RS-232 to RS-485 Converter
– data LEDs, software driver control
Model BB-485TBLED

B+B SMARTWORX

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PRODUCT FEATURES

- Converts RS-232 signals to RS-485 signals
- Extends data communication up to 1219 meters (4000 ft)
- Data rate: up 115.2 kbps
- Quick inline installation
- Terminal block for easy wiring
- LEDs for Receive and Transmit data lines
- Multidrop capability - up to 32 receivers per driver
- 12 VDC power supply required (not included, sold separately)

OVERVIEW

Model BB-485TBLED converts unbalanced, full-duplex RS-232 signals to balanced, full or half-duplex RS-422 or RS-485 signals. RS-485 is an enhanced version of the RS-422 Standard allowing multiple drivers and receivers on a two-wire or four-wire system.

The RS-232 port, configured as a DCE port, has a female DB25 connector with pins 2 (TD input), 3 (RD output), and 7 (Signal Ground) supported. Pins 4 (RTS) and 5 (CTS) are tied together, and pins 6 (DSR), 8 (CD), and 20 (DTR) are also tied together. Pins 1 (Frame Ground) and 7 (Signal Ground) are connected straight through to the RS-485 terminal blocks. The RS-485 terminal blocks support Transmit Data (A-) and (B+), Receive Data (A-) and (B+), Frame Ground, Signal Ground, and +12 VDC input. **See Schematic.**

LEDS – TD & RD

Model BB-485TBLED has two LEDs: Transmit Data LED to show when the RS-485 driver is enabled and Receive Data LED showing data appearing at pin 3 of the RS-232 port. These are useful for determining if data is getting through the converter. Note that the TD LED indicates that the RS-485 driver is enabled. Data must be present on pin 2 of the RS-232 side for data to be transmitted out of the RS-485 side. If no data is present, no data will be transmitted even though the TD LED is illuminated.

FLOW CONTROL - JUMPERS

Model BB-485TBLED uses two different methods to enable the RS-485 driver: either by toggling Request to Send (pin 4) of the RS-232 side, or by automatic sensing of the data on Transmit Data (pin 2) of the RS-232 side. This option is user-selectable by setting push-on jumpers located next to the terminal blocks. **See Figure 1.** Also, by removing both sets of jumpers completely constantly enables the RS-485 driver and receiver. This makes the BB-485TBLED act like an RS-422 converter.

BAUD RATE - RESISTOR 9

Resistor R9 is a timing component on the converter, **see Figure 1**. This resistor is part of the automatic sensing circuit and affects the baud rate at which the converter can be used in a two-wire setup. It is factory selected to run at 9600 baud or higher. With this component, the RS-485 driver will shut off approximately 1ms after the last character has been sent. If you need to change the BB-485TBLED to a baud rate other than 9600 baud, you can change this component. To change the baud rate, remove R9 and add through-hole component R14, **see Table 1**. **Figures 2 and 3** show how to interconnect two RS-485 converters using 4-wire and 2-wire methods.

ORDERING INFORMATION

MODEL NUMBER	DESCRIPTION
BB-485TBLED	RS-232 to RS-485 Converter

The Echo jumper is used in the 2-wire mode, and allows you to prevent data being sent from the RS-232 port from being echoed back to the RS-232 port. Up to 32 receivers can be driven by any one RS-485 driver, allowing you to put together large systems with many drop points. If you are using termination resistors, they should be located at opposite ends of the system.

Proper operation of any RS-485 system requires the presence of a return path. The RS-485 Standard recommends that a third wire be used for this. For safety, a 100 Ohm resistor should be connected between Signal Ground and the "reference wire" at every drop point. While it may be possible to interconnect Signal Grounds directly, this is not recommended due to the danger of poissible circulating currents being present.

No wire type or maximum run length is listed in the RS-485 Standard. However, the RS-422 Standard (which is very similar) recommends number 24AWG twisted-pair telephone cable with a shunt capacitance of 16 picofarads per foot, and no more than 1219 meters (4000 ft) of distance.

POWERING

Model BB-485TBLED required a 12 VDC external power source (power supply not included, sold separately).

All product specifications are subject to change without notice.
485TBLED_3318ds

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Figure 1. R9 RESISTOR & BAUD RATE

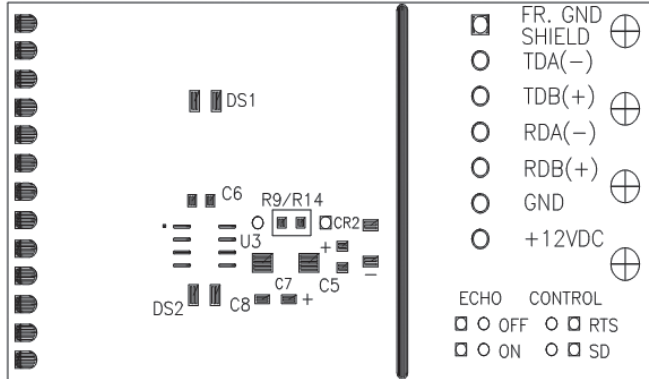## Table 1. RESISTOR REPLACEMENT FOR CHANGING BAUD RATE TIMEOUTS

BAUD RATE	TIME (MS)	RESISTOR R3 (OHM)
1200	8.33	820k
2400	4.16	430k
4800	2.08	200k
9600	1.04	100k
19200	0.520	56k
38400	0.260	27k
57600	0.176	16k
115200	0.0868	8.2k

SPECIFICATIONS

| SERIAL TECHNOLOGY	
RS-232 Connector	DB25 female
RS-485 Connector	Terminal block
Baud Rate	Up to 115.2 kbps
POWER	
Source	External (power supply required, not included, sold separately)
Input Voltage	9 to 14 VDC
MECHANICAL	
Enclosure	In-line mount, plastic
Dimensions	54.5 x 84.34 x 18.43 mm (2.14 x 3.32 x 0.725 in)
ENVIRONMENTAL	
Operating Temperature	0 to +70 °C
MEANTIME BETWEEN FAILURE (MTBF)	
MTBF	1850680 hours
MTBF Method	MIL 217F Parts Count Reliability Prediction
APPROVALS / DIRECTIVES / STANDARDS	
FCC, CE	
Directives	2014/30/EU – Electromagnetic Compatibility Directive (ECD) 2011-65/EU – Reduction of Hazardous Substances Directive (RoHS) 2012/19/EU – Waste Electrical and Electronic Equipment (WEEE)
Standards	EN 55032 Class B – Electromagnetic Compatibility of Multimedia Equipment – Emission Requirments EN 55024 - Information Technology Equipment - Immuity Characteristics – Limits and Methods of Measurement EN 61000-6-3 + A1 – Generic Emission Standard for Residential, Commercial and Light-industrial Environments (Class B) EN 61000-6-2 – Generic Immunity Standard for Industrial Environments

Figure 2. 4-WIRE RS-485
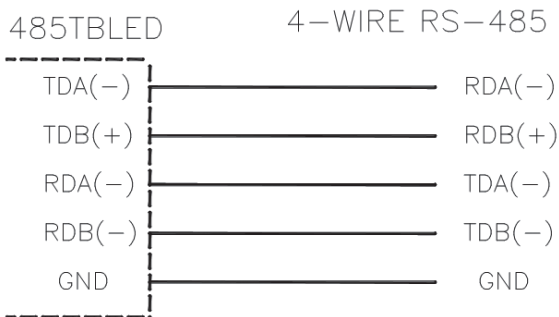
Figure 3. 2-WIRE RS-485
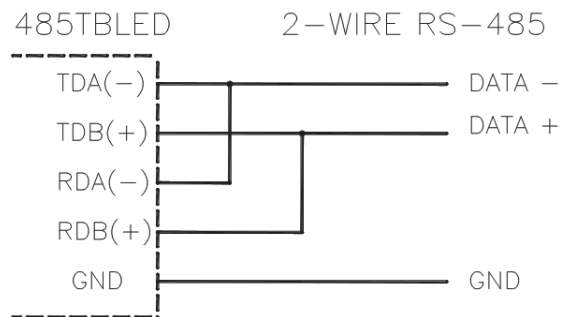
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SCHEMATIC

485TBLED