

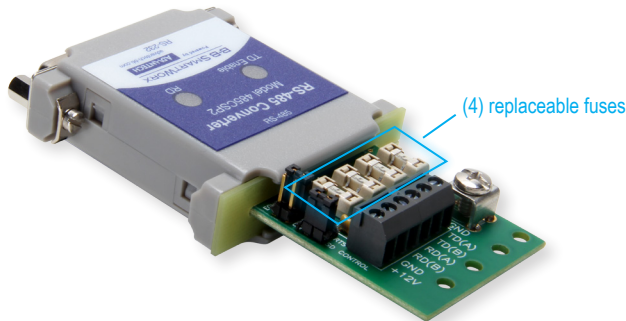
RS-232 to RS-485 Converter

– surge protection with replaceable fuses
Model BB-485CSP2

B+B SMARTWORX

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PRODUCT FEATURES

- Converts RS-232 signals to RS-485 signals
- Built-in surge protection – with replaceable fuses
- Data rate: 9.6 kbps
- Easy inline installation
- Automatic Send Data Control
- Extends data communication up to 1219 meters (4000 ft)
- Multidrop capability – up to 32 receivers per driver
- 12 VDC power supply required (not included, sold separately)

OVERVIEW

Model BB-485CSP2 converts unbalanced RS-232 signals to balanced, full or half-duplex RS-485 signals. It also provides transient surge protection and fast acting fuses on the RS-485 data lines. RS-485 is an enhanced version of the RS-422 Standard allowing multiple drivers and receivers on a two-wire system.

The RS-232 port has a female DB-25 connector with pins 2 (TD), 3 (RD), 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 485CSP2 has two LEDs, a Transmit Enable LED to show when the RS-485 driver is enabled, and a Receive Data LED showing data appearing at pin 3 of the RS-232 port. These are very useful for determining if data is getting through the converter. Note that the Transmit Enable LED indicates only that the 485 driver is enabled, data must be present on pin 2 of the 232 side for data to be transmitted out of the 485 side. If no data is present, no data will be transmitted even though the Transmit Enable LED is illuminated. 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 Figure 1.**

For the protection properties on Model BB-485CSP2 to work, the Frame Ground terminal block or pin 1 on the RS-232 side must be connected directly to a good frame (chassis, green wire, or earth) ground. This must be a low impedance connection for Model BB-485CSP2 to be effective.

JUMPER CONFIGURATION

The jumper labeled “CONTROL” sets the method in which the tristate of the RS-422/485 driver will be controlled. In the “RTS” position, the RS-422/485 driver must be controlled directly by Request to Send (pin 4) of the RS-232 side. Your software must be written to raise this output handshake line when transmitting out to the RS-422/485 system. When you are done transmitting, the handshake line must be lowered to allow other drivers on the line to transmit.

Putting the control jumper in “SD” position enables an automatic send data circuit that manages control of the RS-422/485 driver. The circuit senses the data on Transmit Data (pin 2) of the RS-232 side and turns on the RS-422/485 driver. When the data is done transmitting, Model BB-485CSP2 waits one millisecond before shutting off the RS-422/485 driver. This preset timeout allows continuous transmission of data at 9600 baud or higher. If other baud rates are desired, this timeout can be changed by changing the value of Capacitor C6 and Resistor R9 located on the PC board next to the terminal blocks. The resistor and capacitor values for different timeouts are shown in **Table 1.**

ORDERING INFORMATION

MODEL NUMBER	DESCRIPTION
BB-485CSP2	RS-232 to RS-485 Converter with surge protection

ACCESSORIES - sold separately

BB-SMI6-12-V-ST – Power Supply, 12 VDC 6 Watt, Stripped and Tinned, International AC Input, International AC Blades (power supply required)

BB-4F125 – 125 mA replacement fuses (kit of 4)

For RS-422 point-to-point operation, the control jumper can be removed completely. This leaves the driver constantly enabled. The jumper labeled “ECHO” determines when the RS-422/485 receiver will be disabled. Putting the echo jumper in the “ON” position leaves the receiver enabled at all times. The jumper should be in the “ON” position for any four-wire configuration. Putting the echo jumper in the “OFF” position disables the receiver when the driver is enabled. This position is useful in two-wire mode when you do not want to see an echo of the data sent from your RS-232 port.

INTERCONNECTION

Figure 2 shows how to interconnect two RS-485 converters using two wires. The termination resistors (Rt) are optional, depending on line length, baud rate, etc. The resistors should be about the impedance of the line used, but in no case should they be less than 120 Ohms each. 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 there should be no more than two and 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 circulating currents possibly 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 24 AWG twisted-pair telephone cable with a shunt capacitance of 16 picofarads per foot, and no more than 122 meters (4000 feet) of distance.

All product specifications are subject to change without notice.
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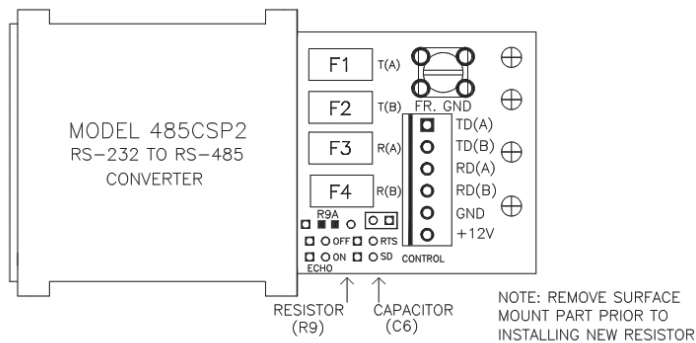
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Table 1. COMPONENT REPLACEMENTS FOR CHANGING BAUD RATE TIMEOUTS

BAUD RATE	TIME (MS)	RESISTOR R9 (OHM)	CAPACITOR (C6) (MFD)
300	33.3	330k	0.1
600	16.6	160k	0.1
1200	8.33	820k	0.01
2400	4.16	430k	0.01
4800	2.08	200k	0.01
9600	1.04	100k	0.01
19200	0.520	56k	0.01
38400	0.260	27k	0.01
57600	0.176	16k	0.01
115200	0.0868	8.2k	0.01

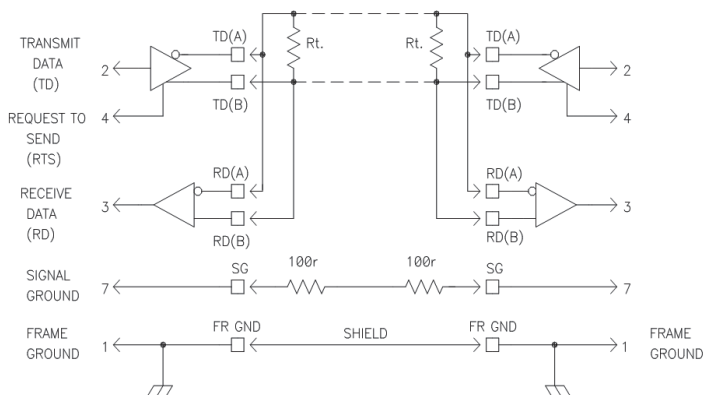
Figure 1. JUMPERS & TERMINAL BLOCKS



SPECIFICATIONS

SERIAL TECHNOLOGY	
RS-232 Connector	DB25 female
RS-485 Connector	Fused terminal block
Data Rate	Up to 9.6 Kbps
SURGE PROTECTION	
Surge Suppression	7.5V, bi-directional avalanche breakdown device. 500W peak power dissipation. Clamping time < 1 picosecond (theoretical). 6000 pF maximum capacitance.
Fuses	125mA ultra fast-acting type. 5 Ohms series resistance maximum. Size - 6.1L x 2.69W mm (Replacement fuses available, Model# BB-4F125)
POWER	
Source	External (power supply required, not included, sold separately)
Input Voltage	12 VDC, 100 mA
MECHANICAL	
Enclosure	In-line mount, plastic
MEANTIME BEFORE FAILURE (MTBF)	
MTBF	880634 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 Requirements EN 55024 - Information Technology Equipment - Immunity 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. INTERCONNECTION



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SCHEMATIC

