Guide for RS-485 & RS-232 Main 14 Pin Cable Kit

This guide covers the basics of setting up and using the cables provided as a part of the serial cable kit (Dover Motion part number 31-1045). The parts provided allow for communication over either RS-485 or RS-232 protocols.

Parts Included

This cable kit contains the parts needed to connect to the stage over serial RS-485 and RS-232. A universal serial adapter is included with the kit that will allow communication over either protocol.

- 36308-00   Main stage cable
- 65-5741   RS-232 pinout adapter (Not needed for RS-485 communications, only use for RS-232)
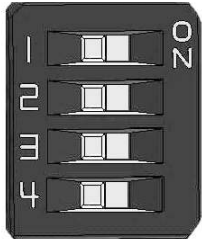- 65-5551   Universal Moxa serial adapter

Hardware Setup

Connect the cables to the stage as shown in the diagram below, for more hardware setup information see the below sections.
Note: the RS-232 adapter is ONLY USED FOR RS-232 communications. For RS-485 communications DO NOT USE the red circled adapter.
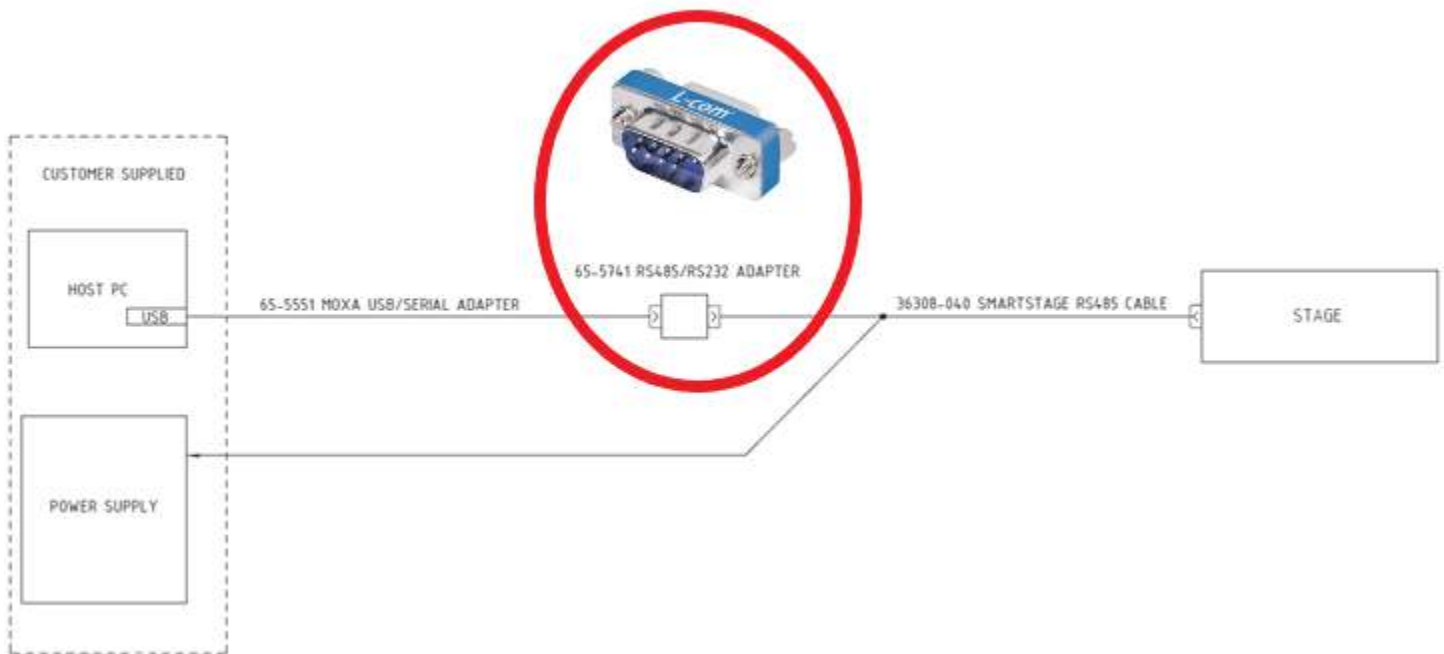
Communications Protocol Switches

Note: the stage is factory set and shipped with the communications switches set according to the ordered configuration, no changes are required for successful communication.   Each stage has a set of DIP switches per axis that selects the hardware communications protocol. Use the table below to select the appropriate settings for the new connections. Note that these are set at the factory for the selected protocol. See the SmartStage User Guide for more detail on setting the DIP switches for the stage.

| Description	Switch Setting				Switch
Position	1	2	3	4	
Name	CAN/SRL	485/232	LOZ/HIZ	HD/FD	
RS-232 Primary Axis	ON	ON	OFF	OFF	
RS-232 Secondary Axis	ON	ON	ON	ON	
RS-485 Low Z Full Duplex	ON	OFF	OFF	ON	
RS-485 Low Z Half Duplex	ON	OFF	OFF	OFF	
RS-485 High Z Full Duplex	ON	OFF	ON	ON	
RS-485 High Z Half Duplex	ON	OFF	ON	OFF	
CAN Low Z	OFF	X	OFF	X	
CAN High Z	OFF	X	ON	X	

Connecting With RS-485

The benefit of using RS-485 is that multiple stages and axes can be communicated with over the same connection to the PC, which means that only one USB port and adapter are needed for multiple axes (up to 256). When first connecting the serial adapters, be sure to install the serial drivers before connecting the devices. The drivers can be downloaded from the manufacturer site, or from: https://www.moxa.com/en/products/industrial-edge-connectivity/usb-to-serial-converters-usb-hubs/usb-to-serial-converters/uport-1000-series#resources.

Once the device has been connected, configure it for RS-485 communications. Do this by:
- Opening the device manager
  - o Find the Multi-port serial adapter section, and selecting the appropriate Moxa adapter
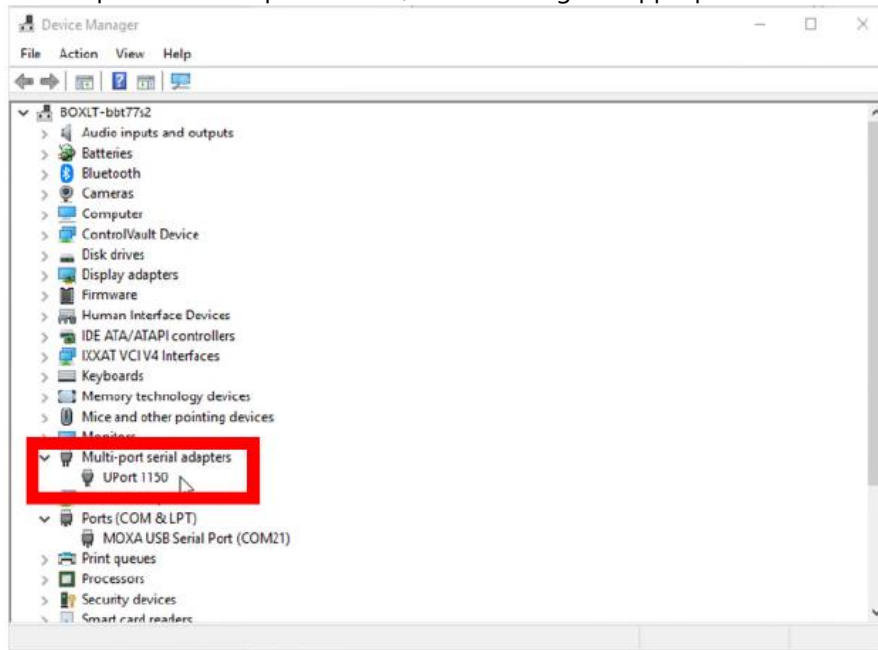

  - o Click on the Ports Configuration tab
  - o Select the port setting option
  - o Under the interface dropdown, select the appropriate serial protocol
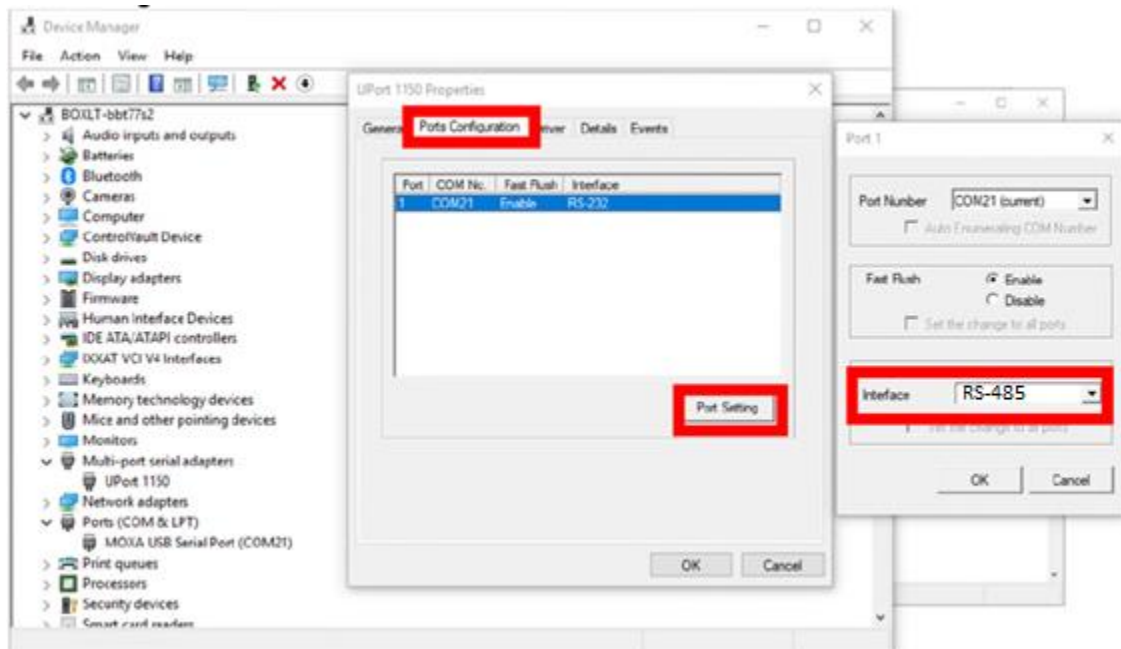
Next, the stages use DIP switches to select the protocol used on the control board. Make sure that these switches (one set per control board, so in an XY stack, there are two controllers that need to be set separately) are set appropriately for RS-485. See the SmartStage User Guide for more information on these settings. There should be one stage in any network, preferably the last in the daisy chain if that is how the network is configured, that is set for low impedance (Low Z), and the rest of the connections should be set for high impedance. This means that there is 120Ω termination on this stage.

Next, connect the Moxa adapter to the main serial cable, and connect the USB side to the host machine. The main cable should then be connected to the stage, and the power supply. The system can be powered on, and a connection attempted from the host machine. For more information on the pinout, I/O, connections and cabling, see the SmartStage User Guide.
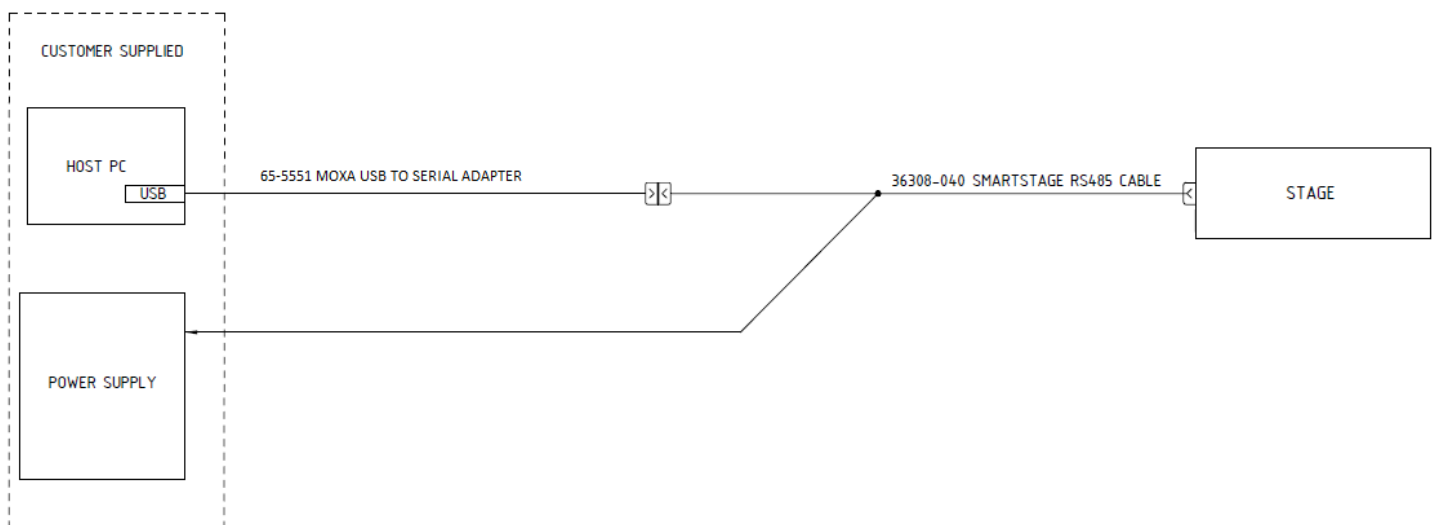
The RS-232 adapter is not needed and can be removed and set aside. Be certain that it is not installed, as it is a small DE-9 connector that is primarily blue, it is easy to miss.

Stages connected over RS-485 are factory configured for multi-drop protocol unless requested otherwise. This means that the stage controller needs to be connected to using the correct address for the controller to respond, otherwise timeout errors will occur.

This means that the serial commands must be formatted with an address that is included in the checksum calculation. For more information on command formatting when connecting programmatically through a host machine, see the word structure app note and the C-Motion new user guide.

Connecting with RS-232

The drawback to RS-232 communication is that each axis needs a dedicated communications hardware for each axis, which for a three axis system would require 3 USB ports and 3 adapters. Note, only one axis in a SmartStage XY stack can be communicated with at a time. The communications switches for both axes must be setup properly, with one set as the primary axis and one set as the secondary axis. ***The hardware provided with this kit will only communicate with the axis that is setup as the "primary" axis according to the switch settings above.*** When first connecting the serial adapters, be sure to install the serial drivers before connecting the devices. The drivers can be downloaded from the manufacturer site, or from: https://www.moxa.com/en/products/industrial-edge-connectivity/usb-to-serial-converters-usb-hubs/usb-to-serial-converters/uport-1000-series#resources.

Once the device has been connected, configure it for RS-232 communications. Do this by:
- Opening the device manager
  - o   Find the Multi-port serial adapter section, and selecting the appropriate Moxa adapter
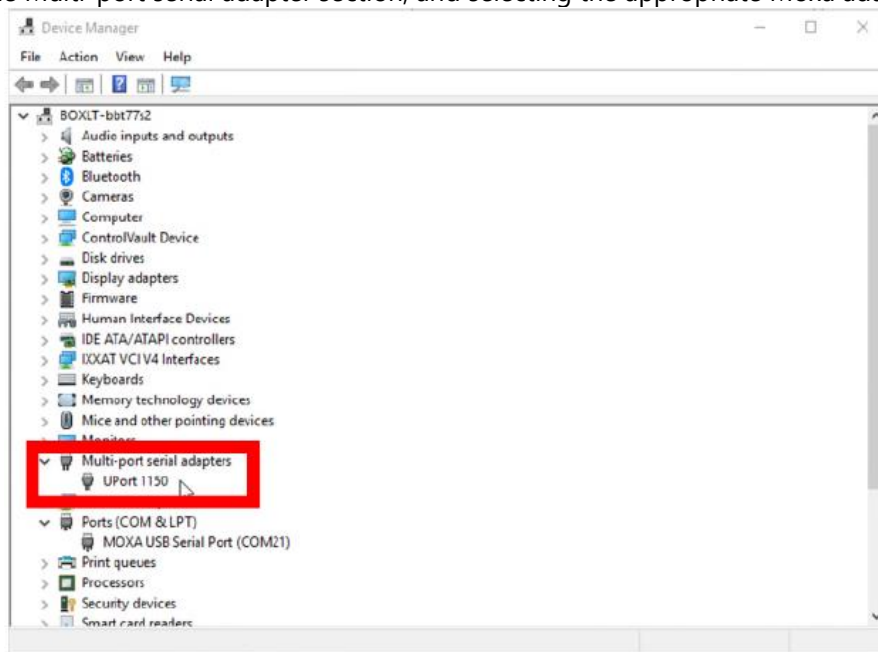
  - o   Click on the Ports Configuration tab
  - o   Select the port setting option
  - o   Under the interface dropdown, select the appropriate serial protocol
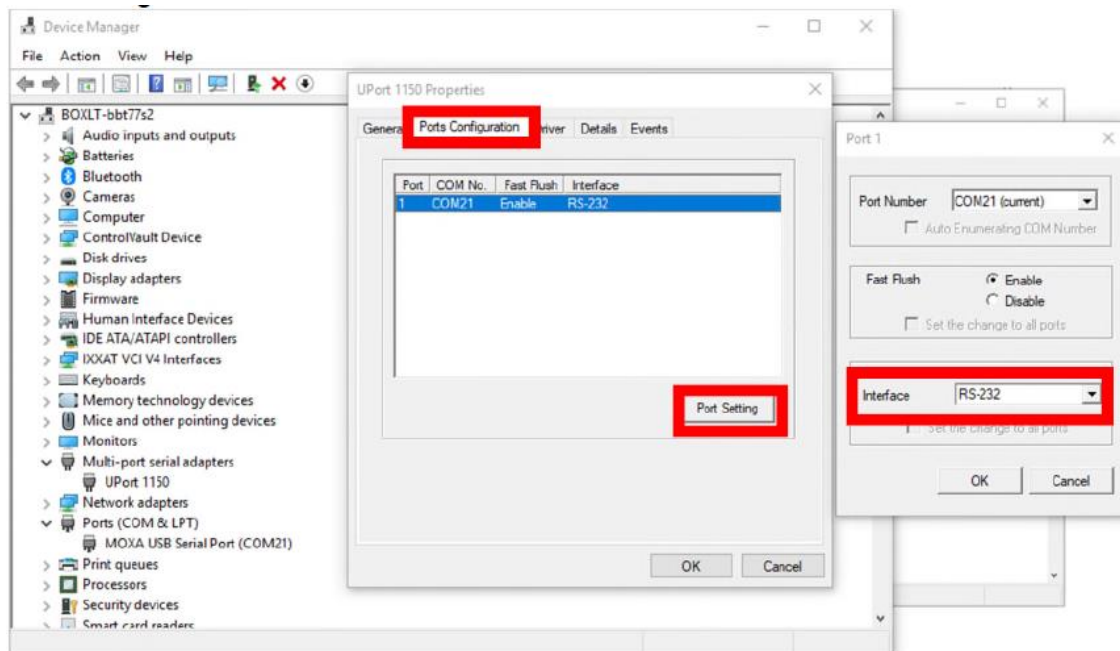
Next, the stages use DIP switches to select the protocol used on the control board. Make sure that these switches are set correctly for the Primary axis in RS-232 mode, the other axis in a 2 axis stack must be setup as the secondary axis. See the SmartStage User Guide for more information on these settings. Note that using this kit only one stage can be connected at a time, the one setup as the Primary axis.
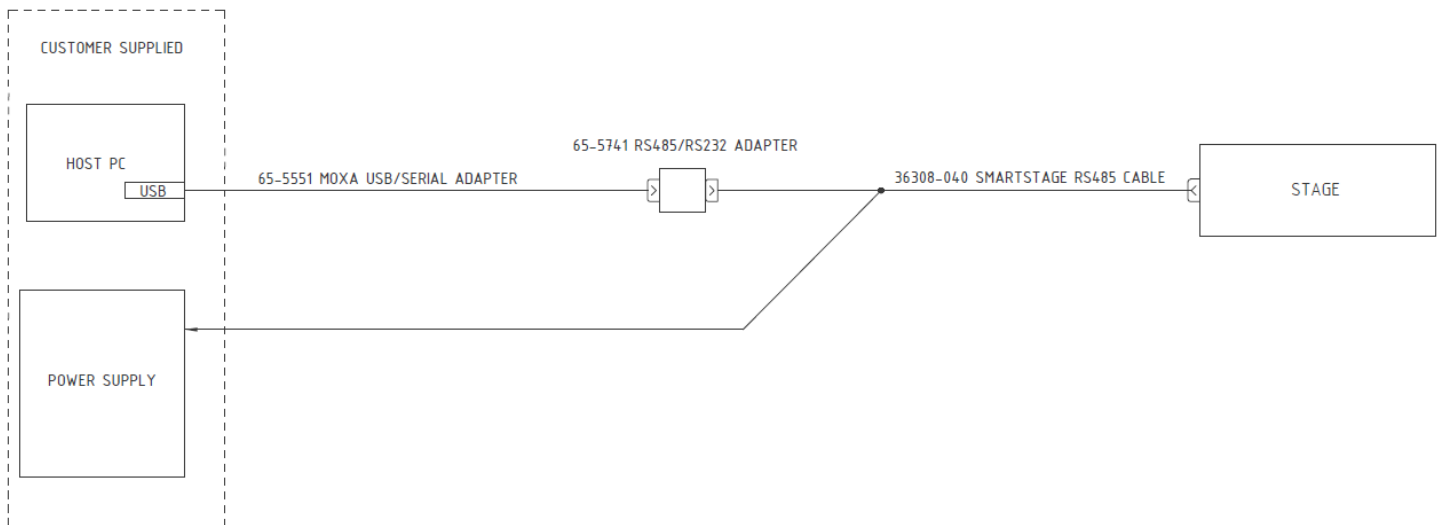
Next, connect the RS-232 breakout adapter (65-5741) to the main stage cable. Connect the Moxa adapter to the adapter cable end(s). The main cable should then be connected to the stage, and the power supply. The system can be powered on, and a connection attempted from the host machine. For more information on the pinout, I/O, connections and cabling, see the SmartStage User Guide.

Stages connected over RS-232 are configured for point-to-point communications and will not use addressing, but for stages that are being switched from one protocol to another this may not be the case. A connection should be attempted as follows:

1) Point-to-point (no address)
2) Multidrop, address 0 (or with the address ordered)
3) Multidrop, address 1

If connection issues still take place, ensure that the stage is powered on, connected, the Moxa driver is properly configured, that the RS-232 adapter is installed and that the

For more information on command formatting when connecting programmatically through a host machine, see the word structure app note.