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DPA1200, DPA1232, DPA1485, DPA7485-I, DPA7485-N DPA8008, DPA8232-N, DPA8485-I, & DP8485-N

Serial Communication Converters & Adapters

Serial Communication Converters & Adapters Instruction Manual

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ORDERING INFORMATION

Model	Description
DPA1200	Meter Copy Cable, 3' (0.9 m)
DPA1232	RS-232 Serial Adapter
DPA1485	RS-485 Serial Adapter
DPA7485-I	RS-232 to RS-422/485 Isolated Converter
DPA7485-N	RS-232 to RS-422/485 Non-Isolated Converter
DPA8008	USB Serial Adapter
DPA8232-N	USB to RS-232 Non-Isolated Converter
DPA8485-I	USB to RS-422/485 Isolated Converter
DPA8485-N	USB to RS-422/485 Non-Isolated Converter
DP6000-SOFT	DP6000-SOFT Software for Meters
	FREE Download available at www.omega.com

SAFETY INFORMATION





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

DPA1232 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 meter: 6' (1.8 m) max; Adapter to computer: 50' (15 m) max; serial interface cable not provided
POWER	Powered by meter M-Link connection
STATUS INDICATION	Separate LEDs for Power (P), Transmit (TX), and Receive (RX)

DPA1485 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 meter: 6' (1.8 m) max; Adapter to computer: 3,937' (1,200 m) max
POWER	Powered by meter M-Link connection
STATUS INDICATION	Separate LEDs for Power (P), Transmit (TX), and Receive (RX)

DPA7485 RS-232 to RS-422/485 Converter

COMPATIBILITY	EIA-232, EIA-422, and EIA-485	
CONNECTORS	Screw terminal connector and DB9	
DISTANCE	RS-232 connection: 50' (15 m) max; RS-422/485 connec- tion: 3,937' (1,200 m) max	
NUMBER OF UNITS	Up to 31 RS-485 compatible devices	
POWER	9-12 VDC; 115 VAC/12 VDC adapter included	
STATUS INDICATION	Separate LEDs for Power (P), Transmit (TX), and Receive (RX)	
ISOLATION	DPA7485-I: 1500 VAC between data lines; 700 VDC input/output-to-power	
	DPA7485-N: 1500 VAC between data lines only	

Serial Communication Converters & Adapters Instruction Manual DPA8008 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 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)	

DPA8232 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	

DPA8485 USB to RS-422/485 Converter

COMPATIBILITY	USB 1.1, USB 2.0, EIA-422, and EIA-485
CONNECTORS	Screw terminal connector and USB Type B
DRIVERS	Windows [®] 98/2000/ME/XP, Linux 2.4 & greater
DISTANCE	USB connection: 10' (3 m) max; RS-422/485 connection: 3,937' (1,200 m) max
NUMBER OF UNITS	Up to 31 RS-485 compatible devices
POWER	USB port
STATUS INDICATION	Separate LEDs for Power (P), Transmit (TX), and Receive (RX)
ISOLATION	DPA8485-I: 1500 VAC between data lines; 700 VDC input/output-to-power
	DPA8485-N: 1500 VAC between data lines only

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

Serial Communication Converters & Adapters Instruction Manual

Alpha 6203C. A two-wire system requires two twisted pairs, and a fourwire system requires three twisted pairs (the extra twisted pair is needed for the signal ground).

Figure 1 illustrates how to connect a general four-wire network (a fourwire network actually contains 5 wires).



Figure 1. General Four-Wire Network Connection

Figure 2 illustrates how to connect a general two-wire network (a twowire network actually contains 3 wires). Note that the DPA7485 and DPA8485 have DIP switches that allow for two-wire connections without the need to externally wire the DO to the DI and the /DO to the /DI (see the converter section for complete details).



Figure 2. General Two-Wire Network Connection

DPA1232 RS-232 SERIAL ADAPTER



Description

The DPA1232 converts the serial output of the 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 meter M-Link connection.

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

The DPA1232 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 meter.

Serial Communication Converters & Adapters Instruction Manual Installation

Figure 3 shows the connection of a meter to a PC using the DPA1232 serial adapter. The DPA1232 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 3. RS-232 Adapter Connections

Connections

A Cat5e cable is provided to connect the meter to the DPA1232 serial adapter.

Serial Communication Address (5Er ,RL)

For the meter, the address may be programmed from 001 to 247. The meter is factory set to address 001.

To change the 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 RL) menu is displayed and press **Enter**, Rddr E5 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.

DPA1485 RS-485 SERIAL ADAPTER



Description

The DPA1485 converts the serial output of the meter to balanced, full or half-duplex RS-485 signals.

The DPA1485 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 meter's M-Link connection.

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

The DPA1485 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 meter.

Installation

Figure 4 shows the connection of a meter to a PC using the DPA1485 serial adapter and a DPA7485 RS-232 to RS-422/485 converter in an RS-422 network. The DPA1485 has an RJ45 connector to connect the Cat5e cable and a screw terminal connector to connect to the RS-422 network. Figure 5 shows the connection of several meters with DPA1485 serial adapters to a PC using a DPA7485 RS-232 to RS-422/485 converter in an RS-485 network.

Serial Communication Address (5Er IRL)

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 meter the address may be programmed from 001 to 247. The meter is factory set to address 001.

To change the meter address:

- 1. Press and hold the **Menu** button for three seconds to access Advanced Features menu of the meter.
- Press Up arrow until Serial (5Er RL) menu is displayed and press Enter, Rddr E5 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 4. 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.
- Refer to RS-232 to RS-422/485 Converter documentation for further details.
- 3. Use shielded cable, twisted-pairs plus ground. Connect ground shield only at one location.



Figure 5. 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. Refer to RS-232 to RS-485 Converter documentation for further details.
- 3. Use shielded cable, twisted-pair plus ground. Connect ground shield only at one location.

Connections

A Cat5e cable is provided to connect the meter to the DPA1485 adapter.

Figure 6 details the wiring connections from the DPA1485 to an RS-422/485 serial converter (such as the DPA7485 or DPA8485) for a four-wire network.

DPA1485 to RS-422/485 Serial Converter Connections	
RS-422/485 Serial Converter	DPA1485 RS-485 Adapter
누	····
DO	DI
DO	DI
DI	DO
DI	DO

Figure 6. Connections for DPA1485 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 DPA1485 screw terminal connector is needed.

DPA7485 RS-232 TO RS-422/485 CONVERTER



Description

The DPA7485 converts unbalanced, full-duplex RS-232 signals to balanced, full or half-duplex RS-422 or RS-485 signals.

The RS-232 port, configured as a DTE 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 RS-485 terminal blocks support Transmit Data (DO) and (/DO), Receive Data (DI) and (/DI), and Signal Ground. A separate terminal block supports the power input (+12VDC) and power ground (GND).

Baud rates are automatic and handled by the DPA7485.

The DPA7485 has three diagnostic LEDs: a Power (P) LED to show when the converter is powered properly, a Transmit Data (TX) LED to show when the converter is sending data out from the PC side, and a Receive Data (RX) LED to show when the converter is receiving data from the network side.

The DIP switch SW1 is located between the screw terminal connectors and allows for system configurations.

Serial Communication Converters & Adapters Instruction Manual Installation

The DIP switch SW1 allows for several different options. Factory settings for the switch are shown in Figure 7.



Figure 7. DPA7485 Terminal Connectors and DIP Switch

The TERM switch position adds an internal 120 ohm termination resistor when ON (up). Termination should be used on both ends of the network with high data rates and long wiring runs.

To configure a two-wire network set both of the 2 WIRE switch positions to ON (up). For a four-wire network set both of the 2 WIRE switches to OFF (down).

When the RS422 switch position is ON (up) it is configured for an RS-422 network. For RS-485 networks set the RS422 switch to OFF (down).

The ECHO switch position allows the data being sent from the RS-232 port to be echoed back into the RS-232 port. In most networks, this is an undesired effect and the ECHO switch would be OFF (down).

DPA7485 DIP Switch Settings		
SW1 Switch Position	ON Setting Function	
1	Network Termination Included (120 ohm)	
2	2-Wire Network Mode Connection (factory setting)	
3	2-Wire Network Mode Connection (factory setting)	
4	RS-422 Mode	
5	ECHO Mode	

Figure 8. DPA7485 DIP Switch Settings

Serial Communication Converters & Adapters Instruction Manual Connections

To power the DPA7485, connect 12 VDC to the +12VDC and ground to the GND screw terminals from the supplied 115 VAC/12 VDC adapter.

The DPA7485 may be configured for either a four-wire or two-wire network. Figure 9 details the wiring connections from the DPA7485 to an RS-422/485 serial device in a four-wire network.

DPA7485 to RS-422/485 Serial Device Four-Wire Connections		
DPA7485 Serial Converter	RS-422/485 Serial Device	
ᆛ		
DO	DI	
DO	DI	
DI	DO	
DI	DO	

Figure 9. Connections for DPA7485 in a Four-Wire Network

Figure 10 details the wiring connections from the DPA7485 to an RS-422/485 serial device in a two-wire network when the DIP switches on the DPA7485 have been set to the "2-Wire Mode".

DPA7485 to RS-422/485 Serial Device Two-Wire Connections		
DPA7485 Serial Converter	RS-422/485 Serial Device	
	÷	
DO	DATA	
DO	DATA	

Figure 10. Connections for DPA7485 in a Two-Wire Network

The DPA7485 internally connects the /DI to the /DO and the DI to the DO when the DIP switches are set to "2-Wire Mode". Either the /DI or /DO could be used to connect to /DATA and either the DI or DO could be used to connect to DATA.

Two DPA7485 RS-232 to RS-422/485 Serial Converters could be used as a serial extender to allow RS-232 serial devices to communicate over long distances. This would allow an RS-232 device to operate up to 3,937' (1,200 m).

DPA8008 TO USB SERIAL ADAPTER



Description

The DPA8008 to USB Serial Adapter allows for direct connection of a meter to the USB port of a PC.

Installation

Figure 22 shows the connection of a meter to a PC using a DPA8008 to USB Serial Adapter.



Figure 22. USB Adapter Connections

DPA8232 USB TO RS-232 CONVERTER



Description

The DPA8232 USB to RS-232 Converter allows for direct connection of a serial device to the USB port of a PC.

DPA8485 USB TO RS-422/485 CONVERTER



Description

The DPA8485 converts USB to balanced, full or half-duplex RS-422 or RS-485 signals.

The DPA8485 has a removable screw terminal connector for the RS-422/485 terminals which includes Transmit Data (DO) and (/DO), Receive Data (DI) and (/DI), and Signal Ground.

Baud rates are automatic and handled by the DPA8485.

The DPA8485 has three diagnostic LEDs: a Power (P) LED to show when the converter is powered properly, a Transmit Data (TX) LED to show when the converter is sending data out from the PC side, and a Receive Data (RX) LED to show when the converter is receiving data from the network side.

The DIP switch SW1 is located inside the case and allows for system configurations.

Serial Communication Converters & Adapters Instruction Manual Installation

The DIP switch SW1 allows for several different options. Factory settings for the switch are shown in Figure 24.



Figure 24. DPA8485 DIP Switch Location

The termination switch position adds an internal 120 ohm termination resistor when ON (up). Termination should be used on both ends of the network with high data rates and long wiring runs.

To configure a two-wire network set both of the 2-wire switch positions to ON (up). For a four-wire network set both of the 2-wire switches to OFF (down).

When the RS-422 switch position is ON (up) and the RS-485 switch position is OFF (down) it is configured for an RS-422 network. When the RS-422 switch position is OFF (down) and the RS-485 switch position is ON (up) it is configured for an RS-485 network.

DPA8485 DIP Switch Settings		
SW1 Switch Position	ON Setting Function	
1	Network Termination Included (120 ohm)	
2	2-Wire Network Mode Connection (factory setting)	
3	2-Wire Network Mode Connection (factory setting)	
4	RS-422 Mode	
5	RS-485 Mode (factory setting)	

Figure 25. DPA8485 DIP Switch Settings

Serial Communication Converters & Adapters Instruction Manual Connections

The DPA8485 is powered by the USB port.

The DPA8485 can be configured for either a four-wire or two-wire network. Figure 26 details the wiring connections from the DPA8485 to an RS-422/485 serial device in a four-wire network.

DPA8485 to RS-422/485 Serial Device Four-Wire Connections		
DPA8485 Serial Converter	RS-422/485 Serial Device	
÷	÷	
DO	DI	
DO	DI	
DI	DO	
DI	DO	

Figure 26. Connections for DPA8485 in a Four-Wire Network

Figure 27 details the wiring connections from the DPA8485 to an RS-422/485 serial device in a two-wire network when the DIP switches on the DPA8485 have been set to the "2-Wire Mode".

DPA8485 to RS-422/485 Serial Device Two-Wire Connections		
DPA8485 Serial Converter	RS-422/485 Serial Device	
÷	늰	
DO	DATA	
DO	DATA	

Figure 27. Connections for DPA8485 in a Two-Wire Network

The DPA8485 internally connects the /DI to the /DO and the DI to the DO when the DIP switches are set to "2-Wire Mode". Either the /DI or /DO could be used to connect to /DATA and either the DI or DO could be used to connect to DATA.

TROUBLESHOOTING

Symptom	Check/Action
Power LED is off	 DPA1232 or DPA1485: Check modular cable connection Check power to meter DPA7485: Check wall plug adapter output Check power connection polarity DPA8485, or DPA8008: Check USB connections Try different USB port 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 5. Check DIP switch setting on the DPA7485 or DPA8485
If only the TX (or DATA IN) data status LED is flashing when serial communications attempted	 Check: Serial adapter and cable Serial protocol selected Meter address and baud rate MeterView address and baud rate Check DIP switch setting on the DPA7485 or DPA8485
If both data status LEDs (TX and RX) are off when trying to com- municate	Remove all unnecessary cables and meters. Try getting the system to work with only one meter (to ease trouble- shooting) and then expand the system one device at a time. DPA1232 or DPA7485: 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	 Increase the TX delay time Decrease the baud rate
Other symptoms not described above	Call Technical Support for assistance.

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