



2-Port USB 1.1 CAT5 Extender

Extend USB connections beyond the desktop,
as far as 131 feet (40 m) over CAT5 cable, to two
USB devices.



Customer Support Information

Order toll-free in the U.S.: Call 877-877-BBOX (outside U.S. call 724-746-5500)
FREE technical support 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746
Mailing address: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: www.blackbox.com • E-mail: info@blackbox.com

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This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

Instrucciones de Seguridad (Normas Oficiales Mexicanas Electrical Safety 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 debe 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 conectado 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 física 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 líneas de energía.
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 líquidos 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: Objetos 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.

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1. Specifications

Current Available to USB Device at Remote Unit — 400 mA shared between devices when the local extender is supplied with 800 mA

Distance (Maximum)* — Full-Speed and Low-Speed: 131 feet (40 m);
Low-Speed: Up to 278 feet (85 m)

USB Device Support — High-speed devices (USB 2.0) at full-speed (USB 1.1) rates;
Full-speed devices (USB 2.0 and USB 1.1);
Low-speed devices (USB 2.0 and USB 1.1)

USB Host Support — XHCI (USB 3.0), EHCI (USB 2.0) and OHCI/UHCI (USB 1.1)

USB Hub Support — Any single chain can include up to (3) USB hubs, depending on which USB devices are being extended.
Extension distance will be reduced with each hub added to the system.

Connectors — Local Extender Unit: (1) USB Type B, (1) RJ-45 (CAT5 interconnect);
Remote Extender Unit: (1) RJ-45 (CAT5 interconnect), (2) USB Type A

Temperature — Operating: 32 to 122° F (0 to 50° C);
Storage: -4 to +158° F (-20 to +70° C)

Relative Humidity — Operating: 20 to 80%, noncondensing;
Storage: 10 to 90%, noncondensing

Power — Local Extender Unit: From the host device's USB interface;
Remote Extender Unit: From the Local Extender;
Available Power: 400 mA shared between USB ports when transmitter is supplied with 800 mA of bus power

Size — Each unit (local or remote): 0.9"H x 2.2"W x 3.3"D (2.3 x 5.6 x 8.4 cm)

**NOTE: Device and host dependent.*

2. Overview

2.1 Introduction

Use CAT5 cable to extend connections to USB peripherals such as keyboards, mice, interactive whiteboards, and other devices without the need for external power adapters. The extender is composed of two individual units: the local extender and the remote extender.

The local extender receives power from the host computer, making it ideal for extensions in industrial control, sensor, or data acquisition applications where you are short on power outlets. The extender supplies up to 400 mA to USB devices and is industrial rated for ESD/EFT (electrostatic discharge/electrically fast transient) immunity.

Also, the extender's remote unit has two downstream USB Type A ports for plugging in USB 1.1 or 2.0 devices. The extender supports 130-foot (40 m) extensions over non-networked CAT5 cabling, but for some low-speed HID devices (keyboards and mice, for instance), it can go as far as 278 feet (85 m).

You don't need to add any software to your system or target devices. Simply attach the transmitter to your computer's USB port, plug in the CAT5 cable, attach the remote USB peripheral to the receiver, and begin transmitting.

2.2 Features

- Reliably extend USB 1.0 or 2.0 signaling over CAT5 cable to remote USB devices.
- Bus powered. No external AC adapter needed at either end.
- Industrial rated for ESD immunity.
- Supports both Full-Speed (12-Mbps) and Low-Speed (1.5-Mbps) throughput.
- Works with all major operating systems (Windows®, Mac OS X®, and Linux®).
- Includes 6-foot (1.8-m) USB cable for transmitter-to-host computer connection.
- Plug-and-play. No software drivers to load.

2.3 What's Included

Your package should include the following items. If anything is missing or damaged, contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

- (1) Local Extender Unit
- (1) Remote Extender Unit
- (1) 6-ft. (1.8-m) USB 2.0 A-B cable
- Quick start guide
- To download this user manual, go to ftp://ftp.blackbox.com/anonymous/manuals/I/IC282A_rev1-USER.pdf.

2.4 What You Need to Supply

To complete the installation, you will require the following items that are not included:

- USB compatible computer (host computer) with a USB compliant operating system.
- USB devices
- CAT5 Unshielded Twisted Pair (UTP) cable with two RJ-45 connectors (if using surface cabling), OR CAT5 cabling with two information outlets and two CAT5 patch cords with RJ-45 connectors (if using premise cabling)

NOTE: All references to CAT5 cable in this document represent the minimum cable requirement of solid-core CAT5e unshielded twisted-pair cable. Or, you can substitute CAT6 or better or STP cable.

2.5 Hardware Description

Figure 2-1 shows the side panels of the Local Extender Unit. Table 2-1 describes the local extender components. Figure 2-2 shows the side panels of the Remote Extender Unit. Table 2-2 describes the remote extender components.

2.5.1 Local Extender

The local extender connects to the host computer using the supplied USB A–B cable.

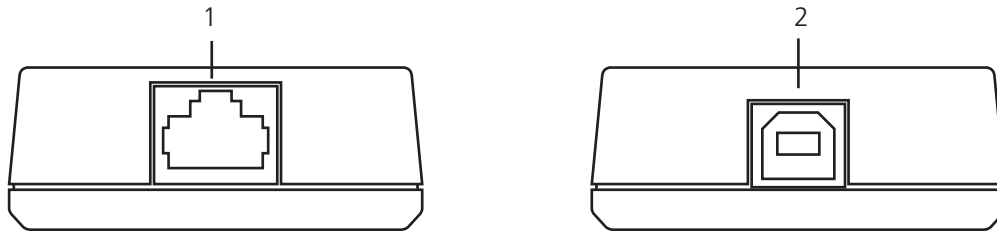


Figure 2-1. Side panels of the local extender.

Table 2-1. Local Extender components.

Item	Component	Description
1	Link Port (RJ-45)	Accepts RJ-45 connector for CAT5e cabling.
2	Device Port (USB Type B)	Used to connect the local extender to the host computer.

2.5.2 Remote Extender

The remote extender provides two downstream Type A ports for standard USB devices. Additional devices may be connected via USB hubs.

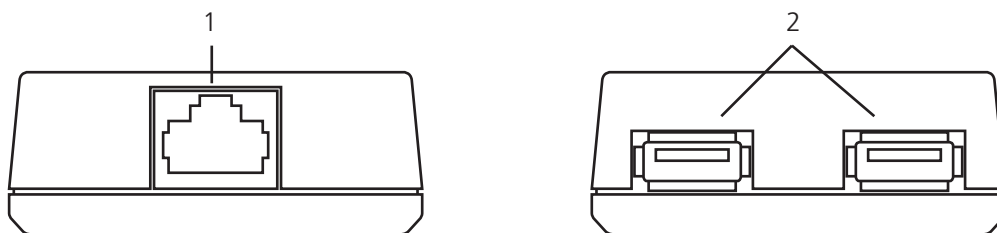


Figure 2-2. Side panels of the remote extender.

Table 2-2. Remote Extender components.

Item	Component	Description
1	Link Port (RJ-45)	Accepts RJ-45 connector for CAT5 cabling.
2	Device Port (USB Type A)	Used to connect the remote extender to a USB device.

2.6 Typical Application

Figure 2-3 shows a typical installation of the extender.

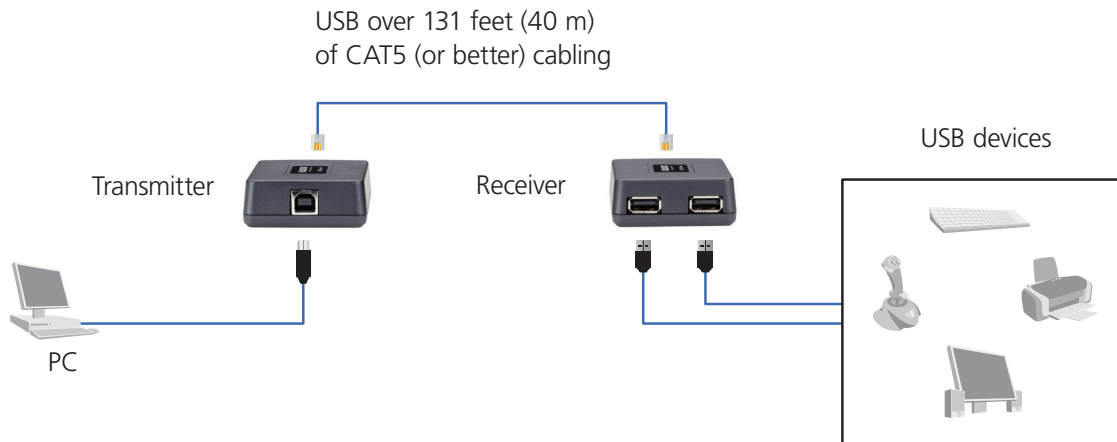


Figure 2-3. Sample installation.

3. Installation

3.1 Preparing Your Site

NOTE: The maximum extension length is reduced by 43.3 feet (13.2 m) for each USB hub added between the host computer and the end device.

NOTE: Extender systems cannot be daisychained. An extender system can have only one local extender and one remote extender.

Follow these steps to prepare your site:

1. Determine where the host computer will be located and set up the computer.
2. Determine where you want to locate the remote USB device(s).
3. Make sure the cable run (including patch cables) between the host computer and the USB device(s) is no greater than 131 feet (40 m).

3.2 Installing the Local Extender Unit

1. Place the local extender near the host computer.
2. Plug the supplied USB cable into the local extender and into an available USB port on the computer.

3.3 Installing the Remote Extender Unit

Place the remote extender near the USB device(s) at the desired remote location.

3.4 Connecting the Local Extender to the Remote Extender

If you are using surface cabling, follow these steps:

1. Plug one end of the CAT5 cable (not included) into the Link port (RJ-45) on the local extender.
2. Plug the other end of the CAT5 cable into the Link port (RJ-45) on the remote extender.

If you are using premise cabling, follow these steps:

1. Plug one end of a CAT5 patch cord (not included) into the Link port (RJ-45) on the local extender.
2. Plug the other end of the patch cord into the CAT5 information outlet near the host computer.
3. Plug one end of a second CAT5 patch cord (not included) into the Link port (RJ-45) on the remote extender.
4. Plug the other end of the second patch cord into the CAT5 (RJ-45) information outlet near the USB device.

3.5 Connecting a USB Device

1. On the host computer, install any software required to operate the USB device. If necessary, refer to the documentation for the USB device(s).
2. Connect the USB device(s) to the device port(s) on the remote extender.

Chapter 4: Troubleshooting

4. Troubleshooting

4.1 Problems/Solutions

Table 4-1 provides troubleshooting tips. The solutions are arranged in the order in which they should be executed in most situations. If you are unable to resolve the problem after following these instructions, contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

Table 4-1. Troubleshooting tips.

Problem	Cause	Solution
The USB device does not operate correctly.	<ul style="list-style-type: none">• The USB device is malfunctioning.• The computer does not recognize the USB device.• The application software for the USB device is not operating.	<ol style="list-style-type: none">1. Un-install and re-install the driver for the USB device.2. Update the driver for the USB device.3. Directly connect the USB device to the host to verify that the USB device operates correctly.
The USB device is detected as an "Unknown Device" in the operating system.	<ul style="list-style-type: none">• The host computer or USB device may not be capable of supporting extreme distances.• The USB device's timing does not conform to the USB 1.1 specification.	<ol style="list-style-type: none">1. Connect the local extender to the remote extender using a short cable.2. Unplug the local extender from the host and wait 15 seconds. Then, plug the local extender back into the host.
The operating system reports that a power surge occurred or that the USB device is using too much power.	<ul style="list-style-type: none">• The host is not providing enough power to the extender.	<ol style="list-style-type: none">1. Connect the local extender to a different USB port on the host.2. Connect a self-powered USB hub between the remote extender and the USB device.

4.2 Contacting Black Box

If you determine that your 2-Port USB CAT5 Extender is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

4.3 Shipping and Packaging

If you need to transport or ship your 2-Port USB CAT5 Extender:

- Package it carefully. We recommend that you use the original container.
- If you are returning the unit, make sure you include everything you received with it. Before you ship for return or repair, contact Black Box to get a Return Authorization (RA) number.

5. Technical Glossary

Category 5 (CAT5) Network Cabling — Category 5 cable is commonly also referred to as CAT5. This cabling is available in either solid or stranded twisted pair copper wire variants and as UTP (Unshielded Twisted Pair) or STP (Shielded Twisted Pair). UTP cables are not surrounded by any shielding making them more susceptible to electromagnetic interference (EMI). STP cables include shielding over each individual pair of copper wires that provides better protection against EMI. Category 5 has been superseded by CAT5e cabling, which includes improved data integrity to support high-speed communications.

USB Cables — USB cables have two distinct connectors. The Type A connector is used to connect the cable from a USB device to the Type A port on a computer or hub. The Type B connector is used to attach the USB cable to a USB device.

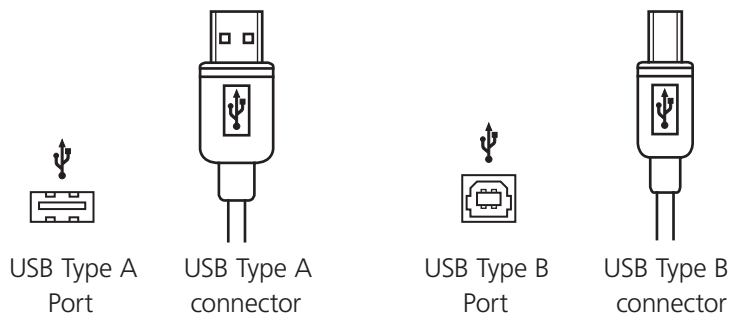


Figure 5-1. USB cables.

RJ-45 — The Registered Jack (RJ) physical interface is what connects the network cabling (CAT5) to the local extender and remote extender. You may use either the T568A scheme (Table 5-2) or the T568B scheme (Table 5-3) for cable termination because the extender uses all four pairs of the cable. RJ-45 connectors are sometimes also referred to as 8P8C connectors.

RJ-45 Pin Positioning —

Table 5-2. T568A wiring.

Pin	Pair	Wire	Cable Color
1	3	1	White/Green
2	3	2	Green
3	2	1	White/Orange
4	1	2	Blue
5	1	1	White/Blue
6	2	2	Orange
7	4	1	White/Brown
8	4	2	Brown

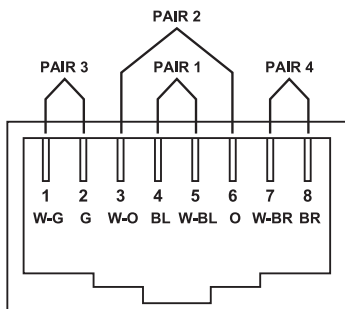


Figure 5-2. T568A connector pinout.

Table 5-3. T568B wiring.

Pin	Pair	Wire	Cable Color
1	2	1	White/Orange
2	2	2	Orange
3	3	1	White/Green
4	1	2	Blue
5	1	1	White/Blue
6	3	2	Green
7	4	1	White/Brown
8	4	2	Brown

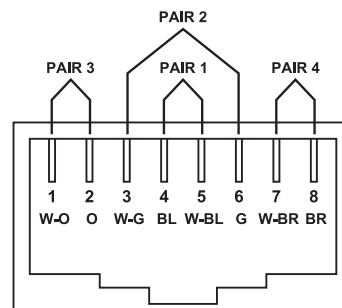


Figure 5-3. T568B connector pinout.

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About Black Box

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