USB-TEMP and USB-TC Series

Temperature Measurement Devices

The USB-TEMP Series provides temperature measurement flexibility as each channel can monitor any of the supported input types

Overview

All USB-TEMP and TC Series devices support thermocouple inputs. The USB-TEMP and USB-TEMP-AI also support RTD, thermistor, and semiconductor sensor measurements. In addition, voltage measurements are supported by the USB-TEMP-AI and USB-TC-AI. Each device also includes eight digital I/O lines.

The USB-TEMP and USB-TC Series offers the most accurate temperature measurement possible, since the internal measurement electronics accuracy exceeds the accuracy specifications of the temperature sensors.

The combination of the USB-TEMP and USB-TC Series and the Measurement Computing DAQ software suite gives you a complete data acquisition solution that will have you taking measurements in minutes.

Analog Input

The USB-TEMP and USB-TC each include eight thermocouple inputs. The USB-TEMP also supports RTD, thermistor, and semiconductor sensor measurements.

The USB-TEMP-AI and USB-TC-AI feature four thermocouple inputs plus four voltage inputs with ranges up to ±10 V. The USB-TEMP-AI also supports RTD, thermistor, and semiconductor sensor measurements. The USB-TEMP-AI and USB-TC-AI also offer four voltage input channels with ranges from ±1.25 V to ±10 V.

A 24-bit analog-to-digital (A/D) converter is provided for each pair of analog inputs. Users can connect a different category of sensor to each temperature channel pair.

Open thermocouple detection (OTD) is provided to detect broken thermocouples. Cold junction compensation (CJC) sensors are provided for TC measurements, and built-in current excitation sources for resistive sensor measurements.

Sample Rate

Each channel can be sampled at up to two samples per second for a total device throughput of 16 samples per second.

Digital I/O

Eight independent, TTL-compatible digital I/O channels are used to monitor TTL-level inputs and communicate with external devices. The DIO lines on the USB-TEMP-AI and USB-TC-AI can also be used to generate alarms.

The digital I/O lines are software programmable for input or output.

Features

- **Temperature and voltage measurements**
- **Thermocouples, RTDs, thermistors, semiconductor sensors**
- **8 analog inputs**
- **24-bit resolution**
- **8 digital I/O**
- **1 event counter**

Supported Operating Systems

- **Windows® 10/8/7/Vista®/XP, 32/64-bit**
- **Linux®**
- **Android™**

Counter Input

USB-TEMP-AI and USB-TC-AI devices have a 32-bit event counter that accept frequency inputs up to 1 MHz. The internal counter increments when the TTL levels transition from low to high.

Calibration

USB-TEMP and USB-TC Series devices are factory-calibrated using a NIST-traceable calibration process. Specifications are guaranteed for one year.

The USB-TEMP and USB-TC Series also supports field calibration for users to calibrate the device locally with the InstaCal utility.

InstaCal prompts you to run its calibration utility when you change from one sensor category to another. Allow the device to operate for at least 30 minutes before calibrating. This warm up time minimizes thermal drift and achieves the specified rated accuracy of measurements.

USB-TEMP and USB-TC Series Selection Chart

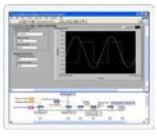
Model	Channels	Thermocouple Inputs	RTD, Thermistor, Semiconductor Sensor Inputs	Voltage Inputs
USB-TC	8	✓	—	—
USB-TEMP	8	✓	✓	—
USB-TC-AI	8	✓	—	✓
USB-TEMP-AI	8	✓	✓	✓

USB-TEMP and USB-TC Series

Software

Software Support

USB-TEMP and TC Series devices are supported by the software in the table below.

Ready-to-Run Applications		
DAQami™		Data acquisition companion software with drag-and-drop interface that is used to acquire, view, and log data, and generate signals. DAQami can be configured to log analog, digital, and counter channels, and to view that data in real-time or post-acquisition on user-configurable displays. Logged data can be exported for use in Excel® or MATLAB®. Windows OS DAQami is included with the free MCC DAQ Software bundle. Install DAQami and try the fully-functional software for 30 days. After 30 days, all features except for data logging and data export will continue to be available – data logging and data export features can be unlocked by purchasing the software.
InstaCal™		An interactive installation, configuration, and test utility for MCC hardware. Windows OS InstaCal is included with the free MCC DAQ Software bundle.
TracerDAQ™ and TracerDAQ Pro		Virtual strip chart, oscilloscope, function generator, and rate generator applications used to generate, acquire, analyze, display, and export data. Supported features may vary by hardware. The Pro version provides enhanced features. Windows OS TracerDAQ is included with the free MCC DAQ Software bundle. TracerDAQ Pro is available as a purchased software download.
General-Purpose Programming Support		
Universal Library™ (UL) for Windows		Library for developing applications in C, C++, VB, C# .Net, VB .Net, and Python on Windows. The UL for Windows is included with the free MCC DAQ Software bundle. The UL Python API for Windows is available on GitHub (github.com/mccdaq/mcculw).
UL for Linux®		Library for developing applications in C, C++, and Python on Linux. UL for Linux is available on GitHub (github.com/mccdaq/uldaq). Open-source, third-party Linux drivers are also available for supported MCC devices.
UL for Android™		Library of Java classes for programmers who develop apps for Android-based mobile devices. UL for Android communicates with select MCC DAQ devices. Supports Android project development on Windows, Linux, Mac OS X. UL for Android is included with the free MCC DAQ Software bundle.
Application-Specific Programming Support		
ULx for NI LabVIEW™		A comprehensive library of VIs and example programs for NI LabVIEW that is used to develop custom applications that interact with most MCC devices. Windows OS ULx for NI LabVIEW is included with the free MCC DAQ Software bundle.
DASYLab®		Icon-based data acquisition, graphics, control, and analysis software that allows users to create complex applications in minimal time without text-based programming. Windows OS DASYLab is available as a purchased software download. An evaluation version is available for 28 days.

USB-TEMP and USB-TC Series

Specifications

USB-TEMP-AI and USB-TC-AI

All specifications are subject to change without notice.
Typical for 25 °C unless otherwise specified.
Thermocouple specifications apply to the USB-TEMP-AI and USB-TC-AI.
RTD, thermistor, and semiconductor specifications apply only to the USB-TEMP-AI
All other specifications apply to all temperature and voltage input channels unless otherwise specified.

Analog Input

A/D converter type: T0x-T3x, V0x-V3x, AD42_321, dual 24-bit Sigma-Delta
Number of channels
- **Voltage input**: 4 differential, V0x-V3x, 4 single-ended
- **Temperature Input**: 4 differential, T0x-T3x

Input isolation: 500 VDC min between field wiring and USB interface
Channel configuration
- **T0x-T3x**: Temperature input, software programmable to match sensor type
- **V0x-V3x**: Voltage input

Analog input modes
Power up and reset state: Factory default configuration is Disabled mode; once configured, each channel reverts to the mode previously set by the user
Single-ended: Vx_H are connected directly to screw terminal pins; Vx_L are disconnected from screw terminal pins and internally connected to GND
Differential: Vx_H and Vx_L are connected directly to screw terminal pins; Tx_H and Tx_L are connected directly to their screw terminal pins
Input ranges
- **Thermocouple**: T0x-T3x, ±0.080 V
- **RTD**: T0x-T3x, 0 to 0.5 V
- **Thermistor**: T0x-T3x, 0 to 2 V
- **Semiconductor**: T0x-T3x, 0 to 2.5 V
- **Voltage**: V0x-V3x, ±10, ±5, ±2.5, ±1.25 V

Absolute maximum input voltage
- **T0x-T3x** relative to GND: ±25 V max power on, ±40 V max power off
- **V0x-V3x** relative to GND: ±25 V max power on, ±15 V max power off

Input impedance
- **T0x-T3x**: 5 GΩ power on, 1 MΩ power off
- **V0x-V3x**: 10 GΩ power on, 2.49 kΩ power off

Input leakage current
- **T0x-T3x**: With open thermocouple detect disabled, 30 nA max
- **T0x-T3x**: With open thermocouple detect enabled, 105 nA max
- **V0x-V3x**: ±1.5 nA typ, ±25 nA max

Input bandwidth (–3 dB)
- **T0x-T3x**: 50 Hz
- **V0x-V3x**: 3 kHz

Maximum working voltage (signal + common mode): V0x-V3x: ±10.25 V max
Common mode rejection ratio
- **T0x-T3x**: fIN = 60 Hz, 100 dB
- **V0x-V3x**: fIN = 60 Hz, all input ranges, 83 dB

ADC resolution: 24 bits
ADC no missing codes: 24 bits
Input coupling: DC
Warm-up time: 30 minutes min
Open thermocouple detect
- **T0x-T3x**: Automatically enabled when the channel pair is configured for thermocouple sensor; the maximum open detection time is 3 seconds

CJC sensor accuracy
- **T0x-T3x**: 15 °C to 35 °C: ±0.25 °C typ, ±0.5 °C max
- **T0x-T3x**: 0 °C to 70 °C: –1.0 °C to 0.75 °C max

Channel Configurations

T0x-T3x: Disabled, all temperature input channels are disconnected from screw terminals and internally connected to GND
T0x-T3x: Thermocouple, 4 differential channels
T0x-T3x: Semiconductor sensor, 4 differential channels
T0x-T3x
- **RTD and thermistor**
  - 2-wire with a single sensor per channel pair, 2 differential channels
  - 2-wire with two sensors per channel pair, 4 differential channels
  - 3-wire with a single sensor per channel pair, 2 differential channels
  - 4-wire with a single sensor per channel pair, 2 differential channels
  - 4-wire with two sensors per channel pair, 4 differential channels

V0x-V3x: Disabled, all voltage input channels are disconnected from screw terminals and internally connected to GND
V0x-V3x: Differential, 4 differential channels
V0x-V3x: Single-ended, 4 single-ended channels

Thermocouple:
- J: –210 °C to 1200 °C
- K: –270 °C to 1372 °C
- R: –50 °C to 1768 °C
- S: –50 °C to 1768 °C
- T: –570 °C to 400 °C
- N: –570 °C to 1300 °C
- E: –570 °C to 1000 °C
- B: 0 °C to 1820 °C

RTD
- 100 Ω PT (DIN 43760: 0.00385 ohms/ohm/°C)
- 100 Ω PT (SAMA: 0.003911 ohms/ohm/°C)
- 100 Ω PT (ITS-90/IEC751:0.0038505 ohms/ohm/°C)

Thermistor: Standard 2,252 Ω through 30,000 Ω
Semiconductor/IC: LM35, TMP35 or equivalent

Accuracy

Thermocouple Measurement Accuracy: T0x-T3x

Sensor Type	Sensor Temp. Range	Accuracy Error Max (°C)	Accuracy Error Typ (°C)	Temp (°C/ °C)
J	–210	2.028	0.707	0.031
	0	0.835	0.278	
	1200	0.783	0.288	
K	–210	2.137	0.762	0.035
	0	0.842	0.280	
	1372	0.931	0.389	
S	–50	1.225	0.435	0.021
	250	0.554	0.195	
	1768	0.480	0.157	
R	–50	1.301	0.458	0.019
	250	0.549	0.190	
	1768	0.400	0.134	
B	250	2.193	2.185	0.001
	700	0.822	0.819	
	1820	0.469	0.468	
E	–200	1.976	0.684	0.030
	0	0.954	0.321	
	1000	0.653	0.240	
T	–200	2.082	0.744	0.035
	0	0.870	0.290	
	400	0.568	0.208	
N	–200	2.197	0.760	0.028
	0	0.848	0.283	
	1300	0.653	0.245	

Includes CJC measurement accuracy. All specifications are (±).

Semiconductor Sensor Measurement Accuracy: T0x-T3x

Sensor Type	Temperature Range (°C)	Accuracy Error Maximum (°C)
LM35, TMP35 or equivalent	–40 to 150	±0.50

USB-TEMP and USB-TC Series

Specifications

USB-TEMP-AI/TC-AI Specifications, continued

RTD Measurement Accuracy: T0x-T3x				
RTD	Sensor Temp. Range (°C)	Accuracy Error Max. (°C)	Accuracy Error Typ. (°C)	Tempco (°C/ °C)
PT100, DIN, US or ITS-90	–200	2.913	2.784	0.001
	–150	1.201	1.070	0.001
	–100	0.482	0.349	0.001
	0	0.261	0.124	0.001
	100	0.269	0.127	0.001
	300	0.287	0.136	0.001
	600	0.318	0.150	0.001

Ix+ = 210 µA. All specifications are (±).

Thermistor Measurement Accuracy: T0x-T3x				
Thermistor	Sensor Temp. Range (°C)	Accuracy Error Max. (°C)	Accuracy Error Typ. (°C)	Tempco (°C/ °C)
2252 Λ	–40	0.001	0.0007	0.001
	0	0.021	0.008	0.001
	50	0.263	0.130	0.001
	120	3.473	1.750	0.001
5000 Λ	–35	0.001	0.0006	0.001
	0	0.009	0.004	0.001
	50	0.115	0.049	0.001
	120	1.535	0.658	0.001
10000 Λ	–25	0.001	0.0005	0.001
	0	0.005	0.002	0.001
	50	0.060	0.028	0.001
	120	0.771	0.328	0.001
30000 Λ	–10	0.001	0.0005	0.001
	0	0.002	0.001	0.001
	50	0.019	0.009	0.001
	120	0.267	0.128	0.001

Ix+ = 10 µA. All specifications are (±).

Typical Thermistor Resistance Measurement Range					
Temp (°C)	Thermistor				
	2252 Λ	3000 Λ	5 kΛ	10 kΛ	30 kΛ
–40	76 kΛ	101 kΛ	168 kΛ	240 kΛ	885 kΛ
–35	55 kΛ	73 kΛ	121 kΛ	179 kΛ	649 kΛ
–30	40 kΛ	53 kΛ	88 kΛ	135 kΛ	481 kΛ
–25	29 kΛ	39 kΛ	65 kΛ	103 kΛ	360 kΛ
–20	22 kΛ	29 kΛ	49 kΛ	79 kΛ	271 kΛ
–15	16 kΛ	22 kΛ	36 kΛ	61 kΛ	206 kΛ
–10	12 kΛ	17 kΛ	28 kΛ	48 kΛ	158 kΛ
–5	9.5 kΛ	13 kΛ	21 kΛ	37 kΛ	122 kΛ
0	7.4 kΛ	9.8 kΛ	16 kΛ	29 kΛ	95 kΛ

Resistance values >180 kΛ cannot be measured by the device in thermistor mode.

Absolute Accuracy: V0x-V3x	
Range	Absolute Accuracy (mV)
±10 V	±2.779
±5 V	±1.398
±2.5 V	±0.707
±1.25 V	±0.362

Noise Performance			
Range	Peak to Peak Noise (µV)	RMS Noise (µVrms)	Noise-Free Resolution (Bits)
±10 V	41.13	6.23	19.09
±5 V	30.85	4.67	18.51
±2.5 V	17.14	2.60	18.36
±1.25 V	11.14	1.69	17.98

Settling Time: V0x-V3x	
Range	Accuracy ±0.0004% (seconds)
±10 V	15.0
±5 V	0.40
±2.5 V	0.40
±1.25 V	0.40

Accuracy Components					
Range	Gain Error (% of Reading)	Offset error (µV)	INL error (% of range)	Gain Temperature Coefficient (ppm/°C)	Offset Temperature Coefficient (µV/°C)
±10 V	0.0246	16.75	0.0015	3.68	0.42
±5 V	0.0246	16.75	0.0015	3.68	0.42
±2.5 V	0.0246	16.75	0.0015	3.68	0.42
±1.25 V	0.0246	16.75	0.0015	3.68	0.42

All specifications are (±).

USB-TEMP and USB-TC Series

Specifications

USB-TEMP-AI/TC-AI Specifications, continued

Analog Input Calibration

Recommended Warm-Up Time: 30 minutes min
Calibration: Firmware calibration
Calibration interval: 1 year
Calibration reference: 10.000 V, ±5 mV max; measured values stored in EEPROM
Tempco: 5 ppm/°C max
Long term stability: 30 ppm/1000 h

Throughput Rate

Maximum throughput: 2 Samples/second per channel

Digital Input/Output

Digital type: 5 V CMOS
Number of I/O: 8 (DIO0 through DIO7)
Configuration: Independently input or output; power on reset is input mode
Pull-up/down configuration: All pins pulled up to 5 V through 47 k∧ (default); contact MCC for pull down to ground capability
Digital I/O transfer rate (software paced)
Digital input: 50 port reads or single bit reads per second, typ.
Digital output: 100 port writes or single bit writes per second, typ
Input high voltage: 2.0 V min, 5.5 V absolute max
Input low voltage: 0.8 V max, –0.5 V absolute min
Output low voltage (IOL = 2.5 mA max): 0.7 V max
Output high voltage (IOH = –2.5 mA max): 3.8 V min

Temperature Alarms

Number of alarms: 8 (one per digital I/O line)
Alarm functionality: Each alarm controls a DIO line as an alarm output. The alarm input can be set to any temperature input channels. When enabled, the associated DIO line is set to output after the device is reset, and driven to the state determined by the alarm options and input temperature.
Alarm input modes: T1 and T2 may be independently set for each alarm.
Alarm when input temperature > T1
Alarm when input temperature > T1, reset alarm when input temperature goes below T2
Alarm when input temperature < T1
Alarm when input temperature < T1, reset alarm when > T2
Alarm when input temperature is < T1 or > T2
Alarm output modes: Disabled, enabled/active high output, and enabled/active low output
Alarm update rate: 1 second

Counter

Number of channels: 1
Resolution: 32-bits
Counter type: Event counter
Input type: TTL, rising edge triggered
Input source: CTR screw terminal
Counter read/writes rates (Software Paced): 33 to 1000 reads per second
Schmidt trigger hysteresis: 20 mV to 100 mV
Input leakage current: ±1.0 µA typ
Input frequency: 1 MHz max
High pulse width: 500 ns min
Low pulse width: 500 ns min
Input high voltage: 4.0 V min, 5.5 V absolute max
Input low voltage: 1.0 V max, –0.5 V absolute min

Power

Supply current: USB enumeration, <100 mA
Supply current: Quiescent mode with all inputs configured for Disabled mode, 270 mA typ
User 5 V input voltage range: 4.75 V min to 5.25 V max
User 5 V output voltage range: 4.9 V min to 5.1 V max
User 5 V output current: connected to a self-powered hub, 5 mA max
Isolation: Measurement system to PC, 500 VDC min

Current Excitation Outputs (±Ix, T0x-T3x)

Configuration: 2 dedicated pairs
Current excitation output ranges: Thermistor 10 µA; RTD: 210 µA
Tolerance: ±5.0%
Drift: 200 ppm/°C
Line regulation: 2.1 ppm/V max
Load regulation: 0.3 ppm/V
Output compliance voltage: 3.90 V max, –0.03 V min, (relative to GND)

Environmental

Operating temperature range: 0 °C to 55 °C max
Storage temperature range: –40 °C to 85 °C max
Humidity: 0 to 90% non-condensing max

Mechanical

Dimensions (L × W × H): 128.52 × 88.39 × 35.56 mm (5.06 × 3.48 × 1.43 in.)
User connection length: 3 m (9.84 ft) max

USB-TEMP and USB-TC

All specifications are subject to change without notice.
Thermocouple specifications apply to both USB-TEMP and USB-TC.
RTD, thermistor, and semiconductor specifications apply only to the USB-TEMP.
Typical for 25 °C unless otherwise specified.

Analog Input

A/D converters: Four dual 24-bit, Sigma-Delta type
Number of channels: 8 differential
Input isolation: 500 VDC min between field wiring and USB interface
Channel configuration: Software programmable to match sensor type
Differential input voltage range
Thermocouple: ±0.080 V
RTD: 0 to 0.5 V
Thermistor: 0 to 2 V
Semiconductor sensor: 0 to 2.5 V
Absolute maximum input voltage: ±25 V power on, ±40 V power off
Input impedance: 5 G∧, min
Input leakage current: OTD disabled, 30 nA max; OTD enabled, 105 nA max
Normal mode rejection ratio: fIN = 60 Hz, 90 dB min
Common mode rejection ratio: fIN = 50 Hz/60 Hz, 100 dB min
Resolution: 24 bits
No missing codes: 24 bits
Input coupling: DC
Warm-up time: 30 minutes min
Open thermocouple detect: Automatically enabled; 3 seconds
CJC sensor accuracy: 15 °C to 35 °C, ±0.25 °C typ., ±0.5 °C max, 0 °C to 70 °C, –1.0 to 0.5 °C max

Channel Configurations

Thermocouple: 8 differential channels
Semiconductor sensor: 8 differential channels
RTD and thermistor
2-wire with a single sensor per channel pair, 4 differential channels
2-wire with two sensors per channel pair, 8 differential channels
3-wire with a single sensor per channel pair, 4 differential channels
4-wire with a single sensor per channel pair, 4 differential channels
4-wire with two sensors per channel pair, 8 differential channels

Compatible Sensors

Thermocouple
J: –210 °C to 1200 °C
K: –270 °C to 1372 °C
R: –50 °C to 1768 °C
S: –50 °C to 1768 °C
T: –570 °C to 400 °C
N: –570 °C to 1300 °C
E: –570 °C to 1000 °C
B: 0 °C to 1820 °C
RTD
100 ∧ PT (DIN 43760: 0.00385 ohms/ohm/°C)
100 ∧ PT (SAMA: 0.003911 ohms/ohm/°C)
100 ∧ PT (ITS-90/IEC751:0.0038505 ohms/ohm/°C)
Thermistor: Standard 2,252 ∧ through 30,000 ∧
Semiconductor/IC: LM35, TMP35 or equivalent

Throughput Rate

Maximum throughput: 2 S/s per channel

USB-TEMP and USB-TC Series

Specifications

USB-TEMP/TC Specifications, continued

Accuracy

Thermocouple Measurement Accuracy			
Sensor Type	Maximum Error	Typical Error	Temperature Range (°C)
J	±1.499	±0.507	–210 to 0
	±0.643	±0.312	0 to 1200
K	±1.761	±0.538	–210 to 0
	±0.691	±0.345	0 to 1372
S	±2.491	±0.648	–50 to 250
	±1.841	±0.399	250 to 1768.1
R	±2.653	±0.650	–50 to 250
	±1.070	±0.358	250 to 1768.1
B	±1.779	±0.581	250 to 700
	±0.912	±0.369	700 to 1820
E	±1.471	±0.462	–200 to 0
	±0.639	±0.245	0 to 1000
T	±1.717	±0.514	–200 to 0
	±0.713	±0.256	0 to 600
N	±1.969	±0.502	–200 to 0
	±0.769	±0.272	0 to 1300

Includes CJC measurement error.

Semiconductor Sensor Measurement Accuracy		
Sensor Type	Temperature Range (°C)	Accuracy Error Maximum (°C)
LM35, TMP35 or equivalent	–40 to 150	±0.50

RTD Measurement Accuracy			
RTD	Sensor Temp. (°C)	Max Accuracy Error (Ix+ = 210 µA)	Typical Accuracy Error (Ix+ = 210 µA)
PT100, DIN, US or ITS-90	–200 to –150	±2.85 °C	±2.59 °C
	–150 to –100	±1.24 °C	±0.97 °C
	–100 to 0	±0.58 °C	±0.31 °C
	0 to 100	±0.38 °C	±0.11 °C
	100 to 300	±0.39 °C	±0.12 °C
	300 to 600	±0.40 °C	±0.12 °C

Thermistor Measurement Accuracy		
Thermistor	Temperature Range (Ix+ = 10 µA)	Max Accuracy Error (Ix+ = 10 µA)
2252 Ω	–40 °C to 120 °C	±0.05 °C
3000 Ω	–40 °C to 120 °C	±0.05 °C
5000 Ω	–35 °C to 120 °C	±0.05 °C
10000 Ω	–25 °C to 120 °C	±0.05 °C
30000 Ω	–10 °C to 120 °C	±0.05 °C

Typical Thermistor Resistance Measurement Range					
Temp (°C)	Thermistor				
	2252 Ω	3000 Ω	5 kΩ	10 kΩ	30 kΩ
–40	76 kΩ	101 kΩ	168 kΩ	240 kΩ	885 kΩ
–35	55 kΩ	73 kΩ	121 kΩ	179 kΩ	649 kΩ
–30	40 kΩ	53 kΩ	88 kΩ	135 kΩ	481 kΩ
–25	29 kΩ	39 kΩ	65 kΩ	103 kΩ	360 kΩ
–20	22 kΩ	29 kΩ	49 kΩ	79 kΩ	271 kΩ
–15	16 kΩ	22 kΩ	36 kΩ	61 kΩ	206 kΩ
–10	12 kΩ	17 kΩ	28 kΩ	48 kΩ	158 kΩ
–5	9.5 kΩ	13 kΩ	21 kΩ	37 kΩ	122 kΩ
0	7.4 kΩ	9.8 kΩ	16 kΩ	29 kΩ	95 kΩ

Resistance values >180 kΩ cannot be measured by the device in thermistor mode.

Digital Input/Output

Digital type: 5 V CMOS
Number of I/O: 8 (DIO0 through DIO7)
Configuration: Independently configured for input or output; power on reset is input mode
Pull-up/down configuration: All pins pulled up to 5 V through 47 kΩ resistors
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: 2.0 V min, 5.5 V absolute max
Input low voltage: 0.8 V max, –0.5 V absolute min
Output low voltage (IOL = 2.5 mA max): 0.7 V max
Output high voltage (IOH = –2.5 mA max): 3.8 V min

Power

Supply current
USB enumeration: <100 mA
Continuous mode: 140 mA typ
User 5 V input voltage range: 4.75 V min to 5.25 V max
User 5 V output voltage range: self-powered hub, 4.75 V min to 5.25 V max
User 5 V Output current: Bus-powered; connected to a self-powered hub, 10 mA max
Isolation: Measurement system to PC, 500 VDC min

Current Excitation Outputs (±Ix)

Configuration: 4 dedicated pairs
Current excitation output ranges: Thermistor 10 µA, **RTD**: 210 µA
Tolerance: ±5.0%
Drift: 200 ppm/°C
Line regulation: 2.1 ppm/V max
Load regulation: 0.3 ppm/V
Output compliance voltage: 3.90 V max, –0.03 V min, (relative to GND)

Environmental

Operating temperature range: 0 °C to 70 °C max
Storage temperature range: –40 °C to 85 °C max
Humidity: 0 to 90% non-condensing

Mechanical

Dimensions (L × W × H): 128.52 × 88.39 × 35.56 mm (5.06 × 3.48 × 1.43 in.)
User connection length: 3 m (9.84 ft) max

USB-TEMP and USB-TC Series

Ordering

Order Information

Hardware

Part No.	Description
USB-TEMP	8-channel temperature measurement device; supports thermocouples, RTDs, thermistors, and semiconductor sensors. Includes USB cable and MCC DAQ software
USB-TEMP-AI	8-channel temperature and voltage measurement device; supports thermocouples, RTDs, thermistors, and semiconductor sensors. Includes USB cable and MCC DAQ software
USB-TC	8-channel thermocouple measurement device. Includes USB cable and MCC DAQ software
USB-TC-AI	8-channel thermocouple and voltage measurement device. Includes USB cable and MCC DAQ software

Accessories

Part No.	Description
745690-E001	E-type thermocouples wire, fiberglass (0 °C to 482 °C, 32 °F to 900 °F), 1 m
745690-E002	E-type thermocouples wire, fiberglass (0 °C to 482 °C, 32 °F to 900 °F), 2 m
745690-J001	J-type thermocouples wire, fiberglass (0 °C to 482 °C, 32 °F to 900 °F), 1 m
745690-J002	J-type thermocouples wire, fiberglass (0 °C to 482 °C, 32 °F to 900 °F), 2 m
745690-K001	K-type thermocouples wire, fiberglass (0 °C to 482 °C , 32 °F to 900 °F), 1 m
745690-K002	K-type thermocouples wire, fiberglass (0 °C to 482 °C, 32 °F to 900 °F), 2 m
745690-T001	T-type thermocouples wire, fiberglass (0 °C to 482 °C, 32 °F to 900 °F), 1 m
745690-T002	T-type thermocouples wire, fiberglass (0 °C to 482 °C, 32 °F to 900 °F), 2 m
745691-01	3-wire, 100 ∧ RTD, sealed with alumina tube, 1 m (USB-TEMP and USB-TEMP-AI only)
745691-02	3-wire, 100 ∧ RTD, platinum (ready made), 2 m (USB-TEMP and USB-TEMP-AI only)

Software also Available from MCC

Part No.	Description
DAQami	Data acquisition companion software for acquiring data and generating signals
TracerDAQ Pro	Out-of-the-box virtual instrument suite with strip chart, oscilloscope, function generator, and rate generator – professional version
DASYLab	Icon-based data acquisition, graphics, control, and analysis software