4-Channel Universal Analog Input USB Data Acquisition Module

OM-USB-2404-UI

1 YEAR WARRANTY

OM-USB-2404-UI shown smaller than actual size.

- **4 Channels of Universal Analog Input**
- **24-Bit Resolution**
- **Measures: Voltage (±125 mV, ±1V, ±4V, ±15V, ±60V), Current (±25 mA), Thermocouples (J, K, T, E, R, S, N, B), RTDs (Pt100, Pt1000, 3- and 4-Wire), Resistance (2- and 4-Wire), and Bridge-Based Sensors (Quarter-, Half-, and Full-Bridge)**
- **Simultaneous Sampling at Up to 100 S/s Per Channel**
- **Built-In Thermistor for Cold-Junction Compensation (CJC)**
- **Six-Position Input Screw Terminal Allows Different Measurement Types to be Performed On Each Channel**

The new OM-USB-2404-UI provides four channels of 24-bit universal analog input with integrated signal conditioning. The device can be used to measure a variety of sensor types such as RTDs, thermocouples, load cells, and other powered sensors. The four channels are individually configurable, so a different measurement type can be performed on each channel. All channels are measured simultaneously at up to 100 S/s per channel.

The OM-USB-2404-UI can perform the following measurements:

- Voltage
- Current
- Thermocouple
- RTD (3- and 4-wire)
- Resistance (2- and 4-wire)
- Bridge-based sensors (quarter-, half-, and full-bridge)

Measurement ranges vary for each type of measurement.

The device features a built-in current and voltage excitation. The excitation circuit is protected from overcurrent and overvoltage fault conditions. Each channel also has a built-in thermistor for cold-junction compensation (CJC) calculations when measuring thermocouples. An analog pre-filter removes noise that may be present in the signals prior to conversion.

With 250 Vac channel-to-channel and channel-to-ground isolation, the OM-USB-2404-UI protects the individual channels and connected computer and ensures a reliable data stream. Each channel has a detachable six-position screw terminal block for field wiring connections.

The OM-USB-2404-UI ships with a 2 m (6') USB cable and is powered by the 5V USB supply from your computer. No external power is required.

The OM-USB-2404-UI is a USB 2.0 high-speed device that is supported under popular Microsoft Windows® operating systems. The OM-USB-2404-UI is fully compatible with both USB 1.1 and USB 2.0 ports.

Software

The OM-USB-2404-UI module ships with an impressive array of software, including the new 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 v8.5 through 2013) and InstaCal™ installation, calibration and test utility-powerful solutions for programmers and nonprogrammers alike. These modules operate under Microsoft Windows® XP (32-bit only) and VISTA/7/8 (32-bit and 64-bit) operating systems.

The OM-USB-2404-UI 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 acquired 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. A comparison of some of the features included in TracerDAQ vs TracerDAQ PRO is shown below.

TracerDAQ Strip Chart.

TracerDAQ PRO Strip Chart with Measurements.

Features Comparison

Strip Chart

Feature	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

Feature	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

Function Generator

Feature	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

Rate Generator

Feature	TracerDAQ	TracerDAQ PRO
Channel Type	Counter output	Counter output
Number of Channels	1	20

SPECIFICATIONS

ANALOG INPUT

Number of Channels: 4
A/D Converter Resolution: 24-bit
A/D Converter Type: Delta-Sigma with analog pre-filtering
Sampling Mode: Simultaneous
TEDS Sensor Type Supported: IEEE 1451.4 TEDS Class II (interface)
Input Mode: Voltage, current, resistance (2- and 4-wire), RTD (3- and 4-wire), thermocouple, quarter-bridge, half-bridge, full-bridge
Conversion Time (No channels in TC mode)
- **High Speed:** 10 ms for all channels
- **Best 60 Hz Rejection:** 110 ms for all channels
- **Best 50 Hz Rejection:** 130 ms for all channels
- **High Resolution:** 500 ms for all channels

Conversion Time (One or More Channels in TC Mode)
- **High Speed:** 20 ms for all channels
- **Best 60 Hz Rejection:** 120 ms for all channels
- **Best 50 Hz Rejection:** 140 ms for all channels
- **High Resolution:** 510 ms for all channels

Overvoltage Protection
- **Terminals 1 and 2:** ±30V
- **Terminals 3 Through 6, Across any Combination:** ±60V

Input Impedance
- **Voltage Mode (±60V, ±15V, ±4V):** 1 MΩ
- **Current Mode:** <40 Ω
- **All Other Modes:** >1GΩ

Input Bias Current: <1nA
Integral Non-Linearity (INL): ±15 ppm
Common Mode Rejection Ratio (CMRR): >100 dB
Normal Mode Rejection Ratio (NMRR)
- **Best 60 Hz Rejection:** 90 dB at 60 Hz
- **Best 50 Hz Rejection:** 80 dB at 50 Hz
- **High Resolution:** 65 dB at 50 Hz and 60 Hz

INPUT MODE RANGES

Input Mode	Nominal Range(s)	Actual Range(s)
Voltage	±60V, ±15V, ±4V, ±1V, ±125 mV	±60V, ±15V, ±4V, ±1V, ±125 mV
Current	±25 mA	±25 mA
4-Wire and 2-Wire Resistance	10 kΩ, 1 kΩ	10.5 kΩ, 1.05 kΩ
Thermocouple	±125 mV	±125 mV
4-Wire and 3-Wire RTD	Pt1000, Pt100	5.05 kΩ, 505 Ω
Quarter-Bridge	350 Ω, 120 Ω	390 Ω, 150 Ω
Half-Bridge	±500 mV/V	±500 mV/V
Full-Bridge	±62.5 mV/V, ±7.8 mV/V	±62.5 mV/V, ±7.8125 mV/V

ACCURACY

Mode, Range	Gain Error (Percent of Reading) Typical 25°C, ±5°C, -40 to 70°C Maximum	Offset Error (ppm of Range) Typical 25°C, ±5°C, -40 to 70°C Maximum
Voltage, ±60V	±0.3, ±0.4	±20, ±50
Voltage, ±15V	±0.3, ±0.4	±60, ±180
Voltage, ±4V	±0.3, ±0.4	±240, ±720
Voltage, ±1V	±0.1, ±0.18	±15, ±45
Voltage/Thermocouple, ±125 mV	±0.1, ±0.18	±120, ±360
Current, ±25 mA	±0.1, ±0.6	±30, ±100
4-Wire and 2-Wire (Note 1) Resistance, 10 kΩ	±0.1, ±0.5	±120, ±320
4-Wire and 2-Wire (Note 1) Resistance, 1 kΩ	±0.1, ±0.5	±1200, ±3200
4-Wire and 3-Wire RTD, Pt1000	±0.1, ±0.5	±240, ±640
4-Wire and 3-Wire RTD, Pt100	±0.1, ±0.5	±2400, ±6400
Quarter-Bridge, 350 Ω	±0.1, ±0.5	±2400, ±6400
Quarter-Bridge, 120 Ω	±0.1, ±0.5	±2400, ±6400
Half-Bridge, ±500 mV/V	±0.03, ±0.07	±300, ±450
Full-Bridge, ±62.5 mV/V	±0.03, ±0.08	±300, ±1000
Full-Bridge, ±7.8 mV/V	±0.03, ±0.08	±2200, ±8000
Cold-Junction Compensation Sensor Accuracy		±1°C, typical

Note 1: *2-wire resistance mode accuracy depends on the lead wire resistance. This table assumes 0 Ω of lead wire resistance.*

STABILITY

Measurement Conditions	Gain Drift (ppm of reading/°C)	Offset Drift (ppm of range/°C)
Voltage, ±60V	±20	±0.2
Voltage, ±15V	±20	±0.8
Voltage, ±4V	±20	±3.2
Voltage, ±1V	±10	±0.2
Voltage/Thermocouple, ±125 mV	±10	±1.6
Current, ±25 mA	±15	±0.4
4-Wire and 2-Wire Resistance, 10 kΩ	±15	±3
4-Wire and 2-Wire Resistance, 1 kΩ	±15	±30
4-Wire and 3-Wire RTD, Pt1000	±15	±6
4-Wire and 3-Wire RTD, Pt100	±15	±60
Quarter-Bridge, 350 Ω	±15	±120
Quarter-Bridge, 120 Ω	±15	±240
Half-Bridge, ±500 mV/V	±3	±20
Full-Bridge, ±62.5 mV/V	±3	±20
Full-Bridge, ±7.8 mV/V	±3	±20

INPUT NOISE (ppm of Range$_{rms}$)

Mode, Range	Conversion Time			
	High Speed	Best of 60 Hz Rejection	Best of 50 Hz Rejection	High Resolution
Voltage, ±60V	7.6	1.3	1.3	0.5
Voltage, ±15V	10.8	1.9	1.9	0.7
Voltage, ±4V	10.8	2.7	2.7	1.3
Voltage, ±1V	7.6	1.3	1.3	0.5
Voltage/Thermocouple, ±125 mV	10.8	1.9	1.9	1.0
Current, ±25 mA	10.8	1.9	1.9	1.0
4-Wire and 2-Wire Resistance, 10 kΩ	4.1	1.3	0.8	0.3
4-Wire and 2-Wire Resistance, 1 kΩ	7.1	1.8	1.2	0.7
4-Wire and 3-Wire RTD, Pt1000	7.6	1.7	1.1	0.4
4-Wire and 3-Wire RTD, Pt100	10.8	1.9	1.9	0.9
Quarter-Bridge, 350 Ω	5.4	1.0	1.0	0.7
Quarter-Bridge, 120 Ω	5.4	1.0	1.0	0.7
Half-Bridge, ±500 mV/V	3.8	0.5	0.5	0.2
Full-Bridge, ±62.5 mV/V	5.4	1.0	1.0	0.8
Full-Bridge, ±7.8 mV/V	30	4.7	4.7	2.3

Half-Bridge and Full-Bridge Mode Excitation Level

Measurement Conditions	Load Resistance (Ω)	Excitation (V)
Half-Bridge	700	2.5
Half-Bridge	240	2.0
Full-Bridge	350	2.7
Full-Bridge	120	2.2

Resistance, RTD, and Quarter-Bridge Mode Excitation Level

Load Resistance (Ω)	Excitation (mV)
120	50
350	150
1000	430
10,000	2200

OM-USB-2404-UI shown smaller than actual size.

TracerDAQ software (included).

GENERAL

Operating Temperature Range: 0 to 60°C (32 to 140°F), 10 to 90% RH non-condensing

Storage Temperature Range: -40 to 85°C (-40 to 185°F), 5 to 95% RH non-condensing

Communications: USB 2.0 Hi-Speed mode (480 Mbps) is recommended; otherwise USB 1.1 full-speed mode (12 Mbps)

Current Consumption from USB: 500 mA, maximum

Channel-to-Earth Ground Isolation

Continuous: 250 Vrms (measurement category II for measurements performed on circuits directly connected to the electrical distribution system)

Withstand: 2300 Vrms (verified by a 5 second dielectric withstand test)

Channel-to-Channel Isolation

Continuous: 250 Vrms (measurement category II for measurements performed on circuits directly connected to the electrical distribution system)

Withstand: 1390 Vrms (verified by a 5 second dielectric withstand test)

Signal I/O Connector: 6-position screw terminals

Screw terminal Wiring: 18 to 28 AWG copper conductor wire with 7 mm (0.28") of insulation stripped from the end

Maximum Altitude: 2000 m (6562')

Dimensions: 134 L x 143 W x 39 mm H (5.27 x 5.64 x 1.54")

Weight: 567 g (1.25 lb)

OMEGACARE℠ Extended Warranty Program

OMEGACARE℠ extended warranty program is available for models shown on this page. Ask your sales representative for full details when placing an order. OMEGACARE℠ covers parts, labor and equivalent loaners.

To Order

Model No.	Description
OM-USB-2404-UI	4-channel universal analog input USB data acquisition module
OM-ACC-164	Spare 6-position screw terminal connectors for the OM-USB-2404-UI (quantity of 4)
OM-ACC-176	Backshell kit for use with the OM-ACC-164, 6-position connectors (quantity of 4)
SWD-TRACERDAQ-PRO	TracerDAQ PRO software

Comes complete with 2 m (6') USB cable and TracerDAQ software and user manual on CD.

***Ordering Example: OM-USB-2404-UI** 4-channel universal analog input USB data acquisition module and **OCW-1,** OMEGACARE℠ extends standard 1-year warranty to a total of 2 years.*