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Installation and Maintenance Instructions for Serial Communication Adapters

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ORDERING INFORMATION

Model	Description
101B224-05	DM61 Meter Copy Cable, 3' (0.9 m)
101B224-06	DM61 RS-232 Serial Adapter
101B224-07	DM61 RS-485 Serial Adapter
101B224-08	DM61 USB Serial Adapter
101B224-09	USB to RS-232 Non-Isolated Converter

SAFETY INFORMATION

⚠ **!**	⚡
CAUTION: Read complete instructions prior to installation and operation of the equipment.	**WARNING**: Risk of electric shock.

⚡ *WARNING*

Hazardous voltages could exist on serial communication wiring networks. Installation and service should be performed only by trained service personnel.

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SPECIFICATIONS

101B224-06 DM61 RS-232 Serial 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
DISTANCE	Adapter to DM61 meter: 6' (1.8 m) max; Adapter to 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 DM61 RS-485 Serial 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
DISTANCE	Adapter to DM61 meter: 6' (1.8 m) max; Adapter to 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 DM61 USB Serial Adapter

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
DISTANCE	Adapter to DM61 meter: 6' (1.8 m) max. USB connection: 10' (3 m) max
DRIVER	Windows 98/SE, ME, 2000, Server 2003/2008, XP 32/64-Bit, Vista 32/64-Bit, Windows 7 32/64-Bit
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
DRIVERS	Windows® 98/2000/ME/XP
DISTANCE	USB connection: 10' (3 m) max; RS-232 connection: 50' (15m) max
POWER	USB port

SERIAL COMMUNICATIONS OVERVIEW

RS-232, RS-422, 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 multipoint 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).

101B224-06 DM61 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 1 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.
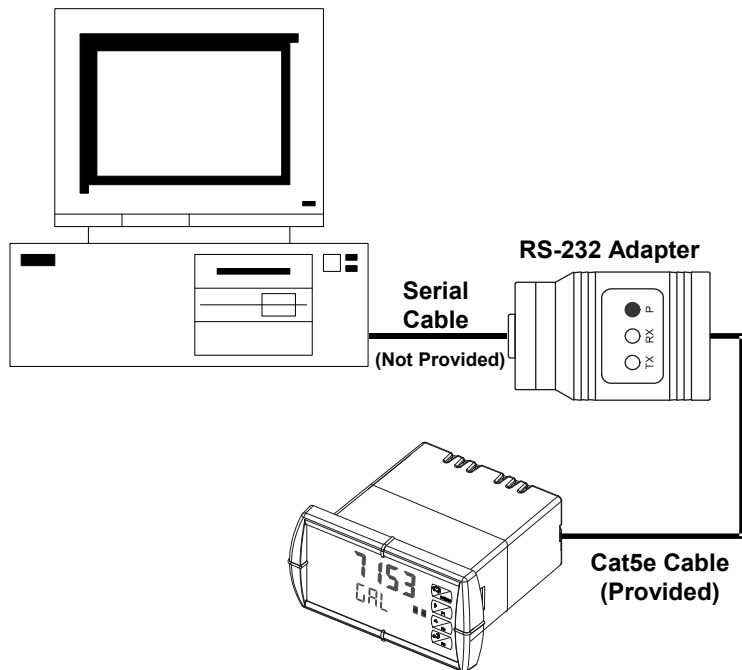

Figure 1. RS-232 Adapter Connections

Connections

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

DM61 Serial Communication Address (5Er iAL)

The DM61 meter is factory set to address 001.

To change the DM61 meter address:

1. Press and hold the **Menu** button for three seconds to access Advanced Features menu of the meter.
2. Press **Up** arrow until Serial (5Er iAL) menu is displayed and press **Enter**, AddrE5 is displayed.
3. Press **Enter** to change meter address using **Right** and **Up** arrow buttons. Press **Enter** to accept.
4. Press **Menu** button to exit and return to Run Mode.

101B224-07 DM61 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 RS-485 bus to the meter, and a Receive Data (RX) LED to show when the adapter is receiving data from the DM61 meter.

Installation

Figure 2 shows the connection of a DM61 meter to a single-point full-duplex RS-485 device using the 101B224-07 serial adapter. The 101B224-07 has an RJ45 connector to connect the Cat5e cable and a screw terminal connector to connect to the RS-485 network. Figure 3 shows the connection of several DM61 meters with 101B224-07 serial adapters to a multi-point half-duplex RS-485 network.

DM61 Serial Communication Address (5Er IAL)

When using more than one meter in a multi-drop or multi-point mode, each meter must be provided with its own unique address. For the DM61 meter the address may be programmed from 001 to 247. The DM61 meter is factory set to address 001.

To change the DM61 meter address:
1. Press and hold the **Menu** button for three seconds to access Advanced Features menu of the meter.
2. Press **Up** arrow until Serial (5Er IAL) menu is displayed and press **Enter**, AddrES is displayed.
3. Press **Enter** to change meter address using **Right** and **Up** arrow buttons. Press **Enter** to accept.
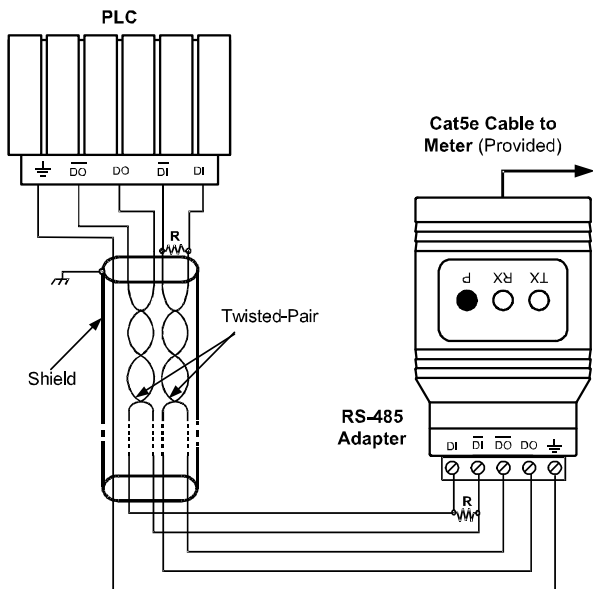4. Press **Menu** button to exit and return to Run Mode.

Figure 2. RS-485 Full-Duplex Four-Wire Wiring

Notes:

1. Termination resistors are optional and values depend on the cable length and characteristic impedance. Consult the cable manufacturer for recommendations.

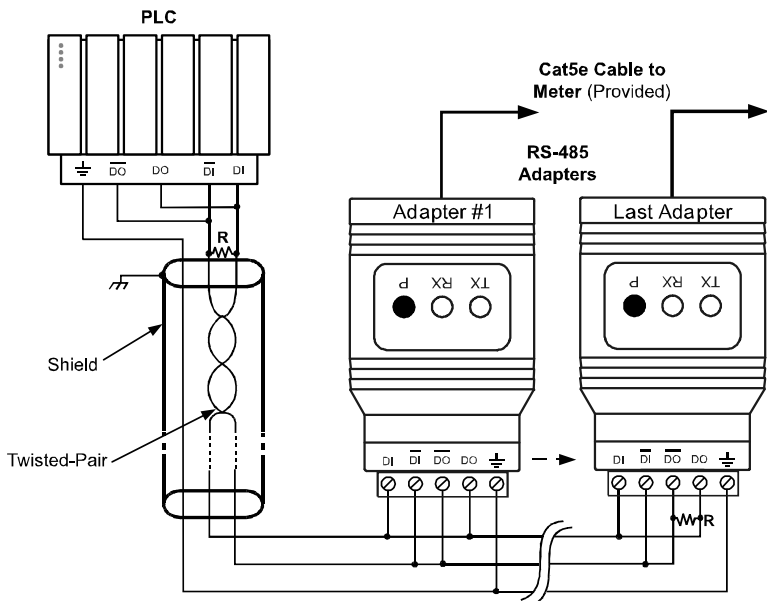2. Use shielded cable, twisted-pairs plus ground. Connect ground shield only at one location.

Figure 3. RS-485 Half-Duplex (Multi-Drop) Two-Wire 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 4 details the wiring connections from the 101B224-07 to a full-duplex RS-485 four-wire network device.

101B224-07 to RS-422/485 Serial Converter Connections	
RS-485 Full-Duplex Device	**101B224-07 RS-485 Adapter**
⏚	⏚
$\overline{DO}$	$\overline{DI}$
DO	DI
$\overline{DI}$	$\overline{DO}$
DI	DO

Figure 4. Connections for 101B224-07 to RS-485 Device

If the RS-485 device 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 DM61 TO USB SERIAL ADAPTER

Description

The 101B224-08 DM61 to USB Serial Adapter allows for direct connection of a DM61 Series meter to the USB port of a PC.

Installation

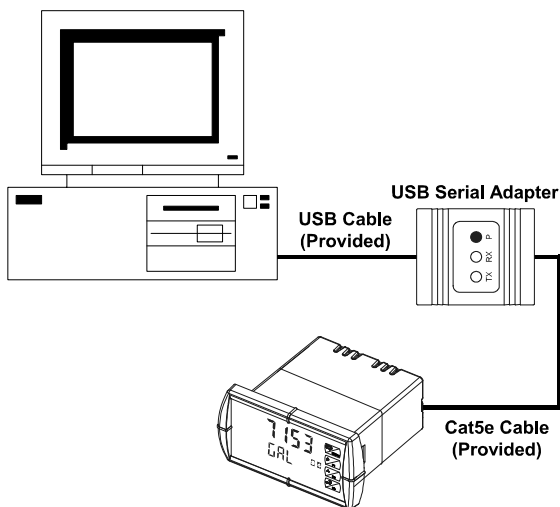Figure 22 shows the connection of a DM61 Series meter to a PC using a 101B224-08 DM61 to USB Serial Adapter.

Figure 22. USB Adapter Connections

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 23. shows the connection of a Trident meter to a PC using a 101B224-09 USB to RS-232 Converter, PDA7232 RS-232 adapter, and the PDA7420 Modular Cable.
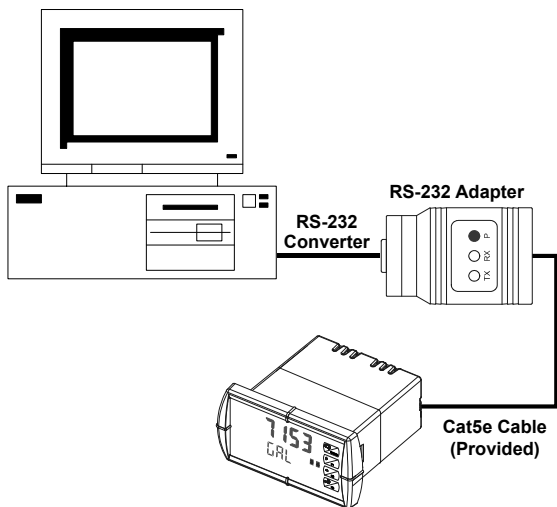

Figure 23. Connections for 101B224-09 to serial device

TROUBLESHOOTING

Symptom	Check/Action
Power LED is off	101B224-06 or 101B224-07: 1. Check modular cable connection 2. Check power to meter 101B224-08: 1. Check USB connections 2. Try different USB port 3. Check USB port with other device
Meter not communicating with DproM or other programs	Check: 1. Serial adapter and cable 2. Serial protocol selected 3. Meter address and baud rate 4. Software 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.