Users Manual

ZigBee to RS485 Bridge (ZRB)
1000127-01

Document Number: 80027

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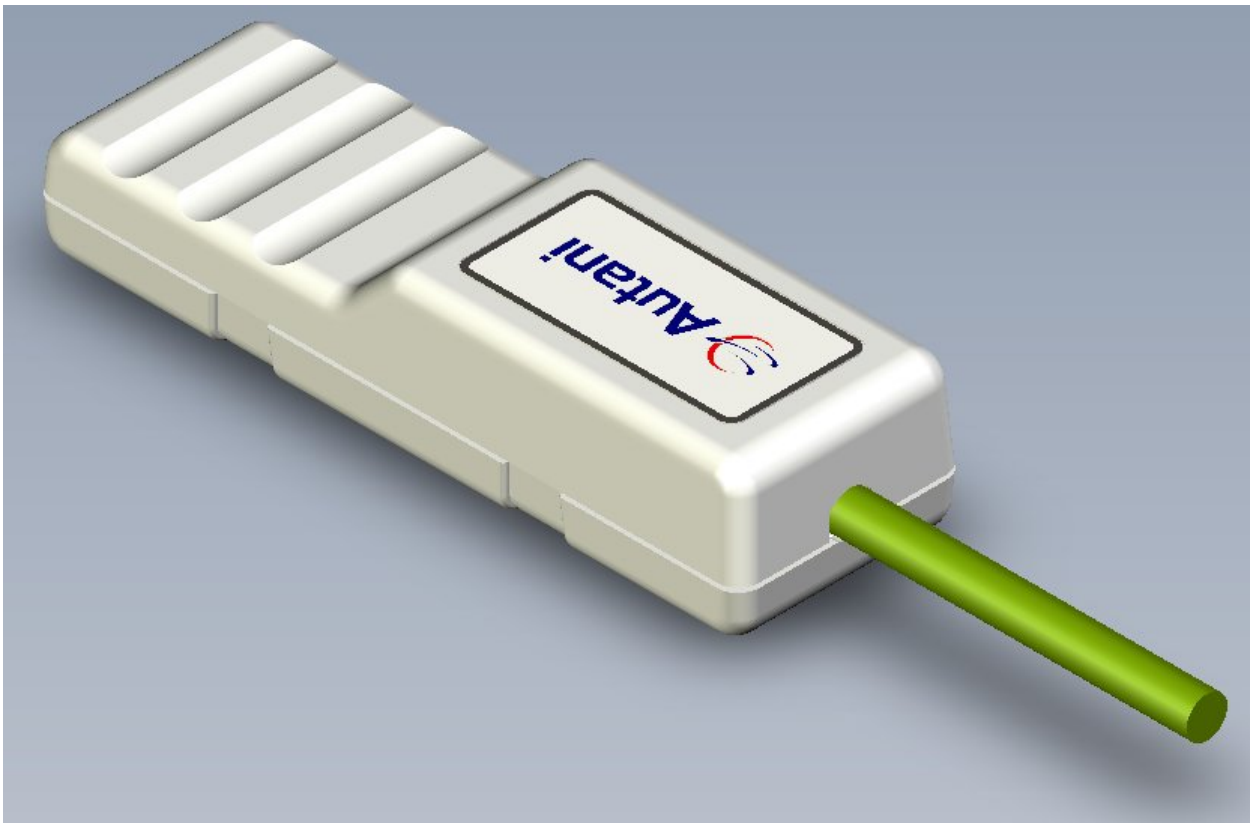
1. Description

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



Features

- FCC (V8NZRB1000127) and IC (7737A-ZRB1000127) certified
- Approximately 500 ft LOS transmit/receive distance

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2. Ordering Information

Part Number	Ordering Number	Description
ZRB1000127	1000127-01	Aprilaire 8870 Thermostat Interface Module
ZRB1000127	1000127-02	Jackson System's T-32-P Thermostat Interface Module
ZRB1000127	1000127-05	National Meter 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	^{o}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^{o}C	9	40	VDC
Input Voltage (Vdd)	At 25^{o}C	9	28	VAC
Operating Temperature		0	60	^{o}C

3.3 DC Electrical Specifications

Test conditions unless otherwise specified: at 25^{o}C, Vdd = 24VAC, No load on RS485 Bus, LEDs off.

Parameter	Test Condition	Typ.	Max.	Unit
Operational Current				
Input Current (Idd)		25	31	mA

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3.4 RF Electrical Characteristics

Parameter	Test Condition	Min.	Typ.	Max.	Unit
Frequency Range	At 25°C	2400		2500	MHz
Sensitivity	1% PER, 20byte packet defined by IEEE 802.15.4		-99	-94	dBm
High-side Adjacent Channel Rejection	IEEE 802.15.4 signal at -82 dBm		35		dB
Low-side Adjacent Channel Rejection	IEEE 802.15.4 signal at -82 dBm		35		dB
Other Channel Rejection	IEEE 802.15.4 signal at -82 dBm		40		dB
802.11g Rejection centered at +12MHz or -13MHz			35		dB
Maximum Input Signal Strength		0			dBm
Relative Frequency Error		-120		120	ppm

4. Physical Interface

All signals are from the perspective of the ZRB.

Wire Number	Color	Signal Name	Description
1	No wire present	-	Reserved for future feature expansion
2	Red	PWR	Input power of the ZRB
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 ZRB
8	No wire present	-	Reserved for future feature expansion

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5. Certifications

5.1 FCC – United State

The ZRB complies with Part 15 of the Federal Communications Commission rules and regulations. Any modifications to the ZRB may violate the rules of the FCC and make operation of the module unlawful. FCC ID: V8NZRB1000127.

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 radiates 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: The ZRB complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. The ZRB must be installed and/or operated with a minimum distance of 8 in. (20 cm.) between the antenna and people.

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 ZRB is IC certified. IC ID: 7737A-ZRB1000127.

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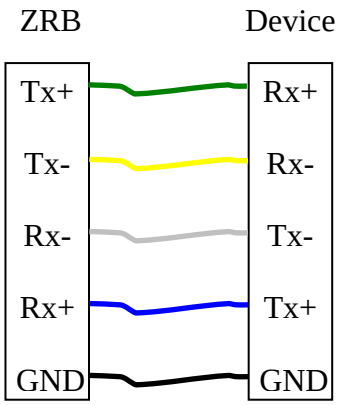
6. Theory of Operation

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

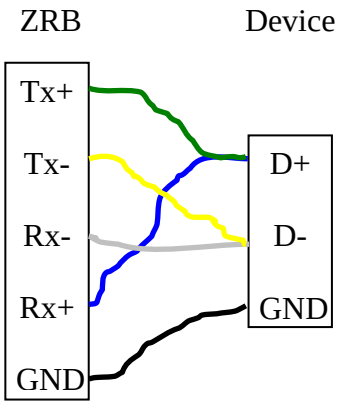
The serial communications port on the ZRB is capable of full-duplex and half-duplex operations, depending on firmware loaded into the ZRB. The ZRB can interface with a host of RS485 based protocols such as LonWorks, BACnet, Modbus and other proprietary protocols based on the firmware image programmed into the device. Commands and data can originate from either the wired or wireless sides of the ZRB. 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 ZRB uses ZigBee in the 2.4 GHz ISM band to communicate wirelessly. There are two LEDs on the bottom of the ZRB 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 ZRB becomes one part of a multifaceted system designed to eliminate wasted energy and increase operating efficiency. When paired with another ZRB 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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