



ColdStream® RF²

Infrastructure | Japan

Wireless Temperature Monitoring Infrastructure

Cold chain management—the process of monitoring temperature-sensitive products moving from one partner or location to another—is a complex endeavor with many variables that can adversely affect quality, shelf life, and safety. When a load is exposed to various methods of transportation, multiple handoffs between receivers, and time spent in staging and/or storage, quality can be compromised through excursions in time and temperature. Electronic monitoring technology gives receivers a snapshot of a delivery's cold chain history, but requires labor to retrieve, download and interpret the data. Wireless temperature monitoring automates the data collection and download process, delivering accurate and comprehensive data for every trip.

Sensitech has taken the mystery out of wireless technology. The ColdStream® RF² “RF squared” Infrastructure operates in a mesh-networking environment. The Infrastructure integrates the data collection and communication technologies necessary to automate the process of collecting and managing comprehensive time, temperature and location information in a reliable and cost-effective manner.

Benefits of Wireless Technology

- Wireless downloads automate data collection and communication for increased operational efficiencies—no monitor retrieval or data conditioning is required.
- Comprehensive time, temperature and location information deliver a broader picture of the cold chain process.
- Secure, validated, centralized data management through ColdStream® allows information to be shared among partners.
- Automated alarming and alerting improves quality, reduces waste, and enables receivers to prioritize and focus resources appropriately.
- Tailored robust reporting facilitates sound decision making.





Infrastructure Components

Hardware

TempTale® RF² (TTRF²) temperature monitors are part of Sensitech's family of precision devices designed to track and collect time and temperature data about temperature-sensitive shipments. These highly reliable, wireless monitors collect and store temperatures for a wide array of in-transit and storage applications. TTRF² is designed with configurable time and temperature limits to trigger time-out-of-range alerts, along with easy-to-read LED indicators for immediate shipment evaluation. Use TTRF² monitors to:

- Measure and store ambient temperature data at set intervals.
- Set alarm limits.
- Start data collection using the front panel buttons.
- Configurable to auto stop via gateway server settings.
- Store and record location information when other ColdStream RF² Infrastructure components are detected.
- Operate within the 915 MHz or 868 MHz ISM band for efficient transmission in high water content product situations.
- Leverage reader-talk-first mode—monitors will never transmit until they are in the vicinity of an active ColdStream Infrastructure component (i.e., an operational RF² Gateway); this mode is a requirement for air transit.

RF² Gateway is an AC powered reader with an integrated PC server that is attached to the network via an Ethernet connection. The RF² Gateway wirelessly communicates with TTRF² monitors directly. When an RF² Gateway is shipped, its operating frequency band is set by country.

The RF² Gateway automatically chooses a channel within the band based on the current signal-to-noise ratio measured in each channel.

TempTale® RF² Specifications

Monitor specification	Single use, ambient
Read Range	up to 100 meters (328 feet) line of sight
Frequency Bands	915 or 868 MHz
Temperature Measurement Range	-22°F to +158°F (-30°C to +70°C)
Battery Life	up to one year
Temperature Accuracy	±2°F from -13°F to +14°F (±1.0°C from -25°C to -10°C) ±1°F from +14°F to +77°F (±0.5°C from -10°C to +25°C) ±2°F from +77°F to +140°F (±1.0°C from +25°C to +60°C)
Memory Capacity	1,920 data points (2K)
Programmable Temperature Alarms	Single and cumulative time-out-of-range events
Display	LED indicators for alarm and status
Start-Up Delay	Configurable
Water Resistant Housing	NEMA 4; IP64 rated
Start Button	Color-coded, finger button for easy execution
Dimensions	4.25" L x 2.25" W x 0.86" H (10.80 cm x 5.72 cm x 2.18 cm)
Weight	3.1 ounces (88 grams)
Programmable Measurement Interval	Selectable
Primary Sensor Resolution	0.1° (1/10°) over full operational temperature range
Certifications	Gitaki, FCC, RoHS, WEEE, RTCA/DO-160G Section 21, and IC

Software

Gateway Server Software is a Windows®-based software agent that manages the activity of the hardware components to ensure that new TTRF² monitors are read and downloaded when they are detected in the network. The Gateway forwards the downloaded data files via high-speed Internet connection to Sensitech's secure central data repository—ColdStream®.

ColdStream® is a validated, hosted and secure relational database application easily accessible via the Internet for query, reporting and analysis of stored data. ColdStream enables receivers to share critical data efficiently through password protected, selective access—across their own organization or with selected trading partners.

Gateway Server Requirements

Operating System	Windows® 7 Enterprise
Internet Connection	High Speed Required
AC Power	One AC Power Outlet
Communication to ColdStream	http, https via ports 80 and 443
Communication to Gateway	TCP/IP via ports 4900-4904

How the ColdStream Wireless Infrastructure Works

Every receiving site is unique. For optimal performance, our experienced technical field teams conduct site surveys, which include receiving site layouts and sophisticated transmission testing to ensure high-quality read rates.

Outfitting small areas would likely consist of one RF² Gateway. When a TTRF² monitor detects the presence of an RF² Gateway, the monitor records the facility's location identifier associated with that network, thereby providing time, temperature and location information.





Your System Is Secure

Data is Safe from Tampering

- Data is in binary format.
- Data is encrypted via AES 128-bit encryption (Advanced Encryption Standard).

Infrastructure is Safe from Tampering

- ColdStream RF² Infrastructure only accepts valid data packets.
- TTRF² monitors only communicate when asked, and only respond to a set list of ColdStream commands.

Infrastructure Protects Your Systems from Interference

- Communicates only with other ColdStream components.
- Can co-exist on wireless networks without interfering.
- Has very low bandwidth requirements and will not overload your networks.

Security

Data within the ColdStream RF² Infrastructure is safe from tampering. Temperature monitor data is encrypted at the source with an AES (Advanced Encryption Standard) and decrypted at the destination (on the RF² Gateway). This encryption provides basic protection from inadvertent viewing or hacking.

In addition, the data downloaded from a TTRF² monitor is in binary format which is not human readable. This provides an additional level of security from unauthorized data access.

Security has also been integrated into the infrastructure level. ColdStream RF² Infrastructure is designed to accept only valid packets with a known destination. TTRF² monitors will only communicate with the ColdStream RF² Infrastructure when asked, and will only respond to a set list of commands.

The ColdStream RF² Infrastructure is designed to not interfere with any of your existing systems. It cannot communicate with any devices other than ColdStream devices. The bandwidth requirement is very low and will not overload your networks. ColdStream RF² Infrastructure is installed to ensure that it can co-exist with your wireless networks without causing interference issues.

Sensitech Inc. is focused on delivering supply chain visibility solutions that track, monitor and protect products for global leaders in the food, life sciences, consumer goods, and industrial markets. Our solutions are focused in three key areas: quality and compliance, supply chain security, and logistics performance management. Quality and compliance solutions address temperature-sensitive, complex supply chains focused on delivering the highest quality possible, while our supply chain security solutions help to mitigate risks associated with theft, diversion and chain of custody. Sensitech's logistics performance solutions deliver origin-to-destination, real-time transparency to any in-transit journey. Sensitech Inc. is an ISO 9001:2015 company, headquartered in Beverly, Mass., with over 35 sales, service and distribution locations around the world. Sensitech is a Carrier company, a leading provider of heating, air conditioning and refrigeration systems, building controls and automation, and fire and security systems leading to safer, smarter, sustainable and high-performance buildings. Unless otherwise indicated, all trademarks and service marks are the property of Sensitech Inc. Visit www.sensitech.com for additional information. ©2020 Carrier. All Rights Reserved. Microsoft, Windows, Windows XP, Windows Vista, and Internet Explorer are registered trademarks of Microsoft Corporation in the United States and other countries.

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