BLACK BOX®
NETWORK SERVICES

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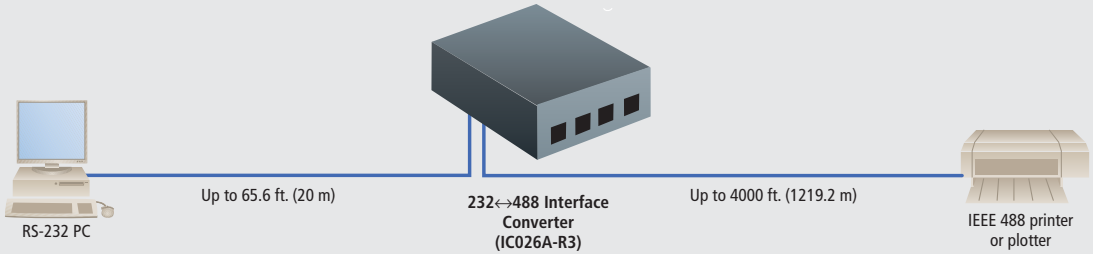
232↔488 Interface Converter

Integrate serial devices onto an IEEE 488 bus, communicate with serial equipment, or extend the bus.

FEATURES

- Requires no programming changes for most applications.
- Runs at speeds up to 57.6 kbps.
- Interface is RS-232 or RS-422.

Connect an RS-232 PC to an IEEE 488 printer or plotter with the converter.



OVERVIEW

Whether your industrial applications include oscilloscopes, meters, plotters, printers, or other industrial equipment, Black Box has the converter you need.

Imagine being able to control an industrial device from your RS-232 PC. With the converter, you can attach an RS-232 device to an IEEE 488 device. The distance between the converter and the IEEE 488 device can be up to 4000 feet (1219.2 m). The distance between the RS-232 device and the converter can be up to 65.6 feet (20 m). (See the diagram pictured above.)

Interconnecting IEEE 488 and serial devices is easy with the 232↔488 Interface Converter. The device can operate in either of two modes: In controller mode, it enables an RS-232 device to control an IEEE 488 device, such as a printer or plotter. In peripheral mode, it can transfer data from an IEEE 488 controller to a serial device.

And because it runs at a wide range of speeds—from 110 bps to 57.6 kbps—it's flexible for your application.

The converter's dynamically allocated 32K buffer is there when and where you need it. It will store data from whichever port is active. Because no specific buffer is allocated to each port, no buffer space is wasted and incoming data has access to storage when it needs it.

The converter's transparent to data format, so it will work with spreadsheets (such as Lotus®) or CAD programs (such as AutoCAD®).

A self-testing feature checks the microprocessor and program each time you power on. All you have to do is plug in the unit and turn on the power. The lights on the front panel blink once to indicate proper operation. A steady light indicates a problem area, except for the power light, which always stays on.

You can run RS-232 or RS-422, so you don't need another converter to work with your RS-422 equipment.

And even if you have an older HP® 74xx or 75xx plotter, the unit adapts your old plotter to the serial communications port of your PC.

The converter comes with an external wallmount power supply (9 VDC) that plugs into the back of the unit.

NOTE: This unit is compatible with any IEEE 488 device except tape drives, hard drives, or HP 2500, HP 2600, or HP 2900 printers.

IEEE 488.

IEEE 488 (also known as GPIB or General Purpose Interface Bus) is an international standard for a parallel interface that has greatly simplified the connection of sensors and programmable instruments to a computer. With it, instruments from different manufacturers can be connected by a single standard cable.

Two IEEE 488 standards are in use: the older IEEE 488.1 standard, which deals with the hardware only, and the newer IEEE 488.2 standard, which also addresses software issues like data formats and error handling.

IEEE 488.1 is a clearly defined mechanical, hardware, and electrical protocol specification. It doesn't address data formats, status reporting, message-exchange protocol, or common configuration or device-specific commands.

IEEE 488.2 enhances the IEEE 488.1 standard by specifying data formats, status reporting, error handling, controller functionality, and common instrument commands. It focuses mainly on the software protocol issues and thus maintains compatibility with the hardware-oriented IEEE 488.1 standard. IEEE 488.2 systems tend to be more compatible and reliable.

Most devices can be adapted to the IEEE 488 specification. The specification says nothing about the function of the device itself, or about the form of the device's data. Instead, it defines a separate interface that can be added to the device. Only the signals passing into the interface from the IEEE 488 bus and from the device are defined in the standard.

There are three classes of devices that can be connected to the IEEE 488 bus: Listeners, Talkers, and Controllers. Some devices include more than one of these functions. The IEEE 488 standard allows a maximum of 15 devices to be connected on one bus. A minimum system consists of one Controller and one Talker or Listener device.

A Controller is the device that sends instructions. It's possible to have several Controllers on the bus at once but only one may be active at a time. The Controller that's in charge at the moment is called the Active Controller.

The Controller that's in charge of the entire bus is called the System Controller. It has several unique capabilities, including the ability to send Interface Clear (IFC) and Remote Enable (REN) commands. IFC clears all device interfaces and returns control to the System Controller. REN allows devices to respond to bus data once they are addressed to listen. The System Controller may optionally pass control to another Controller, which then becomes the Active Controller.

A Listener is a device that can receive data from the bus when instructed by the Controller. A Talker transmits data on the bus when instructed. The Controller can set up a Talker and a group of Listeners to send data between groups of devices.

The IEEE 488 interface system consists of 16 signal lines and 8 ground lines. The 16 signal lines are divided into 3 groups (8 data lines, 3 handshake lines, and 5 interface-management lines).

The lines DIO1 through DIO8 are used to transfer addresses and control information and data. The formats for addresses and control bytes are defined by the IEEE 488 standard. Data formats are undefined and may be ASCII or binary. DIO1 is the Least Significant Bit.

The three handshake lines (NRFD, NDAC, DAV) control the transfer of message bytes among devices and form the method for acknowledging the transfer of data. This handshaking process guarantees that bytes on the data lines are sent and received without any transmission errors. It's one of the unique features of the IEEE 488 bus.

The Not Ready for Data (NRFD) handshake line is asserted by a Listener to indicate it is not yet ready for the next data or control byte. Note that the Controller will not see NRFD released (meaning the devices are ready for data) until all devices have released it.

The Not Data Accepted (NDAC) handshake line is asserted by a Listener to indicate it has not yet accepted the data or control byte on the data lines. Note that the Controller will not see NDAC released (i.e., data accepted) until all devices have released it.

The Data Valid (DAV) handshake line is asserted by the Talker to indicate that a data or control byte has been placed on the data lines and has had the minimum specified stabilizing time. The byte can now be safely accepted by the devices.

Five interface management lines (ATN, EOI, IFC, REN, SRQ) manage the flow of control.

The Attention (ATN) signal is asserted by the Controller to indicate that it is placing an address or control byte on the data bus.

The End or Identify (EOI) signal has two uses. A Talker may assert EOI simultaneously with the last byte of data to indicate end-of-data. Or the Controller may assert EOI along with ATN to initiate a parallel poll. Although many devices do not use parallel poll, all devices should use EOI to end transfers.

The Interface Clear (IFC) signal is used by the System Controller in order to initialize all device interfaces to a known state.

The Remote Enable (REN) signal is used by the System Controller. REN enables a device to go into remote mode when addressed to listen. When in remote mode, a device will ignore its local front-panel controls.

The Service Request (SRQ) line is like an interrupt: it may be asserted by any device to request the Controller to take some action. The Controller must determine which device is asserting SRQ by conducting a serial poll. The requesting device releases SRQ when it's polled.

TECH SPECS

General:
Certification — FCC, CE
Data Buffer — 32 KB, dynamically allocated
Data Format — 7 or 8 data bits, 1 or 2 stop bits; parity odd, even, mark, space, or disabled
User Controls — Power switch (external), IEEE and Serial parameter switches (internal); Jumper selection of RS-232 or RS-422 operation (internal)
Interface — IEEE 488; RS-232/RS-422
Indicators — (5) LEDs: Talk, Listen, Send, Receive, Power
Environment — 32 to 122°F (0 to 50°C); Up to 70% to 95°F (35°C) relative humidity; Linearly derate 3% relative humidity/degrees C from 95 to 122°F (35 to 50°C)
Power — Input: 100–240 VAC, autosensing, 50–60 Hz, 0.5 A maximum; Output: 9 VDC, 15 W maximum, 1.7 A
Size — 2.7"H x 5.4"W x 7.5"D (6.9 x 13.7 x 19.1 cm)
Weight — 2.5 lb. (1.1 kg); Power supply: 0.9 lb. (0.4 kg)

IEEE 488 Interface:
Implementation — C1, C2, C3, C4, and C28 controller subsets; Serial to IEEE: SH1, AH1, T6, TE0, L4, LE0, SR1, RL0, PP0, DC1, DT0, E1
Terminators — Selectable CR, LF, LF-CR, and CR-LF with EOI
Connectors — Standard IEEE 488 connector with metric studs

Serial Interface:
Character Set — Asynchronous bit serial
Data Format — Selectable 7 or 8 data bits; 1 or 2 stop bits; odd, even, mark, space, and no parity on transmit
Duplex — Full with Echo/No Echo
EIA RS-232C — AB, BA, BB, CA, CB
EIA RS-422A — Balanced voltage on TxD and RxD
Input Voltage — ±3 volts minimum; 15 volts maximum
Output Voltage — ±5 volts minimum (RS-232C); 5 volts typical (RS-422A)
Serial Control — Selectable CTS/RTS or X-ON/X-OFF
Speed — Selectable 110, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 19,200, and 57,600 bps
Terminators — Selectable CR, LF, LF-CR, and CR-LF
Connectors — DB25 male, DCE configured

Why Buy From Black Box? Exceptional Value. Exceptional Tech Support. Period.

Recognize any of these situations?

- **You wait more than 30 minutes to get through to a vendor's tech support.**
- **The so-called "tech" can't help you or gives you the wrong answer.**
- **You don't have a purchase order number and the tech refuses to help you.**
- **It's 9 p. m. and you need help, but your vendor's tech support line is closed.**

According to a survey by Data Communications magazine, 90% of network managers surveyed say that getting the technical support they need is extremely important when choosing a vendor. But even though network managers pay anywhere from 10 to 20% of their overall purchase price for a basic service and support contract, the technical support and service they receive falls far short of their expectations—and certainly isn't worth what they paid.

At Black Box, we guarantee the best value and the best support. You can even consult our Technical Support Experts before you buy if you need help selecting just the right component for your application.

Don't waste time and money—call Black Box today.

Item	Code
To link an RS-232 device to a 488 bus, order…	
232↔488 Interface Converter	**IC026A-R3**
You may also need…	
IEEE 488 Cable (with Molded Connectors)	
6.6-ft. (2-m)	**EXN02M**
13.1-ft. (4-m)	**EXN04M**
Individually Shielded Low-Capacitance Cables, Extra Distance, PVC, 4-Conductor	**ERN04A**