

Extended Range Synchronized 1 Channel Wireless Thermocouple Node



Introduction

TC-Link[®]-1CH complete wireless thermocouple node, designed for integration with wireless sensor networks, combines full thermocouple conditioning with award-winning MicroStrain[®] wireless systems.

It features a standard thermocouple input connector with embedded cold junction temperature sensor. On-board linearization algorithms are software programmable to support a wide range of thermocouple types (J, K, N, R, S, T, E, B).

The node can simultaneously log data to internal memory, and transmit real-time data to a base station transceiver at a pre-programmed rate. Embedded software provides the user-programmable wireless transmission rates, from two samples per second to one sample every seventeen minutes. A single host transceiver can address hundreds of sensor nodes.

Features & Benefits

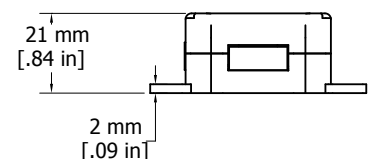
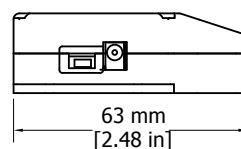
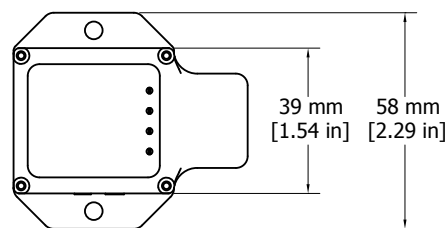
- plug and play: quickly add wireless sensing and logging capabilities to existing thermocouples and probes
- supports type J, K, N, R, S, T, E, B thermocouples with on-board cold junction compensation
- simultaneous data acquisition from multiple sensors
- self-calibrating 24 bit sigma-delta analog to digital converter
- sample rates from 2 Hz to 1 sample every 17 minutes
- 2.4 GHz IEEE 802.15.4 spread spectrum radio with 70 m line-of-sight range (100 m with high gain antenna), license free worldwide
- miniature enclosure footprint allows unobtrusive coupling of nodes with existing sensors
- SensorCloud[™] ready

Applications

- civil structures sensing: concrete maturation
- industrial sensing networks: machine thermal management
- food and transportation systems: refrigeration, freezer performance monitoring
- advanced manufacturing: plastics processing, composite cure monitoring
- assembly line testing with smart packaging
- cryogenic applications

System Overview

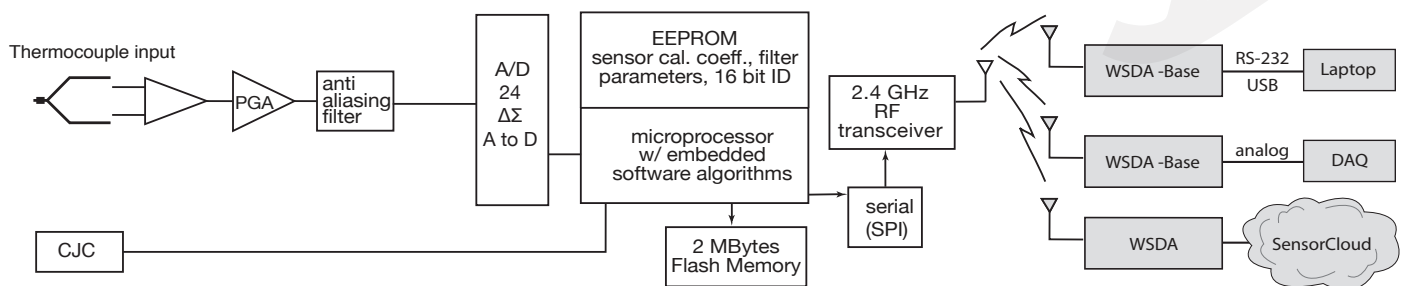
At the heart of MicroStrain's extended range synchronized (mXRS[™]) system is the WSDA[®]-Base, which uses our exclusive beaconing protocols to synch precision timekeepers embedded within each sensor node in the network. The WSDA[®]-Base also coordinates data collection from all sensor nodes, including TC-Link[®]-1CH -mXRS[™]. Users can easily program each node on the scalable network for simultaneous, periodic, or burst mode sampling with our Node Commander[®] software, which then automatically configures network radio communications to maximize the aggregate sample rate.





Specifications

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|---|--|
| Thermocouple inputs supported | software selectable: one, type-J, K, N, R, S, T, E, or B, input channel, one ambient CJC channel |
| Standard thermocouple measurement range | J: -210 to 760 °C; K: -200 to 1372 °C; N: -200 to 1300 °C; R: -50 to 1664 °C; S: -50 to 1664 °C; T: -200 to 400 °C; E: -200 to 1000 °C; B: 250 to 1820 °C |
| Temperature measurement accuracy | ±0.1 % full scale or ±2 °C, whichever is greater (does not include errors due to TC wire or transducer) |
| Temperature repeatability | ±0.1 °C (does not include errors due to TC wire or transducer) |
| Temperature resolution | 0.0625 °C |
| Cold junction compensation range | -20 °C to 85 °C |
| Thermocouple connector | type 1 standard mini (SM) connectors for flat pin TC inputs |
| Analog to digital (A/D) converter | 24 bit sigma-delta A/D |
| Sample Rate | programmable, from 2 Hz to 1 sample every 17 minutes, for datalogging or LDC modes |
| Datalogging mode | log up to 90,000 data points |
| Nodes per gateway | supports up to 100 nodes per gateway |
| Sample rate stability | datalogging and LDC modes ±25 ppm |
| Radio frequency (RF) transceiver carrier | 2.4 GHz direct sequence spread spectrum, license free worldwide (2.405 to 2.480 GHz) – 16 channels, radiated power programmable from 0 dBm (1 mW) to 20 dBm (100 mW); European models limited to 10 mW |
| Range for bi-directional RF link | programmable communication range from 70m to 2,000m |
| RF data packet standard | IEEE 802.15.4, wireless communication architecture |
| PC Communications | 115,200 baud over USB |
| Internal Li-ion battery | 550 mAh, high capacity, Lithium-ion primary battery |
| Power consumption (battery life) with 550 mAh battery | 2 samples per second - 0.8 mA (23 days) 1 sample per second - 0.48 mA (1.5 months) 3 samples per minute - 0.1 mA (6 months) 1 sample per minute - 0.09 mA (7 months, 13 days) |
| Operating temperature | -20 °C to +60 °C with standard internal battery and enclosure, extended temperature range optional with custom battery and enclosure; -40 °C to +85 °C for electronics only |
| Maximum acceleration Limit | 500 g standard (high g option available) |
| Dimensions | 58 mm x 63 mm x 21 mm (with enclosure) |
| Weight | 48 grams (with enclosure and battery) |
| Enclosure Material | ABS plastic |
| Compatible Base Stations | WSDA®, WSDA® -Base (Analog), WSDA® -Base (USB/RS-232) |
| Software | Node Commander® Windows XP/Vista/7 compatible |



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Patents Pending