## 8-Channel Wireless Temperature Measurement Module

### OM-WLS-TEMP

**1 YEAR WARRANTY** CE

✔ **8 Temperature Input Channels**
✔ **Supports Thermocouple Types J, K, T, E, R, S, B, N, RTD's, Thermistors and Semi-Conductor Temperature Sensors**
✔ **Built-In Cold Junction Compensation and Open Thermocouple Detection**
✔ **Eight Digital I/O–User Configuration for Alarms**
✔ **802.15.4 Wireless Protocol**
✔ **Range: Up to 46 m (150') Indoors and 732 m (2400') Outdoors**

**OM-WLS-TEMP shown smaller than actual size.**

The OM-WLS-TEMP is a wireless USB 2.0 full-speed temperature input module (fully compatible with both USB 1.1 and 2.0).

The OM-WLS-TEMP provides 8 differential input channels that are software programmable for different sensor types including:

- Thermocouple Types J, K, T, E, R, S, B, N
- RTD–2, 3 or 4-wire Pt100 RTDs
- Thermistors–2, 3 or 4-wire measurements
- Semiconductor temperature sensors–LM36 or equivalent

The OM-WLS-TEMP provides a 24-bit analog-to-digital (A/D) converter for each pair of differential analog input channels. Each pair of differential inputs constitutes a channel pair. A different type of sensor (i.e., thermocouple, RTD, thermistor or semiconductor) can be connected to each channel pair, however both channels in the channel pair need to be the same sensor type (although if thermocouples are connected it is possible to mix thermocouple types).

The OM-WLS-TEMP provides two integrated cold junction compensation (CJC) sensors for thermocouple measurements and built-in current excitation sources for resistive sensor measurements, an open thermocouple detection feature allows detection of a broken thermocouple. An onboard microprocessor automatically linearizes the measurement data.

The OM-WLS-TEMP features 8 independent temperature alarms. Each alarm controls an associated digital I/O channel as an alarm output. The input to each alarm is one of the temperature channel inputs. The output of each alarm is software configurable as active high or low. Temperature threshold conditions are software programmable to activate each alarm. When an alarm is activated, the associated digital I/O channel is driven to the output state. All configurable options are software programmable. The OM-WLS-TEMP is fully software-calibrated.

The OM-WLS-TEMP can be operated as a standalone plug-and-play device which draws power through the USB cable.

The unit can also be operated as a remote device that communicates with the computer through the OM-WLS-IFC USB-to-wireless interface device. An external power supply is shipped with the device to provide power during remote operation.

When operating as a remote device, the OM-WLS-TEMP communicates with the computer through the OM-WLS-IFC device connected to the computer's USB port. Before the OM-WLS-TEMP can be operated remotely, it needs to be connected to the computer's USB port and the network parameters configured to establish a wireless link with the interface device. Only devices with the same parameter settings can communicate with each other. All configurable options are software programmable using the included InstaCal™ utility software.
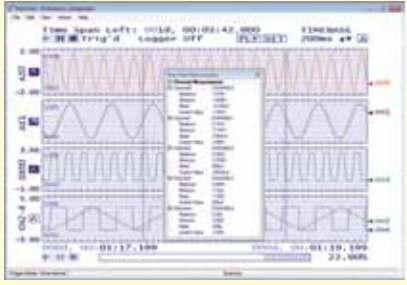
LEDs on the OM-WLS-TEMP indicate the status of communications over the wireless link. An LED bar graph shows the fade margin of signals received by the OM-WLS-TEMP.

## Software

The OM-WLS-TEMP module ships with an impressive array of software, including TracerDAQ®, a full-featured, out-of-the-box data logging, viewing, and analysis application. Driver support and detailed example programs are included for Universal Library programming libraries for Microsoft® Visual Studio® programming languages, and other languages, including DASYLab®, and ULx for NI LabVIEW® (comprehensive library of VIs and example programs compatible with 32-bit and 64-bit LabVIEW 2010 or later) and InstaCal™ installation, calibration and test utility-powerful solutions for programmers and nonprogrammers alike. These modules operate under Microsoft Windows® VISTA/7/8/10 (32-bit and 64-bit) operating systems.



**TracerDAQ Strip Chart.**



**TracerDAQ Pro Strip Chart with Measurements.**

The OM-WLS-TEMP data acquisition module is supplied with TracerDAQ software which is a collection of four virtual instrument applications used to graphically display and store input data and generate output signals:
- • Strip Chart—Log and graph values acquire from analog inputs, digital inputs, temperature inputs and counter inputs
- • Oscilloscope—Display values acquired from analog inputs
- • Function Generator—Generate waveforms for analog outputs
- • Rate Generator—Generate waveforms for counter outputs

TracerDAQ PRO is an enhanced version of TracerDAQ and is available as a purchased upgrade (SWD-TRACERDAQ-PRO). A comparison of some of the features included in TracerDAQ vs TracerDAQ PRO is shown below.

## Features Comparison
### Strip Chart

| Features | TracerDAQ | TracerDAQ Pro |
|---|---|---|
| Channel Types | Analog input, temperature input, digital input, event counter | Analog input, temperature input, digital input, event counter |
| Number of Channels | 8 | 48 |
| Number of Lanes | 2 | 8 |
| Maximum Samples per Channel | 32,000 | 1 million |
| Alarm Conditions | No | Yes |
| Measurements Window | No | Yes |
| Enter Annotations | No | Yes |
| Software Triggering | No | Yes |
| Hardware Triggering | No | Yes |
| Time-of-Day Triggering | No | Yes |
| Linear Scaling | No | Yes |

### Oscilloscope

| Features | TracerDAQ | TracerDAQ Pro |
|---|---|---|
| Channel Type | Analog input | Analog input |
| Number of Channels | 2 | 4 |
| Measurements Window | No | Yes |
| Reference Channel | No | Yes |
| Math Channel | No | Yes |

### Rate Generator

| Features | TracerDAQ | TracerDAQ Pro |
|---|---|---|
| Channel Type | Counter output | Counter output |
| Number of Channels | 1 | 20 |

### Function Generator

| Features | TracerDAQ | TracerDAQ Pro |
|---|---|---|
| Channel Type | Analog output | Analog output |
| Number of Channels | 1 | 16 |
| Waveform Types | Sine | Sine, square, triangle, flat, pulse, ramp, random, arbitrary |
| Duty Cycle | No | Yes |
| Phase | No | Yes |
| Gate Ratio | No | Yes |
| Rate Multiplier | No | Yes |
| Sweep (Linear and Exponential) | No | Yes |

## SPECIFICATIONS

### ANALOG INPUTS

**A/D Converter:** Four dual 24-bit sigma delta A/D converters

**Input Isolation:** 500 Vdc min between field wiring and USB interface

**Number of Channels:** 8 differential temperature inputs

**Differential Input Voltage Range:** Thermocouple, ±0.080V; RTD, 0 to 0.5V; thermistor, 0 to 2V; semiconductor sensor, 0 to 2.5V

**Absolute Maximum Input Voltage:** ±25V (power on), ±40V (power off)

**Throughput Rate:** 2 samples/sec max for all active channels

**Input Impedance:** 5 GΩ min

**Input Leakage Current:** 105 nA max (with open thermocouple detection enabled)

**Normal Mode Rejection Ratio:** 90 dB min

**Common Mode Rejection Ratio:** 100 dB min

**Warm-Up Time:** 30 minutes max

**Thermocouple Input:** Software programmable for type J, K, T, E, R, S, B, N

**Open Thermocouple Detection:** Automatically enabled when a channel is configured for a thermocouple sensor

**CJC Sensor Accuracy:** ±0.25°C typical, ±0.5°C max (15 to 35°C); -1.0 to 0.50°C max (0 to 70°C)

**Pt100 RTD Input:** 2-, 3- or 4-wire DIN 43760, $\alpha$ = 0.00385, SAMA, $\alpha$ = 0.003911, ITS-90/IEC751, $\alpha$ = 0.0038505 (3- or 4-wire connections take up 2 differential channels)

**Thermistor Input:** 2-, 3- or 4-wire standard 2252 through 30,000 Ω (3- or 4-wire connections take up 2 differential channels)

**Semiconductor Sensor:** TMP36 or equivalent

### DIGITAL I/O

**Digital I/O Channels:** 8

**Type:** CMOS

**Configuration:** Each DIO bit can be independently configured for input or output. Power on reset is input mode unless bit is configured for alarm



**OM-WLS-IFC shown smaller than actual size.**

**Pull-Up/Pull-Down Configuration:** All pins pulled up to 5V via 47 kΩ resistors (default). Pull-down to ground (GND) also available

**Digital I/O Transfer Rate (Software Paced):**

**Digital Input:** 50 port reads or single bit reads per second (typical)

**Digital Output:** 100 port writes or single bit writes per second (typical)

**Input High Voltage:** 2.0V min, 5.5V absolute max

**Input Low Voltage:** 0.8V min, -0.5V absolute min

**Output High Voltage:** 0.7V max (IOL = 2.5 mA)

**Output Low Voltage:** 3.8V min (IOH = -2.5 mA)

**Temperature Alarms:** 8 (one per digital I/O line)

### Compatible Thermocouple Input Types

| Type | Temperature Range | Accuracy* (Typical, °C) |
|------|-------------------|-------------------------|
| J | -210 to 1200°C (-346 to 2192°F) | ±0.507 typ, ±1.499 max (-210 to 0°C)<br>±0.312 typ, ±0.643 max (0 to 1200°C) |
| K | -210 to 1372°C (-346 to 2502°F) | ±0.538 typ, ±1.761 max (-210 to 0°C)<br>±0.345 typ, ±0.691 max (0 to 1372°C) |
| T | -200 to 600°C (-328 to 1112°F) | ±0.514 typ, ±1.717 max (-200 to 0°C)<br>±0.256 typ, ±0.713 max (0 to 600°C) |
| E | -200 to 1000°C (-328 to 1832°F) | ±0.462 typ, ±1.471 max (-200 to 0°C)<br>±0.245 typ, ±0.639 max (0 to 1000°C) |
| R | -50 to 1768°C (-58 to 3214°F) | ±0.650 typ, ±2.653 max (-50 to 250°C)<br>±0.358 typ, ±1.070 max (250 to 1768°C) |
| S | -50 to 1768°C (-58 to 3214°F) | ±0.648 typ, ±2.491 max (-50 to 250°C)<br>±0.399 typ, ±1.841 max (250 to 1768°C) |
| B | 250 to 1820°C (482 to 3308°F) | ±0.581 typ, ±1.779 max (250 to 700°C)<br>±0.369 typ, ±0.912 max (700 to 1820°C) |
| N | -200 to 1300°C (-328 to 2372°F) | ±0.502 typ, ±1.969 max (-200 to 0°C)<br>±0.272 typ, ±0.769 max (0 to 1300°C) |

***** *Includes cold junction compensation measurement error*

## WIRELESS COMMUNICATIONS
**Protocol:** IEEE 802.15.4, ISM 2.4 GHz

**Range:** Up to 150' (50 m) indoor/urban; up to ½ mile (750 m) outdoor line-of-sight

**Transmit Power:** 10 mW (10 dBm)

**Receiver Sensitivity:** -100 dBm (1% packet error rate)

**RF Channels:** 12 direct sequence channels available, channels 12-23 (2.410-2.465 GHz), software selectable

**Addressing:** 16-bit PAN (personal area network) IDs per channel (software selectable), 64-bit device address

**Encryption:** 128-bit AES (software selectable)

## GENERAL
**Memory:** EEPROM

**Microcontroller:** Three high-performance 8-bit RISC microcontrollers

**Power Supply Voltage (Supplied by USB Port):** 4.75V min to 5.25V max

**Power Supply Current (Supplied by USB Port):** 500 mA max

**User Output Voltage (5V)** 4.75V min to 5.25V max, (connected to self-powered hub)

**Wireless Communications Operation Supply Current:** 500 mA max (ac adaptor required for remote wireless communications operation)
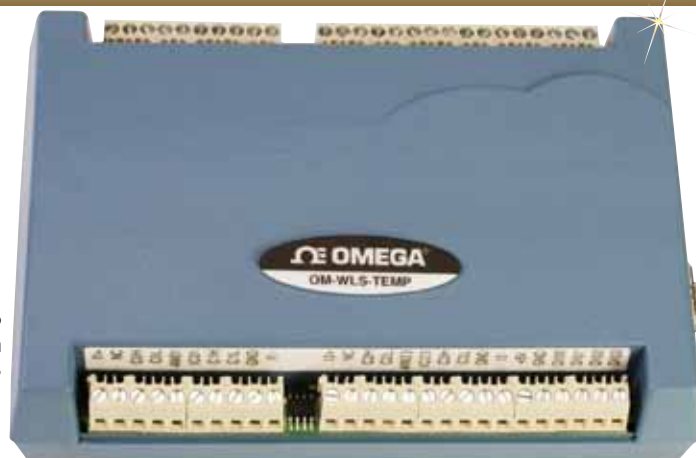
**Excitation Current for Resistance Sensors:** RTD, 210 uA ±5% typ; thermistor, 10 uA ±5% typ

**Isolation:** 500 Vdc min measurement system to PC

**OMEGACARE**℠
**Extended Warranty Program**

**OM-WLS-TEMP shown smaller than actual size.**

**USB Device Type:** USB 2.0 (full-speed)

**Device Compatibility:** USB 1.1, USB 2.0

**USB Cable Length:** 3 m (10') max

**Dimensions:** 127 L x 89 W x 36 mm D (5.0 x 3.5 x 1.4")

**Input Connections:** Screw terminal blocks (accept 16 to 30 AWG wire)

**Operating Temperature:** 0 to 50°C (32 to 122°F), 0 to 90% RH non-condensing

**Storage Temperature:** -40 to 85°C (-40 to 185°F)

**Weight:** 180 g (6.4 oz)

### RTD Measurement Accuracy

| Temperature Range | Typ Error (°C) | Max Error (°C) |
|---|---|---|
| -200 to -150°C (-328 to -238°F) | ±2.59 | ±2.58 |
| -150 to -100°C (-238 to -148°F) | ±0.97 | ±1.24 |
| -100 to 0°C (-148 to 32°F) | ±0.31 | ±0.58 |
| 0 to 100°C (32 to 212°F) | ±0.11 | ±0.38 |
| 100 to 300°C (212 to 572°F) | ±0.12 | ±0.39 |
| 300 to 600°C (572 to 1112°F) | ±0.12 | ±0.40 |

### Thermistor Measurement Accuracy

| Thermistor | Temperature Range | Max Error (°C) |
|---|---|---|
| 2252Ω | -40 to 120°C (-40 to 248°F) | ±0.05 |
| 3000Ω | -40 to 120°C (-40 to 248°F) | ±0.05 |
| 5000Ω | -35 to 120°C (-31 to 248°F) | ±0.05 |
| 10,000Ω | -25 to 120°C (-13 to 248°F) | ±0.05 |
| 30,000Ω | -10 to 120°C (14 to 248°F) | ±0.05 |

### Semiconductor Sensor Measurement Accuracy

| Sensor Type | Temperature Range | Max Error (°C) |
|---|---|---|
| TMP36 or equivalent | -40 to 150°C (-40 to 302°F) | ±0.05 |

## To Order

| Model No. | Description |
|---|---|
| **OM-WLS-TEMP** | 8-channel wireless temperature measurement module |
| **OM-WLS-IFC** | USB-to-wireless interface device (receiver) |
| **SWD-TRACERDAQ-PRO** | TracerDAQ Pro software |

*Comes complete with a 2 m (6') USB cable, 100 to 240 Vac ac adaptor with USA plug, Quick Start Guide, TracerDAQ software, and operator's manual on CD.*

***Ordering Example: OM-WLS-TEMP** 8-channel wireless temperature measurement module and **OCW-1** OMEGACARE℠ 1 year extended warranty adds 1 year to standard 1 year warranty.*