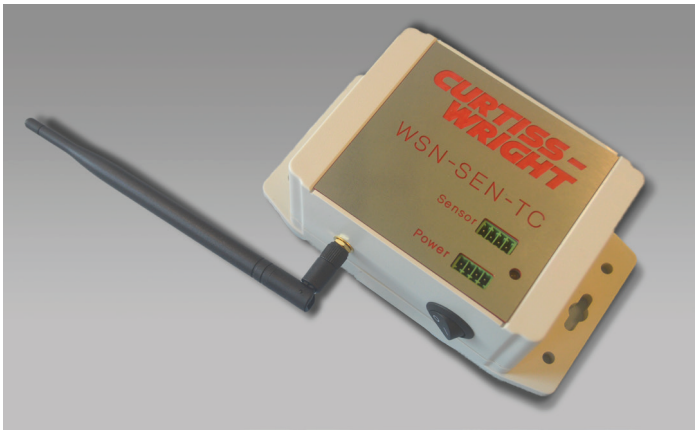
Wireless Sensor Network

Plant Monitoring and Control

Nuclear Power Products and Services



Wireless Sensor Network

The Curtiss-Wright Wireless Sensor Network product is designed specifically for use in nuclear power generation to collect process data from plant equipment and systems that are not currently wired to existing process monitoring systems. While it shares characteristics with similar industrial counterparts, it implements the security, reliability, robustness and the extended life cycle necessary to the nuclear market in a single, multipurpose design.

The Wireless Network system is made up of three components, Wireless Sensor Nodes, Wireless Receiver Nodes, and a Data Collection Computer. The Wireless Network system components are inherently flexible and can be easily migrated to provide virtually all of the operating characteristics of industrial devices. Over time, and consistent with regulatory requirements, the product will expand from Cyber Security Level 2 monitoring applications to Level 3 monitoring applications.

The Wireless Sensor and Receiver Nodes are configured on the I&C benchtop using proprietary tools before being placed in the field. Units are not adjustable or configurable in the field enhancing security of the devices. By utilizing 256-bit AES encryption, diagnostics, and error trapping technology, the only credible threat to the communication link is jamming the transmission, which will be detected and reported by system diagnostics.

The Wireless Sensor Nodes (WSN) are intelligent and collect data from sensors and instruments located on plant equipment. Currently supported sensors include thermocouple, RTD, radiation, current loop and voltage devices. Custom sensor interfaces and multiple channel devices are also available.

Second generations designs will support increased on-board data preprocessing enabling dynamic signal reduction prior to communication thus preserving data bandwidth.

The WSN supports single channel and eight channel configurations (TC, RTD and Voltage only).

The Wireless Receiver Nodes aggregate data from the network(s) for collection over the plant communication backbone. Each node supports up to 16 WSN and manages data formatting for communication over the plant backbone. The collected data are easily integrated in any standard database for use by all plant disciplines. The WRN also manages and reports all network diagnostics and reports any attempt at intrusion.

The power consumption of the network is strictly controlled through the sensor acquisition rate, data transmission rate and the radiated power of the wireless node to provide continuous uninterrupted service on batteries for up to 4 years in typical configurations. Should higher data rates or difficult device access require longer service periods both AC power and energy scavenging devices are available to recharge the battery.

The radiated power of the wireless sensor node and wireless repeater node (if required) are configured on the bench for 1mw, 10mw or 20mw power levels restricting the transmitter exclusion zone to as little as 8 inches and making the communications virtually undetectable outside the plant security zone. Up to 50 communication channels are available to support multiple networks within the plant.

Data presentation tools are provided and are utilized to facilitate user interaction and display of the data in a meaningful manner. Graphing, trending, data reduction, data archive, multivariable combination, analysis and report generation are all a part of the data presentation software.

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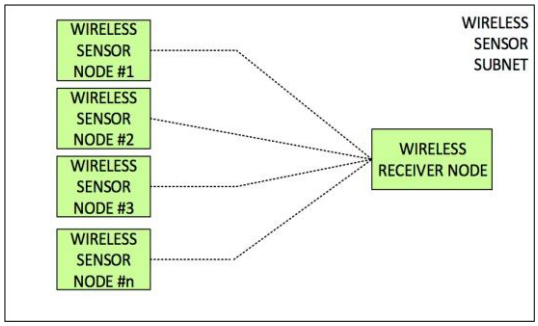

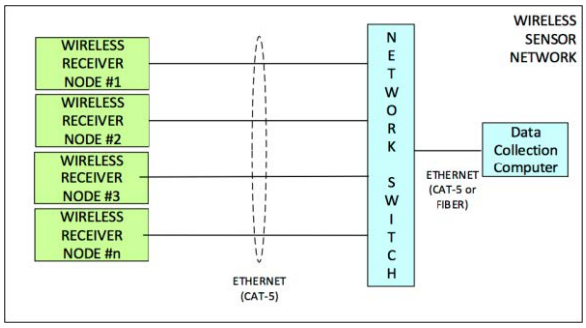

SUMMARY SPECIFICATIONS

Summary Specifications Wireless Sensor Nodes				
	Temperature (Thermocouple)	**Radiation (single channel only)**	**Temperature (RTD)**	**Voltage**
Type	Type K, J, N, R, S, T, E, and B Thermocouple	Beta and Gamma	100 Ohm Platinum to 1000 Ohm Platinum, 2-, 3-, 4-Wire	-12.8 VDC to +12.8 VDC
Dimensions	160.79mm H x 90.79mm W x 62.5mm D <450g (single channel 220.79mm H x 120.79mm W x 62.5mm D <600g (eight channel)			
Operating Range	-20°C to +85°C	-30°C to +50°C	-40°C to +85°C	-40°C to +85°C
Power Consumption	10 uA (Sleep) 2 mA (Scanning)	450 uA	3 mA (Sleep) 3.5 mA (Scanning)	1 uA (Sleep) 3.25 mA (Scanning)
Battery Pack	9600 mAh (> 4 years) without recharging at nominal scan and transmit rates			
Sensitivity / Accuracy	± 0.15% FSR (Thermocouple) ± 0.7°C (CJC)	5.8 cpm ± 15% for 1 uSv/h dose rate	± 0.05% FSR (±0.5°C)	±0.8 FSR
ADC Resolution	19-bit	N/A (maximum counts 2^16)	15-bit	18-bit
Radio Frequency	ISM 902-928 MHz, 50 channels (U.S. and Canada)			
Transmit Distance	@1mw 30ma, 50m (150') @10mw 45ma, 85m (275') @20mw 55ma, 100m (325')			
Encryption	256-bit AES			
Warranty	2 years			
Summary Specifications Wireless Receiver Node				
Network Connectivity	RJ-45, 10 MB Ethernet UDP transmit only to user specified port and IP address			
Dimensions	160.79mm H x 90.79mm W x 62.5mm D <450g			
Operating Range	-20°C to +85°C			
Power Supply	100 - 240 VAC 50/60 Hz 0.2 A Max			
Battery Pack	2200 mAh (requires external recharger)			
Radio Frequency	ISM 902 to 928 MHz, 50 channels (U.S. and Canada)			
Encryption	256-bit AES			
Warranty	2 years			

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