RS485-FD Converter

The RS485-FD Converter (model **RS485-FD**) converts any USB port on your laptop or desktop computer to a four-wire RS485 serial communication port.

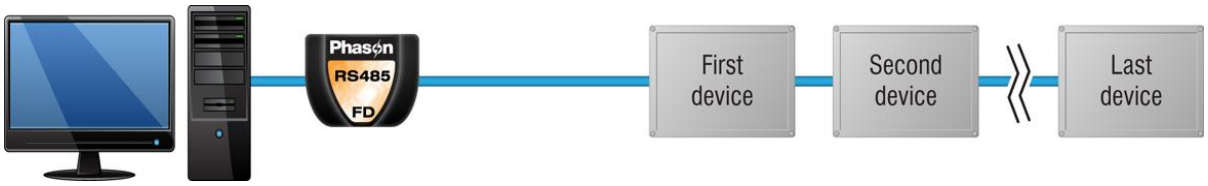
Communication overview

All Phason networkable devices communicate with the computer using four-wire RS485 serial communication. The RS485-FD provides a way for the Phason software on your computer to communicate with the devices along a communication channel.

A communication channel is a continuous line of cable connecting all devices in the series, in other words, a "daisy chain". The last device on a communication channel must have the termination resistors in place, or a termination module installed.

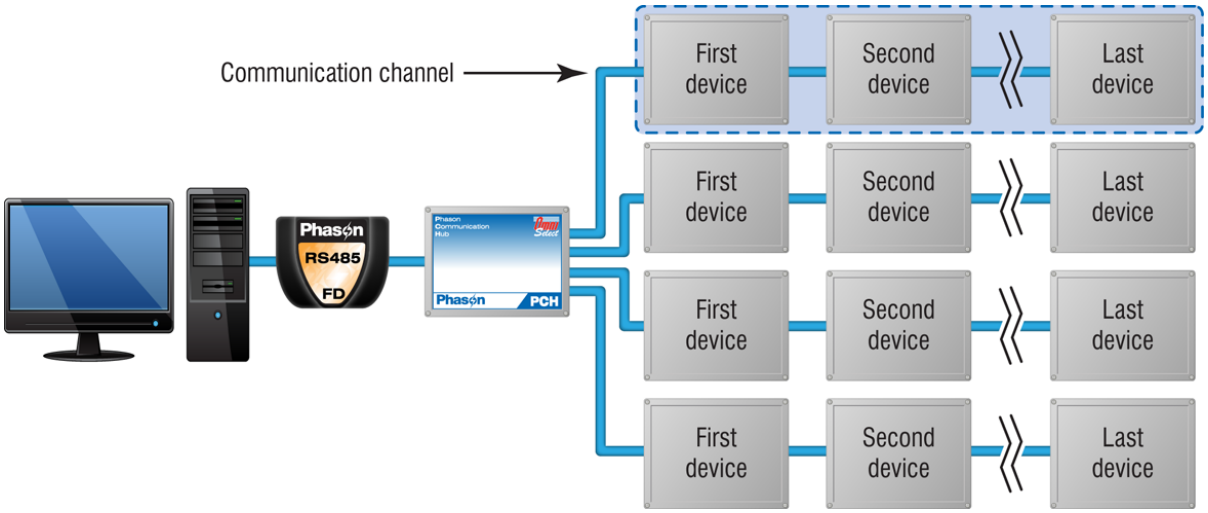
Single-channel systems

A single-channel system consists of the computer, RS485-FD Converter, and the Phason devices. The last device must have the termination resistors in place, or a termination module installed.



Multi-channel systems

A multi-channel OMNI Select system requires a Phason Communication Hub (PCH). The PCH has 4 communication channels and can communicate with up to 64 devices.



Installing the RS485-FD Converter

There are three steps to installing the RS485-FD Converter:

1. Connecting the communication and common reference wiring
2. Connecting the RS485-FD to the computer
3. Installing the software drivers on the computer

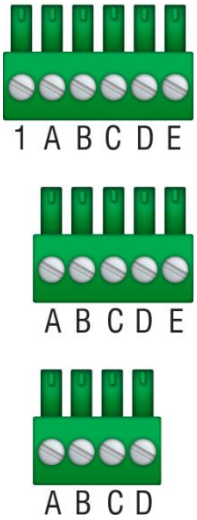
Communication cable requirements

The following types of cable are acceptable. Phason does not recommend other types of wire.

- Unshielded twisted pair (UTP), category 5 (CAT5)
- Shielded twisted pair (STP), CAT5

Proper connector alignment and wiring

There are three possible connector types on Phason devices. The four-positions, **A B C D**, are common to all models. Some models have five positions and include **E** for common reference wiring. The six-position connectors that include position **1** are included on the RS485-FD and Phason Communication Hub.



Using consistent wiring helps eliminate communication connection errors and makes troubleshooting much easier. Use the wire colors shown below when connecting all devices to the communication system.

Wire function	RS485	PCH (if installed)	All devices
1 alarm signal*	**1** white/green	**1** white/green	
A communication [Tx –]	**A** blue	**A** blue	**A** blue
B communication [Tx +]	**B** white/blue	**B** white/blue	**B** white/blue
C communication [Rx –]	**C** orange	**C** orange	**C** orange
D communication [Rx +]	**D** white/orange	**D** white/orange	**D** white/orange
E common reference	**E** green	**E** green	**E** green

***** Used only in OMNI Select systems with the Phason Communication Hub (PCH). For information about connecting a PCH see the installation guide for that specific product.

Common mistakes in communication wiring

- **Not using the correct type of communication cable** – the communication cable must be twisted pair cable, category 5 (CAT5). You can use either unshielded twisted pair (UTP) or shielded twisted pair (STP) cable. Phason does not recommend other types of wire.

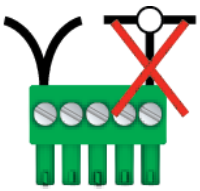
  There are additional guidelines to follow when using STP cable. For more information, read **Using shielded twisted pair (STP) cable** on page 4.

- **Running the communication cable in the same conduit as, or beside AC power cables** – routing communication cable in the same conduit as, or beside AC power cables, can cause electrical interference and communication failures. Follow the guidelines below when routing communication cable.

  - Do not run the cable in the same conduit as AC power cables.
  - Do not run the cable beside AC power cables or near electrical equipment.
  - When crossing other cables or power lines, cross them at a 90-degree angle.

- **Not continuing the communication wiring properly** – all the devices on the communication channel must be connected in series (in a daisy chain) and the wire must be continued properly from one device to the next. When continuing the communication wiring from one device to the next, the wires must be connected as shown in the following diagram.

  A wire goes into each position on the connector and then goes out to the next device.

  Do not use “branches” or “T-connections”.

- **Not terminating the last device on the communication channel** – on all systems, the last device on the communication channel must have the termination resistors in place or a termination module installed. You must remove the termination resistors from all devices, except the last one on the communication channel.

  The termination resistors are located on the circuit board of all networkable devices except the PBx Power Block, which has termination jumpers.

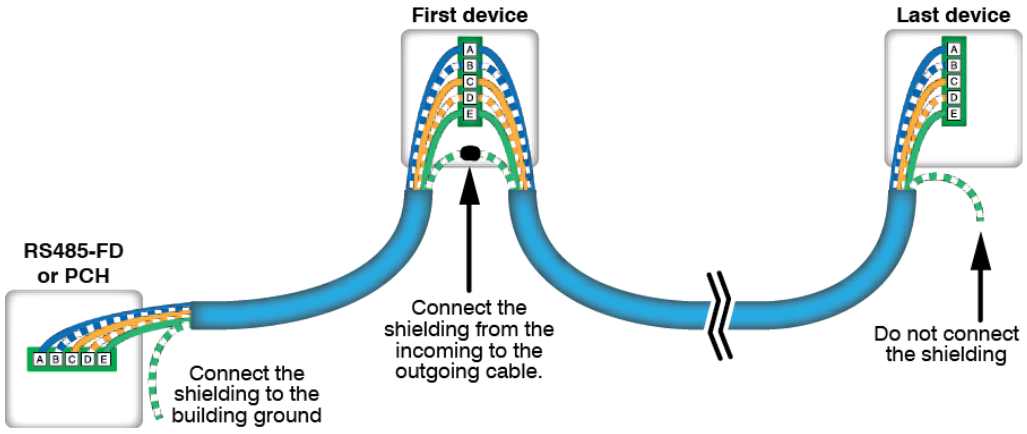
Using shielded twisted pair (STP) cable

The advantage of using STP cable is that it can improve communications by reducing electromagnetic interference. The drawback of STP cable is that it requires more care during installation. If the shielding is connected incorrectly, shielded cable can cause more problems than it solves.

How to install shielded cable

When installing shielded cable, you must connect the shielding to the building ground at one end only. Phason recommends connecting the cable to the building ground near the computer.

When connecting the devices along the communication channel (daisy-chain), connect the shielding of the incoming cable to the shielding of the outgoing cable. Do not connect the shielding to the device or to anything else. At the last device on the daisy chain, do not connect the shielding; leave it unconnected.



Connecting the communication and common reference wiring

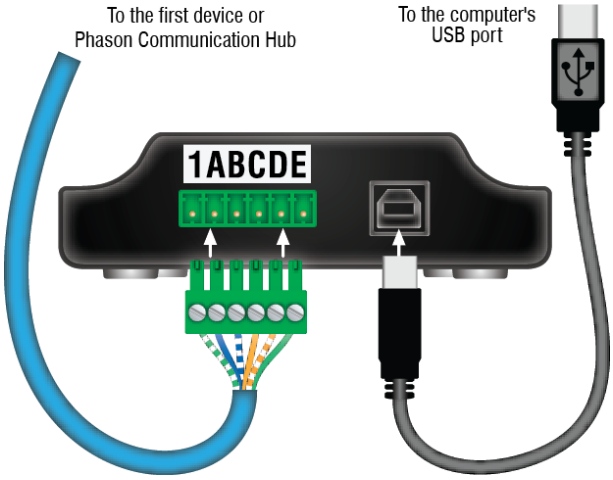
1. Connect all the devices in series. For example, **A** on the RS485-FD to **A** on the first device, to **A** on the second device, and so on. Use the wires specified in the table on page 2 and follow the guidelines on page 2.
2. Remove the termination resistors from each device, **except for the last one on the communication channel**. The last device **must** have the termination resistors in place. For the location of the termination resistors, see the installation guide for each specific product.

- ◇ For controls having only four-position connectors, it is a good idea to leave the communication cable one foot longer than is needed for connecting to the terminals (**A**, **B**, **C**, and **D**). You can then use the extra length of wire to connect to a reference point on the circuit board in place of the **E** terminal.
- ◇ For information about which terminal to use in place of the **E** terminal, see the user manual for the specific device, or contact Phason Customer Support.

Connecting the RS485-FD to the computer

After connecting the communication and common reference wiring to all the devices, connect the RS485-FD to the computer.

1. Plug the communication connector into the communication socket on the RS485-FD.
2. Connect the square end of the USB cable to the RS485-FD and the rectangular end directly to one of your computer's USB ports.



NOTE

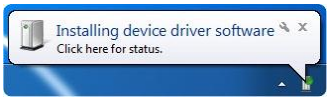
- ◇ Because of the RS485-FD power requirements, if you are using a USB hub, it must be one that has an external power supply, **not one powered from the computer's USB port**.
- ◇ If this is the first time you have connected the RS485-FD to the computer, your operating system will tell you that it has detected new hardware and ask to install the drivers. Read the next section before installing the drivers.

Installing the software drivers

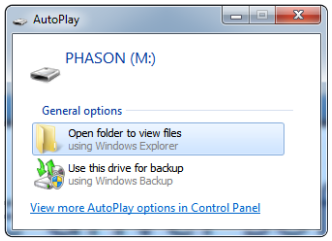
The USB stick that came with the RS485-FD includes software drivers for Windows 7 and higher. The first time you connect the RS485-FD, your operating system will ask you for drivers. Drivers tell the computer how to operate the RS485-FD.

There are two drivers to install: one called **USB Serial Converter**, the other called **USB Serial Port**. After both drivers have been successfully installed, the power LED on the RS485-FD should light up green. To install the drivers, follow the instructions below.

Windows 7 and higher



1. Insert the USB stick into one of your computer's USB ports. Windows might install drivers for the USB stick. The *Autoplay* window should display. If the window does not display, see the NOTE below.
2. In the *Autoplay* window, select **Open folder to view files**. Windows Explorer displays.



3. Double-click `Install_RS485_Drivers.exe`.
4. Follow the instructions on the screen to install the drivers for the **USB Serial Converter** and **USB Serial Port** from the USB stick.
5. When installation has finished, connect the RS485-FD to one of your computer's USB ports.

To manually start driver installation, open **My Computer** or **Windows Explorer**. Browse the USB stick and double-click the file `Install_RS485_drivers.exe`.

Loopback testers

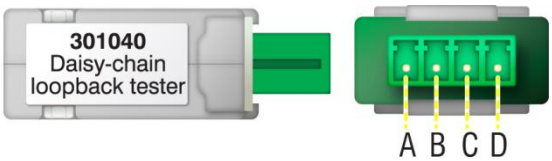
Loopback tests help verify the integrity of the communication line. If you have communication problems, you should perform loopback tests before replacing hardware. To perform loopback tests, you need a test utility (included with all Phason software) and loopback connectors.

During loopback tests, the computer sends out information along the communication channel. The information "bounces back" when it gets to the loopback connector. The computer compares the information it receives back; if it is the same as the information sent out, then both the send (TX) and receive (RX) lines are intact.

There are two types of loopback connectors; each type is for testing at different locations along the communication channel. When loopback testing, it is best to start at the computer and then work outward along the communication channel. For more-detailed information about loopback tests and how to use the test utilities, contact Phason Customer Support.

Converter loopback connector

The Converter loopback connector is for testing the RS-485 Converters for PCH channels.

Daisy-chain loopback connector

The daisy-chain loopback connector is for testing individual connections at the devices on the communication channel. For devices with a five or six-position male connector, the **A B C D** pins of the connector must line up as shown in the diagram