VERY IMPORTANT - PLEASE READ

MOST COMMON ISSUES ENCOUNTERED DURING INSTALLATION

Polara's 2-Wire Accessible Pedestrian System transmits power **and data** between the iCCU Central Control Unit and each Push Button Station (PBS). It is not simply voltage/power carried over the PBS wires. This equipment must be wired correctly, and the wiring must be of good quality for data to transmit properly. The following are the **most common problems** installers experience when installing Polara's 2-Wire system. Please read the items listed below, then thoroughly read the attached Quick Start Installation Guide and make sure each step is understood before proceeding.

1. **PROPER WIRING:**
   A. **Never apply 120 VAC to a PBS, ICB or iCCU terminal block. This will cause damage and void the warranty.**
   B. For proper operation, a dedicated pair of #14 or #12 AWG wire is required between each PBS and the Interconnect Board (ICB) / iCCU to ensure good communication. It is not recommended to share button wires between buttons.
2. **PROPER POWER UP SEQUENCE:**
   A. **DO NOT CONNECT AC POWER TO THE iCCU UNTIL INSTALLATION OF ALL SYSTEM WIRING IS COMPLETE!**
   B. Once all cabinet wiring is complete and all PBSs are mounted and connected to the button wires, power up the iCCU-S2 by connecting the power cord to the iCCU-S2 AC inlet, or if using an iCCU-C2, slide it into the rack.
   C. Each PBS should beep, and then after a short time, its LED should flash with a 2-flash sequence, while the PBSs attempt to communicate with the iCCU. Once a PBS is communicating with the iCCU, it will begin to flash in a four-flash pattern.
   D. If after a few minutes any PBS continues in a two-flash pattern, this indicates the PBS has not established communication with the iCCU. Typically, this is corrected by changing the communication channel. See Advanced Communications, Settings Sections 5.3 (iOS App) in the iNS2 System Manual (or Section 1.3 in Android manual) before proceeding with system setup. The manual is available in the Field Service apps, or on our website **www.polara.com**. *****(Do not change the gain settings)***** If changing the channel does not bring a PBS out of a two-flash pattern, contact Polara Tech support for assistance @ 903-366-0300 EXT 4 or 888-340-4872. **ALL buttons must have a four-flash pattern to proceed with setting up the system**.
   E. If installing an iCCU-C2 and there is a two-flash sequence on **all** buttons, verify wiring complies with that shown in the iCCU-C2 Quick Start Guide or Section 3.3 of Manual.
3. **PASSWORD ISSUES**: The iCCU can be connected to thru Wi-Fi. The buttons can be connected to thru Bluetooth.
   A. Once Wi-Fi is turned on at the iCCU, the Wi-Fi password is ***DEFAULT1*** (ALL CAPS).
   B. Following power up, each button will say "change password" every 30 seconds, until the default password is changed. There is one shared password for logging into an iCCU and all PBS connected to it. The factory default password is **1234**. Using a Field Service app, use 1234 to log into the iCCU or any PBS the first time, and change the password. This changes the password for all PBS and the iCCU. See Section 5.2 in the Manual for details.
   C. If the password is unknown, a **Password Reset** requires a call to Polara Tech Support.
4. **iCCU and PBS FIRMWARE VERSIONS:**
   A. The system will not work properly if it does not have the latest, or correct firmware. Once the system is powered up and operating, **the firmware must be upgraded** to the latest version, **first on each PBS**, then on the iCCU using the Polara Intelligent Config PC app, or the Polara iOS / Android Field Service apps. **UPGRADE BUTTONS FIRST**
5. **CHANGING SYSTEM SETTINGS:**
   A. A button can be logged into to change its settings. If desired, those settings can be uploaded to all buttons.
6. **Operating in BIU/SDLC mode**:
   A. **A connection from the iCCU-S2 to the Traffic Controller's Logic Ground must be established using a Polara manufactured SDLC cable because standard SDLC cables do not pass-through Logic Ground connections.** Polara offers a straight SDLC cable with an external ground wire, or a "Y" cable with internal ground. **If a Polara made SDLC cable is not used, then the CABLE-C-LG supplied with every iCCU-S2, must be used. Not doing this can cause damage to the iCCU and other equipment connected to the SDLC bus. Request document 350-079 for details.**

If you have questions, or encounter issues during installation, call our Tech Support line at **888-340-4872** between 7:30 AM and 5:00 PM CDT/CST.

Installation Quick Start Guide for iNS2/iCCU-S2 System

See “iNS2 System Manual” for complete Installation and Operation instructions. When Sections are referenced below, it is referring to the System Manual. Installation is covered in Section 3.

The iNS2 can operate as an iNS3 when paired with an iPHCU3S. Refer to iNS3/iDS3 System Manual and Quick Start Guide.

Polara offers a free iOS app that can be downloaded from the Apple Store. The app can be used to change the password, adjust settings, upload custom messages and update firmware. The website also has tutorial videos that show how to do most processes.

Note 1: Pay special attention to Instruction Steps #10 and #11 below. The firmware versions in the iCCU-S2 and Push Button Stations may not be compatible depending on when each was manufactured. The only way to ensure compatibility and proper operation of the system is to update with the latest released firmware to each push button station first, then the iCCU-S2.

ALWAYS UPDATE THE BUTTONS FIRST, THEN UPDATE THE iCCU-S2.

NOTE, ALL WIRING MUST BE COMPLETED BEFORE APPLYING POWER TO THE iCCU-S2.

Note 2: For optimum functionality Polara recommends:

1. **A dedicated cable with two (or three for a spare) conductors run from the Traffic Cabinet to each APS button. We recommend IMSA 50-2 cable. This cable includes a shield, but connecting the shield is not required/recommended. Twisted pair is not required, but would be acceptable. Cable similar to 50-2 without the shield and drain wire would also be acceptable.**
2. **If the distance from the cabinet to the farthest APS button is less than 300’, #14 AWG solid or stranded conductors/wire should be fine. If the distance is greater than 300’, #12 AWG stranded conductors/wire should be used.**
3. **If dedicated pairs cannot be pulled/provided to each button, at a minimum a single pair daisy chained to two buttons on a corner of an intersection typically will work. A 3-wire cable per corner with the common wire shared by two buttons on the corner will also typically work, but with either option in place of dedicated pairs, you may encounter data transmission issues.**
4. **A common wire for 120 VAC lights must never be used as the button common.**
5. **For further wiring information refer to the document “Field Wiring Recommendations for 2-Wire” at polara.com.**

The iCCU-S2 is expected to sit on a shelf inside the traffic signal controller cabinet. The iCCU-S2 can function in one of three configurations:

1. **BIU Mode**
2. **SDLC Hybrid Mode**
3. **Hard-Wired Mode**

It is strongly recommended to connect the LOGIC GROUND wire from CABLE-C-LG or CABLE-C to the cabinet’s LOGIC GROUND even when SDLC will not be used. This is because at some point, if the cabinet is upgraded to use SDLC, it will already be correctly wired and will prevent a future oversight and failure of the iCCU, traffic controller or other equipment on the SDLC bus. Please note, NEMA TS2 cabinets tend to have an explicit LOGIC GROUND (NOT TO BE CONFUSED WITH PED COMMON OR OTHER GROUNDS). This would be the DC logic ground of the power supply that provides DC voltage to the traffic controller.

1. BIU Mode (See Diagram Page 4)

The iCCU-S2 can obtain ped interval information and place ped calls via the SDLC bus. For the iCCU-S2 to work in this mode, the traffic controller must support NEMA TS2 compliant SDLC and be communicating with an MMU. Any standard SDLC cable can be used (such as P/N: **iN2-SDLC-CABLE**) if there is an available port to plug into. If there are no available ports, a “Y” cable is available (P/N: **iN2-SDLC-YCABLE**) to insert between an existing connection and the traffic controller.

When using SDLC, it is necessary to share a common logic/signal ground with the traffic controller and other devices on the SDLC bus. Therefore, each iCCU-S2 is shipped with CABLE-C-LG. This cable connects to the connector on the iCCU-S2 labeled “C/To Ped Inputs”. This cable only has a single wire, which must be connected to the cabinet’s logic/signal ground. Note, this is different from Earth or chassis ground. Please refer to your cabinet’s wiring diagram to find the appropriate logic/signal ground connection point.

*** Failure to establish this ground connection can result in damage to the iCCU-S2, the traffic controller, or other hardware on the SDLC bus. ***

For proper operation and to maintain the product warranty, it must be guaranteed that the iCCU-S2’s logic/signal ground is tied to the cabinet’s logic/signal ground.

This mode requires configuration of the traffic controller to reserve a detector rack BIU address for the iCCU-S2 as well as remapping of ped inputs, typically using logic statements. Please consult the traffic controller’s user manual for more information.

2. SDLC Hybrid Mode (See Diagram Page 5)

The iCCU-S2 can obtain ped interval information from the SDLC bus while placing calls using traditional wiring to the cabinet’s ped input. For the iCCU-S2 to work in this mode, the traffic controller must support NEMA TS2 compliant SDLC and be communicating with an MMU. Any standard SDLC cable can be used (such as P/N: **iN2-SDLC-CABLE**) if there is an available port to plug into. If there are no available ports, a “Y” cable is available (P/N: **iN2-SDLC-YCABLE**) to insert between an existing connection and the traffic controller.

Additionally, **CABLE-C** is required to place calls to the cabinet’s ped inputs. It provides four separate contact closures for four pedestrian phases. They are identified as A (brown), B (red), C (orange), and D (yellow). Common is black. The wire colors are solid with a white stripe. These wires typically connect to phases 2, 4, 6, and 8 respectively, but each may be assigned to any phase during configuration, so the connections

can be to any phase as desired. This cable connects to the connector on the iCCU-S2 labeled “C/To Ped Inputs”.

When using SDLC, it is necessary to share a common logic/signal ground with the traffic controller and other devices on the SDLC bus. Therefore, CABLE-C has an additional white/red or white wire, which must be connected to the cabinet’s logic/signal ground. Note, this is different from Earth or chassis ground. Please refer to your cabinet’s wiring diagram to find the appropriate logic/signal ground connection point.

*** Failure to establish this ground connection can result in damage to the iCCU-S2, the traffic controller, or other hardware on the SDLC bus. ***

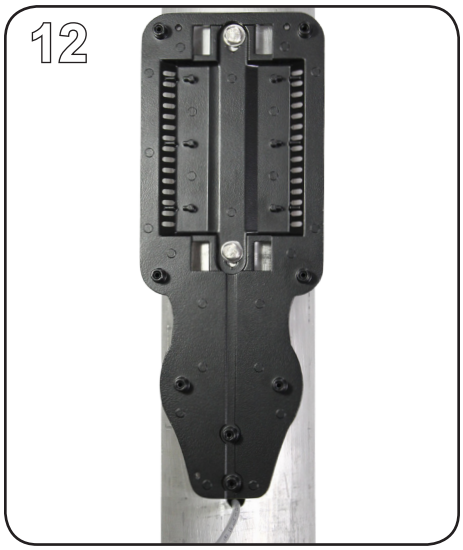
3. Hard-Wired Mode (See Diagram Page 6)

Note: The iCCU-S2 is not compatible with the 50-Pin D-Sub cable used by prior CCU models and new cables (below) must be used.

The iCCU-S2 can be directly wired to the cabinet’s ped load switch outputs to obtain ped interval information, and it can be wired to the cabinet’s ped inputs to place ped calls. This mode is the most versatile because it can work in any type of cabinet.

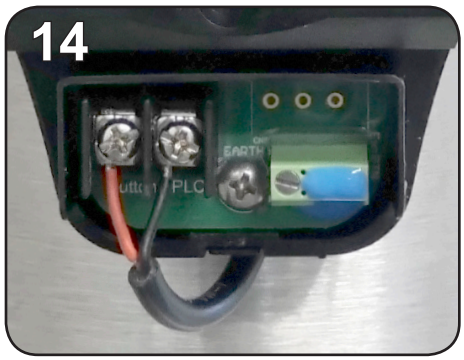
CABLE-A is used to provide the iCCU-S2 with the status of the pedestrian Walk/DW signals. Each Walk/DW pair is identified as A, B, C, or D. These wires connect to traffic signal cabinet terminals in parallel with wires that power the pedestrian signals, that is, ped load switch outputs. The inputs are nominally 120 VAC. Therefore, caution should be taken during installation to avoid electric shock. There is a single white wire for connection to AC neutral. During configuration, each pair must be assigned to a pedestrian phase. This would typically be A/2, B/4, C/6, and D/8, however this is not restricted in any way. Installation varies with cabinets and configurations.

CABLE-C is required to place calls to the cabinet’s ped inputs. It provides four separate contact closures for four pedestrian phases. They are identified as A (brown), B (red), C (orange), and D (yellow). Common is black. The wire colors are solid with a white stripe. These wires typically connect to phases 2, 4, 6, and 8 respectively, but each may be assigned to any phase during configuration, so the connections can be to any phase as desired. This cable connects to the connector on the iCCU-S2 labeled “C/To Ped Inputs”.



Installation Instructions

1. Place intersection in PED recall.
2. Determine iCCU-S2 location in cabinet and place/install. For cabinets with EIA standard rack, Polara offers a bracket (P/N **CCU-BRKT**) to hold the iCCU-S2. See Accessories Section of iNS2 Intelligent Navigator page at www.polara.com.
3. Determine Interconnect Board (iN2-ICB) location and install. See Section 3.2 of the Manual.
4. Attach appropriate cables to front of iCCU-S2. Route cables to hook up locations. See pages 3-5 of this Quick Start Guide, or Section 3.2 of iNS2 Manual, depending upon type of cabinet.
5. If using SDLC and an open SDLC port is available in the cabinet, connect one end of SDLC cable to front of iCCU-S2 and other end to open port location. If an open SDLC port is not available, Polara offers a “Y” cable. See iN2-SDLC-YCABLE in the Control Unit Section of iNS2 Intelligent Navigator page at www.polara.com.
6. Polara recommends that the AC power cord be connected to a source of AC that is switched off during flash. See Section 3.1 of Manual. **DO NOT CONNECT POWER TO iCCU-S2 UNTIL SYSTEM INSTALLATION IS COMPLETED. THE POWER CORD SHOULD NOT BE CONNECTED TO A GFI PROTECTED SOURCE.**
7. Plan PBS (push button station) locations if they have preprogrammed special messages. If special messages are not used, or will be programmed once each PBS is installed, proceed to next step.
8. **The iNS2 PBS must be mounted only in the upright orientation with the connection terminals at the bottom, any other mounting orientation will void the warranty.** If retrofitting these buttons on an intersection with existing buttons, remove existing buttons. Typical push button frames have the wire exit hole in the pole directly behind the center of the button (approx. 3.5” below lower mounting hole). Because our PBS requires the wires to reach the bottom of the unit, verify 8” of wire extends beyond wire exit hole in pole. If enough wire is not available, evaluate whether a new, lower wire exit hole that would line up with the terminal block access point in the bottom of the PBS would provide adequate wire length. If yes, drill and reroute wires, the optimal position of this hole is approx. 6.5” below the lower mounting hole. If not, you need to figure out a way to achieve more wire length.
9. The iNS2 is a modular device consisting of a backplate, electronics module, speaker module, arrow button diaphragm, button cover, sign, and optional sign backplate (for larger signs). The iNS2 is shipped partially assembled to secure it during transport. To prepare for mounting, remove 3 screws from the lower cover. Remove all screws securing the sign and sign backplate if present. Remove EARTH GND (ground) screw located between the two terminal



blocks at the bottom of the unit. Store this screw in a safe place, it ensures the unit is grounded to the pole and must be reinstalled. Verify the arrow on PBS module is oriented toward the associated crosswalk. If necessary, the button diaphragm assembly may be taken off and rotated as needed. Secure the button diaphragm in the correct orientation by tightening the two retaining screws with a Phillips-head screwdriver. **Please use caution as the metal button diaphragm is sharp.** Remove the electronics module and speaker module together from the backplate.

10. Position backplate on pole at correct height and orientation so arrow points to ending of crosswalk on the opposite side of the street. Orientation is very important because a blind person uses the arrow and face of the sign to orient themselves to the direction of travel. Mark mounting bolt locations if existing holes not correctly located. MUTCD max. height is 48”. Typical recommended height is 42”, but can be lower. Drill and tap ¼-20 bolt holes and wire access hole (if necessary, see **Step 8**).
11. Position the backplate against the pole and route the wires forward near the bottom end of the backplate. Position the wire such that 3 or 4 inches of wire is available at the bottom of the backplate.
12. Attach the backplate to the pole using the provided ¼-20 bolts with washers.
13. Re-install the electronics/speaker modules. Re-install the sign (and sign backplate if using), securing the PBS Module in place before wiring. Re-install EARTH GND (ground) connection screw to location between terminal blocks.
14. Connect the two wires from the traffic signal cabinet to the terminals of the larger black terminal block labeled BUTTON/PLC. Wire polarity is not important. Recheck tightness of all connections. Re-install the lower cover.

Note: To maintain corrosion protection, leave the blue dielectric grease intact while tightening any screws.

15. Once all cabinet wiring is complete and all PBSs are mounted and connected to the button wires, power up the iCCU-S2 by connecting the power cord to the iCCU-S2 AC inlet. Each PBS will beep, then it’s LED should blink in a four sequence pattern. If any PBS flashes in a two sequence pattern, this indicates the PBS has not established communication with the iCCU-S2. See Advanced Communications, Settings Sections 5.3 (iOS App), in the iNS2 System Manual before proceeding to step 16.

Note: Wi-Fi default password is “DEFAULT1” (all caps, no quotes), iNS2/iCCU-S2 default password is “1234”.

16. The next step is to update the firmware on each PBS. For each PBS, connect to the PBS and perform a firmware update. See Section 8.1 of Manual if using the iOS app, or Section 14 of Manual if using the PC app. The PBS will reset after the firmware upgrade is completed.
17. Next, connect to the iCCU-S2 and perform a firmware update. See Sections 5.1 and 8.1 of Manual if using the iOS app. The iCCU-S2 will reset after the firmware upgrade is complete.
18. Each PBS will play the message “Change Password” until the password is changed. It is now necessary to change the password and perform channel and PED phase setup of the iCCU-S2. Use the iNS2/iCCU-S2 default password as the “Current” password. See Sections 5.2-5.4 of Manual.
19. Once the channel and phasing is set for the iCCU-S2, each PBS must be assigned to a phase. See Section 5.5 of Manual.
20. Once each PBS phase is assigned, the settings of each PBS can be configured as needed. See Section 6 of Manual.

Advanced Communications Settings

All iNS2 PBSs connected to the interconnect board communicate with the iCCU-S2 via the field wires, using one of three communication channels, A, B, or C.

The iNS2 PBSs and the iCCU-S2 need to be on the same channel in order to communicate with each other. Anytime an iNS2 PBS is powered and electrically connected to an iCCU-S2 but is not communicating with the iCCU-S2, the iNS2 will automatically perform a recalibration. The iNS2 will recalibrate by resetting itself, identifying the correct communications channel, and adjusting its signal until it establishes communication with the iCCU-S2. This process typically takes 1-3 minutes. Once calibrated, each iNS2 will save its communications settings in non-volatile memory and use them during any subsequent restart. Once a PBS’s communications settings are calibrated and it makes a successful connection to the iCCU-S2, it will flash its pilot light in a four flash pattern. This four flash pattern will continue until the PBS is assigned to a phase that is receiving pedestrian Walk, Don’t Walk, or Clearance intervals.

There may be field conditions that make one communication channel work better than another. Upon installation, customers should place calls and observe proper operation during at least 3 full ped cycles. Next, connect to any iNS2 and confirm that the health log of every other iNS2 and the iCCU-S2 can be read without error. If either of these steps fail, try the other communication channel. It is only necessary to change the channel of the iCCU-S2, as the iNS2 PBSs will automatically configure to the appropriate channel. To change the communication channel on the iCCU-S2 with the iOS App: from the main menu, choose Advanced Options, then Communication Settings. Next, select Channel A, B, or C and then Save. Make sure the target device is the iCCU-S2 and not an iNS2. Within a few minutes, all iNS2 PBS devices should establish a connection to the iCCU-S2.

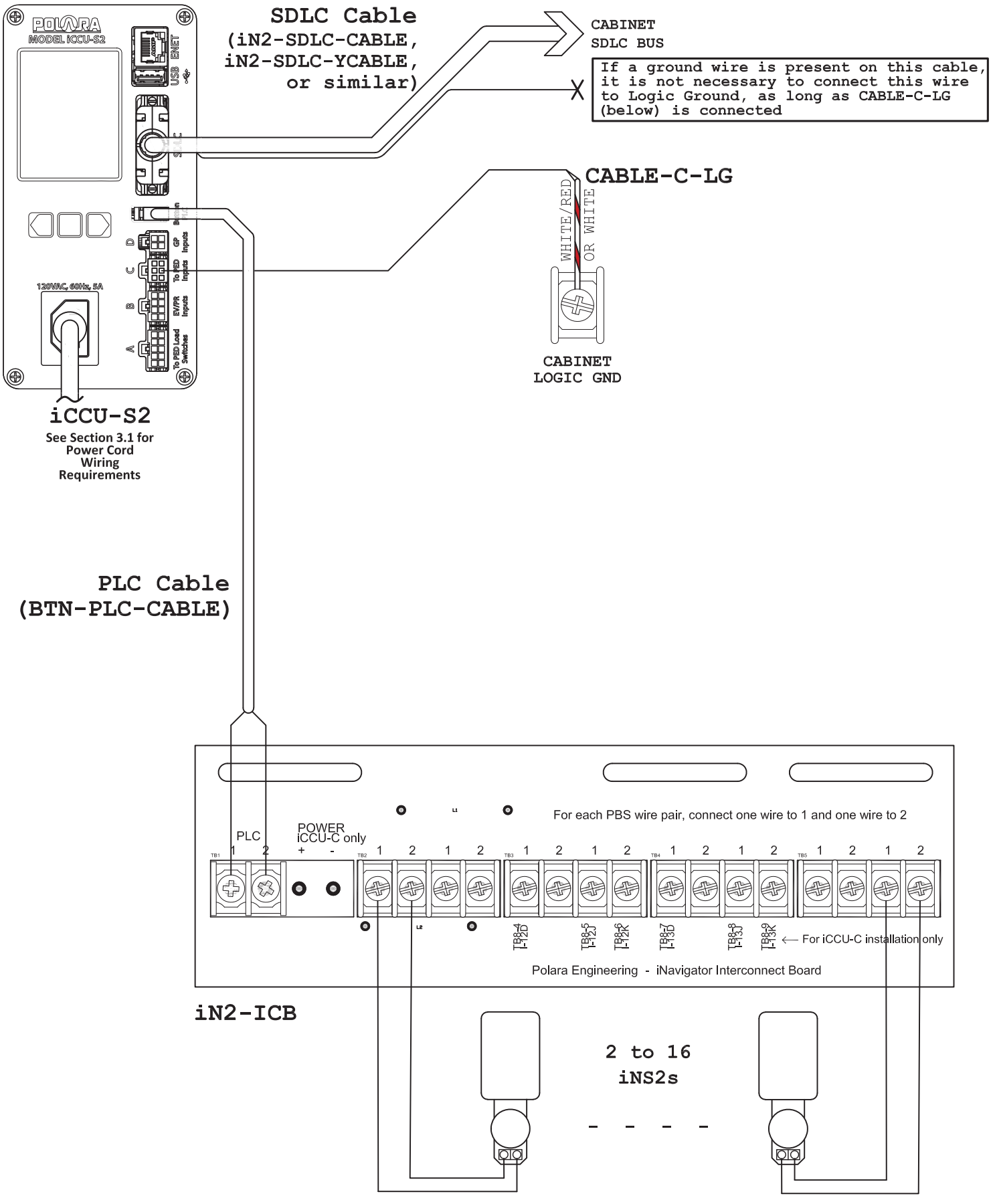
If any PBS exhibits a two flash pattern, see Advanced Communications Settings, Sections 5.3 (iOS App), in the iNS2 System Manual.

Because of the various types and states of field wiring, PLC communication may not work in all field wiring conditions. Therefore, Polara cannot guarantee an iNS2 system will work on all intersections. If the steps in the Advance Communications Settings Sections of the iNS2 System Manual fail in establishing reliable communication between a PBS and iCCU-S2, a 3-Wire system is the only option.

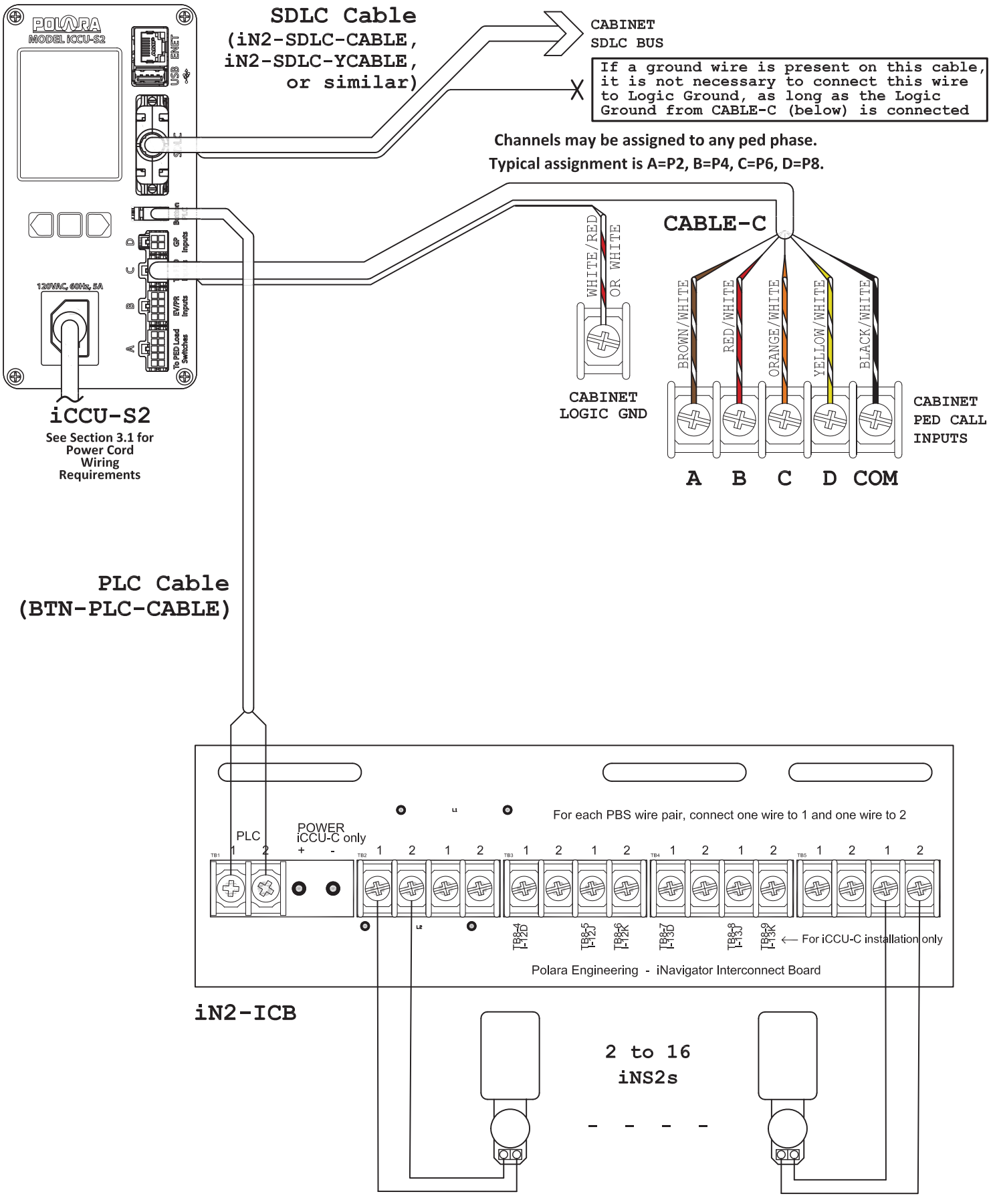
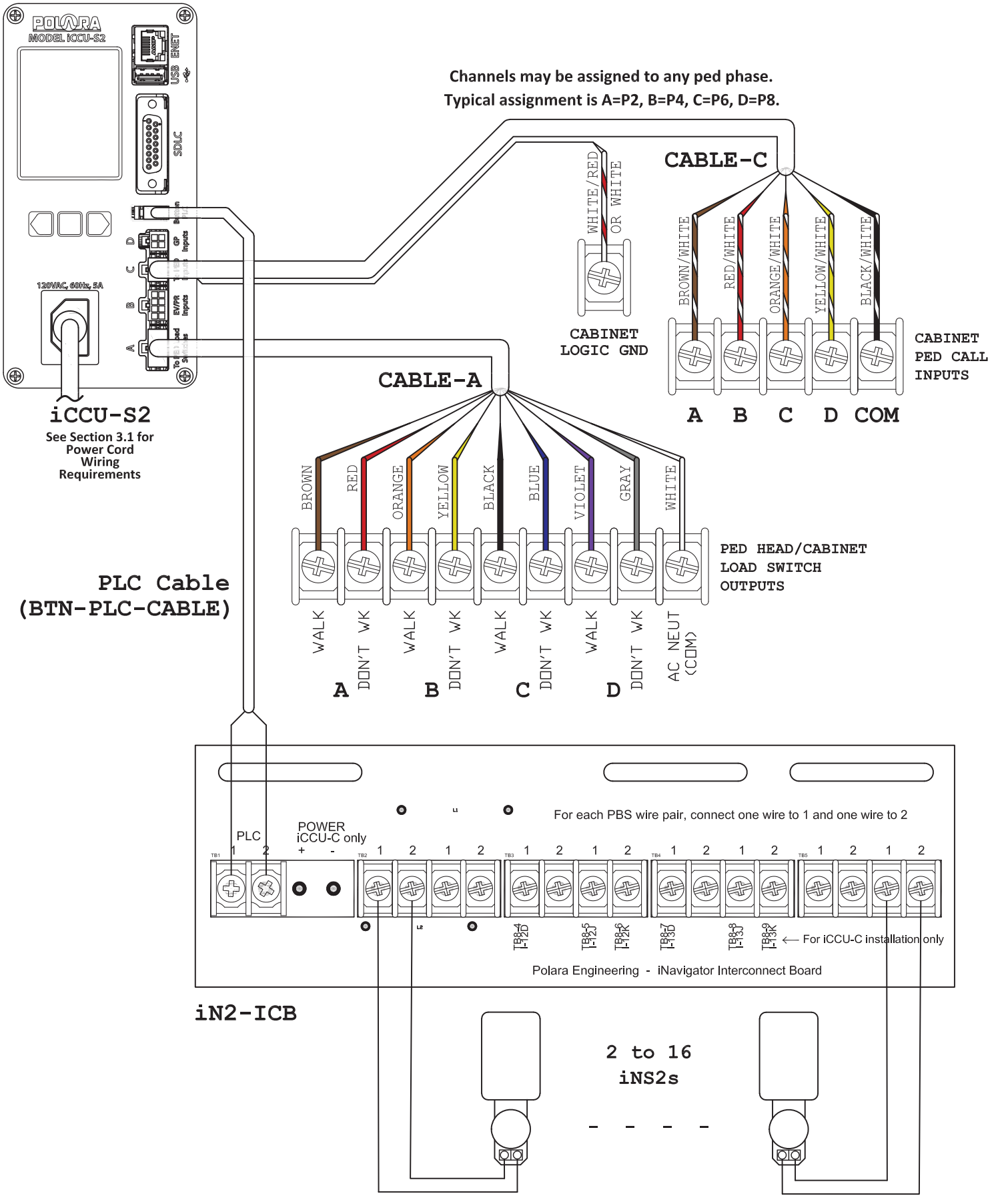
Technical Support Contact

Polara @ 888-340-4872 - The latest version of the complete manual is available in PDF format at www.polara.com.

Typical NEMA TS2 Type 1 Cabinet Connection with Interconnect Board – BIU Mode



Typical NEMA TS2 Type 1 Cabinet Connection with Interconnect Board – SDLC Hybrid Mode



Typical NEMA TS1 Cabinet Connection with Interconnect Board – Hard-Wired Mode