



# Users Manual

## ZigBee to RS485 Bridge (ZRB2)

### 1000141

Document Number: 80071

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Version	Date	Changed By	Revision Description
1	1-11-2011	MEP	Preliminary

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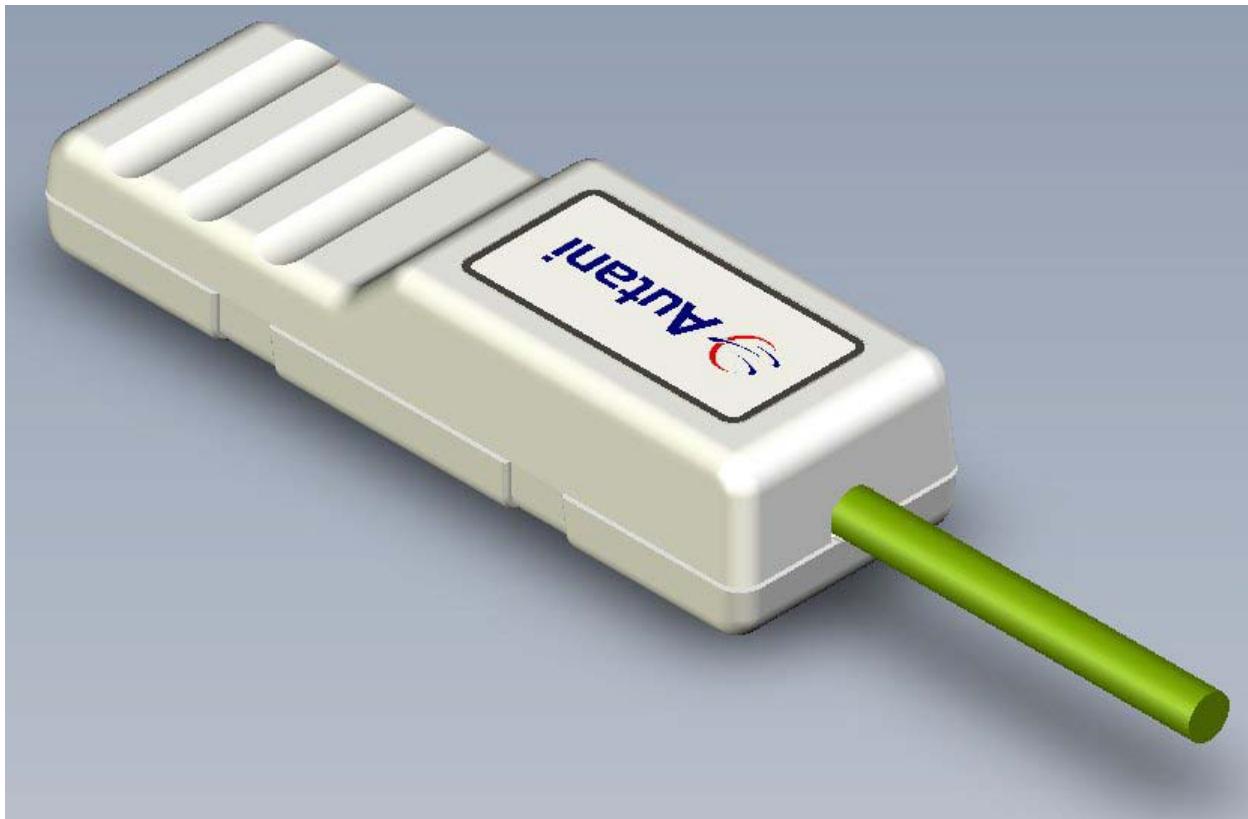
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## 1. Description

The ZigBee to RS485 Bridge (ZRB2) provides a cost-effective path to wirelessly enable many devices which still use wired communications channels. The wireless side of the ZRB2 employs an RF transceiver in the 2.4 GHz ISM band based on the ZigBee IEEE 802.15.4 wireless network protocol. The wired side of the ZRB2 communicates in RS485 full or half duplex differential modes (i.e. RS485 or RS422).



### Features

- FCC (V8NZRB1000141) and IC (7737A-ZRB1000141) certified
- Operational Range: ~1000 feet (LOS)

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## 2. Ordering Information

Part Number	Description
1000141-01	ZRB2, Aprilaire 8870 Thermostat Interface Module
1000141-02	ZRB2, Jackson System's T-32-P Thermostat Interface Module
1000141-03	ZRB2, Point-to-Point Interface Module
1000141-04	ZRB2, RS485 Back Bone Interface Module
1000141-05	ZRB2, National Meter Interface Module
1000141-06	ZRB2, E50C2 Power Meter Interface Module
1000141-07	ZRB2, Pulse Meter Interface Module
1000141-08	ZRB2, Dent Powerscout Meter Interface Module
1000141-09	ZRB2, Wireless ZigBee Router Interface Module
1000141-10	ZRB2, RS-232 Interface Module

## 3. Specifications

### 3.1 Absolute Maximum Ratings

Note: Exceeding the maximum ratings may cause permanent damage to the unit

Parameter	Test Condition	Min.	Max.	Unit
Input Voltage (Vdd)		-150	50	V
Voltage on Signal Pin (Rx+, Rx-, Tx+, Tx-)		-9	14	V
Storage Temperature		-25	80	°C

### 3.2 Recommended Operating Conditions

Note: Operating conditions outside those listed here may cause inappropriate and unpredictable behavior.

Parameter	Test Condition	Min.	Max.	Unit
Input Voltage (Vdd)	At 25°C	9	40	VDC
Input Voltage (Vdd)	At 25°C	9	28	VAC
Operating Temperature		0	60	°C

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### 3.3 DC Electrical Specifications

Test conditions unless otherwise specified: at 25°C, Vdd = 24VDC, No load on RS485 Bus, LEDs off.

Parameter	Test Condition	Typ.	Max.	Unit
Input Current (Idd)		15	60	mA

### 3.4 RF Electrical Characteristics

Parameter	Test Condition	Min.	Typ.	Max.	Unit
Frequency Range	At 25°C	2400		2500	MHz
Maximum Input Signal Strength		0			dBm
Relative Frequency Error		-120		120	ppm
EM250 Tx Power (CH11-CH25)			-11		dBm
EM250 Tx Power (CH26)			-20		dBm

## 4. Physical Interface

All signals are from the perspective of the ZRB2.

Wire Number	Color	Signal Name	Description
1	No wire present	-	Reserved for future feature expansion
2	Red	PWR	Input power of the ZRB2
3	Blue	Rx+	Positive half of the Receiver differential pair
4	White	Rx-	Negative half of the Receiver differential pair
5	Yellow	Tx-	Negative half of the Transmitter differential pair
6	Green	Tx+	Positive half of the Transmitter differential pair
7	Black	GND	Input ground and RS485 reference of the ZRB2
8	No wire present	-	Reserved for future feature expansion

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## 5. Certifications

### 5.1 FCC – United State

The ZRB2 complies with Part 15 of the Federal Communications Commission rules and regulations. Any modifications to this device may violate the FCC rules and regulations and make operation of this device unlawful.

FCC ID: V8NZRB1000141.

**NOTE 1:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

**NOTE 2:** This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and/or operated with a minimum distance of 20 centimeters between the radiator and your body.

**NOTE 3:** This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### 5.2 IC – Canada

The ZRB2 is IC certified.

IC ID: 7737A-ZRB1000141

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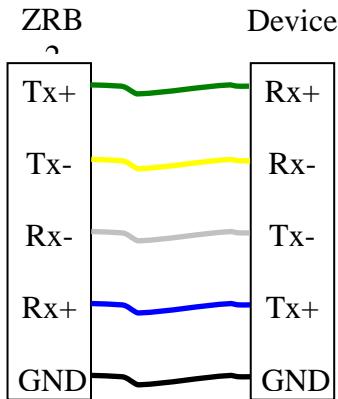
## 6. Theory of Operation

The ZRB2 was designed to be powered from the same voltage that a thermostat or doorbell system operates from, 24 VAC. However, the ZRB2 is flexible enough to be powered from other power sources as well. Refer to the Specifications section for more detailed power requirements.

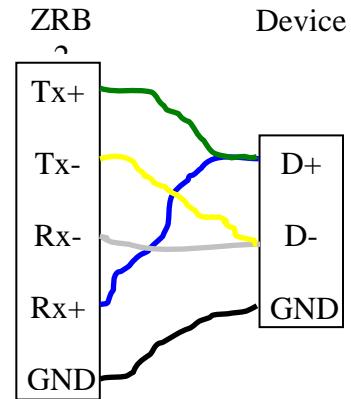
The serial communications port on the ZRB2 is capable of full-duplex and half-duplex operations, depending on firmware loaded into the ZRB2. The ZRB2 can interface with a host of RS485 based protocols such as LonWorks, BACnet, Modbus and other proprietary protocols based on the firmware image programmed into the device. Commands and data can originate from either the wired or wireless sides of the ZRB2. When operating as a full-duplex device the Rx and Tx pairs are connected to the corresponding pair on the communicating device. When operating in half-duplex mode the positive pair and negative pair are attached together to the corresponding connection on the communicating device.

The ZRB2 uses ZigBee in the 2.4 GHz ISM band to communicate wirelessly. There are two LEDs on the bottom of the ZRB2 which indicate network status and unit status. The pushbutton is used to leave and join ZigBee networks. When joined to a ZigBee network with an Energy Manager the ZRB2 becomes one part of a multifaceted system designed to eliminate wasted energy and increase operating efficiency. When paired with another ZRB2 to replace a wire the communications channel requires no special personnel for installation thereby saving money and time.

**Full-Duplex**



**Half-Duplex**



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