

TR9299-WiFi
Battery Powered, Wi-Fi Communicating
CO₂ & Temperature Sensor

With Webpage Accessible Data or Easy Integration With BAS Systems

Key Features

- Ideal for permanent (wall mount), temporary or walk-through monitoring.
- Battery provides 3-year operating life on 2 AA batteries. Also can use 5-24VAC/VDC line power.
- On-board data logger can log up to 3,072 points.
- Up to 200 WiFi transmitters can easily be integrated into wired BACnet™ IP, Modbus or SNMP networks using an inexpensive 3rd party gateway.
- Data easily routed to any Internet device or to an optional cloud database service (SQL database compatible) to allow data to be viewed on any computer, tablet or smartphone.
- Configurable alarm function with audible, visual, email and text alarm indication (Ideal for LEED monitoring).
- Easily configured via a USB plug-in PC interface.
- User adjustable intervals for logging and transmitting.
- Zero maintenance self-calibrating CO₂ sensor.
- “Commissioning Friendly” design supports accurate and simple in-field calibration verification or adjustment.



The TR9299-WiFi is a battery operated CO₂ and Temperature sensor with a microprocessor controlled IEEE 802.11b/g radio Wi-Fi transceiver. The transmitter has an on board clock that allows it to spend most of the time in a low power quiescent state when in battery operation mode. CO₂ and temperature data is subjected to a CRC-16 error check and transmitted in a very short data packet that results in a very short transmitter on-time. This architecture combined with an ultra low power LED based CO₂ sensor, results in very low energy use that makes it ideal for long-term battery operation. The TR9299 will also communicate continuously when line powered (5-24 VDC/VAC).

Upon power up the sensor scans all available WiFi network channels (typically 1, 6, and 11) and associates with the Access Point exhibiting the strongest signal, provided the correct security and encryption setting agree. This feature can also be disabled to allow the user to operate the sensor on a fixed channel.

The TR9299 Wi-Fi CO₂ and Temperature Transmitter also has onboard memory, allowing it to function as a data logger. The sensor has programmable log rates ranging from 2 to 60 minutes. The sensor can store up to 3,072 data and/or event records.

The TR9299 is also ideal for LEED certification in that it offers an on-board audible and visual alarm, and can continuously send data to a website that records all reading for future reference. Email and text messages can be automatically generated if elevated levels occur.

AirTest also offers battery powered WiFi sensors for measuring temperature and dew point (TR7399-WiFi) for better humidity and temperature control inside coolers and also inside freezers (TR7499-WiFi) to monitor for conditions that may lead to food spoilage.

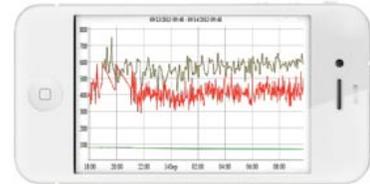
Wi-Fi Details

- 12dBm 2.4 GHz 802.11b/g Wi-Fi module
- Communicates with Industry Standard Access Points
- Supports WEP128, WPA-PSK (TKIP), and WPA2-PSK (AES)
- Small data packets (~75 bytes)
- Supports DHCP or Static IP
- Channel agility
- FCC, CE, and IC Class B compliant

TR9299-WiFi: One Product... Four Applications

1. LEED CO₂ Monitoring (Credit EQc1)

Green Building certification credits are available for installing CO₂ sensors that provide feedback on space ventilation performance. The battery powered TR9299-WiFi does not require wiring and can easily be installed for any retrofit application. This device can provide two ways to monitor space ventilation performance...



1. Blinking LED & beep at high CO₂ levels (silence & disable capable)

2. When WiFi connected, levels are logged to an AirTest provided web page that allows for graphing and email alerts.

2. Walk Through IAQ Surveys

CO₂ levels are a good indication of fresh air ventilation levels. The battery powered TR9299-WiFi can be carried through the space and will store up to 3,072 time-stamped CO₂ and temperature readings.

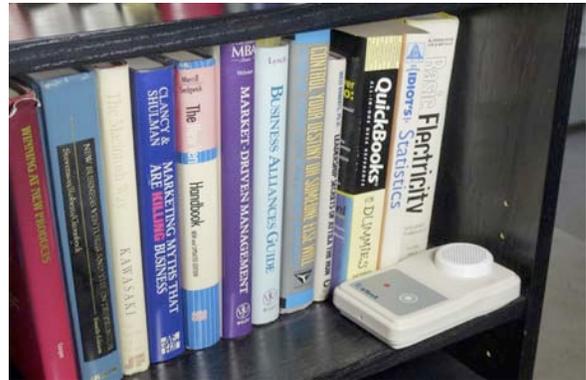
Once the TR9299-WiFi comes within range of a known WiFi network all logged data will be uploaded to an AirTest provided webpage for viewing, graphing and download.



3. Short Term Monitoring (1-7 days)

Monitoring of CO₂ in a space over one to seven days can identify whether a space is over or under ventilated and if it is a good candidate for CO₂ demand controlled ventilation. AirTest has developed a program that allows you to determine potential CO₂ DCV savings based on measurement results.

The TR9299-WiFi can actively transfer data to a local WiFi network or a personal cellular WiFi device (e.g. myfi). If WiFi is not available, the internal data-logger will store data until it connects with its base network.



4. Integration With Building Control Systems

WiFi is the most widespread, dependable, economical and well-understood wireless communication technology available today for inside buildings.

The TR9299-Wifi can tap into any existing networks using the latest in encryption technology. Economical third party gateways are now available that can tap into a WiFi network and deliver a wired BACnet or Modbus or SNMP connection. Building controllers with internet communication capability can easily utilize the internet based data from the TR9299-WiFi.



A Commissioning Friendly CO₂ Sensor...A Different Take On Calibration

Most CO₂ sensors including the TR9299 CO₂ Transmitter incorporate a self-calibration feature that is intended to reduce maintenance and provide long-term stability in CO₂ readings.

In the case of the TR9299, the device uses a background calibration feature that periodically looks for the lowest concentration that takes place over a one or two week period and assumes that that low concentration is similar to outside levels that should be in the 400 to 450 ppm range. This would typically occur when a space is unoccupied over a weekend. Most CO₂ sensors available in today's market use this type of background calibration feature.

One problem with CO₂ sensors today is they are not really designed to allow contractors or building owners to check or perform calibrations as part of a commissioning process. Also many monitoring contractors need to be able to check calibration prior to a measurement session.

In many cases CO₂ manufacturers have felt so confident in their calibration stability they have made it almost impossible for users in the field to verify calibration. The TR9299-WiFi is designed to be "Commissioning Friendly" and offers a number of ways for a user to check or adjust calibration in a way that should be as accurate as a factory calibration.

Option One: Ambient Air Calibration

Turn on the battery powered TR9299 and place it in an outside air environment. After 10 to 15 minutes start the calibration by placing the small magnet provided with the sensor on the upper left side of the case when lying flat. Calibration assuming the outside air is 400 ppm will occur over the next 2 minutes. Job done!

The TR9299 also keeps a date stamped record of the calibration that is included in the CO₂ sensor data stream.

Magnet Activated Outdoor Calibration



Option 2: Calibration Using the TR9299 User Interface

The USB/PC interface program for the TR9299 allows for a number of adjustments to the sensor. The program also supports flow through gas commissioning with the custom designed calibration cap or comparative commissioning with a handheld device.

CO₂ readings can also be logged and time stamped during calibration to provide a record of the process.



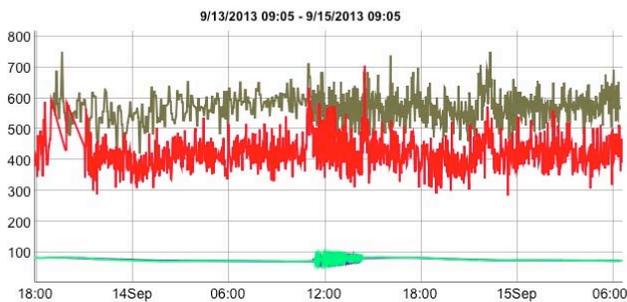
Web Logging Service

AirTest also provides an option with all Wi-Fi communicating products that allows the user to automatically log sensor information to a cloud based database for a nominal monthly fee (first 6 months are free). This is ideal for applications where an ongoing, tamperproof record of readings is important. The webpage interface also allows for automatic report and alarm generation.

View Sensors View Data Reports Manage Account Manage Sensors Help Logout

Select a Sensor Multi-Sensor Select Multiple Sensors
Time Select Time Range

Input	Latest	Highest	Lowest	Average	Unit
Analog_24D0A3E1.Analog:1	565	751	400	570	ppm CO2
Analog_24D0A3E1.Temperature:2	72.7	83.8	70.5	76.4	°F
Analog_74D0A3E1.Analog:1	469	706	284	422	ppm CO2
Analog_74D0A3E1.Temperature:2	72.7	84.9	70.8	76.1	°F



Inside The TR9299-WiFi

USB Configuration Port (Top of enclosure)

Batteries (2 AA Lithium)

5-24 VAC/VDC In

Power Switch



A Wide Variety Of Connection Options

The TR9299-WiFi offers a number of ways to stream the data from the sensor to a cloud database or a building control device or network.

1. For monitoring applications there is the AirTest Cloud server that can store and graph WiFi transmitter data on the web.
2. For control applications the data from the sensor can be streamed to other Internet protocol capable controllers for a building (Driver needed to translate WiFi UDP data packets).
3. To link the WiFi signal to a wired BACnet IP, Modbus or SNMP network the inexpensive [Babble Buster Gateway \(BB2-7010-06\)](#) from Control Solutions Inc. provides an ideal and easy-to-implement integration tool for up to 200 AirTest WiFi transmitters.

Specifications TR9299-WiFi

Sensors

CO₂ Technology: Wavelength specific LED Infrared source with self-calibration algorithm.

Calibration Interval: No calibration required when self calibration algorithm is activated. Otherwise calibration is recommended every 6 to 12 months.

CO₂ Measurement Range: 0 to 2,000 ppm, 0 to 5,000 ppm, 0 to 1%

CO₂ Operating Conditions: 0° to 50° C, 0 to 95% RH, 950 to 1050 bar

CO₂ Accuracy: +/- 50 ppm, +/- 3% of reading

CO₂ Non Linearity: < 1% of full scale

CO₂ Pressure Dependence: 0.13 % of reading per mm Hg

Temperature Accuracy: (45-120°F): ± 0.9°F

Sample Rate: Temperature 15 seconds, CO₂ 2 minutes (Adjustable), Continuous when line powered

Power

Battery: 3.6 vdc Lithium Thionyl Chloride (2)

Battery Life: up to 157,680 transmissions

External Power (optional): 5-24v DC or AC. 1A peak current, 20mA average current

Wi-Fi

Transmission rate: User programmable

Log rate: User programmable

Broadcast: 12dBm 2.4 GHz 802.11b/g Wi-Fi module

Compatibility: Communicates with Industry Standard Access Points

Encryption: Supports WEP128, WPA-PSK (TKIP), and WPA2-PSK (AES)

General: Small data packets (~75 bytes), Supports DHCP or Static IP, Channel agility

Data Packet Spec Link: [TR9299UDPSpec](#)

Certification: FCC, CE, and IC Class B compliant

Weight: 5 oz

MADE IN THE USA

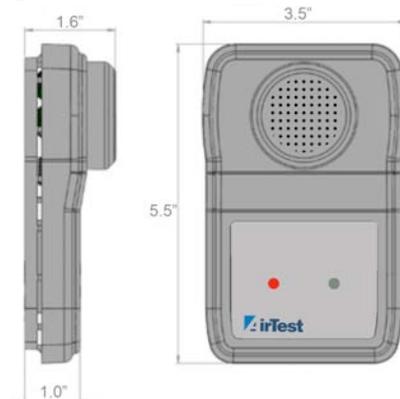


This device contains transmitter module

FCC ID: T9J-RN171 IC: 6514A-RN171

US Patent: 6721546

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Other WiFi Products available from AirTest:

TR9399 – Temperature And Dew Point

TR9499 – Freezer/Cooler Temp Monitoring

Zigbee Versions also available (Xbee Pro)

3/12/14

AirTest™ Technologies Inc. specializes in the application of cost effective, state-of-the-art air monitoring technology to ensure the comfort, security, health and energy efficiency of buildings.

