
Application Note #1167: Modbus Serial Cabling Addendum

Introduction

Pro-face America offers additional cable solutions not included in the Pro-face Device/PLC Connections Manuals. This guide is a supplement to these Pro-face Device/PLC Connections Manuals:

- Schneider MODBUS SIO Master Driver
- Schneider MODBUS SLAVE Driver
- Modbus-IDA General MODBUS SIO Master Driver

The information and diagrams in this document apply to all the MODBUS serial communications device/PLC drivers. The diagrams in this document are for a 1:1 connection between a single Pro-face display and a single External Device. Additional cable diagrams and diagrams for multiple device serial networks can be found in the Pro-face Device/PLC Connections Manuals. More information about Modbus cabling and communications can also be found on the Internet at: http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf

Cabling

Modbus serial cabling can be either a RS232 or a RS422/485 connection. An RS422/RS485 connection can be “2-wire” or 4”wire”. Cable diagrams in this document are for Pro-face displays with DB9 serial ports. For LT4000M displays and legacy Pro-face 25 pin serial port connection diagrams please refer to the Device/PLC Connections Manuals.

Connection notes:

- The FG pin of the External Device body must be D-class grounded. Please refer to the manual of the External Device for more details.
- SG and FG are connected inside the display. When connecting SG to the External Device, design the system to not form short-circuit loop.
- Connect an isolation unit, when communication is not stabilized under the influence of noise etc.

Cable Diagrams

RS232 cabling is point to point. The cable pin-out is specific to the requirements of the External Device. The Pro-face 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.

RS232 Cabling

Display (Connection Port)	PLC / Device Series	PLC (Connection Port)	Cable	Diagram	Remarks
AGP3000 (COM1) AST (COM1) LT3300 GP4000 (COM1) *1 PS/APL 3rd party PC ST401, ST403 SP5000 (COM1/2) SIO Type RS232	Modicon 984	984-785E PC-A984-145 E984-241/251 (Modbus port)	HMI-CAB-ST52 + M-M Gender Changer *2	A	
			User Created Cable	B	
	Quantum	140 CPU 113 02 140 CPU 113 03 140 CPU 434-12A 140 CPU 534-14A (Modbus Port)	HMI-CAB-ST52 + M-M Gender Changer *2	A	
			User Created Cable	Refer to the GP-Pro EX Schneider Modbus SIO Master Device/PLC Connection Manual	
	Momentum	171 CCS 700 00 171 CCS 700 10 171 CCS 760 00 171 CCC 760 10 171 CCS 780 00 171 CCC 780 10	Schneider Electric 110 XCA 203 00 + 110 XCA 282 01(1m) or 110 XCA 282 02(3m) or 110 XCA 282 03(6m)	Refer to the GP-Pro EX Schneider Modbus SIO Master Device/PLC Connection Manual	
			HMI-CAB_102 + 9-25 pin adapter *2	C	
			User Created Cable	D	
	Generic Device		User Created Cable	Refer to the GP-Pro EX Modbus-IDA Device/PLC Connection Manual**	

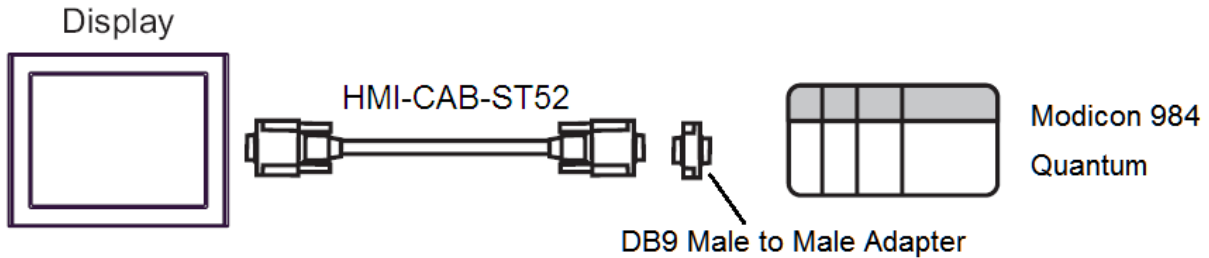
*1 All GP4000 models except GP-4100 series and GP-4203T.

*2 Commercially available gender changer.

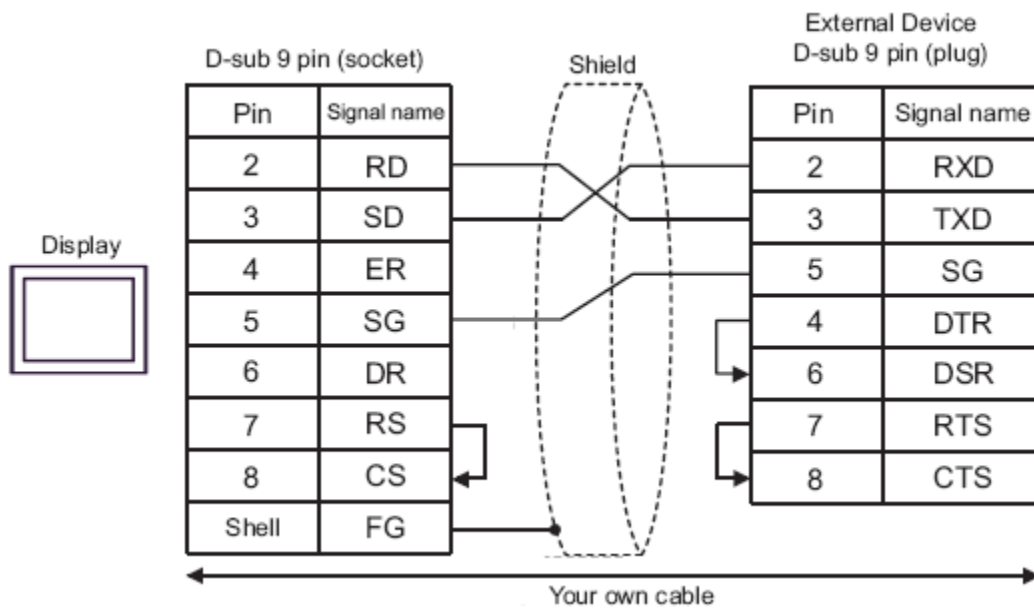
*3 Commercially available standard 25 to 9 pin RS232 serial port adapter or Pro-face CA3-CBLCBT232-01.

** http://www.hmisource.com/otasuke/files/manual/gpprox/v3_60/device/data/mod_grs.pdf

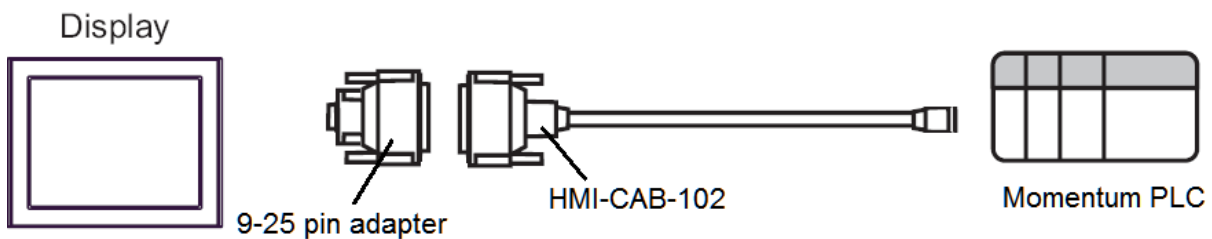
A) When using the RS232 cable (HMI-CAB-ST52) from Pro-face America



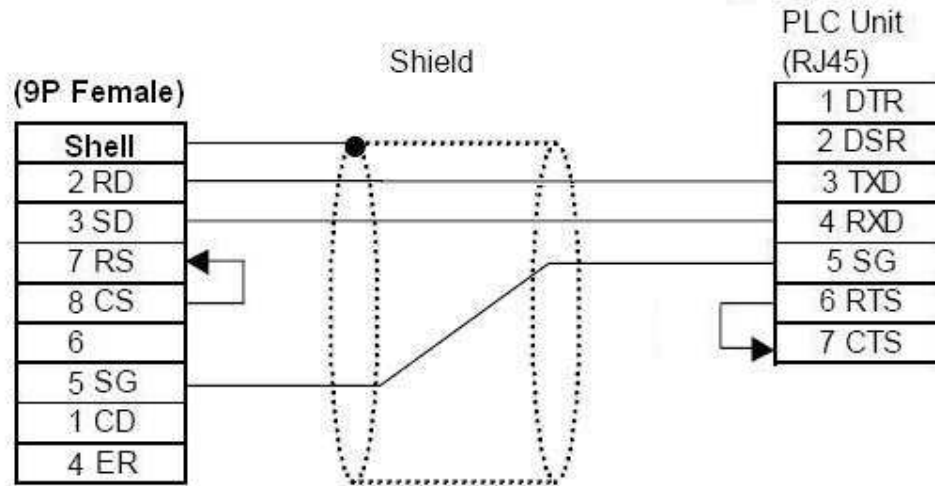
B) When creating your own cable:



C) When using the RS232 cable (HMI-CAB-102) from Pro-face America



D) When creating your own cable:



RS422/485 Cabling

- Connection Diagrams. Regardless of the PLC/Device driver selected in your project refer to the Modbus Slave Device connection diagrams in the GP-Pro EX “Modbus-IDA General MODBUS SIO Master Driver” manual. It is available at: http://www.hmisource.com/otasuke/files/manual/gpproex/v3_60/device/data/mod_grs.pdf

- Pro-face Adapters.

- Migrating from legacy Pro-face or Panel Station hardware and using the existing 25 pin cable:
 - To connect to an AGP3000 series COM2 DB9F port simply use a Pro-face adapter **CA3-CBLCBT422-01** between the display and the existing cable.
 - For connections to RS422/485 Com DB9M (male) ports on AGP3000, GP4000, and SP5000 simply use a Pro-face adapter **PFXZCBCBCVR41** between the display and the existing cable.
- If the connection diagram suggests this adapter combination:

COM port conversion adapter by Pro-face

CA3-ADPCOM-01

+

Connector terminal block conversion adapter by Pro-face

CA3-ADPTRM-01

The newer more compact Pro-face adapter **PFXZCBADTM1** can be substituted for these items.

- Signal Ground. It is important to include a signal ground (SG) or a signal reference “common” connection between the devices as shown in the connection diagrams. When a common or signal ground connection is not provided on the 3rd party device a signal common reference can often be achieved by one of these methods:

- If the 3rd party device has a signal ground, connect pin-5 of the Pro-face device to signal ground.
- Some vendors specify connecting the shield on both ends for a common reference. In this case follow their instructions for their end of the cable and connect the shield to pin 5 (SG) or the shell of the DB9 connector on the Pro-face end.
- If the 3rd party device has a common that is referenced or “strapped” to safety ground connect pin-5 of the Pro-face device to that common. (review the 3rd party device connections and documentation to avoid short circuits and noise inducing “ground loops”)
- 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”)
- Line polarization. Polarization improves the noise immunity on an RS485 network.
 - It is NOT required in all cases. Polarization requirements vary depending on the network layout and the specifications of the connected devices.
 - More than 2 polarization devices can cause communication problems on the network. For Modbus 2 wire RS485 networks only one polarization circuit should be used.
 - For AGP models except AGP-3200 series and AGP3302B use the termination and polarization adapter Pro-face CA4-ADPONL-01 or a polarization feature on the connected device.
 - For other models. If another connected device has a polarization switch or feature, use it. If there is none you can build your own. For instructions on creating serial network polarization refer to the document at:
http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf

Configuring the Device Driver and Establishing Communications:

Master or slave PLC/device driver? In most installations the HMI is the master and the connected devices are slaves. Modbus serial protocol allows a slave to have only one master. If the device offers a choice between ASCII and RTU protocol choose RTU.

If the project is GP-Pro/PB3 use the “Schneider Modbus RTU 1:n comm.” device/PLC driver. If the HMI is the slave in GP-Pro/PB3 select the “Modicon Modbus (SLAVE)” driver.

For supplemental information on configuring a Modbus device driver refer to App Note 1168; “Modbus Establishing Communications Hints”. It provides suggestions 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.Pro-faceamerica.com.

For technical support email: support@Pro-faceamerica.com or call: 800.289.9266.

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