SP385A-R3, SP390A-R3

USB TO RS-232 OR RS-422/485 ISOLATED CONVERTER

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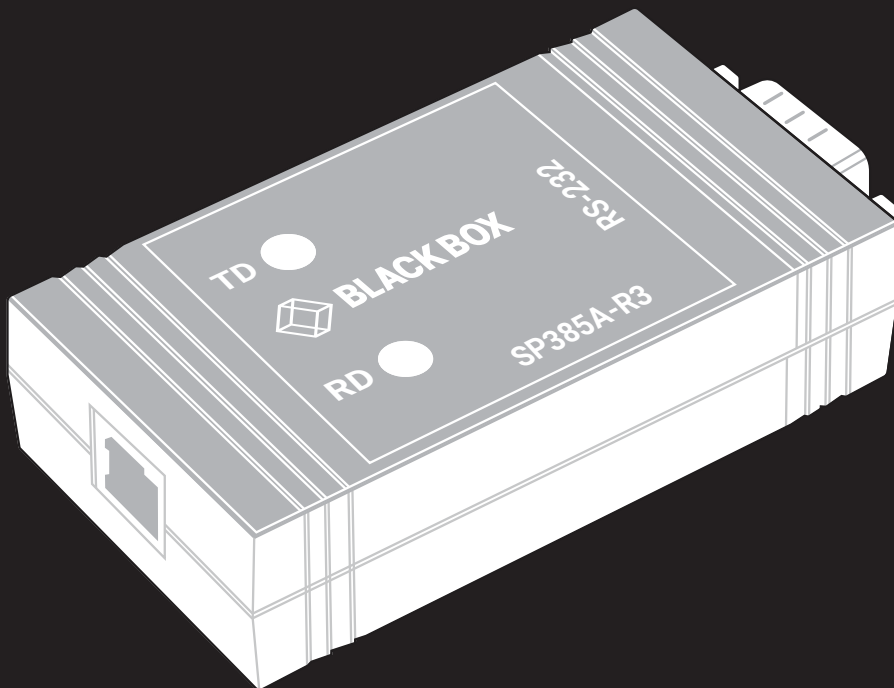
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CHAPTER 1: SPECIFICATIONS

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SPECIFICATIONS		
	SP385A-R3	**SP390A-R3**
COMPATIBILITY	USB 1.0 and 2.0 (full-speed)	USB 1.0 and 2.0 (full-speed)
ISOLATION	Serial port: 2 kV	Serial port: 15 kV
MTBF	247,713 hours	2,267,777 hours
OPERATING SYSTEM	Windows 2000, XP (32/64 bit), Vista (32/64 bit), 7 (32/64 bit), 8 (32/64 bit), 10 (32/64 bit), 2003 & 2008 Server (32/64 bit)	Windows 2000, XP (32/64 bit), Vista (32/64 bit), 7 (32/64 bit), 8 (32/64 bit), 10 (32/64 bit), 2003 & 2008 Server (32/64 bit)
SPEED	Serial port data rate: 460.8 kbps; USB port speed: 12 Mbps (full)	Serial port data rate: 460.8 kbps; USB port speed: 12 Mbps (full)
CONNECTORS	(1) DB9 male, (1) USB Type B	(1) 5-pin pluggable terminal block, (1) USB Type B
TEMPERATURE	Operating: 32 to 158° F (0 to 70° C); Storage: -40 to +185° F (-40 to +85° C)	Operating: 32 to 158° F (0 to 70° C); Storage: -40 to +185° F (-40 to +85° C)
HUMIDITY	Operating: 0 to 95%, non-condensing	Operating: 0 to 95%, non-condensing
POWER	Source: USB bus powered; Consumption: Low-power device (less than 100 mA)	Source: USB bus powered; Consumption: Low-power device (less than 100 mA)
DIMENSIONS	1.7"H x 3"W x 0.9"D (4.3 x 7.7 x 2.3 cm)	1.7"H x 3.5"W x 0.8"D (4.3 x 8.9 x 2.1 cm)
WEIGHT	6.4 oz. (0.18 kg)	6.4 oz. (0.18 kg)

CHAPTER 2: OVERVIEW

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2.1 INTRODUCTION

Use this compact, isolated USB to RS-232 or RS-422/485 converter to add an RS-232 or RS-422/485 port to your USB-only PC. Built to rugged specifications with 2 or 15 kilovolts of isolation, it protects your PC from hazardous ground loops. It's ideal for use in instrumentation and laboratory environments.

One USB port is required for each installed device. The port can be native to the PC or it can be a USB port from an installed USB hub to the PC. The USB port supports full speed (12 Mbps) USB 2.0.

NOTE: The devices work with USB 1.1 or 2.0 ports, but have a maximum USB data rate of 12 Mbps.

The RS-232 port is a DB9 male connector wired as a DTE with full hardware handshake support. It handles RS-232 data rates up to 460.8 kbps.

The RS-422/485 port is a 5-pin pluggable terminal block that also handles RS-422/485 data rates up to 460.8 kbps.

Model SP385A-R3 supports RS-232 communications, and is ideal for shorter distances (the maximum cable length is 50 feet [15.2 m]). In fields such as laboratory automation or surveying, RS-232 devices may continue to be used. Some types of programmable logic controllers, variable-frequency drives, servo drives, and computerized numerical control equipment are programmable via RS-232.

Model SP390A-R3 is a USB to one port RS-422/485 converter. Supporting 2-wire RS-485 or a 4-wire RS-422/485 communications, this device is great for any application that requires long range or multi-drop capabilities. The converter uses pluggable terminal blocks on the RS-422/485 side and a pair of LEDs that indicate data being transmitted or received. Model SP390A-R3 includes special circuitry that adds 2000 volts isolation protection against ground loops and voltage spikes. The product draws power from the USB port so no power supply is required.

Simply plug the converter into an available USB port on your computer or USB hub and the device will show up as an additional COM port in the Windows Device Manager. Configured as an additional COM port, the converter is now compatible with your Windows applications.

RS-485 Control

No special software is required to control the RS-485 receiver or transmit line driver. The driver is automatically enabled during each byte transmitted in RS-485 mode. The transmitter is always enabled in RS-422 mode. The receiver is tri-stated during each byte transmitted in the echo-off mode. The receiver is always enabled in the echo-on mode. There are 4.7 kOhm pull-up/pull-down resistors on the RDA and RDB lines. A termination resistor may be added to R16 if needed.

2.2 FEATURES

- SP385A-R3 Provides 2-kV isolation

- SP390A-R3 provides 15-kV surge protection

- Protects against ESD (4 kV contact, 8 kV air)

- Features a compact in-line case

- Compatible with USB 2.0 full-speed (12 Mbps) devices

- Supports RS-232 or RS-422/485 data rates up to 460.8 kbps

- Powered by the USB bus, so no power supply is needed

CHAPTER 2: OVERVIEW

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2.3 WHAT'S INCLUDED

SP385A-R3:

◆ USB to RS-232 Isolated Converter

◆ 3-ft. (0.914-m) USB Cable

SP390A-R3:

◆ USB to RS-422/485 Isolated Converter

◆ 3-ft. (0.914-m) USB Cable

2.4 HARDWARE DESCRIPTION

2.4.1 SP385A-R3

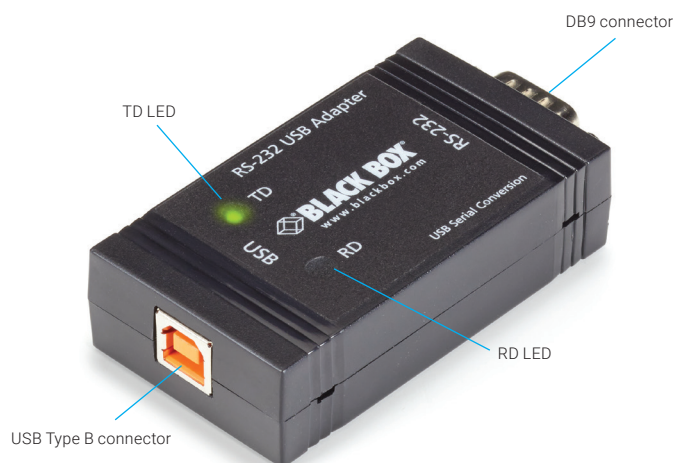Figure 2-1 shows the SP385A-R3. Table 2-1 describes its components.

FIGURE 2-1. SP385A-R3

TABLE 2-1. SP385A-R3 COMPONENTS

NUMBER IN FIGURE 2-1	TYPE	TYPE
1	USB Type B connector	Links to USB device
2	TD LED	Transmit data
3	RD LED	Receive data
4	DB9 connector	Links to RS-232 device

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2.4.2 SP390A-R3

Figure 2-2 shows the SP390A-R3. Table 2-2 describes its components.
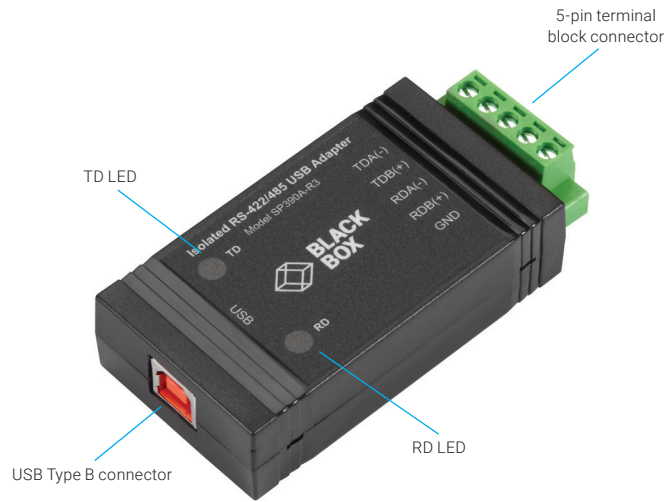
FIGURE 2-2. SP390A-R3

TABLE 2-2. SP390A-R3 COMPONENTS

NUMBER IN FIGURE 2-2	TYPE	TYPE
1	USB Type B connector	Links to USB device
2	TD LED	Transmit data
3	RD LED	Receive data
4	5-pin terminal block	Links to RS-422/485 device

DIP switches allow the SP390A-R3 to be configured for two-wire or four-wire, RS-422 or RS-485 modes. In two-wire mode the TDA (-) and RDA (-) are tied together and so are TDB (+) and RDB (+), making multi-dropping this converter into an existing network easy.

NOTE: If you have the SP385A-R3, you can skip this step.

Set the DIP switches on the SP390A-R3 for 2- or 4-wire operation.

TABLE 3-1. SP390A-R3 DIP SWITCHES

DIP SWITCH NUMBER	OFF	ON
1	TD always enabled (TD 422)	TD only enabled during data transmission (TD 485)
2	RD always enabled (ECHO ON)	RD disabled during data transmission (ECHO OFF)
3	Four-wire mode (4-wire)	Two-wire mode (2-wire)
4	Four-wire mode (4-wire)	Two-wire mode (2-wire)

Follow the instructions in Sections 4-1 through 4-3 to install the isolated converter.

4.1 PLUG IN THE CONVERTER

1. Using the included USB cable, plug the Converter into an available USB port on your PC or USB hub.

2. Using a serial cable (not included), plug the DB9 or terminal block connector on the converter into the RS-232 or RS-422/485 device.

4.2 CHECK THE INSTALLATION

1. Open Windows Device Manager.

2. Scroll down to Ports.

3. Expand ports by clicking on the plus sign. This shows if the ports now exist on the PC. If there are no exclamation points or other indicators of a problem, the ports should be installed correctly and ready for use.

4.3 VERIFY WITH A LOOPBACK TEST

1. For RS-232 or 4-wire RS-485, verify with a loopback test. See RS-232 or RS-422/485 pinout chart for location of pins.

NOTE: For 2-wire RS-485, you cannot do a loopback test as it uses the same two wires for transmit and receive in a half-duplex operation. The unit can either transmit or receive it cannot do both at the same time.

2. Using Hyperterminal or a similar program, connect to the appropriate COM port. Set the baud rate. Make sure Hyperterminal local echo is OFF.

NOTE: Hyperterminal is not provided with Windows Vista or 2003 Server.

3. Transmit data. If the same character string is returned, the test is good.

4.3.1 RS-232 PINOUT FOR SP385A-R3

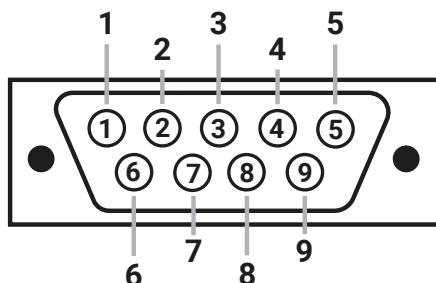Figure 4-1 shows the DB9 RS-232 connector. Table 4-1 describes its pinouts.

FIGURE 4-1. DB9 RS-232 CONNECTOR PINOUT

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TABLE 4-1. RS-232 AND TTL PINOUT (DB9 MALE DTE)

PIN NUMBER	SIGNAL NAME	RS-232 SIGNALS	TTL SIGNALS
1	DCD (Data Carrier Detect)	Input	Not used
2	RD (Receive Data)	Input	Input
3	TD (Transmit Data)	Output	Output
4	DTR (DTE Ready)	Output	Not used
5	SG (Signal Ground)	Ground	Ground
6	DSR (DCE Ready)	Input	Not used
7	RTS (Request to Send)	Output	Output
8	CTS (Clear to Send)	Input	Input
9	RI (Ring Indicator)	Input	Not used

4.3.2 RS-422/485 PINOUT FOR SP390A-R3

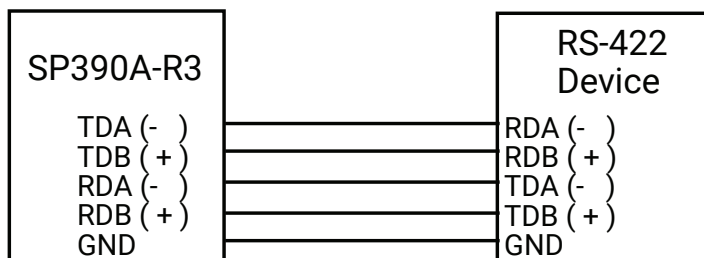Figures 4-2 and 4-3 ahow the 2- and 4-wire RS-422/485 pinouts for the SP390A-R3.

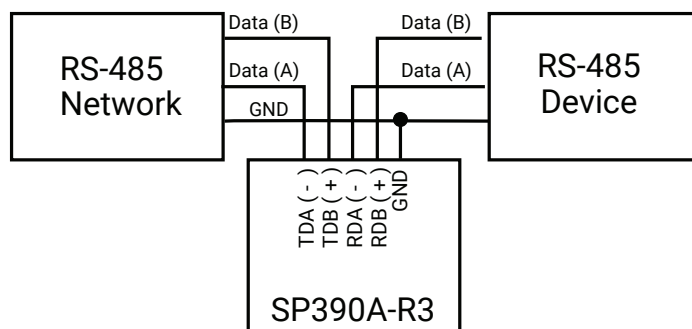FIGURE 4-2. SP390A-R3 IN A FOUR-WIRE SETUP WITH ALL SWITCHES IN THE OFF POSITION

FIGURE 4-3. SP390A-R3 IN A TWO-WIRE SETUP WITH ALL SWITCHES IN THE ON POSITION

APPENDIX A: REGULATORY INFORMATION

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A.1 FCC STATEMENT

This equipment has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Shielded cables must be used with this equipment to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

All power supplies are certified to the relevant major international safety standards.

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APPENDIX A: REGULATORY INFORMATION

A.2 NOM STATEMENT

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.

2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.

3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objetos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:
    A: El cable de poder o el contacto ha sido dañado; u
    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o
    C: El aparato ha sido expuesto a la lluvia; o
    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
    E: El aparato ha sido tirado o su cubierta ha sido dañada.

APPENDIX B: DISCLAIMER/TRADEMARKS

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B.1 DISCLAIMER

Black Box Corporation shall not be liable for damages of any kind, including, but not limited to, punitive, consequential or cost of cover damages, resulting from any errors in the product information or specifications set forth in this document and Black Box Corporation may revise this document at any time without notice.

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