



Application Note 56

Revised February 2009

Interfacing to RS-485 Sensors

A few Sea-Bird instruments use the RS-485 protocol for transmitting setup commands to the instrument and receiving data from the instrument. However, most personal computers (PCs) do not come with an RS-485 port. This Application Note covers interfacing our RS-485 instruments with a PC by the following methods:

- Connecting the instrument to a **USB RS-485 Adapter** that plugs into an existing USB port on the PC, **OR**
- Connecting the instrument to an external **RS-485/RS-232 Interface Converter** that plugs into an existing RS-232 port on the PC, **OR**
- Installing an **RS-485 Interface Card** (and associated software) in the PC, and then connecting the instrument directly to the new RS-485 port in the PC.

The use of these adapters/converters/cards is described below.

Note: Sea-Bird is providing information on adapters / converters / cards that we have tested with our instruments. Other devices from these manufacturers, and devices from other manufacturers, **may** also be compatible with Sea-Bird instruments. **We recommend testing other devices with the instrument before deployment, to verify that there is no problem.**

USB RS-485 Adapter

A USB RS-485 adapter plugs into a USB port on the PC, and allows an RS-485 device to be connected through the adapter. Sea-Bird tested an adapter from one manufacturer with our instruments, and verified compatibility:

National Instruments (www.ni.com) –
USB-485 with USB connector and RS-485 DB-9P connector

Follow this procedure to use the USB-485 Adapter:

1. Install the RS-485 driver software (provided with Adapter) on your PC before installing the Adapter.
2. Install the USB RS-485 Adapter.
3. Configure the USB port in your PC (directions are for a PC running Windows XP):
 - A. Right click on My Computer and select Properties.
 - B. In the System Properties dialog box, click on the Hardware tab. Click the Device Manager button.
 - C. In the Device Manager window, double click on Ports. Double click on the desired USB port.
 - D. In the Port Properties dialog box, click the Port Settings tab. Click the Advanced button.
 - E. In the Advanced Settings dialog box, set Transceiver Mode to **2 wire Auto**. Verify that *Bias Resistors Enabled* is **not checked**. Click OK. Then click OK in the Port Properties dialog box.
4. Disconnect the USB RS-485 Adapter from the PC, then plug it back in again. The new settings from Step 3 should now be in effect.
5. Make a jumper cable (**do not use a standard adapter cable**) to connect the USB-485 Adapter to the instrument's I/O cable. Pin outs are shown for a Sea-Bird 9-pin (current production) or 25-pin (older production) I/O cable:

DB-9S (connect to USB-485 Adapter)	DB-9P (connect to Sea-Bird I/O cable PN 801385)	DB-25P (connect to Sea-Bird I/O cable PN 801046)
pin 1 common	pin 5 common	pin 7 common
pin 4 TX+	pin 3 'A'	pin 2 'A'
pin 8 RX+	pin 3 'A'	pin 2 'A'
pin 5 TX-	pin 2 'B'	pin 3 'B'
pin 9 RX-	pin 2 'B'	pin 3 'B'

6. Run the terminal program software (see instrument manual for correct software for your instrument):
 - A. SEATERM: In SEATERM's Configure menu, select the desired instrument. In the Configuration Options dialog box, set Mode to RS-485 and set COMM Port to the appropriate USB port.
 - B. SeatermV2: In SeatermV2's Instruments menu, select the desired instrument; Seaterm485 opens. In Seaterm485's Communications menu, select Configure. Set the Port to the appropriate USB port.

External RS-485/RS-232 Interface Converter

An RS-485/RS-232 Interface Converter plugs into an RS-232 port on the PC, and allows an RS-485 device to be connected through the Converter. Sea-Bird tested a Converter from one manufacturer with our instruments, and verified compatibility:

Black Box (www.blackbox.com) –
IC520A-F with RS-232 DB-25 female connector and RS-485 terminal block connector

Follow this procedure to use the IC520A-F Converter:

1. Connect the Converter to the PC:
 - If the PC has a 25-pin male RS-232 connector, plug the Converter directly into the PC connector.
 - If the PC has a 9-pin male RS-232 connector, plug the Converter into a 25-pin to 9-pin adapter (such as Black Box FA520A-R2 Adapter). Plug the 25-pin to 9-pin adapter into the PC.
2. On the Converter, measure the voltage between XMT+ and ground and between XMT- and ground. Connect whichever has the highest voltage to RS-485 'A' and the other to RS-485 'B'. The ground terminal can be left unconnected.

RS-485 Interface Card and Port in the PC

An RS-485 Interface Card installs in the PC, and allows an RS-485 device to be connected to the RS-485 port. When using with a Sea-Bird instrument:

- **RS-485 Transmitter** - The Interface Card must be configured to automatically handle the RS-485 driver enable.
- **Two-Wire Interface** -
 TX+ and RX+ on the Interface Card must be connector together and to 'A' on the instrument.
 TX- and RX- on the Interface Card must be connected together and to 'B' on the instrument.
 Note: Some Interface Cards have a jumper to make the connections internally, while for other Cards the connections must be made in a jumper cable.

Sea-Bird tested two Interface Cards from one manufacturer with our instruments, and verified compatibility:

National Instruments (www.ni.com) -
 AT-485/2
 PCI-485/2

Follow this procedure to use the AT-485/2 or PCI-485/2 Interface Card:

1. Install the RS-485 driver software (provided with Interface Card) on your PC before installing the Interface Card.
2. Install the RS-485 Interface Card.
3. Configure the RS-485 Interface Card in your PC (directions are for a PC running Windows XP):
 - A. Right click on My Computer and select Properties.
 - B. In the System Properties dialog box, click on the Hardware tab. Click the Device Manager button.
 - C. In the Device Manager window, double click on Ports. Double click on the desired RS-485 port.
 - D. In the Communications Port Properties dialog box, click the Port Settings tab. Click the Advanced button.
 - E. In the Advanced Settings dialog box, set Transceiver Mode to **2 wire TxRdy Auto**. Click OK. Then click OK in the Communications Port Properties dialog box.

4. Make a jumper cable (**do not use a standard adapter cable**) to connect the Interface Card to the instrument's I/O cable. Pin outs are shown for a Sea-Bird 9-pin (current production) or 25-pin (older production) I/O cable:

DB-9S (connect to PC)	DB-9P (connect to Sea-Bird I/O cable PN 801385)	DB-25P (connect to Sea-Bird I/O cable PN 801046)
pin 1 common	pin 5 common	pin 7 common
pin 4 TX+	pin 3 'A'	pin 2 'A'
pin 8 RX+	pin 3 'A'	pin 2 'A'
pin 5 TX-	pin 2 'B'	pin 3 'B'
pin 9 RX-	pin 2 'B'	pin 3 'B'

5. Run the terminal program software (see instrument manual for correct software for your instrument):
 - A. SEATERM: In SEATERM's Configure menu, select the desired instrument. In the Configuration Options dialog box, set Mode to RS-485 and set COMM Port to the appropriate RS-485 port.
 - B. SeatermV2: In SeatermV2's Instruments menu, select the desired instrument; Seaterm485 opens. In Seaterm485's Communications menu, select Configure. Set the Port to the appropriate RS-485 port.