INSTALLING
THE TREE-COM

with Prolon

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PL-TREE-COM Principles

1. The Prolon PL-TREE-COM is a wireless communication device that transmits and receives Modbus RS485 data over radio frequency communication (2.4GHz)

2. Its goal is to wirelessly extend, complement, or replace standard RS485 wired daisy-chains, where a physical connection would be impractical or uneconomical. *(Figure 1)*

3. The TREE-COM modules communicate on dedicated wireless subnet "channels", where a unique "ROOT" module talks with one or multiple "LEAF" units on the same channel.

    3a) Channel identification is made through dipswitches. Up to 128 different channels may be created.

    3b) All TREE-COM communicating on a given channel must be set to the same dispswitch channel number.

    3c) These dipswitches are not to be mistaken with the controllers' Modbus address, they are for channel identification only. *(Figure 2)*

    3d) The "ROOT" module is always connected to a Modbus "Master" device, the "LEAF" always connect to "follower" devices.

PL-M2000-RTU
Modbus: 20

PL-TREE-COM
Channel: 1
ROOT

PL-TREE-COM
Channel: 1
LEAF

PL-VC2000
Modbus: 21

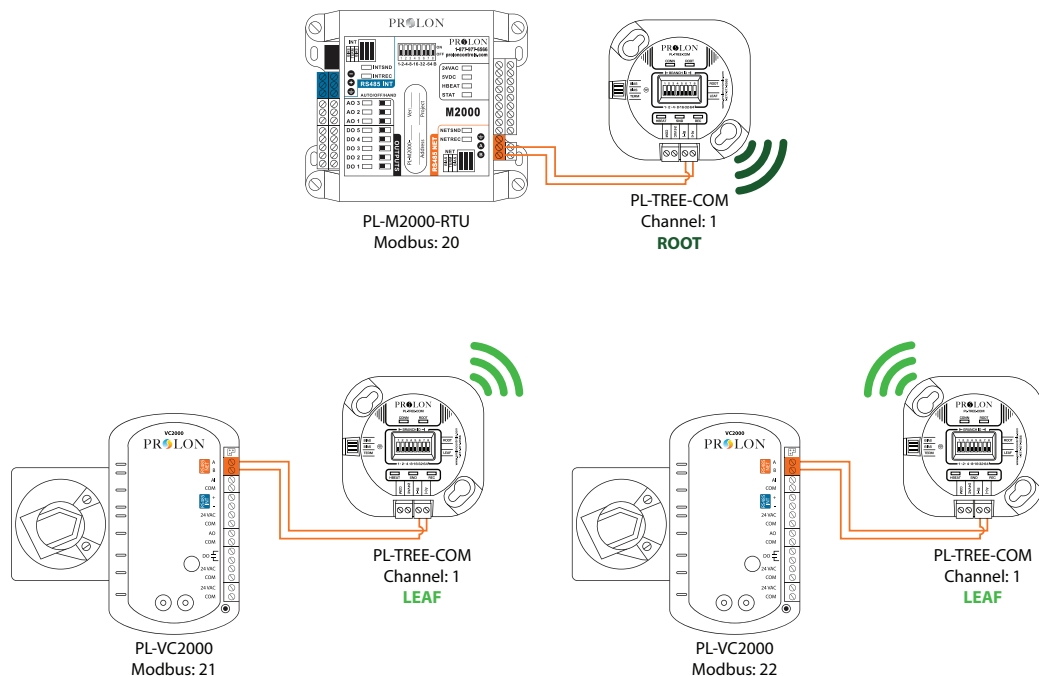PL-TREE-COM
Channel: 1
LEAF

PL-VC2000
Modbus: 22

Figure 1

4. Each wireless segment must have one TREE-COM set as a "ROOT".

    4a) The "ROOT"/"LEAF" function is activated using dipswitch number #8. *(Figure 2)*

    4b) There can only be one "ROOT" on any given segment.

    4c) The "ROOT" can have as many "LEAF" modules as needed by the Prolon system.

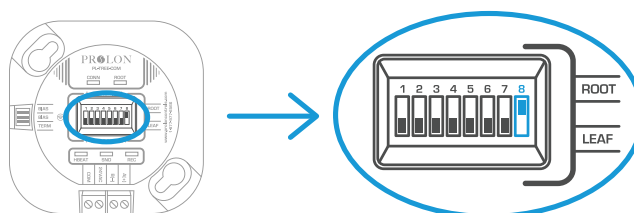   **4d)** The PL-TREE-COM, set as a "ROOT", communicates with all its "LEAF" modules

Figure 2

5. Channel number configuration

A unique channel number on each TREE-COM must be configured by setting the first 7 switches on the channel number dipswitch block to the desired value.

These switches are numbered from 1 to 7 and represent a binary value from 0 to 64 (0, 1, 2, 4, 8, 16, 32, 64 respectively). The value of each switch that is in the ON position is added together to form the numerical value of the TREE-COM channel used.

The example on Figure 3 shows switches 1, 2 and 4 on the ON position. So the corresponding values are 1, 2 and 8, giving a sum of 11. (1+2+8=11)

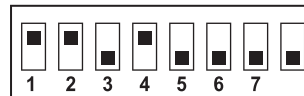TREE-COM modules allow the use of up to 128 channel numbers.

Figure 3

6. Operational range

6a) The PL-TREE-COM can be oriented in any direction when operating under 200ft of range.

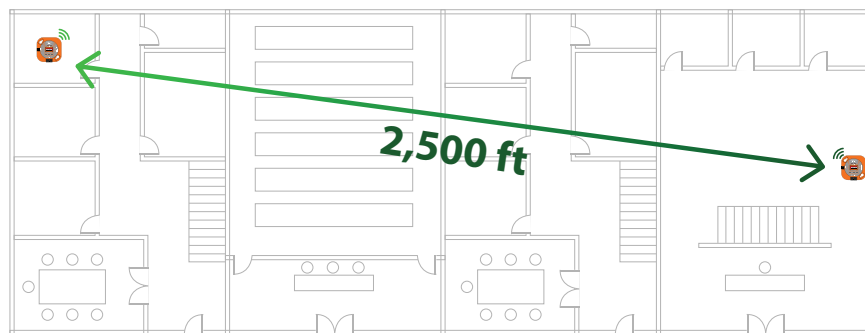**6b)** The PL-TREE-COM can cover distances up to 2500 ft when oriented properly. *(Figure 4)*

2,500 ft

Figure 4

6c) The PL-TREE-COM radio wave pattern is directional, meaning the signal beam, while able to radiate everywhere, will travel farther in one specific direction. The built-in antenna is aligned with its front cover (face with the lights and dipswitches). In order to achieve maximum range, or communicate through complex building structure, both PL-TREE COM modules communicating together should have their faceplates facing each other. Signal quality (read at the "LEAF" module) must be at least 30% to achieve proper communication. *(Figure 5)*

NOTE: Aligning TREE-COM modules face to face is highly recommended for distances beyond 200 ft.
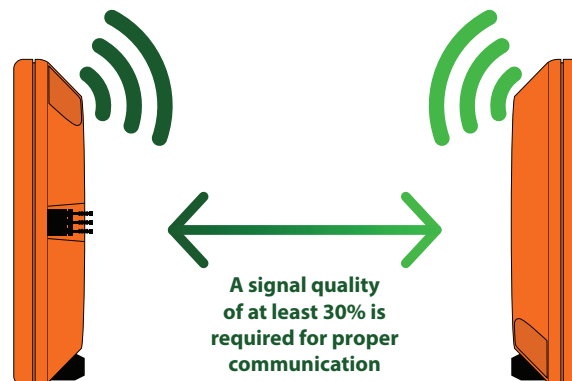

A signal quality
of at least 30% is
required for proper
communication

Figure 5

7. Weatherproof enclosures

Should a PL-TREE COM module need to be installed outdoors, we recommend installing it in a plastic or resin NEMA 4 type enclosure, do not install inside a metal enclosure, since it will block all radio signals.

8. LEDS

The PL-TREE-COM comes equiped with five LEDs to indicate device status. *(Figure 6)*

8a) 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.

8b) 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.

8c) 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".

8d) SND (RED): This LED indicates if data is being transmitted on the RS485 bus. Blinking occurs in quick short bursts.

8e) REC (GREEN): This LED indicates if data is being received from the RS485 bus. Blinking occurs in quick short bursts.

*Once a successful connection is established between a "ROOT" and one or more multiple "LEAF" devices, their individual CONN blue lights will turn on. The connection process may take up to 7 minutes to complete.
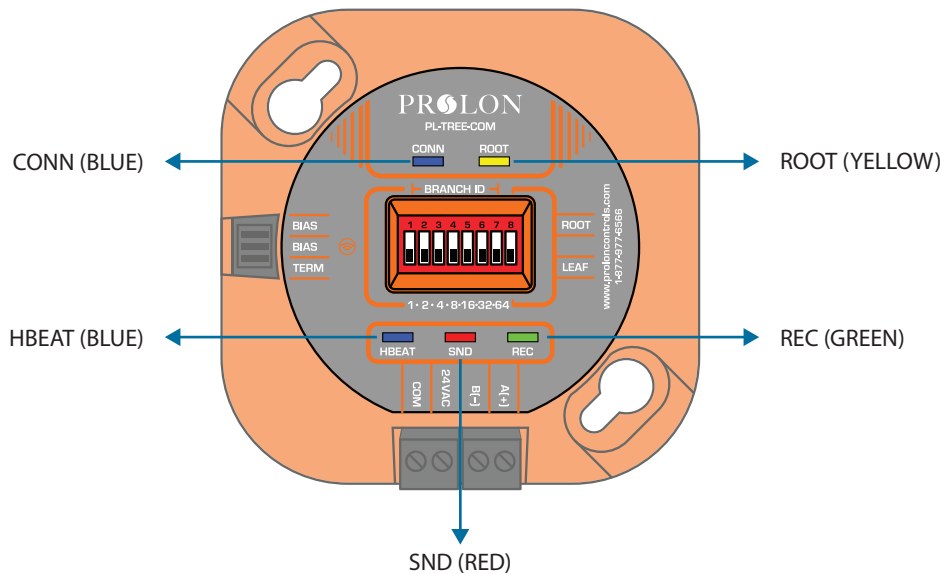

CONN (BLUE) ROOT (YELLOW)

HBEAT (BLUE) REC (GREEN)

SND (RED)

Figure 6

9. 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.

10. Firmware compatibility

The PL-TREE-COM is designed to work with same generation products (v.7.5.0 or later), but can be retrofitted into existing systems, provided that the controllers using TREE-COM modules are compatible. This is especially important with Modbus "Master" devices, that must comply with the TREE-COM's specific communication caracteristics.

10a) When a PL-NC2000 is present, it must have firmware version 7.5.0 or later to support TREE-COM communication.

10b) Any Digital wall sensor (T200/T500/T1000) connected to a TREE-COM must have firmware version 7.5.0 or later to support TREE-COM communication.

10c) Other Modbus Master controllers (RTU, HP, etc.) using older firmware may still work properly with TREE-COM modules. It is strongly recommended however to update them for best communication performance

10d) Follower controllers are not affected by firmware version, all are compatible with the TREE-COM.

PL-TREE-COM installation scenarios

Single-Zone Unit Controllers with Digital Wall Sensor

The RTUS, HPS or FCU controllers can be connected to their respective communicating digital wall sensor, using the PL-TREE-COM device.
***Important** A PL-RS wall sensor CANNOT be connected using a PL-TREE-COM (M2000 only).*

1. The PL-TREE-COM connected to the communicating wall sensor must be set as the "ROOT".

2. The PL-TREE-COM connected to the Single-Zone Unit Controller must be set as the "LEAF".

3. Both TREE-COM modules must have their dipswitches set for the same channel number

PL-M2000-###
Modbus: 20

PL-TREE-COM
Channel: 1
LEAF

PL-C1050-###
Modbus: 30

PL-TREE-COM
Channel: 2
LEAF

PL-T1000

PL-TREE-COM
Channel: 1
ROOT

PL-T1000

PL-TREE-COM
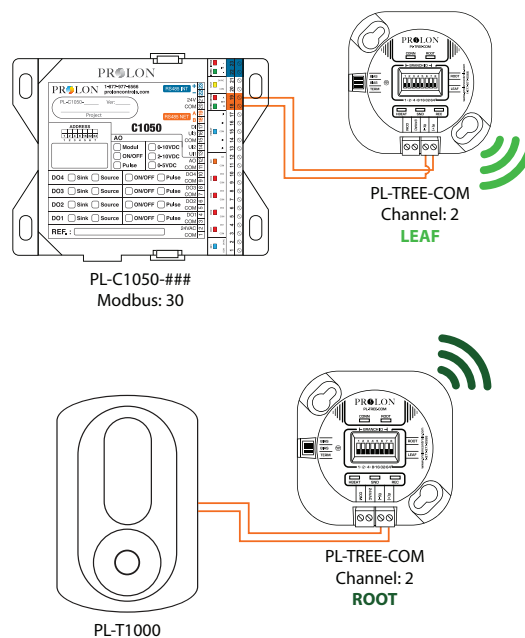Channel: 2
ROOT
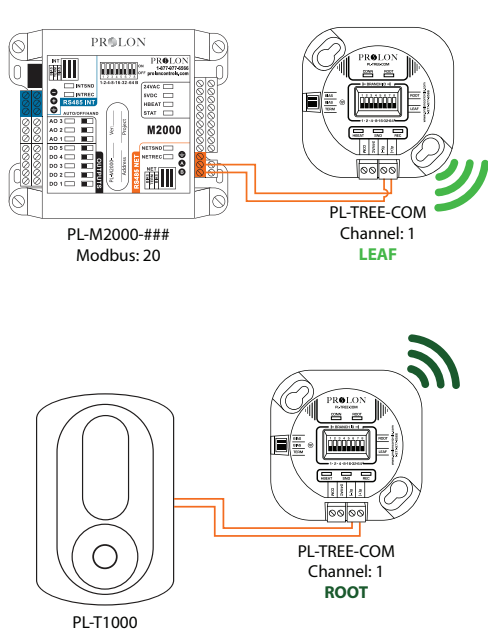
Figure 7

Figure 8

VAV Zone controllers with Digital Wall Sensor

The PL-VC2000 or C1050 VAV controllers can be connected to a communicating digital wall sensor (T1000, T500,T200) using a PL-TREE-COM. *(Figure 9)*

1. The PL-TREE-COM connected to the communicating wall sensor NEEDS to be set as the "ROOT". (INT port)

2. The PL-TREE-COM connected to the VAV controller must be set as the "LEAF". (INT port)

**3.** Both TREE-COM modules must have their dipswitches set for the same channel number.

PL-TREE-COM
Channel: 1
LEAF

PL-VC2000
Modbus: 1

PL-TREE-COM
Channel: 1
ROOT

PL-T1000
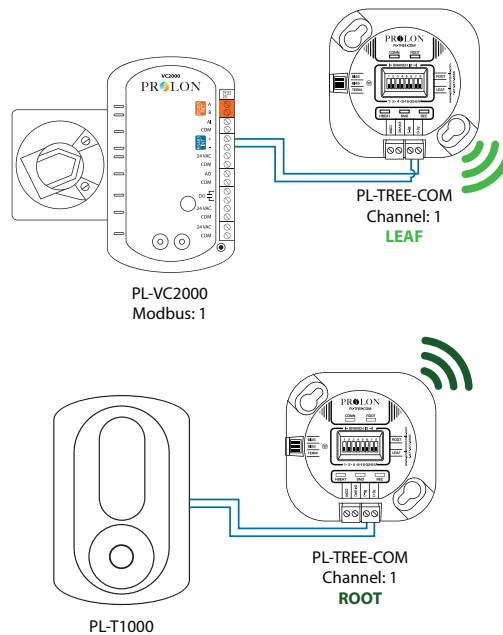
Figure 9

Master Controller with multiple Follower Controllers *(fully wireless network)*

Follower Controllers (VC2000, C1050-VAV, T1100, FLX, BLR, etc.) can be connected wirelessly to a Master Unit Controller such as a PL-M2000-HP or RTU or a PL-C1050-RTU or HP.

1. Each controller must have its own dedicated PL-TREE-COM device

2. The PL-TREE-COM connected to each Follower Controller must be in set as the "LEAF". (NET Port)

3. The PL-TREE-COM connected to the Master Controller must be set as the "ROOT". (NET Port)

4. All PL-TREE-COM modules must have their dipswitches set for the same channel number.
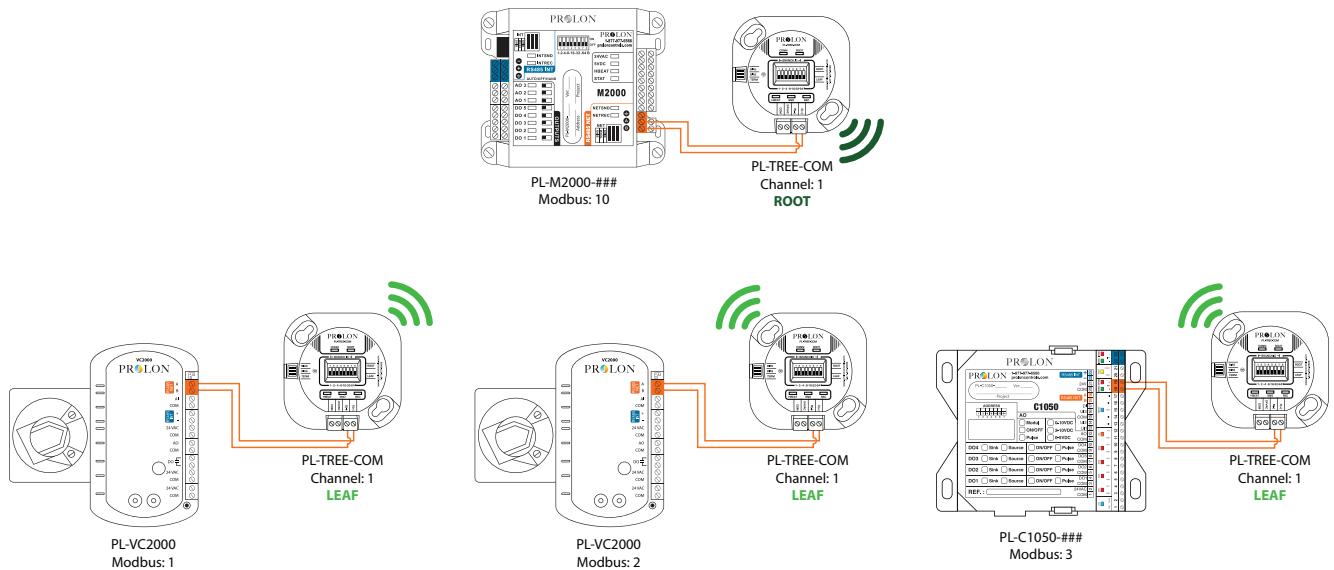
Figure 10

Master Controller with multiple Follower Controllers *(wired/wireless - hybrid network)*

Example 1

It is possible to create hybrid networks, where wireless communication supports and complements wired daisy-chains. In this situation, a PL-TREE-COM will be added to the daisy-chain to gap the link between the Master and all its Followers. *(Figure 11)*

1. The PL-TREE-COM on the M2000 Master's side must be connected in the NET port and be set as the "ROOT".

2. The Followers Network PL-TREE-COM can be inserted anywhere within their own wired daisy-chain. This device must be set as the "LEAF".

3. Both TREE-COM modules must have their dipswitches set for the same channel number.
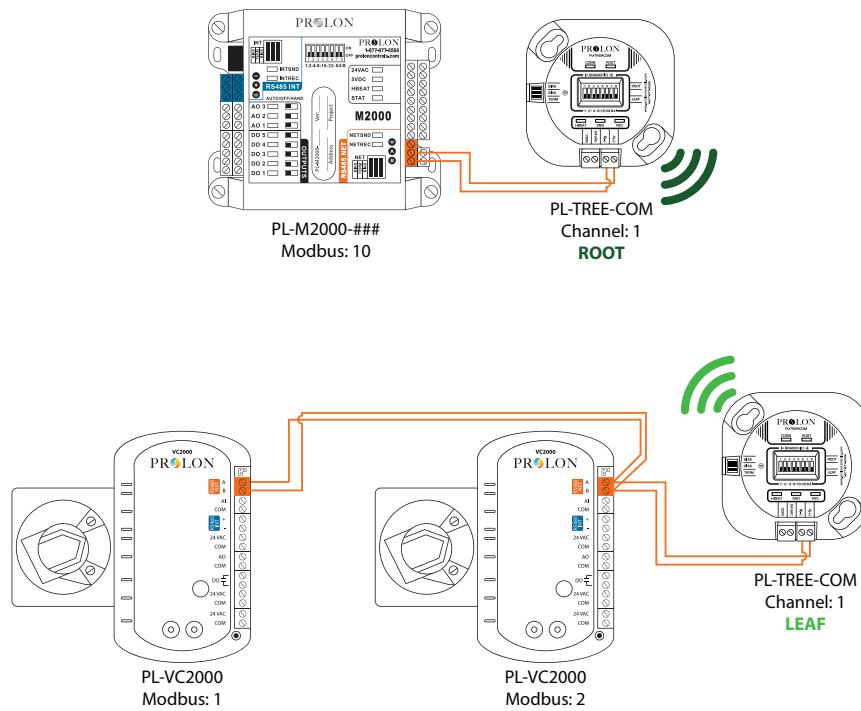
Figure 11

Master Controller with multiple Follower Controllers *(wired/wireless - hybrid network)*

Example 2

A wired communication network can be spliced and re-united using TREE-COM modules, regardless of their location within a Prolon network. *(Figure 12)*

1. The TREE-COM that is hardwired to the Modbus Master (PL-M2000-RTU) must be set in "ROOT" mode

2. The TREE-COM hardwired to the Follower controllers must be set to "LEAF" mode.

3. TREE-COM modules must have their dipswitches set for the same channel number.

4. The TREE-COM modules will act like a virtual segment of wire.

PL-M2000-###
Modbus: 10

PL-VC2000
Modbus: 1

PL-VC2000
Modbus: 2

PL-TREE-COM
Channel: 1
ROOT

PL-VC2000
Modbus: 3

PL-VC2000
Modbus: 4

PL-TREE-COM
Channel: 1
LEAF

PL-VC2000
Modbus: 5

PL-VC2000
Modbus: 6

PL-TREE-COM
Channel: 1
LEAF
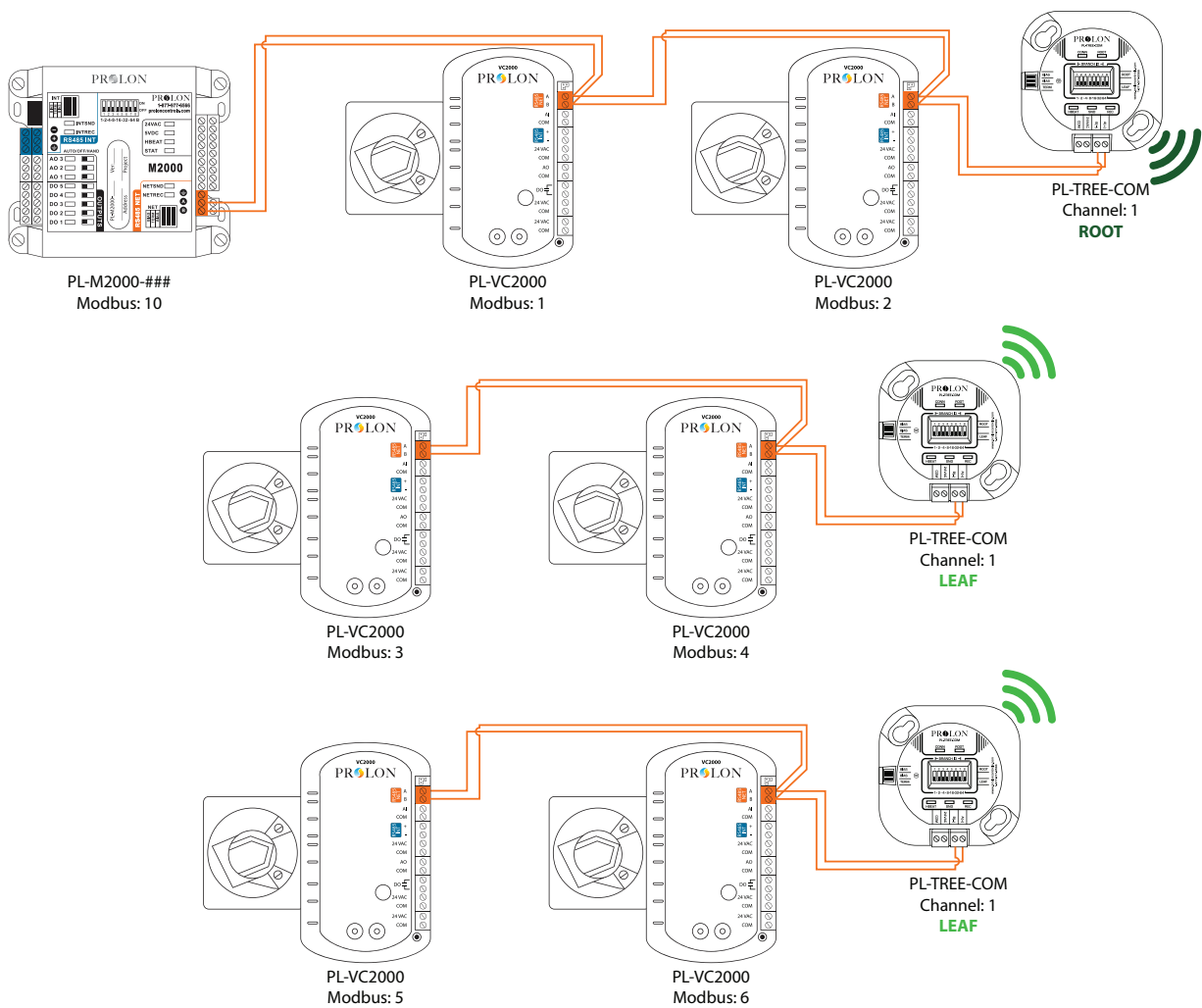
Figure 12

PL-NC2000 connected to a group of Master PL-M2000 or PL-C1050

The communication network between any Master Controller and the PL-NC2000 can be connected wirelessly using the PL-TREE-COM. *(Figure 13)*

1. The PL-TREE-COM connected to the PL-NC2000 via the RS-485 OUT port must be set as the "ROOT".

2. The PL-TREE-COM connected to individual PL-M2000, or PL-C1050 via the INT communication port must be set as the "LEAF".

3. All PL-TREE-COM modules must have their dipswitches set for the same channel number.
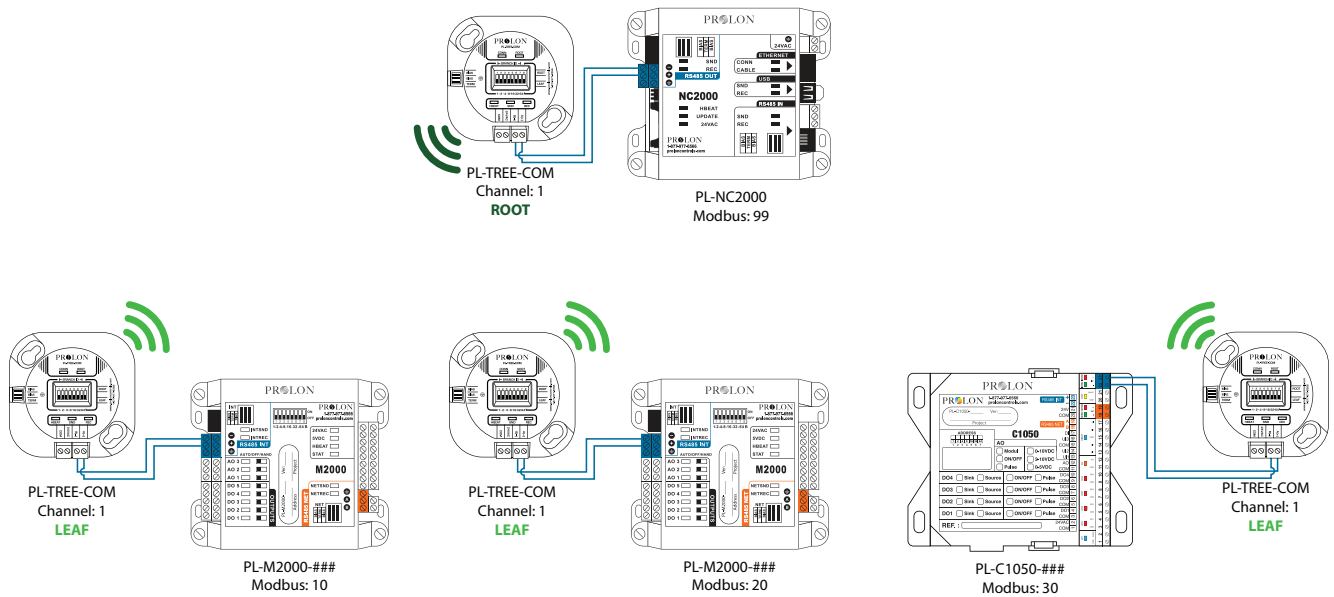
Figure 13

Measuring signal quality with NFC

1. The incoming signal quality from a "ROOT" must be measured at a "LEAF" device, using the Prolon Focus app on a mobile device with NFC capabilities.

2. A measurement only becomes possible on a "LEAF" device, once it has established a connection with its "ROOT" module.

3. Measuring a "ROOT" module using NFC will not yield signal quality, but rather number of associated "LEAF" modules it is able to communicate with.

4. To use this feature, the NFC function must first be enabled on the mobile device.

5. The NFC reading may take a few seconds to display.

Note: We recommend that you remove any casing from your mobile device if you are experiencing trouble connecting.
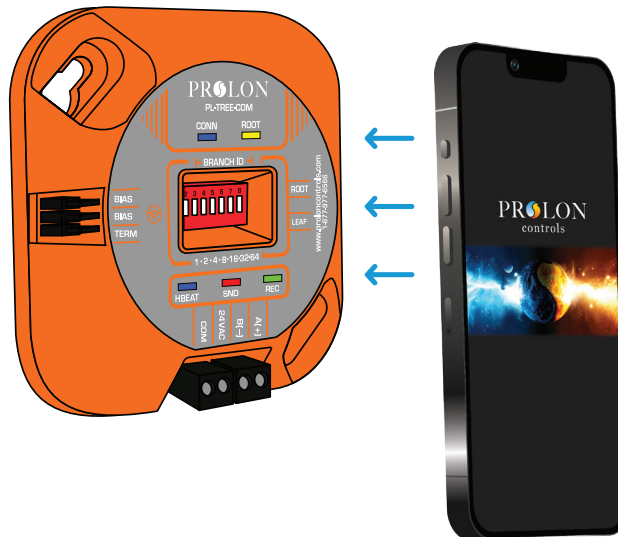
Figure 14

Android
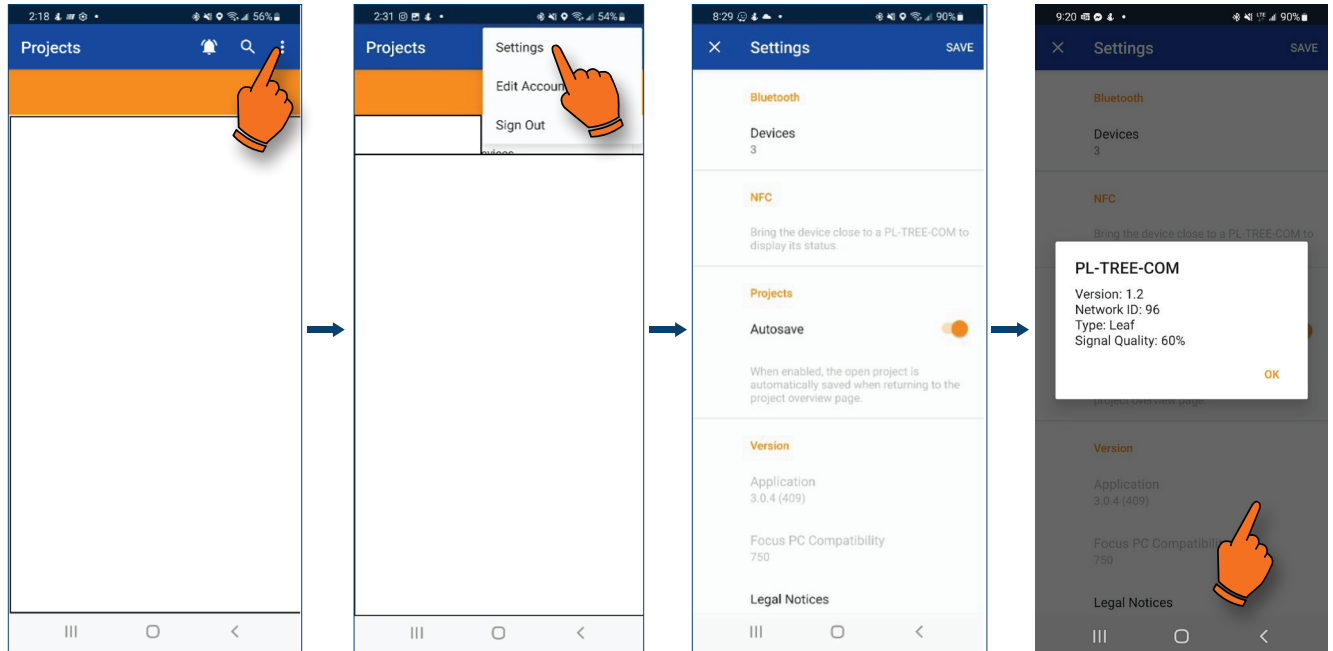
1. To access NFC, tap on the vertical ellopsis icon at the top right of the screen.

2. Tap on "Settings".

3. Approach and hold the back of the mobile device very near the powered up TREE-COM module.

4. Once detected, a popup will show you the information about the TREE-COM found. Tap OK to go back to the settings.

Once on the settings page, hold your phone (back of the phone) close to the face of a powered-up PL-TREE-COM device.

iOS
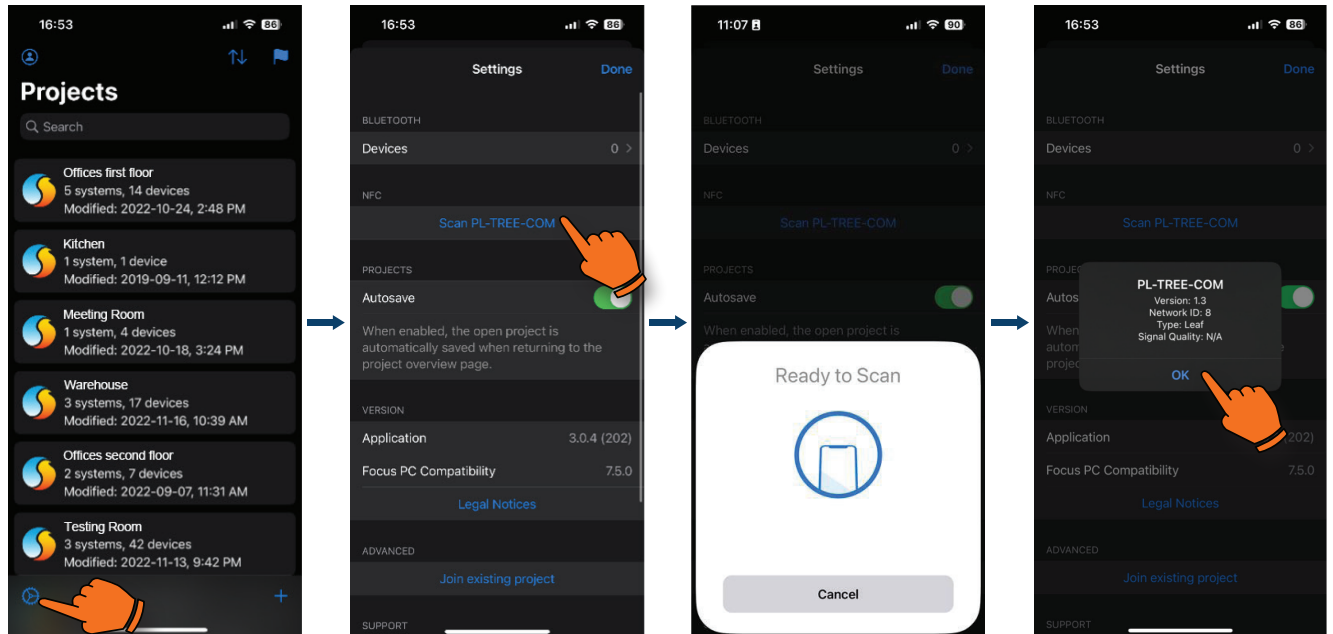
1. To scan the TREE-COM, tap on the settings icon in the left bottom corner.

2. Tap on "Scan PL-TREE-COM".

3. When ready to detect, approach and hold the back of the mobile device very near the powered up TREE-COM module.

4. Once detected, a popup will show you the information about the TREE-COM found. Tap OK to go back to the settings.

Note: We recommend that you remove any casing from your mobile device should you experience trouble connecting.

Low signal quality best practices *(Focus PC only)*

A signal quality of 30% to 60% is considered low quality. To communicate succesfully with signals in this range, it is best to increase the number of retries in Focus (PC) to 10 or 20 attempts, so to reduce the likelyhood of failure. Here is the procedure:

1. Click on "Project" on the top left of your Focus screen.
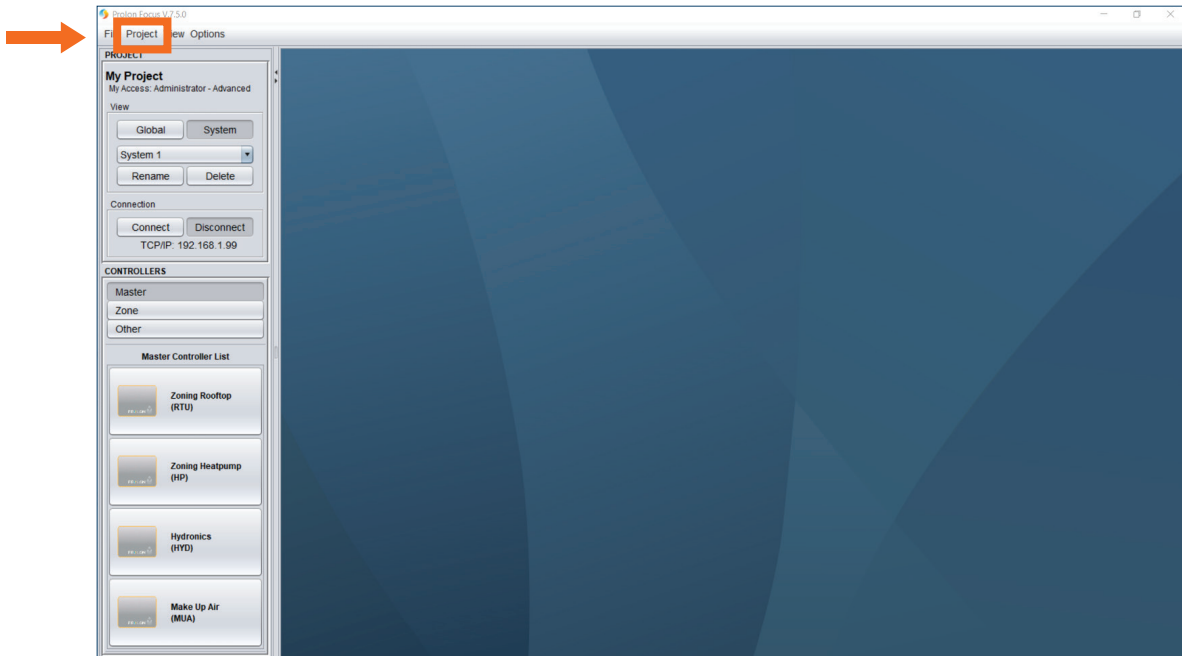
2. Click on "Setup".
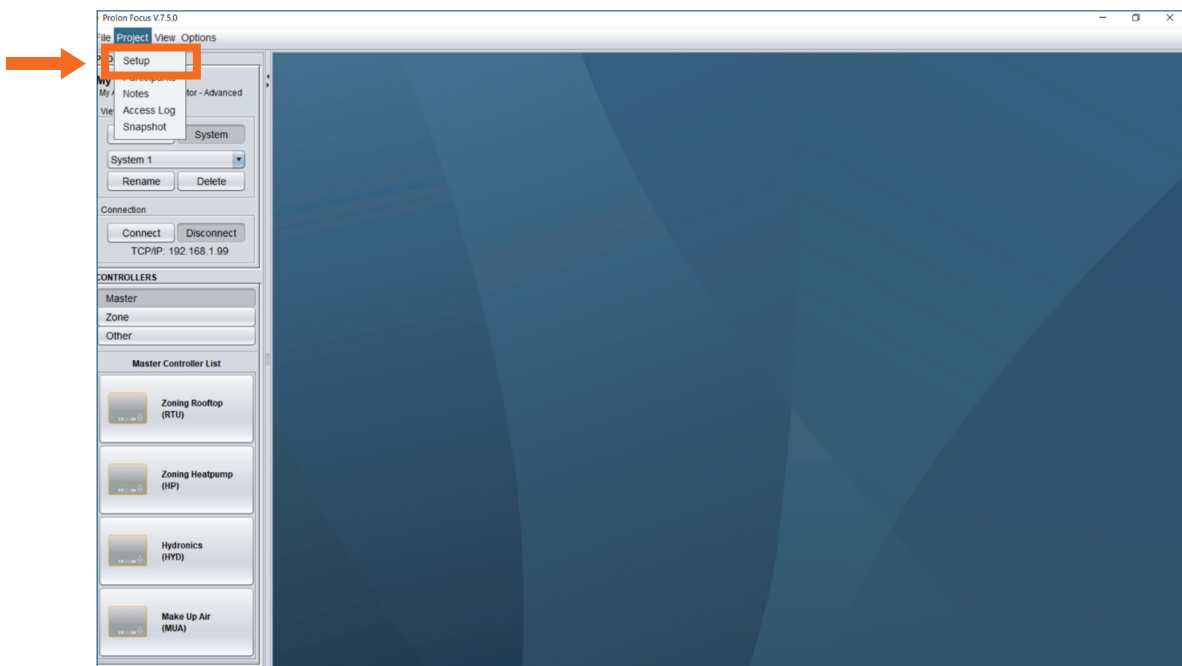
3. Click on "Connection".

4. Enter the desired Retry number.