Integrity Instruments

485-9E
High Speed
Auto Enabled
RS-232 to RS-485
Converter
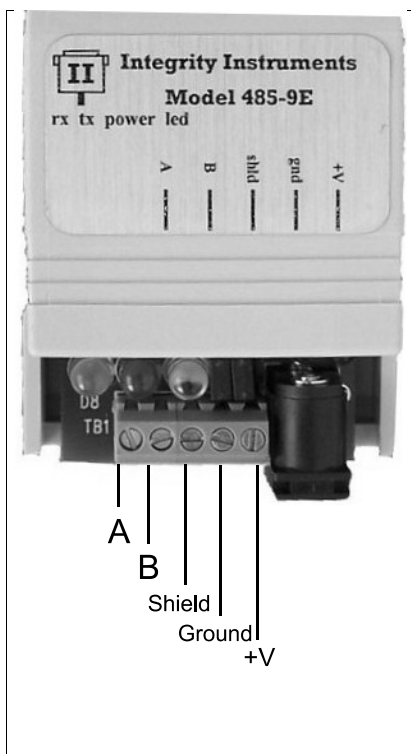
Integrity Instruments
Model 485-9E
rx tx power led

A
B
Shield
Ground
+V

Cabling Notes:

1) Gnd and Shld are connected internally within the **485-9E**
2) Cable termination is important for long distance and high-speed applications
3) **Suggested cable:** 24 awg stranded twisted pair with shield for cable runs in excess of 200 feet. See also Belden cable #9841 and #9463.
4) **Multiple power supplies:** Make sure that power supply +V outputs are **not** wired together.

RS-485 Cabling

The 485-9E is designed to operate in a Multi-Drop RS-485 LAN configuration. In a half-duplex mullti-drop environment all RS-485 nodes share the same data lines. A single pair of data lines act as both Transmit and Receive wires.
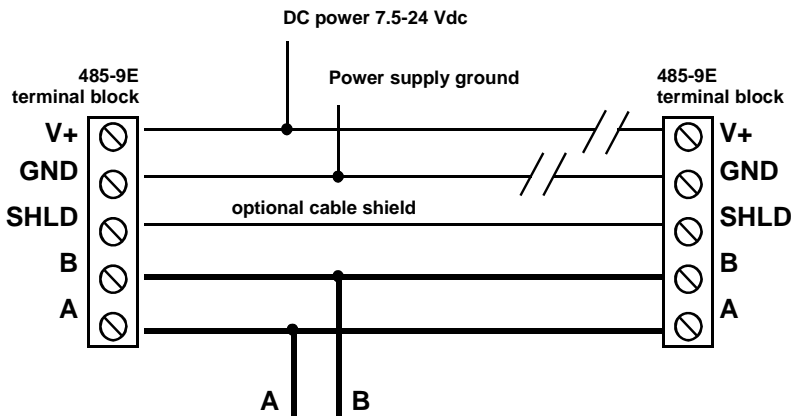
* Data lines (A/B) are the only wires required between RS-485 nodes
* All RS-485 nodes need not share the same V+ and GND

Performance Characteristics

DC input voltage min. (+V)	7.5 Vdc
DC input voltage maximum. (+V)	24 Vdc
DC input current nominal (+V)	45 ma
DC input current max. (+V)	250 ma
ESD static discharge (A/B)	1500 V
Baud Rate maximum	115.2 Kbps
Baud Rate minimum	600 bps
Number of RS-485 nodes	256
Maximum cable length	4000 feet +
Termination resistance	120 ohms
MPU (4 Mhz)	PIC12C508
RS-485 line driver	LTC1487

Power can be supplied to the terminal strip, or through the 2.5 mm power jack. If you supply power through the power jack, the power is available on the terminals strip also, and you can power other devices or other 485-9E converters.

DC power 7.5-24 Vdc

485-9E
terminal block

Power supply ground

485-9E
terminal block

V+

GND

SHLD

optional cable shield

B

A

A   B

Connect up 256 nodes on the same wire

RS-232 Cabling

The **485-9E** is designed to connect to DTE devices like an IBM-PC and expects the RS-232 transmitted data to be present on pin 3 of the DB9 connector. Conversely, the received data is output from the **485-9E** on pin 2 of the DB9 connector. If DCE wiring is needed use a NULL MODEM cable to switch the TxD and RxD signals as well as the RTS and CTS lines.

RS-232 TxD transmit (output):   DB9 pin 3
RS-232 RxD receive (input):   DB9 pin 2

RTS pin 7 connected to CTS pin 8.

CD pin 1 DSR pin 6 and DTR pin 4 are connected together.

LED Operation

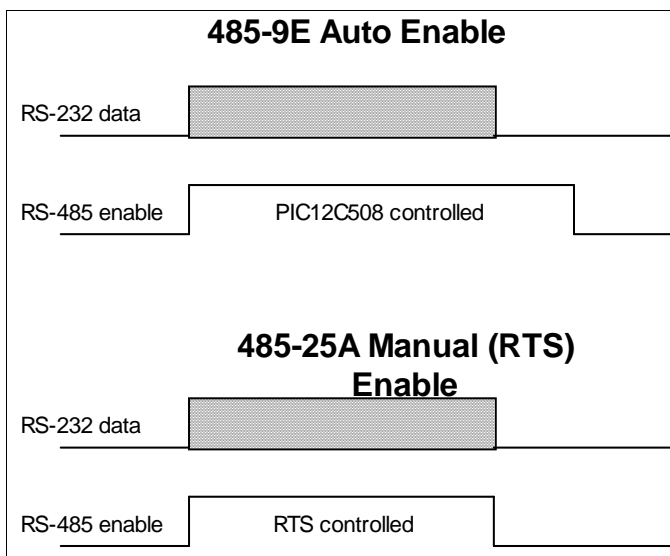The 485-29 provides a power status LED and transmit and receive LEDS.to aid in cabling problems and general operation.

SIGNAL LED RED: RS-232 transmit
SIGNAL LED GREEN: RS-485 receive
POWER LED YELLOW: Power On

Power Supply

The **485-9E** requires an external power supply for proper operation. We suggest a 9 Vdc 400 ma power supply. Power must be in the voltage range 7.5 Vdc to 24.0 Vdc.

485-9E Auto Enable

RS-232 data

RS-485 enable — PIC12C508 controlled

485-25A Manual (RTS) Enable

RS-232 data

RS-485 enable — RTS controlled

Auto Enable (Data Send Control)

The **485-9E** automatically handles the RS-485 half-duplex control via an adaptive algorithm running in the on-board PIC12C508 MPU. When RS-232 data is received, the RS-485 transmit enable is asserted immediately. After approximately one RS-232 byte time (auto detected baud rate) of no RS-232 data, the **485-9E** de-asserts RS-485 transmit enable and reverts back to RS-485 receive.

Conversely, other converters like our **485-25A** begin RS-485 transmit when the RTS line is asserted. RS-485 transmit continues until the RTS line is de-asserted.
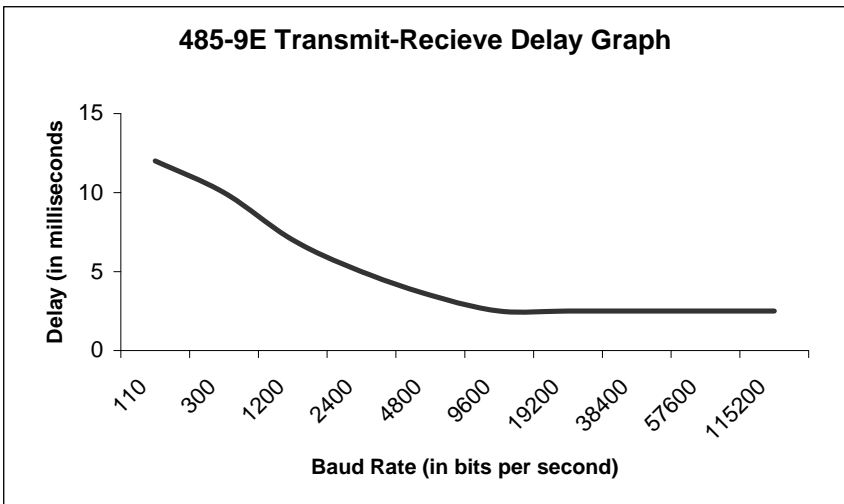
Note: When using the **485-9E** the responding RS-485 device must wait for the auto transmit enable to revert back to the receive state. If the responding RS-485 device transmits a packet back less than one RS-232 byte time after the end of the packet, then you should consider using our **XP485-9E**. The **XP485-9E** can be programmed so the turn around time back to the receive mode takes only microseconds.

Flow Control Options

The Microsoft Windows operating systems allow a user to select several RS-232 low control options. The **485-9E** supports both **Hardware** and **None** options. The Xon/Xoff flow control is supported only if your RS-485 target device supports Xon/Xoff.

None flow control setting is also supported by the **485-9E**. Since the **485-9E** monitors the RS-232 transmit line, it seizes the RS-485 transmit immediately and begins sending data when any RS-232 data is sent.

Regardless of the flow control method selected, the **485-9E** will automatically handle RS-485 transmit enable.

485-9E Transmit-Recieve Delay Graph

Delay (in milliseconds)

15

10

5

0

110 300 1200 2400 4800 9600 19200 38400 57600 115200

Baud Rate (in bits per second)

Baud Rate (bits per second)	Delay (milliseconds)
110	12
300	10
1200	7
2400	5
4800	3.5
9600	2.5
19200	2.5
38400	2.5
57600	2.5
115200	2.5

BUS Termination Jumpers

The **485-9E** is manufactured with jumpers to enable and disable termination. The two RS-485 nodes at the extreme ends of the cable require termination.

Jumpers Installed: Installing JP1 and JP2 provides both active termination (R1/R2) and passive termination (R3) as seen in the schematic. *Active termination is important at its guarantees a stable RxD signal and no false start bits!*
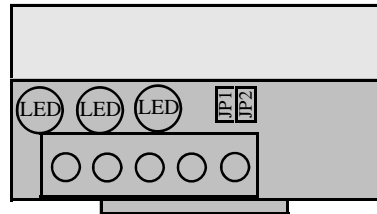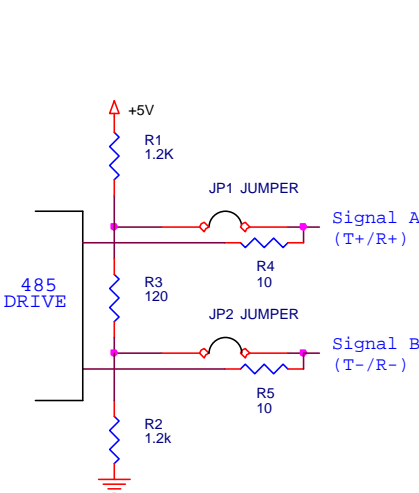

Jumpers Removed: No termination is provided at the converter.

NOTE: Ensure that only the two ends of the cable are terminated. Excessive termination will result in extreme line load and thereby adversely affect data transmission.

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3) Suggested cable: 24 awg stranded twisted pair with shield for cable runs in excess
   of 200 feet. See also Belden cable #9841 and #9463.
4) The normal connection method is the "Daisy Chain" type shown below.

| RS-485 DEVICE | RS-485 DEVICE | RS-485 DEVICE | RS-485 DEVICE | RS-485 DEVICE | RS-485 DEVICE |
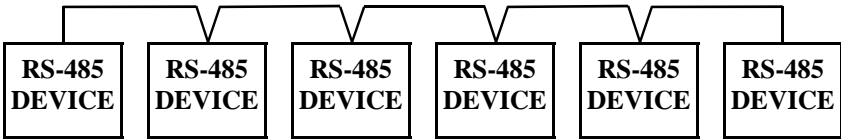
DAISY CHAIN

RS-485 Wire

Belden Caable Number	Number of pairs	DC Resistance ohms	Impedance ohms	Capaci-tance Pf per foot	Wire gauge	O.D. / shield
9841	1	24 ohms/ 1000 ft	120	12.8	24(7x32)	.232 / yes
9463	1	9.5 ohms/ 1000 ft	78	19.7	20(7x28)	.243 / yes