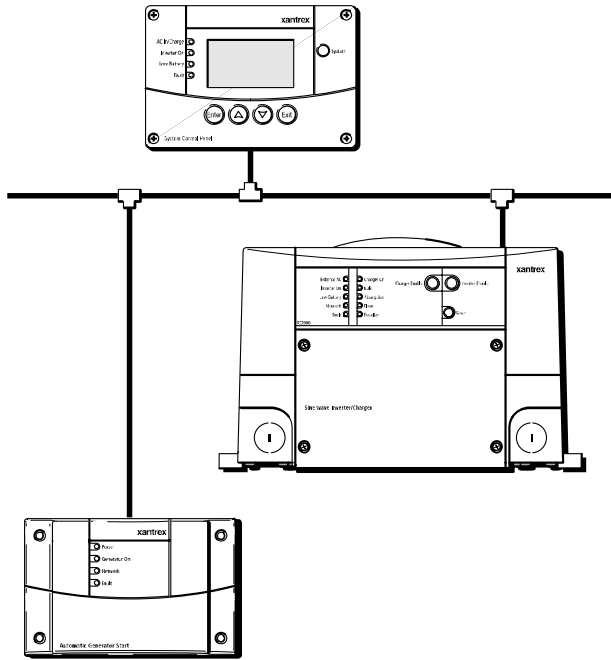


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Installation Guide

Xanbus System



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Xanbus System

Installation Guide

About Xantrex

Xantrex Technology Inc. is a world-leading supplier of advanced power electronics and controls with products from 50 watt mobile units to one MW utility-scale systems for wind, solar, batteries, fuel cells, microturbines, and backup power applications in both grid-connected and stand-alone systems. Xantrex products include inverters, battery chargers, programmable power supplies, and variable speed drives that convert, supply, control, clean, and distribute electrical power.

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About This Guide

Purpose

The purpose of this Guide is to provide explanations and procedures for planning and installing a Xanbus System.

Scope

The Guide provides planning and setup information and guidelines for installing the network.

Audience

The Guide is intended for anyone who needs to plan for a network and/or install a Xanbus System.

Conventions Used

The following conventions are used in this guide.



WARNING

Warnings identify conditions or practices that could result in personal injury or loss of life



CAUTION

Cautions identify conditions or practices that could result in damage to the unit or other equipment.

Important: These notes describe things that are important for you to know, but are not as serious as a caution or warning.

Related Information

Information about additional Xanbus-enabled products is available at www.xantrex.com.

In order to complete network installation, you will also need to refer to the Installation, Operation, or Owner's Guide for the Xanbus-enabled products you've purchased.

Contact Information

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CAUTION: Equipment damage

Connect the Xanbus System only to Xanbus compatible devices.

Although the cabling and connectors used in this network system are the same as Ethernet connectors, **this network is not an Ethernet system**. Equipment damage may result from attempting to connect these two different systems.

Installation

The Installation Guide provides detailed information for planning and installing a Xanbus System.

Xanbus-enabled Devices



The Xanbus™-enabled designation means that this product works on a Xanbus network. Xanbus-enabled products are:

- Easy to use. The Xanbus network simplifies operation and automates routine tasks.
- Reliable. Software control eliminates errors due to analog signalling.
- Accurate. Digital information is less susceptible to interference and line loss.
- Upgradeable. Firmware upgrades mean your purchase will remain up to date.

More Xanbus-enabled devices will become available in the future.

RS2000 Sine Wave Inverter/Charger

The RS2000 Sine Wave Inverter/Charger is a convenient combination of an inverter, multistage battery charger, and transfer switch in one electronic device. It is also the device that typically powers the Xanbus system. For complete information, see the *RS2000 Sine Wave Inverter/Charger Operation Guide* and *RS2000 Sine Wave Inverter/Charger Installation Guide*.

System Control Panel

The System Control Panel provides configuration and monitoring capability for Xanbus-enabled devices. For complete information, see the user guide for your interface panel.

For detailed instructions and a complete list of Xanbus-enabled devices, visit the website at www.xantrex.com.

The Xanbus System

What is a network? A network is a collection of devices that perform individual functions, but also communicate and interact with the other devices. The Xanbus System provides a robust, integrated product solution which simplifies and automates the installation, configuration, control, monitoring, and integration of devices that deliver and distribute AC or DC power.

Components of a network Components of a network include the devices such as an inverter/charger, a control panel, and an automatic generator start. These devices are integrated into a network using cables, network connectors, and terminators. An example of a power network is shown in Figure 1.

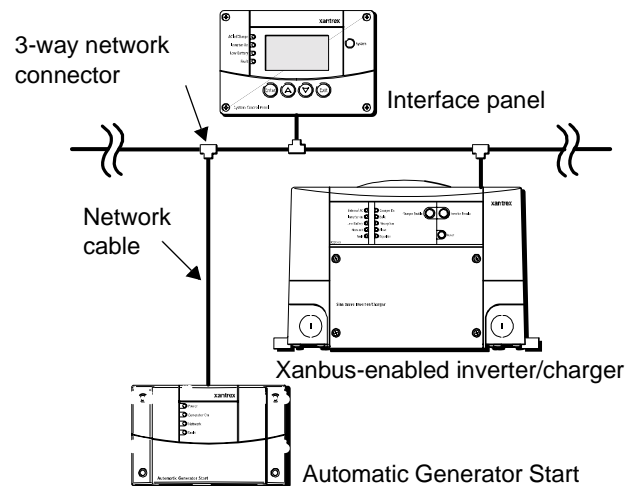


Figure 1 Example of Multi-Drop Backbone

Network configurations The network can be installed in one of two configurations: as a multi-drop backbone (see Figure 1 and Figure 2) or as a daisy chain (see Figure 3).

Purchasing System Accessories

System accessories are available from any authorized Xantrex dealer or at www.xantrex.com. Table 1 provides a partial list of system accessories. When ordering, please provide the part number of the accessory to the dealer.

Table 1 System Accessories

Accessory	Dimensions H x W x D	Part number
System Control Panel (SCP)	4.0 × 6 × 1.60 inches (101 × 152 × 41 mm)	809-0910
Automatic Generator Starter (AGS)	3.8 × 5.8 × 1.5 inches (97 × 147 × 38 mm)	809-0915

Purchasing Network Components

Consult with your local system designer to determine what network components will be needed for your specific installation. Table 2 provides a partial list of network components and part numbers. Pre-made cables are available in standard lengths from 3 feet to 75 feet.

For the most up-to-date list, call your dealer. Call your dealer or visit www.xantrex.com to purchase cables and other network components.

Table 2 Network Components and Part Numbers

Network Component	Part Number
Network termination — Male (2 per pack)	809-0901
Network termination — Female (2 per pack)	809-0905
3-way network connector	809-0903
Network cable 3 ft. (0.9 m)	809-0935
Network cable 5 feet (1.5 m)	809-0936
Network cable 7 feet (2.0 m)	809-0937
Network cable 10 feet (3.0 m)	809-0938
Network cable 14 feet (4.3 m)	809-0939
Network cable 25 feet (7.6 m)	809-0940
Network cable 50 feet (15.2 m)	809-0941
Network cable 75 feet (22.9 m)	809-0942

Planning the Network

This section provides information on the following topics:

- two types of network layouts and the advantages and disadvantages of each layout
- network components
- network connectors and/or terminators
- cable and connector requirements of each layout
- network power supply and network size

See “Installing the Network” on page 11 for instructions on routing and layout.

Network Layouts

Xanbus-enabled devices can be connected in one of two Xanbus System layouts: the multi-drop backbone or the daisy chain. Each network layout has advantages and disadvantages, depending on the application and/or environment. It is up to you or your system designer to decide which layout is best for your installation.

Important: Do not mix the two types of network layouts. Mixed configurations are not supported by Xantrex.

Multi-Drop Backbone Layout

In a multi-drop backbone layout, each Xanbus-enabled device on the network is connected by a drop cable to the network bus or backbone with a network connector, as shown in Figure 2.

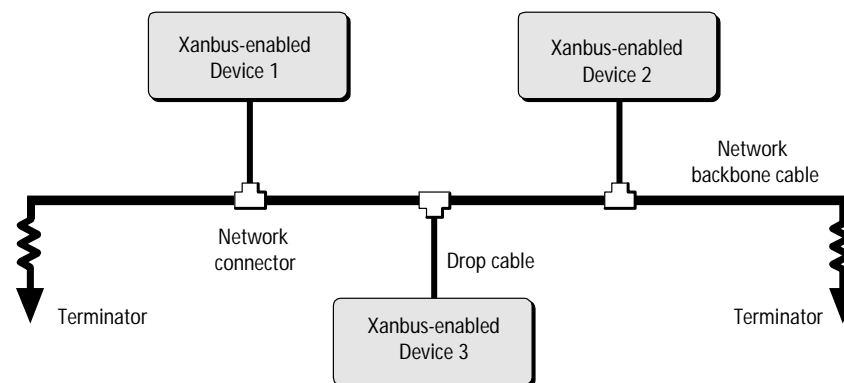


Figure 2 Multi-Drop Backbone Layout

Installation

Terminators	<p>Terminators are required at both ends of the multi-drop backbone cable, as shown in Figure 2. Therefore, the Xanbus-enabled devices do not require their own termination. With only one terminator, the signal quality is degraded and performance on the network is reduced. Permanent configuration with only one terminator is not supported by Xantrex.</p> <p>If cables are placed at the end of the network (as in Figure 2), female terminators are required. Otherwise, male terminators can be inserted directly into the open jack of each network connector at the end of the network.</p>
Advantages	<p>The multi-drop backbone layout is reliable and robust and is recommended for OEM installations.</p> <p>In this layout, Xanbus-enabled devices can be removed or replaced while still keeping the network operating.</p>
Disadvantage	<p>The main disadvantage of this layout is cost. The network connectors are more expensive than in a daisy chain layout (which uses no network connectors), and each device in this layout requires its own network connector.</p>

Daisy Chain Layout

In a daisy chain layout, each device on the network is linked with separate lengths of cable, as shown in Figure 3. This layout does not require network connectors.

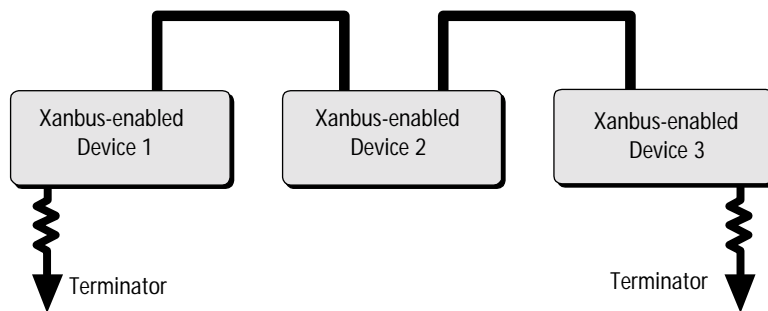


Figure 3 Daisy Chain Layout

Terminators	<p>As in the multi-drop backbone layout, two terminators are required to ensure the communication signal quality on the network. The Xanbus-enabled devices at each end of the chain must have a male terminator inserted into their open network ports, as shown in Figure 3.</p>
Advantage	<p>The advantage of this layout is that it is less expensive to install because network connectors are not required.</p>

Disadvantage	The disadvantage of the daisy chain layout is that Xanbus-enabled devices cannot be removed from the network without interrupting the network. To make the network function after removing a device, you must connect the Xanbus-enabled devices on either side of the missing device to each other or replace the device.
--------------	--

Network Connectors, Terminators, and Cables



CAUTION: Equipment Damage

Connect only to other Xanbus-compatible devices.

Although the cabling and connectors used in this network system are the same as ethernet connectors, **this network is not an ethernet system**. Equipment damage may result from attempting to connect Xanbus to different systems.

Network connectors, terminators, and cables are used to build your Xanbus network.

3-way network connector

The 3-way connector houses three RJ45 jacks that provide a device connection point on a multi-drop layout. All three jacks are wired identically and can accept either network cables or terminators. One jack is available for connecting to a Xanbus-enabled device. The remaining jacks are reserved for connection to two other network connectors, a terminated network cable, or a male terminator.

The network connector is mounted to a bulkhead or a wall, as shown in Figure 4.

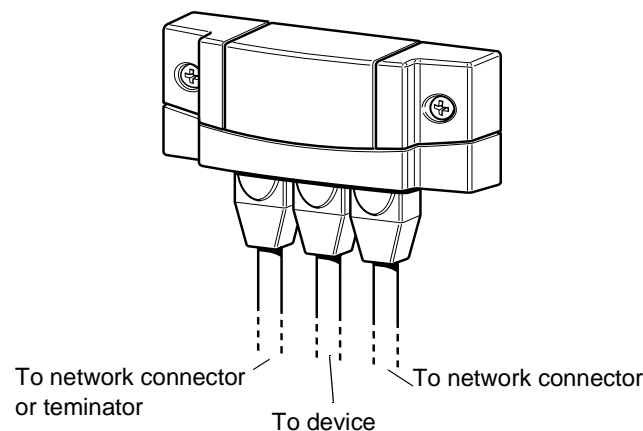


Figure 4 3-Way Network Connector (sample configuration)

Installation

Terminators

Terminators are required at both ends of the network to ensure the communication signal quality on the network. The terminators are female and male. See Figure 5.

The terminator requirements are different for each layout. See Figure 8 and Figure 9.

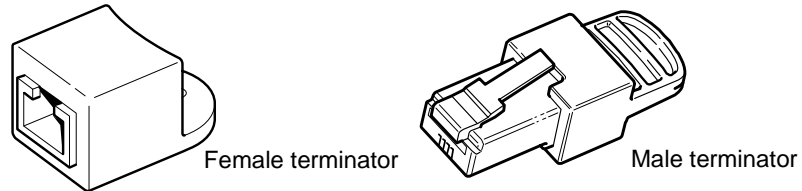


Figure 5 Network Terminators

Cabling Requirements



CAUTION: Equipment damage

Do not use crossover cable in a Xanbus System.

Cabling

The network uses Category 5 (CAT 5) cable, a standard cable available from Xantrex or any computer supply store. The cable consists of eight conductors in four twisted pairs with an RJ45 modular connector wired to the T568A standard. Table 3 contains the arrangements of wire colors to pin numbers for the T568A standard.

Table 3 T568A Standard Wiring

Pin Number	Conductor Name	CAT 5 Cable Insulation Color
1	NET_S	White/Green
2	NET_S	Green
3	NET_C	White/Orange
4	CAN_L	Blue
5	CAN_H	White/Blue
6	NET_C	Orange
7	NET_S	White/Brown
8	NET_C	Brown

Connector Requirements

	Different types of connectors are required to install the Xanbus-enabled devices on the network cable.
RJ45 connector	The network cable uses modular RJ45 connectors, as shown in Figure 6. The connector is suitable for cost-sensitive applications and is easily installed by an end user. The RJ45 connector should be a modular plug, 8-position, 8-contact for round, stranded, unshielded cable.

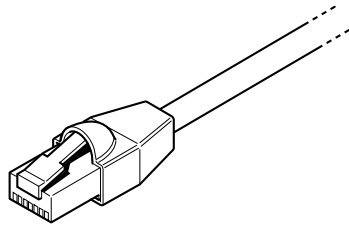


Figure 6 RJ45 Connector

Network Power Supply

In a Xanbus System, the power sources must provide sufficient power for all of the Xanbus-enabled devices.

Important: All networks, regardless of type, require a device that powers the network. Typically, this is your inverter/charger.

Power supply	The network must have at least one device with a power supply to run the network. The total network current supplied by all the power-sourcing devices must be greater than or equal to the total current drawn by the power consuming devices.
--------------	---

For example, in a system with an inverter/charger, an interface panel and an Automatic Generator Start, the inverter/charger is a power-sourcing device capable of providing 800 mA at 15 VDC while the two other devices each consume a maximum of 200 mA for a total maximum consumption of 400 mA. In this example, the network is properly configured from a power perspective because the power source is capable of providing more current than is needed: $800 \text{ mA} \geq 400 \text{ mA}$.

Note: See your Xanbus device guides to determine how much power each device consumes or supplies.

Network Size

Table 4 summarizes the network size in terms of distances and cable lengths.

Table 4 Minimum and Maximum Cable Length

Cable Length	Minimum	Maximum
Backbone or daisy chain	4 inches (10 cm)	130 feet (40 meters)
Total backbone length or daisy chain	4 inches (10 cm)	130 feet (40 meters)
Drop cable on backbone	4 inches (10 cm)	10 feet (6 meters)

Installing the Network

Important: Do not mix the two types of network layouts. Mixed configurations are not supported by Xantrex.

Important: Installing and replacing Xanbus-enabled devices in an existing system must be performed with the Xanbus System in Safe mode. See “Putting the System in Safe Mode” on page 16.

Before You Begin the Installation

- Read the entire section before installing the network. It’s important to plan your installation from beginning to end.
- Assemble all the tools and materials you require for the installation.

Installation Tools and Materials

Tools

You will need the following tools to install the network cables.

- Phillips screwdriver, appropriately sized
- Drill and 1/8" bit

Materials

You will need the following materials to complete your installation.

- CAT 5 cables (available from Xantrex or computer supply stores)
- Network connectors, if installing multi-drop backbone layout
- # 6 screws, 2 per each network connector installed
- Terminators

Guidelines for Routing the Network Cables



WARNING: Shock hazard

Do not route the network cables in the same conduit or panel as the AC and DC power cabling.

To ensure maximum performance of your network, follow these guidelines when routing the network cables. Route the cables before installing Xanbus-enabled devices.

- Route the cables away from sharp edges that might damage the insulation. Avoid sharp bends in the cable—no less than a 4-inch radius.
- Allow for some slack in the cable tension. Cable tension should not exceed 25 lbs.
- Keep the alignment of wire pairs inside the sheath as straight as possible.
- Allow separation between data and power cables (data cables should only cross a power cable at right angles).
- Do not staple the cable with metal cable staples. Use the appropriate hardware fasteners to avoid damage to the cable.
- Apply cable ties loosely.
- Support horizontal cables using J hooks or cable trays.

Mounting a Network Connector

To mount a network connector:

1. Select an appropriate location with the connector in the recommended mounting orientation, as shown in Figure 7.

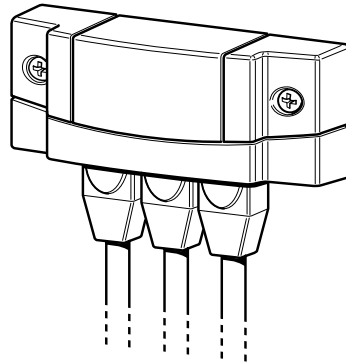


Figure 7 Recommended Mounting Orientation for Network Connector

2. Mark the position of the mounting screws.
3. Pilot drill the two mounting holes.
4. Fasten the network connector to the mounting surface with two #6 screws.

Installing Xanbus-enabled Devices

If you are installing a Xanbus-enabled device on an existing Xanbus System, see “Putting the System in Safe Mode” on page 16.

Important: Mount cables and network connectors in a dry location.

To install the Xanbus-enabled devices:

1. Determine and prepare the location for each device. Refer to the installation procedure in the appropriate guide. See “Related Information” on page iv.
2. Measure and determine the required cable length, taking into consideration the routing and strain relief requirements.
Do not exceed the total recommended cable length of 130 feet (40 meters).
3. Mount the devices according to the installation procedure in the appropriate guide.
4. Connect to the network.

Connecting Your Xanbus System

Use an appropriate length of network cable to connect each device and 3-way network connector (if used). See Figure 2 on page 1–5 and Figure 3 on page 1–6.



CAUTION: Equipment Damage

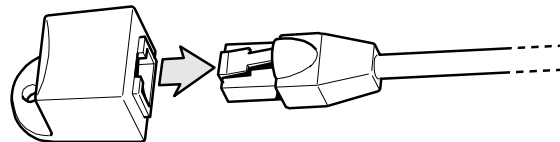
Connect only to other Xanbus compatible devices.

Although the cabling and connectors used in this network system are the same as ethernet connectors, **this network is not an ethernet system**. Equipment damage may result from attempting to connect Xanbus to different systems.

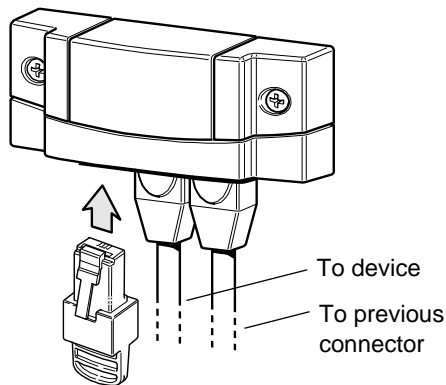
Completing the Multi-Drop Backbone Layout

To complete the multi-drop backbone layout:

- ◆ Attach a female terminator to the backbone cable at each end of the network
- Or
- ◆ Insert a male terminator into the open jack of the network connector at each end of the network (see Figure 8).



Attach female terminator to end of backbone cable.



Insert male terminator into open jack of connector.

Figure 8 Options for Completing a Multi-Drop Backbone Layout

Completing the Daisy Chain Layout

To complete the daisy chain layout:

- ◆ Insert male terminators into the open network ports of the Xanbus-enabled devices at each end of the network. See Figure 9.

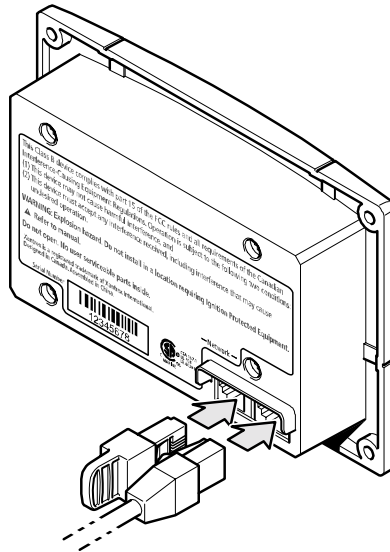


Figure 9 Completing a Daisy-Chain Layout



CAUTION: Unpredictable device behavior

After connecting the Xanbus-enabled devices and terminating the network, do not plug terminators or other cables into any remaining open network ports on any Xanbus-enabled devices.

Do not connect one end of the network to the other to make a ring.

Putting the System in Safe Mode



CAUTION: Unpredictable device behavior

Before removing or installing a device on an existing Xanbus System, you must put the system into Safe mode from the System Control Panel.

In Safe mode, all Xanbus-enabled devices remain powered and continue to communicate, and all device outputs are disabled.

To enter Safe mode:

1. On the Select Device menu, use the down arrow button to highlight System, as shown in Figure 10.

The cursor on the right of the screen indicates where you are in the menu.

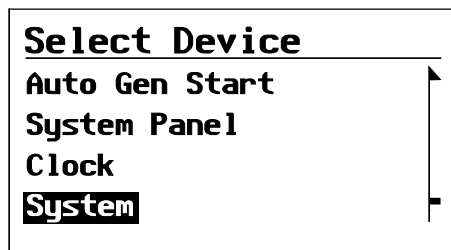


Figure 10 Select Device Menu

2. Press Enter.

The System Settings menu appears.

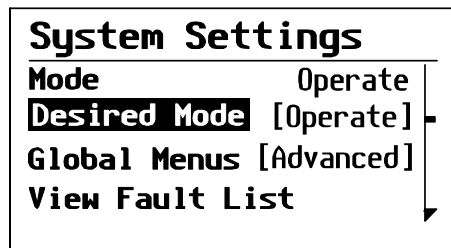


Figure 11 System Settings Menu

3. On the System Settings menu, with Desired Mode highlighted, as shown in Figure 11, press Enter.
4. Use the down arrow button to scroll through the other modes to select Safe mode, as shown in Figure 12.

For more information on the different system modes (Operate, Power Save, and Hibernate), see “System Modes” on page 20.

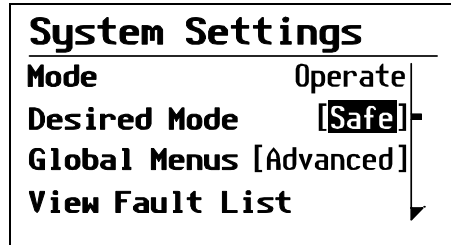


Figure 12 Safe Mode

5. Press Enter.

You are now in Safe mode.

6. Press Exit twice to return to the System Home screen.

To exit Safe mode:

1. On the System settings menu, with Desired Mode highlighted, press Enter.
2. Use the down arrow button to select your desired system mode.
3. Press Enter.

Testing Your Installation

After you have installed the Xanbus System, you should confirm that your installation is operating correctly.

Verifying Power is Available

Each Xanbus-enabled device has an indicator light or display screen that confirms that it is receiving power. See the Installation or Owner's Guide for each Xanbus-enabled device for information on verifying network power.

Verifying Network Communications

You can confirm that a Xanbus-enabled device is properly installed and communicating on the network by viewing its firmware revision number. The firmware revision number is available on the System Control Panel Device Information screen.

To view the firmware version for a device:

1. On the System Home screen, press Enter

You can identify the System Home screen by the down-pointing "menu" arrow on the bottom left corner of the screen. See Figure 13.

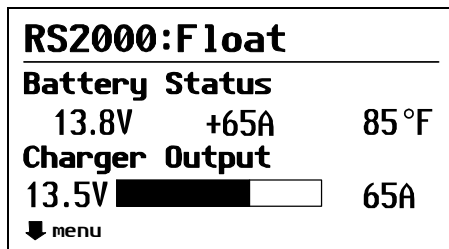


Figure 13 System Home Screen

2. On the Select Device menu, use the down arrow button to highlight System.
3. Press Enter.
4. On the System Settings menu, use the down arrow button to highlight View Device Info, as shown in Figure 14.

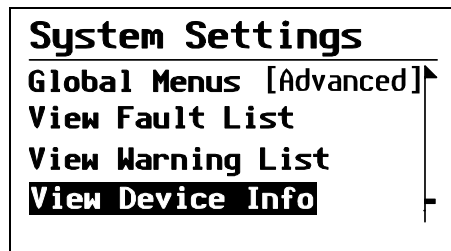


Figure 14 System Settings: View Device Info

5. Press Enter.
6. To view the Device Information screen for each device, press the down arrow button.

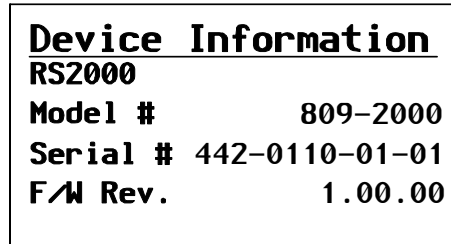


Figure 15 Device Information Screen (RS2000 used for example)

7. To return to the System Settings menu, press Exit.

System Modes

This section provides a brief overview of the four different system modes. See the *System Control Panel Owner's Guide* for complete information.

The system modes described in this section affect the performance and behavior of all Xanbus-enabled devices on the Xanbus System.

You can change system modes using the System Settings menu on the System Control Panel.

You can also use the red System button on the System Control Panel to put the System Control Panel and all other Xanbus-enabled devices into Power Save mode only, as shown in Figure 16.

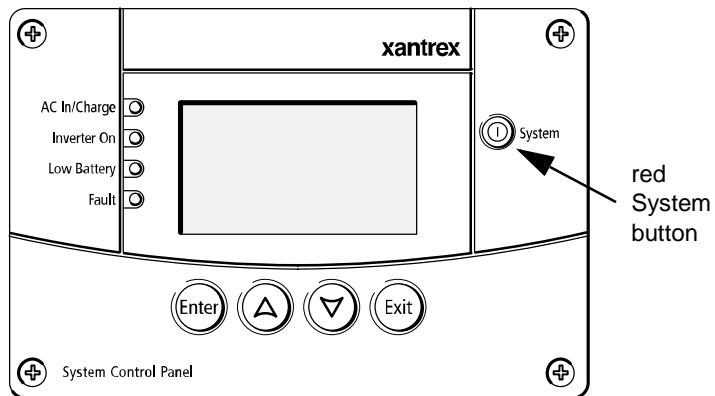


Figure 16 System Control Panel

System modes are changed using the System Settings menu. The four system modes are:

- Operate
- Safe
- Power Save
- Hibernate

Operate mode

- Characteristics** In Operate mode, all communications are enabled on the Xanbus System. All power conversion functions are enabled. Each device is monitoring and communicating its input.
- The default mode of any Xanbus-enabled device is Operate mode. Whenever any device on the Xanbus System is powered on or reset, it will be in Operate Mode, as shown in Figure 17.

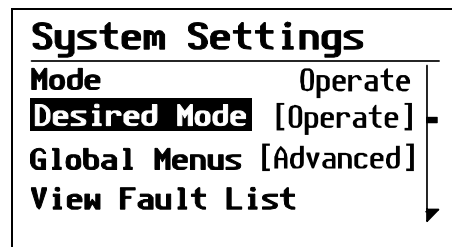


Figure 17 Operate Mode

Safe Mode

See “Putting the System in Safe Mode” on page 16 for more information.

Power Save mode

- Characteristics** Power Save mode minimizes power drawn by the Xanbus-enabled devices. Power Save mode stops all communication on the network, putting the system to “sleep” until it receives a command to “wake up” again.
- When to use** Use Power Save mode during periods when your power needs are minimal—while you are driving, for example. Putting the system in Power Save mode will help preserve the charge in your batteries during periods of minimal power usage.
- Entering and exiting Power Save mode also serves as a reset command for the system.
- To enter or exit Power Save mode:**
- ◆ Press and hold the red System button on the System Control Panel for at least one second.
- When the system enters Power Save mode, the screen on the System Control Panel goes blank and the backlight turns off.
- You can also enter Power Save mode on the System Settings menu by selecting Desired Mode, scrolling to PowerSave as shown in Figure 18, and pressing Enter.

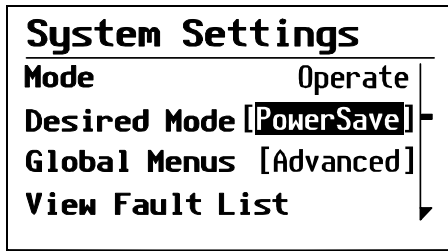


Figure 18 Entering Power Save Mode

Returning to Operate mode

If an inverter/charger supplies power to the network, you can bring the system out of Power Save mode by applying AC input (with utility power or generator power) or by pressing the Reset button on the inverter/charger.

Hibernate mode

Characteristics

Hibernate mode removes power from all Xanbus-enabled devices on the Xanbus System. All operations are suspended until power is restored to the network.

When to use

Important: To prevent any system activity, put the Xanbus system into Hibernate mode when leaving your system unattended for extended periods of time.

If there are active faults in the system, you cannot put the system into Hibernate mode. Clear any active faults, correct the condition that caused the fault, then put the system into Hibernate mode, as shown in Figure 19.

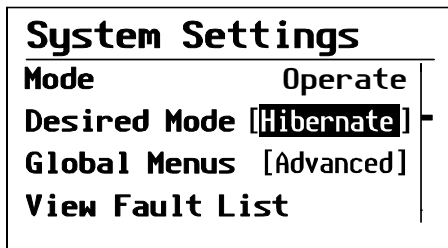


Figure 19 Hibernate Mode

Restoring power

Once in Hibernate mode, the system cannot return to Operate mode by itself. You must restore power to the network manually.

If an inverter/charger supplies power to the network, you can bring the system out of Hibernate mode by applying qualified AC input power with utility power or generator power.

For more information on the behavior of specific Xanbus-enabled devices, refer to Operation Guide or Owner's Guide for each device.

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