

3rd Party Modbus Serial Cabling Tips: Application Note: #1167

Introduction

This application note provides additional information to simplify connecting Proface hardware to communicate with a 3rd party device. The diagrams included are for a 1:1 connection between a Proface ST, AGP, or AST and an External Device. For Modbus networks consisting of multiple devices additional information can be found in the Proface Device/PLC Connections Manuals. Also, additional information about Modbus cabling and communications can be found on the Internet at:

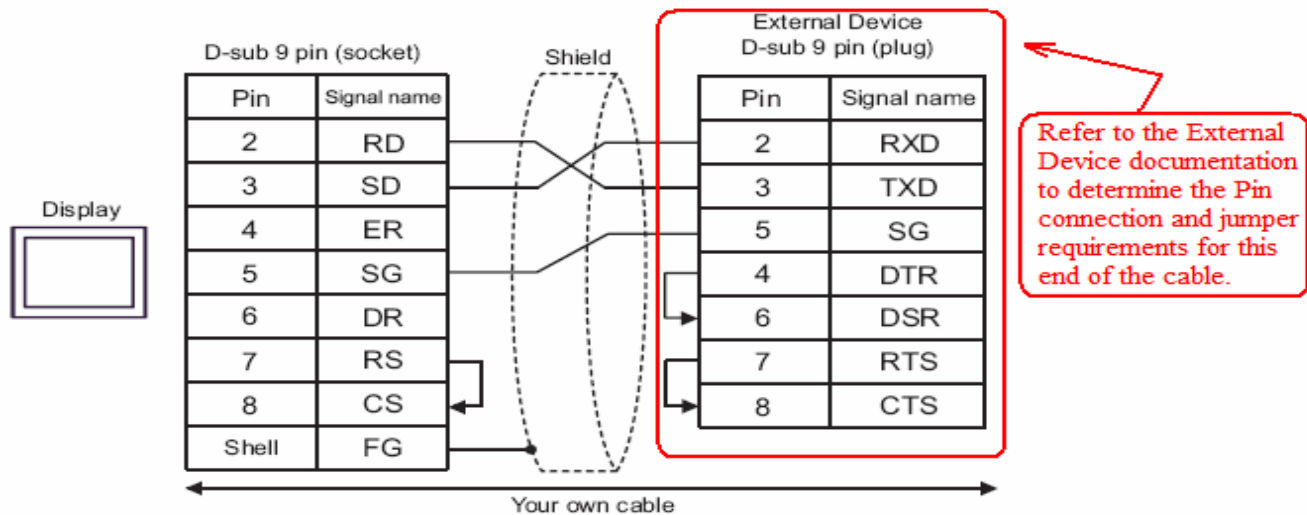
http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf

Cabling

Modbus serial cabling can be a RS232 or RS422/485 connection. The RS422/RS485 cabling connection can be “2-wire” or 4-wire”. Cable diagrams in this document are for Proface hardware 9-pin serial ports. For connections diagrams to a Proface 25 pin serial port please refer to the Device/PLC Connections Manuals.

RS232 cabling is point to point and the cable pin-out is specific to the 3rd party External Device. The Proface hardware requires a minimum of 3 conductors and a jumper: Send Data (SD), Receive Data (RD), a Common (SG), and a jumper between the RS and CS. The cable pin-out and jumpers required by the connected External Device should be obtained from the device documentation. The following illustration is a typical RS232 connection to the Proface hardware:

| Display (Connection Port) | Cable | Notes |
|---------------------------------|----------------|---------------------------------------|
| AGP, AST (COM1) ST401, ST403 | Your own cable | The cable length must be 15m or less. |



RS422/485 Cabling. It is important to include a signal ground (SG) or common connection between the devices. When a common or signal ground connection is not provided on the 3rd party device the common reference can be achieved by other means:

- 1> Some vendors specify connecting the shield on both ends for a common reference. Follow their instructions for that end of the cable and connect the shield to pin 5 (SG) or the shell of the DB9 connector on the Proface end.

- 2> If the 3rd party device has a signal ground connect pin-5 of the Proface device to signal ground.
- 3> If the 3rd party device has a common that is referenced or "strapped" to safety ground connect pin-5 of the Proface device to that common. (review the 3rd party device connections and documentation to avoid short circuits and noise inducing "ground loops")
- 4> Connect pin-5 to the safety ground on the device. (review the 3rd party device connections and documentation to avoid short circuits and noise inducing "ground loops")
- 5> Line polarization using a device such as Proface CA4-ADPONL-01.

Line Polarization. AGP Port Adapter CA4-ADPONL-01 is a convenient line polarization solution for use where it is needed. It is NOT required in all cases. The purpose of line polarization is to improve the noise immunity on an RS485 network. Be sure to follow network design standards when deciding whether to use this device and where to locate it. More than 2 polarization devices can cause problems on the network. For Modbus networks only one polarization circuit should be used on a 2 wire RS485 network. Polarization requirements vary depending on the network layout and the specifications of the connected devices.

Note: The polarization adapter CA4-ADPONL-01 cannot be used on COM1 on any AGP or on any port of some models of the AGP.

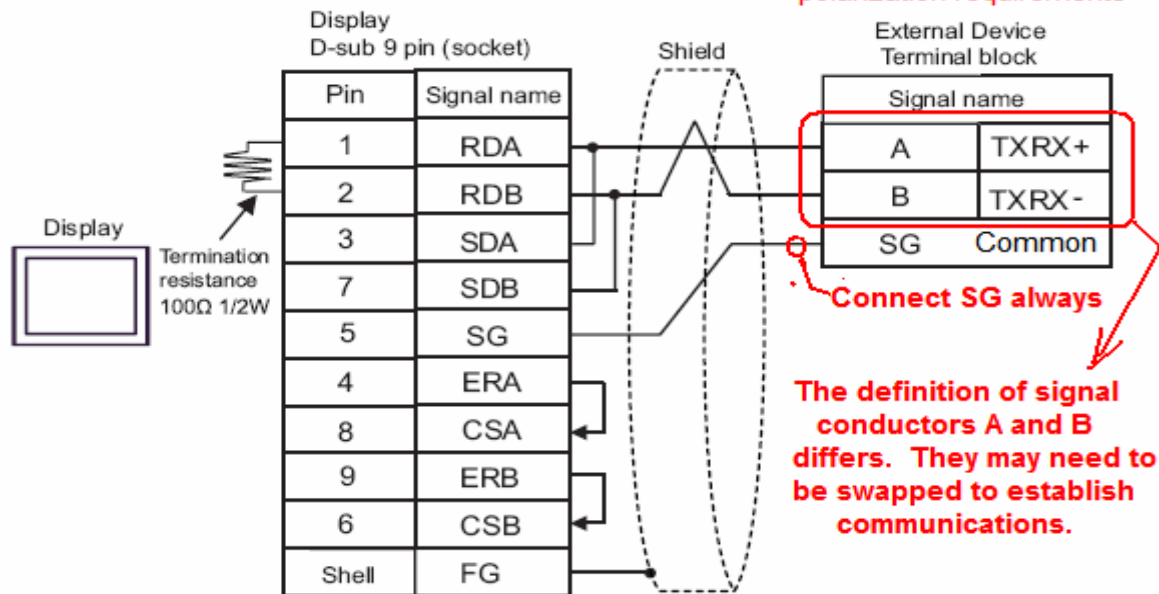
RS485 2-wire Cabling. The definition of the 2 signal wires is inconsistent among device manufacturers. The signal leads (A & B or TxRx+ & TxRx-) might need to be interchanged to establish communications to some field devices.

| Display (Connection Port) | Cable | Notes |
|--|----------------|--|
| AGP.*1 (COM1) ST400, ST403 AGP-3302 (COM2) AST3201 (COM2) | Your own cable | The cable length must be 500m or less. |

*1 All GP models except AGP-3302B

1:1 Connection

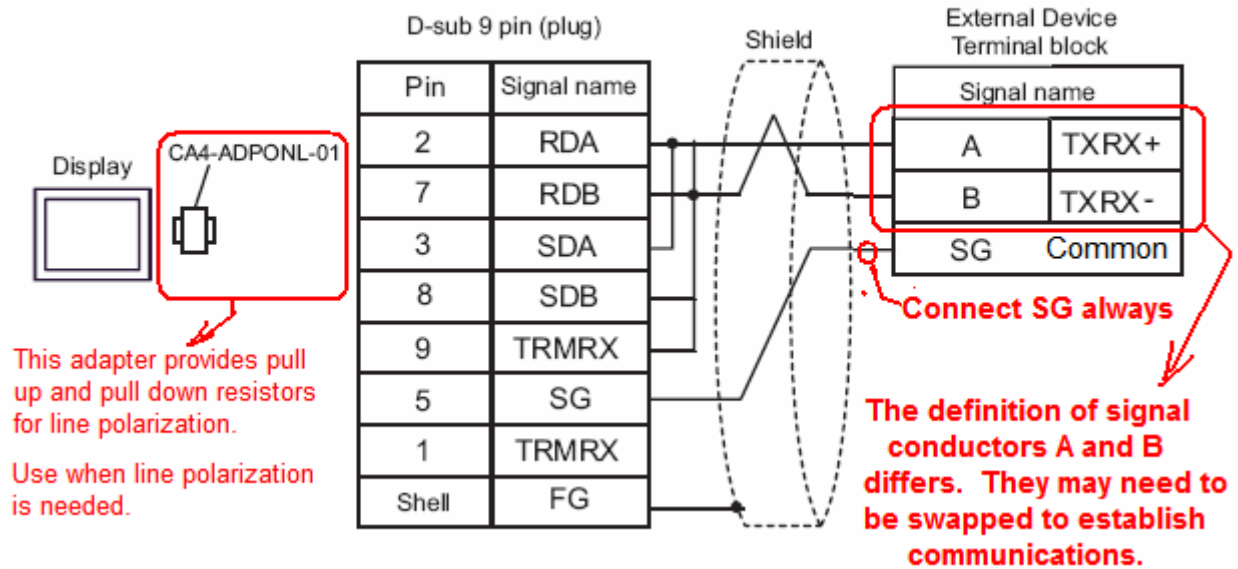
Refer to External Device documentation also for termination and polarization requirements



| Display (Connection Port) | Cable | Notes |
|---------------------------|----------------|--|
| AGP*1 (COM2) | Your own cable | The cable length must be 500m or less. |

*1 All AGP models except AGP-3200 series and AGP-3302B

1:1 Connection **Refer to External Device documentation also for termination and polarization requirements**



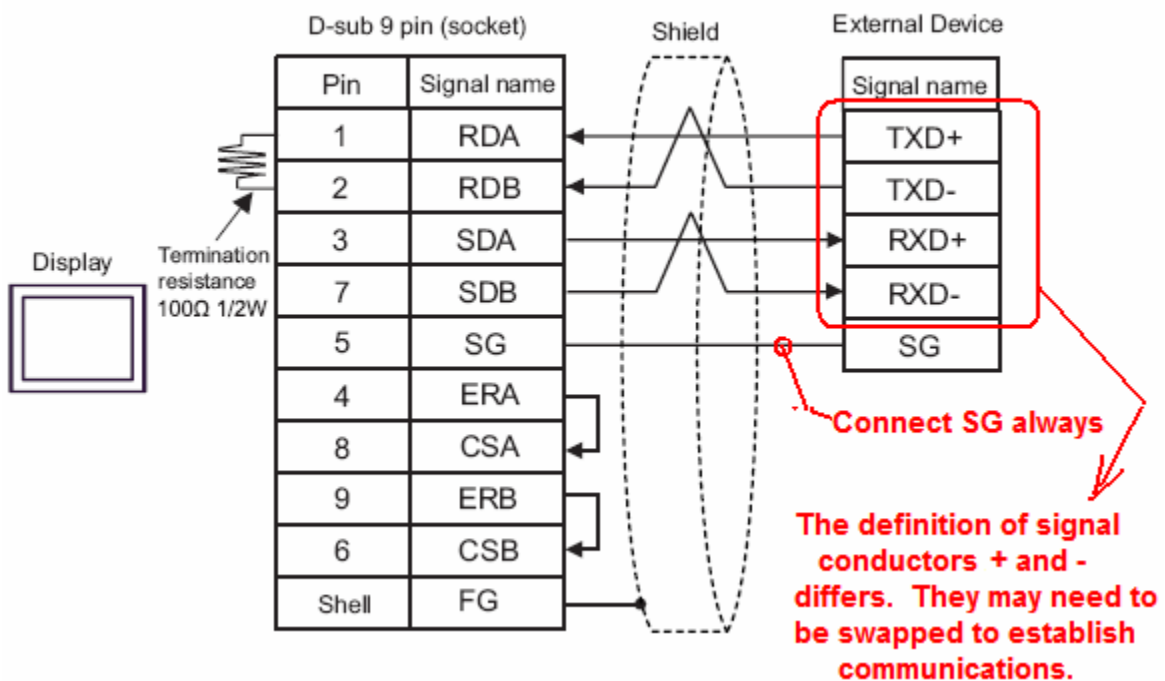
RS422/485 4-wire Cabling.

| Display (Connection Port) | Cable | Notes |
|--|----------------|--|
| AGP.*1 (COM1) ST400, ST403 AGP-3302 (COM2) AST3201 (COM2) | Your own cable | The cable length must be 500m or less. |

*1 All GP models except AGP-3302B

1:1 Connection

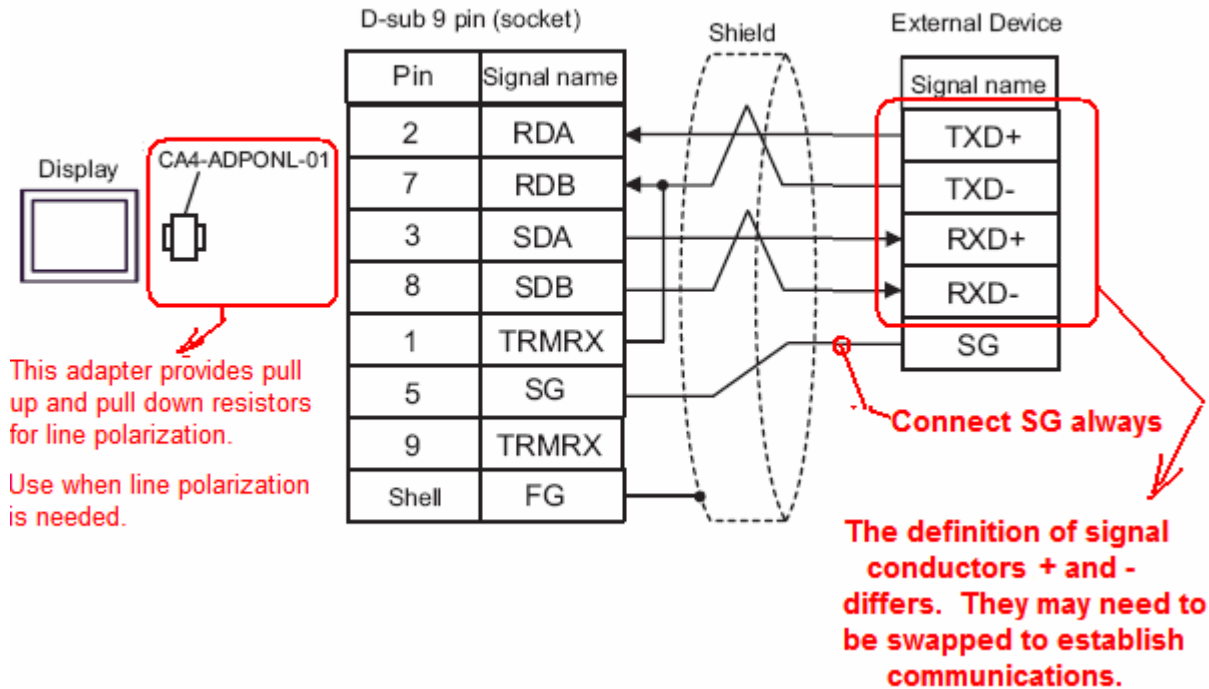
Refer to External Device documentation also for termination



| Display (Connection Port) | Cable | Notes |
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Refer to External Device documentation also for termination and polarization requirements



Configuring the Device Driver and Establishing Communications:

Master or slave device driver? In most installations the HMI is the master and the connected devices are slaves. Modbus serial allows a slave to have only one master. If the project is GP-Pro PB use the "Schneider Modbus RTU 1:N comm." driver. If the device has an ASCII – RTU protocol selection choose RTU.

If the HMI is the slave and the connected device is the master select the Modbus Slave driver. In GP-Pro PB3 select the "Modicon Modbus (SLAVE)" driver.

For additional information on configuring communications refer to App Note 1168; Modbus_Establishing Communications_Hints. It provides additional information to help you establish and troubleshoot Modbus communications with third party devices.

For more information on Pro-face and our full line of HMI, Operator Interface and Industrial PC products please visit our web site at www.profaceamerica.com.