

# Wzzard™ Mesh Wireless Sensor for Industrial Applications

Models BB-WSD2C31010, BB-WSD2M31010, BB-WSD2C21150

**B+B SMARTWORX**

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## PRODUCT FEATURES

- + Ultra low power 802.15.4e SmartMesh IP technology
- + Communicates with SmartSwarm Gateway via highly scalable and reliable wireless mesh networks
- + Connect to industry standard analog or digital sensors
- + Rugged, IP67-rated, fiber reinforced polyester PBT enclosure
- + MQTT and JSON IoT protocol to application platform
- + UL, C1/D2 approved for hazardous locations (exceptions apply)

## Wireless Connectivity Where You Need It

The Wzzard™ intelligent wireless sensor platform creates a complete, quick and easy connectivity stack between your sensors and application – on your network or the Internet. The platform uses Wzzard mesh sensor edge nodes and a wireless 802.15.4e SmartMesh IP network to transmit sensor data to a SmartSwarm Gateway. The gateway can connect to the Internet via wired connections or cellular data networks and communicate with application platforms using the MQTT IoT protocol and JSON data formats.

Wzzard mesh wireless sensor nodes can accommodate virtually any industry-standard external sensors. Connections can be made via M12 connector or conduit fitting. The nodes provide a wide variety of sensor interface options, including general purpose analog input, digital input/output and thermocouple. All nodes contain an internal temperature sensor.

## Secure, Reliable and Highly Scalable Wireless Networking

The 802.15.4e Wzzard platform uses mesh networking and time-synchronized channel hopping to provide up to 99.999% connectivity, even in the most demanding RF environments. New nodes may be added at any time and the SmartMesh IP network will dynamically self-configure as new nodes are added or removed.

## Easy Configuration and Installation

Configuration of the Wzzard sensor platform is easy via the SmartSwarm Gateway. Nodes can be configured with scaling information, eng. units, friendly names, geo-location and other descriptive information.

The platform simplifies physical installation, too. Nodes can be attached to any surface via mounting ear flanges and screws or the embedded magnetic base. Permanent use of the magnetic mount is not approved for UL installations, but may be convenient for temporary RF link determination or other purposes. The IP67 rated, fiber reinforced polyester PBT housing makes the units deployable in any industrial or commercial environment.

## Intelligence at the Network Edge

The Wzzard wireless platform places intelligence at the network edge. The Wzzard mesh wireless sensor nodes can be configured to communicate data only when specified threshold or alert levels are exceeded. When reporting, they can associate useful information like geo-location, device name and uptime. This eliminates unnecessary network traffic, eases the processing burden on upstream resources and cuts the cost of cellular data plans when the gateway is using the cellular data network. Thanks to low-power wireless technology and programmable time synchronization, the Wzzard mesh wireless sensor nodes can operate for many years on battery power.

## SPECIFICATIONS

POWER	
Internal	(2) 3.6V 2400 mAh Lithium Thionyl Chloride AA Batteries
Battery Life	>5 years – based on 1 min. sensor sampling and reporting
Optional External Input Voltage	10-30 VDC @ 40mA peak
MECHANICAL	
Connection Options	Conduit (UL Type 3 outdoor approved): 12.7mm (0.5 in), - includes sensor interface cable, 8-wire, 26 gauge, 1.8m (6ft) M12 connector (Not UL rated for outdoor installations.)
Sensors	Analog Input (0-10 VDC, 0-20 mA, 4-20 mA) Digital Input (0 -48 VDC) Digital Input Frequency 1-1K Hz (accuracy +/- 1 Hz) Digital Input Counter Integrated Temperature Thermocouple (J, K, N, R, S, T, B, E) Digital Output, Sinking, up to 100mA @ 30VDC
External Antenna (included)	RP-SMA, Omni-directional, 3.8 dBi, 2.4 GHz Dimensions: 194 mm (7.64 in)
Mounting Options	(4) Mounting Ears, M5 (#10) screws (UL approved option) Magnetic Mounting (via internal magnet) Pull Force 2.13 kg (4.7 lb) Note: Magnetic mounting (all models) not rated for UL installations.
Enclosure	IP67 Rated – fiber reinforced polyester PBT
Weight	0.34 kg (0.75 lb)
TECHNOLOGY	
Wireless	802.15.4e, SmartMesh IP
Protocols	MQTT, JSON
LED	Network Connectivity
ENVIRONMENTAL	
Installation	Indoor/Outdoor Note: M12 models are rated for outdoor use (except in UL installations).
Operating Temperature	-40 to 80 °C (-40 to 176 °F)
Storage Temperature	-40 to 85 °C (-40 to 185 °F)
Operating Humidity	0 to 95% Non-condensing
WIRELESS SECURITY	
Device Authentication	
128-bit, AES-based Encryption – with multiple keys	
Message Integrity Check (MIC)	
Synchronized Key Changeovers	
Customized Key Rotation	

BB-WSDx\_WzzardMeshWirelessSensor-IndApps\_0318ds  
All product specifications are subject to change without notice.

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## SENSOR INTERFACE SPECIFICATIONS

DIGITAL INPUTS						
Voltage Range	0-48 VDC					
V <sub>IL</sub>	0.4 V, maximum					
V <sub>IH</sub>	2.5 V, minimum					
Pull-up Current	65 µA					
Type	Sinking (NPN) Input					
Isolation	None					
RATE/FREQUENCY INPUTS						
Frequency	Performs a 1 second measurement at each measurement/publish interval Digital input frequency: 1-1K (accuracy +/- 1 Hz) Uses falling edge or rising edge – based on Invert Enabled Setting					
COUNTER INPUT						
Counter Inputs	1					
Channels	Actively counts either falling edge (Invert Enabled) or rising edge (Invert Disabled) Can use a multiplier to convert to a unit type or count Shared with digital inputs Rolls over at 999999.9					
ANALOG INPUTS						
Analog Inputs	2 or 3 (model dependent)					
Input Range	0-10 VDC, 0-20 mA (software selectable)					
Resolution	0.3 mV/1.3 µA					
Input Load Resistance	59 K Ohms					
Accuracy Variance	+/-25mV +/-0.05mA					
THERMOCOUPLE INPUT						
Types Supported	J, K, N, R, S, T, B, E					
Accuracy	<b>THERMOCOUPLE</b>	<b>Temperature Range</b>	<b>Ambient Temperature</b>	<b>Worst Case RSS Error</b>	<b>Probe Error</b>	
	<b>Type B</b>	+95 to +1798 °C	B Type @ +25 °C B Type @ -40 to +85 °C	9.4 °C 47.1 °C	0.5% of T, 0.25% of T 0.5% of T, 0.25% of T	
	<b>Type E</b>	-200 to +1000 °C	C Type @ +25 °C C Type @ -40 to +85 °C	1.4 °C 5.2 °C	1.7 °C, 1 °C 1.7 °C, 1 °C	
	<b>Type J</b>	-210 to +1200 °C	J Type @ +25 °C J Type @ -40 to +85 °C	1.5 °C 5.9 °C	2.2 °C, 1.1 °C 2.2 °C, 1.1 °C	
	<b>Type K</b>	-200 to +1372 °C	K Type @ +25 °C K Type @ -40 to +85 °C	1.8 °C 7.3 °C	2.2 °C, 1.1 °C 2.2 °C, 1.1 °C	
	<b>Type N</b>	-200 to +1300 °C	N Type @ +25 °C N Type @ -40 to +85 °C	2.3 °C 10.3 °C	2.2 °C, 1.1 °C 2.2 °C, 1.1 °C	
	<b>Type R</b>	-50 to +1768 °C	R Type @ +25 °C R Type @ -40 to +85 °C	5.4 °C 26.0 °C	1.5 °C, 0.6 °C 1.5 °C, 0.6 °C	
	<b>Type S</b>	-50 to +1768 °C	S Type @ +25 °C S Type @ -40 to +85 °C	6.7 °C 33.0 °C	1.5 °C, 0.6 °C 1.5 °C, 0.6 °C	
	<b>Type T</b>	-200 to +400 °C	T Type @ +25 °C T Type @ -40 to +85 °C	1.7 °C 7.2 °C	1 °C, 0.5 °C 1 °C, 0.5 °C	
Resolution	0.0078 °C					
Accuracy Variance	0.20% of full-scale reading (0.25%, maximum)					
THERMISTOR INPUT						
Type Supported	10K NTC					
Temperature Range	-40 to 85 °C					
Resolution	0.01 °C					
Accuracy	<b>THERMISTOR</b>	<b>Typ. Error</b>	<b>Worst Case Error</b>	<b>Worst Case RSS Error</b>	<b>Probe Error</b>	
		853 ppm (0.1 °C)	4103 ppm	2101 ppm	n/a	
Accuracy Variance	Maximum +/- 0.5 °C over -40 to +85 °C temperature range					

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## SENSOR INTERFACE SPECIFICATIONS (cont'd)

DIGITAL OUTPUTS	
Voltage Range	0-30 VDC
Output Type	Open drain
Output Current	Not to be less than 100 mA
Protection	Current limit protection
Isolation	None

## INTEGRATED SENSORS

TEMPERATURE	CONDITIONS	MINIMUM	TYPICAL	TYPICAL	UNITS
Offset	Temperature Offset Error @ 25 °C		+/- 0.25		°C
Slope Error	-		+/- 0.033		°C / °C

## SMARTMESH IP 802.15.4E RADIO SPECIFICATIONS

PARAMETER	CONDITIONS	MINIMUM	TYPICAL	MAXIMUM	UNITS
Frequency Band		2.400		2.4835	GHz
Number of Channels			15		
Channel Separation			5		MHz
Channel Clear Frequency	Where k = 11 to 25, as defined by IEEE 802.4.15		2405 + 5*(k-11)		MHz
Modulation	IEEE 802.15.4 Direct Sequence Spread Spectrum (DSSS)				
Raw Data Rate			250		kbps
Range	25 °C, 50% RH, +2dBi Omni-Directional Antenna, Antenna 2m above ground				
	Indoor		100		m
	Outdoor		300		m
Receiver Sensitivity	Packet Data Error Rate (PER) = 1%			-93	dBm
	PER = 50%			-95	dBm
Output Power	Delivered to a 50 Ω load			8	dBm

## THIONYL CHLORIDE LITHIUM BATTERIES (2 supplied with product)

CHARACTERISTICS	CONDITIONS
Temperature Range	-40 to +85 °C
Nominal Capacity	2.4 Ah
Nominal Voltage	3.6 V
Diameter	14.5mm
Height	50.5mm

\*Potential Hazard: Do not recharge, crush, disassemble or heat above 100 °C (212 °F).

## ORDERING INFORMATION

MODEL NUMBER	DESCRIPTION	INCLUDES:	UL
<b>BB-WSD2C31010</b>	Industrial Power Monitor Node - Conduit	3 Analog Inputs, 1 Digital Input, Internal Temperature	Indoor / Outdoor, w/ mounting ear installation
<b>BB-WSD2M31010</b>	Industrial Power Monitor Node - M12	3 Analog Inputs, 1 Digital Input, Internal Temperature	Indoor only, w/ mounting ear installation
<b>BB-WSD2C21150</b>	Industrial Cooler/HVAC Node - Conduit	2 Analog Inputs, 1 Digital Input, 1 Digital Output, 2 Thermocouples, 2 Thermistors, Internal Temperature	Indoor / Outdoor, w/ mounting ear installation

## ACCESSORIES

<b>ACH2-DBAT-DP002-G</b>	External antenna, 2.4 GHz, 2 dBi, dipole, RP-SMA, hinged, 3.8 dBi
<b>ACH2-AT-DP011-G</b>	Magnetic mount antenna, 2.4 GHz, 3.8 dBi
<b>BB-WCD-TM2M</b>	Thermistor cable
<b>WSCAC0-6</b>	Pigtail cable, 1.8 m (6 ft.)
<b>WSCAC12-6</b>	M12 wiring harness cable, 8-pin, 1.8 m (6 ft.)
<b>ZXTMT</b>	Cable gland/conduit kit
<b>210-10152-00</b>	(1) Replacement battery, AA lithium thionyl chloride battery. <i>Notes: Node requires two (2) batteries. UL application approved battery.</i>
<b>BB-2X3.6VLTCAA</b>	(2) Replacement batteries, AA lithium thionyl chloride battery. <i>Notes: Node requires two (2) batteries. UL application approved battery.</i>

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## APPROVALS, DIRECTIVES, STANDARDS

<b>CE - DIRECTIVES</b>	
2014/35/EU	Low Voltage Directive
2014/53/EU	Radio Equipment Directive
2011/65/EU	Reduction of Hazardous Substances Directive (RoHS)
2012/19/EU	Waste Electrical and Electronic Equipment Directive (WEEE)
<b>CE - EMC</b>	
ETSI EN 300 328 v2.1.1	EMC & Radio Spectrum Matters (ERM) Wideband Transmission Systems, 2.4 GHz ISM Band
ETSI EN 301 489-1 v2.1.1	Applied in accordance with the specific requirements of:
ETSI EN 301 489-17 v3.2.0	EMC and Radio Spectrum Matters: Broadband Data Systems
EN 55032:2012+AC:2013, Class A	Information Technology Equipment - RF Emissions
EN 55024:2010	Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement
<b>CE - SAFETY</b>	
EN/IEC 61010-1 (3rd Ed.)	Safety requirements for electrical equipment for measurement, control, and laboratory use (general requirements).
EN/IEC 61010-2-201 (1st Ed.)	Particular requirements for control equipment
<b>CE - RF EXPOSURE</b>	
EN 62479	Assessment of the compliance of low power electronics and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 MHz)
<b>ENVIRONMENTAL</b>	
IEC 60068-2-6	Sine Vibration: 4G, 10-500 Hz, 0.06 in. displacement
IEC 60068-2-27	Mechanical Shock: 50G, 11ms, 18 pulses
<b>FCC, IC</b>	
FCC Part 15 Class A, FCC Part 15.247	
ICES-003:2016	ITE Emissions for Canada
UL (All models w/ mounting ear installation; M12 model indoors only.)	
UL/CSA Class 1/Division 2, Groups A, B, C, D	

## MECHANICAL DIAGRAM

Units = [Millimeters] Inches

