect top cover.

**IMPORTANT!** Do not install the thermostat under the following conditions:

- Any location exposed to direct sunlight.
- On an outside wall.
- Near an air discharge grill.
- In a location where vertical air circulation is restricted.
- Near a dimmer switch.

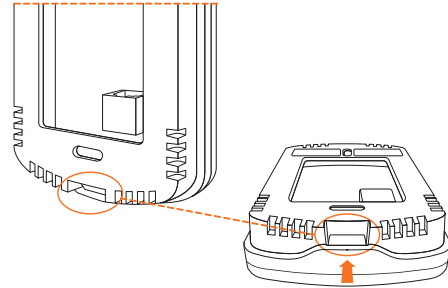


Figure 1

□	⊗	1	INT +
□	⊗	2	INT -
□	⊗	3	24 VAC
□	⊗	4	COM

Figure 2

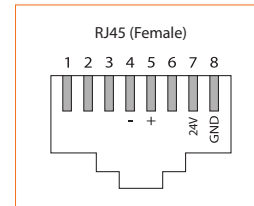


Figure 3

# Digital Thermostat (PL-T1100)

## Auxiliary Analog Input

The T1100 has auxiliary analog input which can be used to connect another thermistor. The T1100 can be configured to use this alternate temperature reading for a variety of functions, including temperature averaging or radiant floor slab temperature. The alternate thermistor (10K $\Omega$  type 3) can be connected to the auxiliary input using the “AUX IN” and “COM” pins.

### Case #1 Remote sensor only

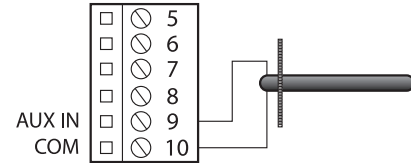
- Physical connection: connect remote sensor (10K $\Omega$  type 3) into terminals 9 and 10 (see figure A)
- T1100 configuration: set T1100 analog input to “Aux Only”

### Case #2 Averaging 2 sensors (1x remote, 1x internal)

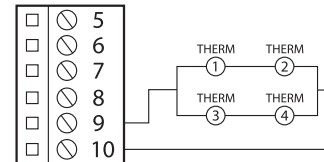
- Physical connection: connect remote sensor (10K $\Omega$  type 3) into terminals 9 and 10 (see figure A)
- T1100 configuration: set T1100 analog input to “Average”

### Case #3 Averaging 4 sensors (4x remote)

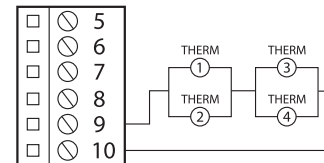
- Physical connection: connect 4 sensors (10K $\Omega$  type 3) in Series-Parallel configuration (see figure B) or in Parallel-Series configuration (see figure C) to terminals 9 and 10
- T1100 configuration: set T1100 analog input to “Aux Only”



(A) Remote Temp Sensor



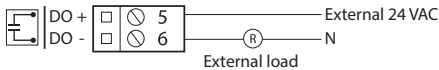
(B) Averaging multiple remote sensors (Series-Parallel)



(C) Averaging multiple remote sensors (Parallel-Series)

# Digital Thermostat (PL-T1100)

## Outputs



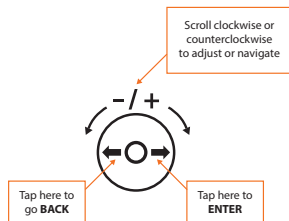
**Digital Output (triac dry contact)**



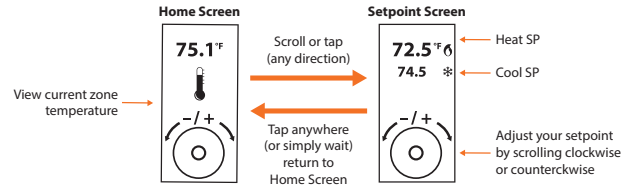
**Analog Output (0-10VDC)**

## Operation

The T1100 is controlled using the circular touch pad on the bottom half of the thermostat. The touch pad uses capacitive sensing technology to detect finger proximity. There are no moving parts to push or rotate. The T1100 is controlled using simple scrolling, tapping or holding motions, performed around the circle of the touch pad. The center of the circle is unused.

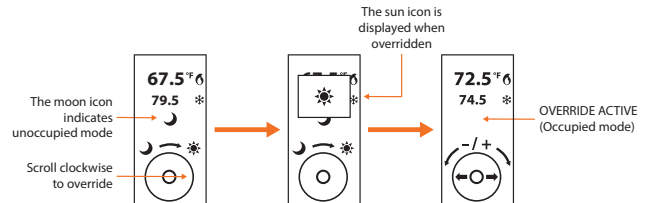


## Changing the setpoint



## Schedule Override

The first, go to the setpoint screen.



### Product Overview

The PL-TREE-COM is a Wireless RS485 converter that is made specifically to work with the Modbus protocol. Its main purpose is to provide a means to wirelessly extend the standard RS485 wired daisy-chains used by existing Proton HVAC control products for new buildings and for retrofits.

PL-TREE-COM operates using the Mira wireless communication protocol, whose patented adaptive frequency hopping algorithms, called Cognitive Coexistence, can avoid wireless disturbances like no other; a must in the exceedingly crowded 2.4GHz band.

The PL-TREE-COM wireless network operates in a fashion that is analogous to a tree: there is a single root that spreads out and eventually ends in leaves. The root can only share with leaves it is attached to. In the same fashion, a single ROOT module must be assigned for a given subnet (tree), and multiple LEAF modules can belong to the same subnet as the ROOT. Any module on the same subnet will share RS485 information. You can setup as many subnets as are required to respect the Master-Follower relationship of a Modbus RS485 network.

Additionally, the PL-TREE-COM is equipped with a Type-A NFC Tag, which means any smart device equipped with the Proton Focus mobile app will be able to view signal quality and other relevant network statistics.

### Connecting the power

Connect the 24VAC and GND screw terminals to the wires of appropriate polarity from a class 2, 24VAC transformer.

### Connecting the RS485

Connect the A (+) and B(-) screw terminals to the wires of appropriate

polarity on the RS485 bus, using appropriate RS485 cabling. Connect the GND screw terminal to RS485 GND reference as needed.

### Setting the Branch ID

The Branch ID for the device can be set using the onboard dip-switches. Switches #1 through #7 can be used to set the Branch ID. Only devices on the same Branch ID will share RS485 information with each other. With seven dipswitches available, a maximum of 128 Branch ID can be made.

### Setting leaf and root

In a PL-TREE-COM Wireless Branch ID, there must be a single ROOT, with up to 127 LEAFs. The ROOT should be placed on the same RS485 bus as the Modbus Master. The ROOT device can be assigned using dipswitch #8. Please refer to Proton Installation Guides for more information on Modbus Master-Follower roles.

### Viewing signal quality

When a PL-TREE-COM module is set up as a LEAF, the signal quality with respect to its associated ROOT can be viewed by any smart device equipped with an active NFC antenna. The smart device requires the Proton Focus app to display the NFC reading. Simply approach the smart device to the front of the PL-TREE-COM. (Due to the small range of NFC communication, it may be necessary to put the smart device and PL-TREE-COM in direct physical contact.) The smart device should detect the NFC tag from the PL-TREE-COM and display an info record, which contains the device version (ex.: V.1.0) and the signal quality (ex.: SQ: 86%).

The signal quality measurement of a LEAF will not be available ("N/A") until a connection to the ROOT. It may take up to seven minutes for a connection to be established. Note that a ROOT device will not display

the signal quality (“N/A”) since it may be connected to multiple LEAFs, each with a different reading. Instead, ROOT nodes will display the quantity of LEAF nodes that they are aware of.

Please note that signal quality measurement of a LEAF begins at 0% and will rise after successful transmissions to its associated ROOT. To speed up this process, LEAF nodes can artificially increase the communication rate for 30 seconds provided:

- They have no devices connected to their RS485 port
- A reading of the signal quality is performed via NFC

Note that a system with a signal quality of less than 30% can introduce delays when interacting with the Focus application due to more frequent transmission errors.

### LEDS

The devices has five LEDs to indicate device status.

- **HBEAT (BLUE):** This LED simply indicates that the device is powered and operating. It should blink once every second, regardless of RS485 or Wireless communication.
- **CONN (BLUE):** This LED indicates if other devices have been found on the same subnet as this device. If so, then the devices are ready to share their RS485 information.
- **ROOT (YELLOW):** This LED indicates if this device has been set as a ROOT using dipswitch #8. When the LED is ON, this device is set as the ROOT for its subnet. If the LED is off, it is instead a LEAF.
- **SND (RED):** This LED indicates if data is being transmitted on the RS485 bus. Blinking occurs in quick short bursts.
- **REC (GREEN):** This LED indicates if data is being received from the RS485 bus. Blinking occurs in quick short bursts.

### Setting bias and terminating resistors

The PL-TREE-COM comes with jumpers to enable RS485 bias and terminating resistors. Bias and terminating resistors are used to stabilize an RS485 network.

- Terminating resistors should be placed at each extremity of an RS485 bus
- Both bias resistors should be activated at a single node on the RS485 bus, but the location of the node is not important

The jumper to activate the resistors are identified on the PL-TREE-COM via the front label. The resistors are activated when the jumper covers both header pins for a given resistor.

### Regulatory and Safety Notices

Model Name: PL-TREE-COM

#### USA: Federal Communications Commission (FCC) Statement

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

#### FCC Warning:

Changes or modifications not expressly approved by ProLon Inc. could void the user’s authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against

harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To comply with FCC/IC RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

### **Contains:**

**FCC ID: X8WBT832XH**

**CANADA: INNOVATION, SCIENCE AND ECONOMIC DEVELOPMENT  
CANADA (ISED) STATEMENT**

IC Notice to Users English/French in accordance with RSS GEN Issue 5, section 8.4:

### **English**

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

### **Français**

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

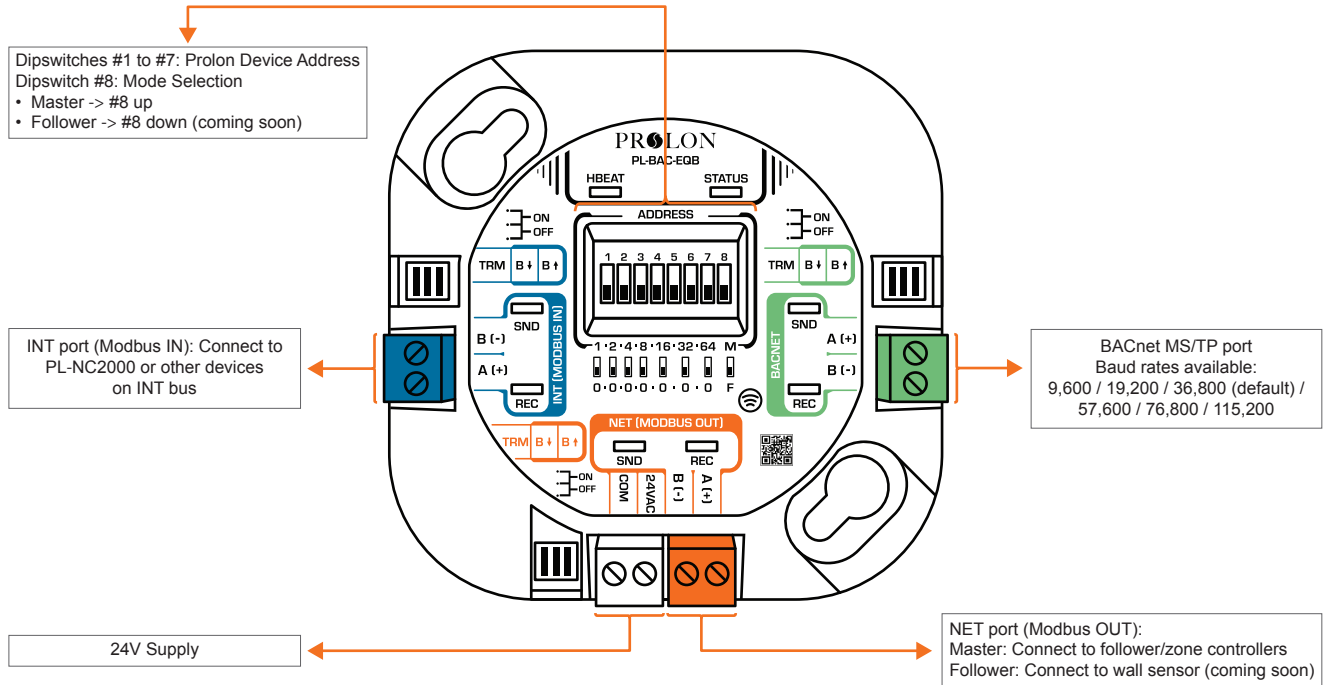
1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CAN ICES-3 (B)/NMB-3(B)

### **Contains/Contient:**

**IC: 4100A-BT832XH**

# BACnet Equipment Bridge (PL-BAC-EQB)



## Networking Notes:

Prolon Device Address (Modbus) = BACnet MAC Address = BACnet Device Instance (Instance # can be modified via software)

**PLEASE NOTE, for the PL-485-BT see page 4.**

**PLEASE NOTE, for the PL-TREE-COM see page 13.**

### Network Controller (PL-NC2000)

- cULus Listed; UL 916 Energy Management Equipment, File E364757, Vol.1
- CAN/CSA-C22.2 No. 2015-12, Signal Equipment
- FCC Compliant to CFR47, Part 15, Subpart B, Class B
- Industry Canada (IC) Compliant to ICES-003, Issue 5: CAN ICES-3 (B)/NMB-3(B)
- RoHS Directive (2002/95/EC)

### Digital Thermostat (PL-T1100)

- FCC Compliant to CFR47, Part 15, Subpart B, Class B
- Industry Canada (IC) Compliant to ICES-003, Issue 5: CAN ICES-3 (B)/NMB-3(B)
- RoHS Directive (2002/95/EC)

### BACnet Equipment Bridge (PL-BAC-EQB)

- UL 916 Energy Management Equipment
- CSA/C22.2 No.205 Signal Equipment (Pending)
- FCC Part 15 subpart B Class B, ICES-003:2020

### FCC User Information

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### Industry Canada

This Class (B) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment regulations.

Cet appareil numérique de la Classe (B) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

## Technical Specifications

### Network Controller (PL-NC2000)

- Supply: 24 VAC  $\pm$ 10%, 50/60 Hz, Class 2
- Consumption: 5 VA max

### Digital Thermostat (PL-T1100)

- Supply: 24 VAC  $\pm$ 10%, 50/60 Hz
- Consumption: 5 VA (typ), 13 VA (max)

### TREE-COM

- Supply: 24 VAC  $\pm$ 10%, 50/60 Hz, Class 2
- Consumption: 1.2VA
- Wireless: Mira (2.4GHz) with Cognitive Coexistence, NFC
- Range: Maximum distance of 2,500 ft (750 m) between wireless devices (line of sight)
- Antenna: Internal (PCB Trace)

### BACnet Equipment Bridge

- Supply: 24 VAC  $\pm$ 10%, 50/60 Hz, Class 2
- Power: 1.3 VA (consumption)