
rdcZBK User Manual

ZigBee to RS-232 / RS-485 Converter

1. Product Overview

The rdcZBK is basically a XBee / XBee Pro carrier board that provides either RS-485 or RS-232 connectivity to Digi's XBee / XBee Pro module. It has a wide power supply range (7 to 30 Vdc or 16 to 28 Vac) to cater for the most common power sources.

It provides the following unique combination of features:

- Supports Digi Xbee with 802.15.4, Zigbee, DigiMesh 2.4 and 900, Point-to-MultiPoint 868 and 900Mhz and the WiFi Xbee.
- Flexible power options : 7-30 Vdc or 16-28 Vac
- Easy to mount – case available if desired.
- Available in RS-232 5 wire or RS-422/485 2/4 wire.
- Comes with a commissioning button, and an optional rotary dial for ID
- Power, Associate, Serial TX and RX LEDs indicators
- Built-in industrial surge diodes

2. Packaging

The rdcZBK is shipped in a black casing (Standard option) without the XBee / XBee Pro. For more information on purchasing the XBee / XBee Pro, contact us at www.robustdc.com.

To install the XBee / XBee Pro module, the user has to unfasten four black screws to open the top cover. It must be ensured that all the pins of the XBee / XBee Pro are properly inserted onto headers H1 and H2.

3. General Description

The rdcZBK consists of the following :

1. 2 headers (H1 & H2) for mounting the XBee / XBee Pro modules
2. a bridge rectifier and switch-mode power supply
3. 4 LED indicators for Power, XBee Tx, Rx and Associate
4. an optional Rotary Dial (Hex) that is connected to 4 DIO pins of the XBee / XBee Pro header (H1 & H2)
5. an programming header (H3) for flashing and configuring the XBee / XBee Pro *
6. 4w / 2w wire jumper (for the RS-485 version only)
7. a push button that acts as a commissioning button

* requires the use of the rdcUSBTool

4. Wiring

There are 7 terminals on the rdcZBK that are labelled as follows :

- a) V~, V~, T+, T-, R+, R-, SG for the RS-485 version
- b) V~, V~, Tx, Rx, Rt, Ct, SG for the RS-232 version

If an AC power supply (with Live and Neutral wire) is to be used, connect each wire to a V~ terminal (polarity does not matter)

If a DC power supply (with V+ and V-) is to be used, connect V+ to any one of the V~ terminals and V- to SG.

For reliable communication, SG must be connected to the signal ground of the communicating device.

4.1 RS-485 Wiring

The RS-485 version of the rdcZBK is shipped with the "4w" jumper shorted. (i.e. operating in 4-wire mode)

To operate in 4-wire (full-duplex) mode, connect T+ and T- of the rdcZBK to R+ and R- of the communicating device, and T+ and T- of the communication device to R+ and R- of the rdcZBK.

To operate in 2-wire (half-duplex) mode, short the jumper "2w" instead of "4w". Then connect T+ and T- of the rdcZBK to T+ and T- of the communicating device.

IMPORTANT : Regardless of the RS-485 operating mode, D7 of the XBee / XBee Pro's I/O pin must be set to a value of 7 (which means that D7 will be set to high to enable the RS-485 driver when data is going to be sent out). (Refer to the XBee / XBee Pro user manual for details).

As previously mentioned, SG must be connected to the signal ground of the communicating device for reliable operation.

4.2 RS-232 Wiring

No jumpers are available in RS-232 mode as it always operates in full-duplex mode.

Connect Tx of the rdcZBK to Rx of the communicating device and Tx of the communicating device to Rx of the rdcZBK. These are the minimum connections required for communicating with the XBee/ XBee Pro module.

4.2.1 RTS / CTS Flow Control (RS-232 version only)

IMPORTANT NOTE : The RTS and CTS of the rdcZBK does NOT operate in the same way as the RTS and CTS in the RS-232 standard. This is due to the way in which the XBee /XBee Pro module handles its flow control.

RTS and CTS flow control must first be enabled on the XBee / XBee Pro module. (Refer to the "Command Reference Table" in the XBee / XBee Pro user manual for details).

The XBee / XBee Pro modules use the labels /CTS as an output and /RTS as input. On the rdcZBK, /CTS is labeled as Rt and /RTS is labeled as Ct. RDC labels it this way to match the convention that RTS is always an output.

Connect Rt of the rdcZBK to CTS of the communicating device and RTS of the communicating device to Ct of the rdcZBK.

Looking from the rdcZBK's standpoint, when the XBee / XBee Pro's serial receive buffer is 17 bytes from being full, Rt will be deasserted (i.e. high or logic "1"). Rt will be re-asserted when there are at least 34 bytes free in the serial receive buffer. This is useful for preventing a faster communication device from over-running the XBee / XBee Pro's serial receive buffer.

When the XBee / XBee Pro's Ct is asserted (i.e. low or logic "0"), serial data will be transmitted out of its serial transmit buffer. In this way, a slower communicating device can take its time to assert its RTS whenever its ready to take in data.

As previously mentioned, SG must be connected to the signal ground of the communicating device for reliable operation.

5. Rotary Dial Connection

The optional rotary dial (Hex) is connected to the XBee / XBee Pro's digital I/O (DIO) pins such that :

- i) DIO12 - 2^0
- ii) DIO11 - 2^1
- iii) DIO4 - 2^2
- iv) DIO3 - 2^3

The following examples will illustrate its operation :

At position 0, all pins will be "high".

At position 15 (F), all pins will be "low"

At position 10 (A), DIO3 - low, DIO4 - high, DIO11 - low, DIO12 - high

As shown, the result is in a complemented form. Hence, its up to the user's program to process the results. (For details on configuring and accessing the DIO pins, refer to the XBee / XBee Pro user manual.)

6. Commission Button

A push button is connected to pin 20 of the XBee / XBee Pro module to act as a commission button. (For details on the usage of the commissioning button, refer to the section "Commissioning Pushbutton" in the XBee / XBee Pro user manual.)

7. LED Indications

Four LEDs provide the user with a quick way to determine if the XBee / XBee Pro is working properly.

The Power LED (Blue) will indicate if there is power to the rdcZBK.

The Tx and Rx LEDs (Yellow) will indicate if there is communication from/to the XBee / XBee Pro module (looking at the standpoint of the XBee / XBee Pro, if the Tx LED blinks, it means that the XBee / XBee Pro is sending data out etc).

The Associate LED (Green) will indicate if the XBee / XBee Pro has successfully joined a network.

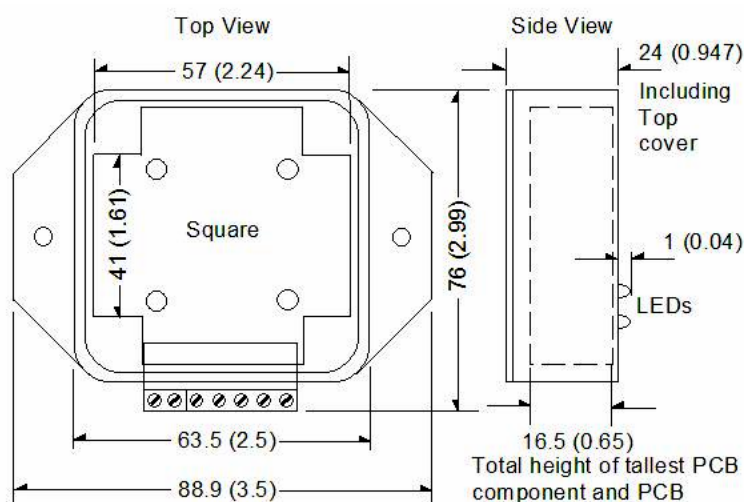
8. Other information

It is possible to configure the XBee / XBee Pro module through the RS-232 or RS-485 (4-wire mode only) serial port of the rdcZBK via the use of Digi's XCTU program.

However, to flash the XBee / XBee Pro module on the rdcZBK via H3, the rdcUSBTool is required.

9. Technical Specification

- 9.1 Serial Interface : RS-232 (Tx, Rx, Rts, Cts, SG)
 : RS-485 4 wire (T+, T-, R+, R-, SG)
 : RS-485 2 wire (T+, T-, SG)
- 9.2 Connector : 2-way screw terminal for power input
 : 5-way screw terminal for serial signals
- 9.3 Power Supply
- 9.3.1 Operating Voltage : 7 to 30 Vdc or 16 to 28 Vac
- 9.3.2 Max Power : 30 mA @ 24 Vdc, 30 mA @ 16 Vac
 : (Tested with a 10 mW version of the XBee Pro)
- 9.3.3 User Indications : Blue LED for main power supply
- 9.4 Communication
- 9.4.1 Maximum Speed : Up to 115 kbps
- 9.4.2 Character Setting : 8,N,1
- 9.4.3 User Indications : Yellows LED indicators for XBee Tx and Rx
 : Green LED for association
- 9.4.4 Practical Distance : 15 m for RS-232, 2 Km for RS-485
- 9.5 Environmental
- 9.5.1 Operating Temp : -20C to +65C
- 9.5.2 Storage Temp : -40C to +85C
- 9.5.3 Relative Humidity : 10-90%, non condensing
- 9.5.4 Casing (Optional) : ABS
- 9.6 Mechanical Dimensions
- 9.6.1 Height, Width, Depth : (See drawing)
- 9.6.2 Weight : Approx.: 100g
- 9.6.3 Terminal Capacity : 2.5mm(12 AWG)



Dimensions of rdcZBK with the optional casing

The PCB of the rdcZBK measures 57 mm (2.24 inches) by 57 mm (2.24 inches) while the overall height is 16.5 mm (0.65 inches)