Installation and Maintenance Instructions for Serial Communication Adapters

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⚠ CAUTION

- Read complete instructions prior to installation and operation of the meter.

⚠ WARNINGS

- Risk of electric shock or personal injury.
- These products are not recommended for life support applications or applications where malfunctioning could result in personal injury or property loss. Anyone using these products for such applications does so at his/her own risk. Ashcroft, Inc. shall not be held liable for damages resulting from such improper use.

⚠ WARNING
Cancer and Reproductive Harm - www.P65Warnings.ca.gov

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Ashcroft, Inc. warrants these products against defects in material or workmanship for the specified period under “Specifications” from the date of shipment from the factory. Ashcroft’s liability under this limited warranty shall not exceed the purchase value, repair, or replacement of the defective unit. See Warranty Information and Terms & Conditions on www.ashcroft.com for complete details.

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Introduction

Ashcroft provides an assortment of serial communications adapters and converters to enhance the utility of its products. These external devices connect to the RJ11 / RJ45 header at the back of the instrument and allow the meter to communicate over RS-232, RS-485 or USB.

Ordering Information

Model	Description
101B224-06	RS-232 Adapter
101B224-07	RS-485 Adapter
101B224-08	USB Serial Adapter
101B224-09	USB to RS-232 Non-Isolated Converter
DProM	DProM Software for DM61 meters. Pre-loaded to meter.

Accessories

Model	Description
101B224-01	DIN rail mounting kit for two devices

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Specifications

General (All)

Warranty	1 year parts & labor. See Warranty Information and Terms & Conditions on www.ashcroft.com for complete details.

101B224-06 RS-232 Adapter

Compatibility	EIA-232
Connectors	PC compatible 9-pin D subminiature connector (DB9) and RJ45 (adapter to meter)
Cable	6' (1.8 m) standard Cat5e cable provided with adapter
Dimension	1.7" x 0.9" x 2.7" (43 mm x 24 mm x 70 mm) (W x H x D)
Distance	Adapter to: DM61 meter: 6' (1.8 m) max; Computer: 50' (15 m) max; Serial interface cable not provided
Power	Powered by DM61 meter M-Link connection
Status Indication	Separate LEDs for Power (P) Transmit (TX), and Receive (RX).

101B224-07 RS-485 Adapter

Compatibility	EIA-485
Connectors	Removable screw terminal connector and RJ11 (adapter to meter)
Cable	6' (1.8 m) standard Cat5e cable provided with adapter
Dimension	1.7" x 0.9" x 3.0" (43 mm x 24 mm x 76 mm) (W x H x D)
Distance	Adapter to: DM61 meter: 6' (1.8 m) max; Computer: 3,937' (1,200 m) max
Power	Powered by DM61 meter M-Link connection
Status Indication	Separate LEDs for Power (P), Transmit (TX), and Receive (RX)

101B224-08 USB Adapter

Purpose	Programming (only) DM61 meter when meter powered from AC or DC.
Compatibility	USB 1.1, USB 2.0
Connectors	RJ45, and USB Type B
Cable	One 6' (1.8 m) standard Cat5e cable and one 3.28' (1.0 m) USB A-B Male cable provided with adapter
Dimension	1.7" x 0.8" x 3.3" 43 mm x 21 mm x 83 mm) (W x H x D)
Distance	Adapter to: DM61 meter: 6' (1.8 m) max. USB connection: 10' (3 m) max
Driver Compatibility	Win 98/2000/ME/XP/Vista/7/8/10
Power	USB Port
Status Indication	Separate LEDs for Power (P), Transmit (TX), and Receive (RX)

101B224-09 USB to RS-232 Converter

Compatibility	USB 1.1, USB 2.0, EIA-232
Connectors	PC compatible 9-pin D subminiature connector (DB9) and USB Type A
Dimension	3' (91.44 cm) (Length)
Distance	USB connection: 10' (3 m) max; RS-232 connection: 50' (15m) max
Driver Compatibility	Win 98/2000/ME/XP/Vista/7/8/10
Power	USB port

USB Drivers for Serial Communications Adapters

USB Drivers for serial communications adapters are available for download from the Documentation CD provided with every product.

DIN Rail Mounting Instructions

The following instructions for expansion modules may be used for mounting the converters and adapters to DIN rails.

Step 1: Mounting the DIN Rail Clips to Module

Place the expansion module on a flat surface with the bottom surface facing up. The bottom surface can be identified as the surface closest to the locking tab slot on the modular connector as shown in *Figure 1*.

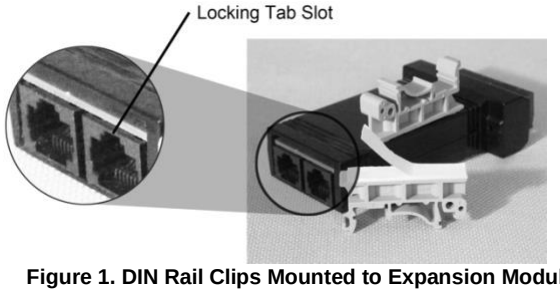

Figure 1. DIN Rail Clips Mounted to Expansion Module

Peel the protective layer off the adhesive tape on the bottom of one of the mounting clips. With the hinge end of the clip, as shown in *Figure 2*, facing the end of the module with the communications connector, align the clip along the long (side) edge of the module and centered lengthwise within the flat surface of the module as shown in *Figure 3*.

Figure 2. Hinge & Latch End of DIN Rail Clip

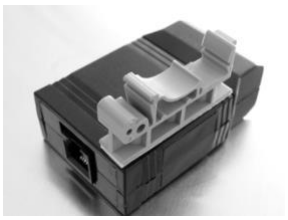

Figure 3. DIN Rail Clips Mounted to Module

Firmly press down on the clip for 10 seconds. Repeat this procedure on the opposite side. Once the clips are properly installed, the modules with clips mounted should look similar to one or both of the modules pictured in *Figure 4*. While the adhesive is initially quite strong, this strength improves significantly over a period of approximately 12 hours.

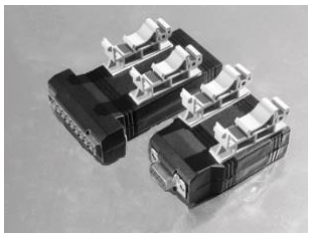

Figure 4. Examples of Clips Mounted to Modules

Step 2: Mounting the DIN Rail to a Surface

The expansion modules, serial adapters and serial converters weigh approximately 1.5 oz (42 grams) each so the mounting hardware does not need to be overly strong. We recommend two #10 pan head screws as shown in *Figure 5*, but only because they best accommodate the slots in the DIN rail. The amount of strain the wiring might place on the module mounting needs to be considered also. In many cases, DIN rail with double-sided tape might be acceptable, although not recommended in areas of high vibration or extreme hot or cold temperatures.

Figure 5. Mounting the DIN Rail with 2 #10 Pan Head Screws

When choosing a location to mount the DIN rail, keep in mind that wires will be entering both ends of the modules as shown in *Figure 6*. Leave enough room on either end of module to allow for wire routing to prevent undue stress placed on the module's connectors and mounting clips. The DIN rail may be mounted on any vertical or horizontal mounting surface.

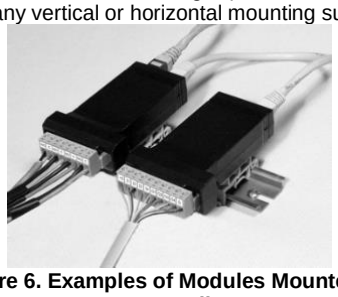

Figure 6. Examples of Modules Mounted to DIN Rail

Step 3: Mounting Modules to the DIN Rail

To mount modules to a DIN rail, first locate the approximate desired position to place the module on the DIN rail, then hook the hinge end of the mounting clip to the edge of the DIN rail as shown in *Figure 7*. Next lower the opposite "latch end" of the clip onto the rail. Press down on the module until the latch end snaps in place.

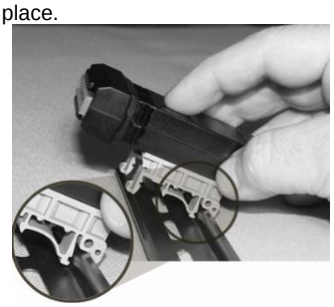

Figure 7. Snapping the Module to the DIN Rail

A typical installation will look like *Figure 8* once modules are mounted to the DIN rail.

Figure 8. Typical Installation of DIN Rail Mounted Devices

Step 4: Connections

After mounting the device(s), refer to the Instruction Manual for each module for proper connections and operation.

Serial Communications Overview

RS-232 and RS-485 are standard interfaces approved by the Electronic Industries Alliance (EIA) for connecting serial devices. In EIA terms, the device (e.g. meter) that connects to the interface is called a Data Communications Equipment (DCE) and the device to which it connects (e.g. the computer) is called a Data Terminal Equipment (DTE).

The RS-422 standard was designed to replace the older RS-232 standard because it supports higher data rates and greater immunity to electrical interference. RS-485 is similar to RS-422 but can support multi-point connections per line because it uses lower-impedance drivers and receivers.

Line drivers and receivers are used to exchange data between two or more points (nodes) on a serial communications network. Reliable data communications can be difficult in the presence of induced noise, ground level differences, and other hazards associated with installation of a network. When communicating at high data rates, or over long distances in real world environments, RS-232 is often inadequate. The differential data transmission of RS-422 and RS-485 offers superior performance in most applications. Differential signals can help nullify the effects of ground shifts and induced noise signals that can appear as common mode voltages on a network.

RS-422 was designed for greater distances and higher baud rates than RS-232. In its simplest form, a pair of converters from RS-232 to RS-422 (and back again) can be used to form an “RS-232 extension cord”. Data rates of up to 100 kbits/second and distances of 3,937' (1,200 m) can be accommodated with RS-422.

RS-422 devices however cannot be used to construct a true multi-point network. A multi-point network consists of multiple drivers and receivers connected on a single bus, where any point (node) can transmit and/or receive data. RS-485 is an enhanced version of the RS-422 standard, which allows multiple drivers and receivers on the same two-wire or four-wire system. The RS-485 standard specifies up to 32 drivers and 32 receivers on a single bus, but with the introduction of “automatic” repeaters and high-impedance drivers/receivers, this number can be extended to hundreds of points (nodes) on a network.

The cabling used for an RS-422 or RS-485 serial communications network should always be a high-quality cable such as Belden 8162 or Alpha 6203C. A two-wire system requires two twisted pairs, and a four-wire system requires three twisted pairs (the extra twisted pair is needed for the signal ground).

Figure 9 illustrates how to connect a general four-wire network (a four-wire network actually contains 5 wires).

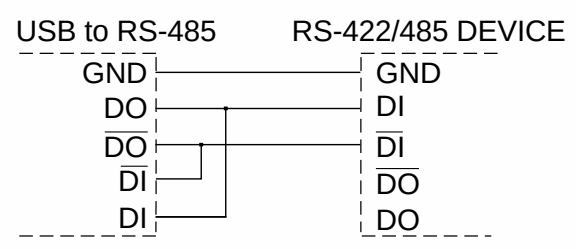

Figure 9. General Four-Wire Network Connections

Figure 10 illustrates how to connect a general two-wire network (a two-wire network actually contains 3 wires).

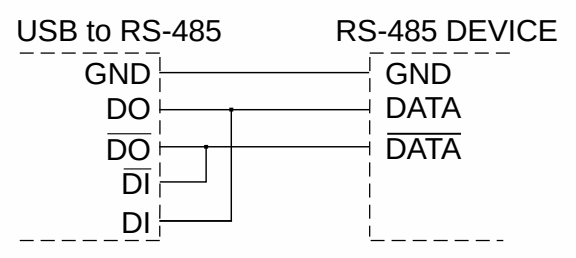

Figure 10. General Two-Wire Network Connections

101B224-06 RS-232 Serial Adapter

Description

The 101B224-06 converts the serial output of the DM61 meter to an unbalanced, full-duplex RS-232 signal.

The RS-232 port has a female DB9 connector with pins 2 (RX output), 3 (TX input), and 5 (Signal Ground). Pins 7 (RTS) and 8 (CTS) are tied together, and pins 1 (CD), 4 (DTR), and 6 (DSR) are tied together. The adapter is powered by the DM61 meter M-Link connection.

Baud rates are adjustable and handled by the DM61 (see the DM61 Instruction Manual for more details).

The 101B224-06 has three diagnostic LEDs: a Power (P) LED to show when the adapter is powered properly, a Transmit Data (TX) LED to show when the adapter is sending data out from the PC side, and a Receive Data (RX) LED to show when the adapter is receiving data from the DM61 meter.

Installation

Figure 11 shows the connection of a DM61 meter to a PC using the 101B224-06 serial adapter. The 101B224-06 has an RJ45 connector to connect the Cat5e cable and a PC compatible 9-pin D subminiature connector (DB9). The DB9 can be connected directly to the PC or by using a standard serial extension cable.

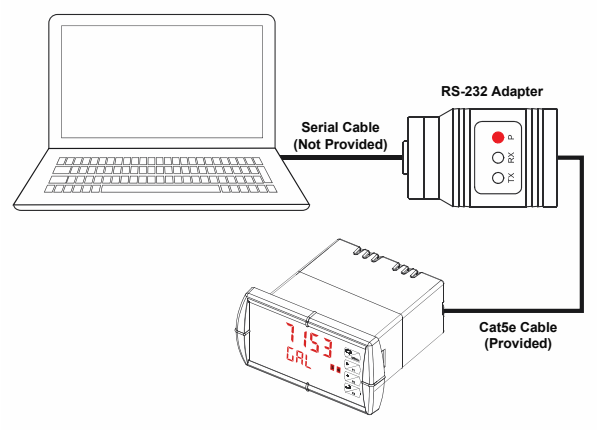

Figure 11. RS-232 Adapter Connections

Connections

A Cat5e cable is provided to connect the DM61 meter to the 101B224-06 serial adapter.

101B224-07 RS-485 Serial Adapter

Description

The 101B224-07 converts the serial output of the DM61 meter to balanced, full or half-duplex RS-485 signals.

The 101B224-07 has a removable screw terminal connector for the RS-485 terminals which includes Transmit Data (DO) and (/DO), Receive Data (DI) and (/DI), and Signal Ground. The adapter is provided by the DM61 meter M-Link connection.

Baud rates are adjustable and handled by the DM61 (see the DM61 Instruction Manual for more details).

The 101B224-07 has three diagnostic LEDs: a Power (P) LED to show when the adapter is powered properly, a Transmit Data (TX) LED to show when the adapter is sending data out from the PC side, and a Receive Data (RX) LED to show when the adapter is receiving data from the DM61 meter.

Installation

Figure 12 shows the connection of a DM61 meter to a PC using the 101B224-07 serial adapter and an RS-232 to RS-485 converter in an RS-422 network. The 101B224-07 has an RJ45 connector to connect the Cat5e cable and a screw terminal connector to connect to the RS-422 network.

Figure 13 shows the connection of DM61 meters with 101B224-07 serial adapters to a PC using an RS-232 to RS-485 converter in an RS-485 network.

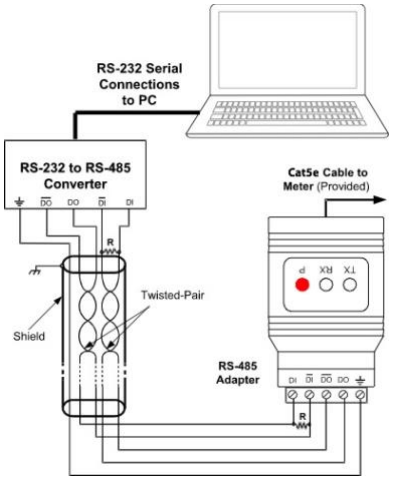

Figure 12. RS-422 or RS-485 Wiring

Notes:

1. Termination resistors are optional and values depend on the cable length and characteristic impedance. Consult the cable manufacturer for recommendations.
2. Use shielded cable, twisted-pairs plus ground. Connect ground shield only at one location.

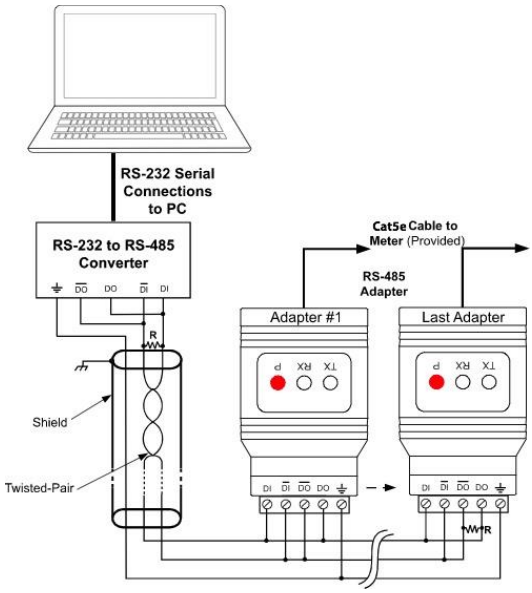

Figure 13. RS-485 Two-Wire Multi-Drop Wiring

Notes:

1. Termination resistors are optional and values depend on the cable length and characteristic impedance. Consult the cable manufacturer for recommendations.
2. Use shielded cable, twisted-pair plus ground. Connect ground shield only at one location.

Connections

A Cat5e cable is provided to connect the DM61 meter to the 101B224-07 adapter.

Figure 14 details the wiring connections from the 101B224-07 to an RS-485 serial converter for a four-wire network.

101B224-07 to RS-485 Serial Converter Connections	
RS-485 Serial Converter	**101B224-07 RS-485 Adapter**
⏚	⏚
$\overline{\text{DO}}$	$\overline{\text{DI}}$
DO	DI
$\overline{\text{DI}}$	$\overline{\text{DO}}$
DI	DO

Figure 14. Connections for 101B224-07 to Serial Converter

If the serial converter is configured for a two-wire network, then the requirement to externally wire the DO to the DI and the /DO to the /DI on the 101B224-07 screw terminal connector is needed.

101B224-08 USB Serial Adapter

Description

The 101B224-08 USB Serial Adapter allows for direct connection of a DM61 Series meter to the USB port of a PC. It is intended only for programming the meter when the meter is powered from AC or DC. Otherwise the USB cable provided with the meter can be used.

Installation

Figure 15 shows the connection of a DM61 meter to a PC using a 101B224-08 USB Serial Adapter.

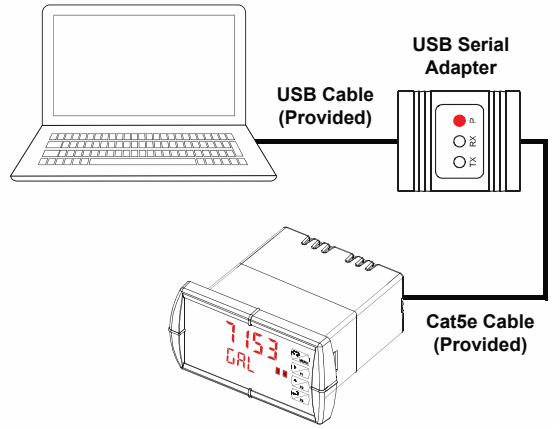

Figure 15. USB Adapter Connections

Driver Download
USB Drivers are available for download from the Documentation CD provided with every product.

101B224-09 USB to RS-232 Converter

Description

The 101B224-09 USB to RS-232 Converter allows for direct connection of a serial device to the USB port of a PC.

Installation

Figure 16 shows the connection of a DM61 meter to a PC using a 101B224-09 USB to RS-232 Converter, 101B224-06 RS-232 adapter, and the included Cat5e Cable.

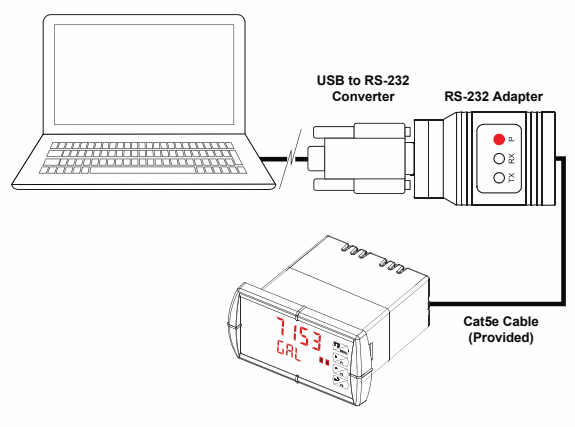

Figure 16. Connections for 101B224-09 to serial device

Driver Download
USB Drivers are available for download from the Documentation CD provided with every product.

Troubleshooting

Symptom	Check/Action
Power LED is off	101B224-06 or 101B224-07 1. Check modular cable connection 2. Check wall plug adapter output 3. Check USB connections 4. Try different USB port 5. Check USB port with other device
Meter not communicating with MeterView or other programs	Check: 1. Serial adapter and cable 2. Serial protocol selected 3. Meter address and baud rate 4. MeterView address and baud rate
If only the TX (or DATA IN) data status LED is flashing when serial communications attempted	Check: 1. Serial adapter and cable 2. Serial protocol selected 3. Meter address and baud rate 4. MeterView address and baud rate
If both data status LEDs (TX and RX) are off when trying to communicate	Remove all unnecessary cables and meters. Try getting the system to work with only one meter (to ease troubleshooting) and then expand the system one device at a time. 101B224-06: 1. Check serial cable 2. Connect the DB9 directly to the PC 3. Try a different serial port
Communications slow	Increase the baud rate
Random communication errors	1. Increase the TX delay time 2. Decrease the baud rate
Other symptoms not described above	Call Technical Support for assistance.

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