

# Low-Cost Multifunction DAQ for USB

## NI USB-6008, NI USB-6009

- Small, portable multifunction data acquisition devices
- 12 or 14-bit input resolution, at up to 48 kS/s
- Built-in, removable connectors for easier and more cost-effective connectivity
- 2 true DAC analog outputs for accurate output signals
- 12 digital I/O lines (TTL/LVTTL/CMOS)
- 32-bit event counter
- Student kits available

### Operating Systems

- Windows 2000/XP
- Mac OS X
- Linux

### Recommended Software

- LabVIEW
- LabWindows/CVI

### Measurement Services Software (included)

- NI-DAQmx Base
- Ready-to-Run Data Logger

**NEW**



Product	Bus	Analog Inputs <sup>1</sup>	Input Resolution (bits)	Max Sampling Rate (kS/s)	Input Range (V)	Analog Outputs	Output Resolution (bits)	Output Rate (Hz)	Output Range (V)	Digital I/O Lines	32-bit Counter	Trigger
USB-6009	USB	8 SE/4 DI	14	48	±1 to ±20	2	12	150	0 to 5	12	1	Digital
USB-6008	USB	8 SE/4 DI	12	10	±1 to ±20	2	12	150	0 to 5	12	1	Digital

<sup>1</sup> SE = single ended, DI = differential

## Hardware Description

The National Instruments USB-6008 and USB-6009 multifunction data acquisition devices provide reliable data acquisition at a low price. With plug-and-play USB connectivity, these devices are simple enough for quick measurements, but versatile enough for more complex measurement applications.

## Software Description

The NI USB-6008 and USB-6009 include a ready-to-run data logger application that acquires and logs up to eight channels of analog data. For more functionality, NI-DAQmx Base software is a multiplatform driver with a subset of the NI-DAQmx programming interface. Use it to develop customized DAQ applications with NI LabVIEW or C-based development environments.

## Recommended Accessories

The USB-6008 and USB-6009 have built-in connectivity, so no additional accessories are required.

## Common Applications

The USB-6008 and USB-6009 are ideal for a number of applications where economy, small size, and simplicity are essential, such as:

- Data logging – Log environmental or voltage data quickly and easily
- Academic lab use – The low price facilitates student ownership of DAQ hardware for completely interactive lab-based courses. Academic pricing available. Visit [ni.com/academic](http://ni.com/academic) for details.
- Embedded OEM applications

## Information for Student Ownership

To supplement simulation, measurement, and automation theory courses with practical experiments, NI has developed the USB-6008 and USB-6009 student kits that include LabVIEW Student Edition and a ready-to-run data logger application. These kits are exclusively for students, giving them a powerful, low-cost hands-on learning tool. Visit [ni.com/academic](http://ni.com/academic) for more details.

## Information for OEM Customers

For information on special configurations and pricing, please visit [ni.com/oem](http://ni.com/oem).

## Ordering Information

NI USB-6008 <sup>1</sup> .....	779051-01
NI USB-6009 <sup>1</sup> .....	779026-01
NI USB-6008 Student-kit <sup>1,2</sup> .....	779320-22
NI USB-6009 Student-kit <sup>1,2</sup> .....	779321-22

<sup>1</sup>Includes NI-DAQmx Base Software, NI-Ready-to-Run Data Logger Software, and a USB cable.

<sup>2</sup>Includes LabVIEW Student Edition

# Low-Cost Multifunction DAQ for USB

## Specifications

Typical at 25 °C unless otherwise noted.

### Analog Input

#### Absolute accuracy, single-ended

Range	Typical at 25 °C (mV)	Maximum (0 to 55 °C) (mV)
±10	14.7	138

#### Absolute accuracy at full scale, differential<sup>1</sup>

Range	Typical at 25 °C (mV)	Maximum (0 to 55 °C) (mV)
±20	14.7	138
±10	7.73	84.8
±5	4.28	58.4
±4	3.59	53.1
±2.5	2.56	45.1
±2	2.21	42.5
±1.25	1.70	38.9
±1	1.53	37.5

<sup>1</sup> Input voltages may not exceed the working voltage range

Number of channels ..... 8 single-ended / 4 differential  
 Type of ADC ..... Successive approximation

### ADC resolution (bits)

Device	Differential	Single-Ended
USB-6008	12	11
USB-6009	14	13

### Maximum sampling rate (system dependent)

Device	Maximum Sampling Rate (kS/s)
USB-6008	10
USB-6009	48

Input range, single-ended ..... ±10 V  
 Input range, differential ..... ±20, ±10, ±5, ±4, ±2.5, ±2, ±1.25, ±1 V  
 Maximum working voltage ..... ±10 V  
 Overvoltage protection ..... ±35 V  
 FIFO buffer size ..... 512 B  
 Timing resolution ..... 41.67 ns (24 MHz timebase)  
 Timing accuracy ..... 100 ppm of actual sample rate  
 Input Impedance ..... 144 kΩ  
 Trigger source ..... Software or external digital trigger  
 System noise ..... 0.3 LSB<sub>rms</sub> (±10 V range)

### Analog Output

Absolute accuracy (no load) ..... 7 mV typical, 36.4 mV maximum at full scale  
 Number of channels ..... 2  
 Type of DAC ..... Successive approximation  
 DAC resolution ..... 12 bits  
 Maximum update rate ..... 150 Hz, software-timed  
 Output range ..... 0 to +5 V  
 Output impedance ..... 50 Ω  
 Output current drive ..... 5 mA  
 Power-on state ..... 0 V  
 Slew rate ..... 1 V/μs  
 Short-circuit current ..... 50 mA

### Digital I/O

Number of channels ..... 12 total  
 8 (P0.<0..7>)  
 4 (P1.<0..3>)  
 Direction control ..... Each channel individually programmable as input or output  
 Output driver type  
 USB-6008 ..... Open-drain  
 USB-6009 ..... Each channel individually programmable as push-pull or open-drain.  
 Compatibility ..... CMOS, TTL, LVTTL  
 Internal pull-up resistor ..... 4.7 kΩ to +5 V  
 Power-on state ..... Input (high impedance)  
 Absolute maximum voltage range ..... -0.5 to +5.8 V

### Digital logic levels

Level	Min	Max	Units
Input low voltage	-0.3	0.8	V
Input high voltage	2.0	5.8	V
Input leakage current	–	50	μA
Output low voltage (I = 8.5 mA)	–	0.8	V
Output high voltage (Push-pull, I = -8.5 mA)	2.0	3.5	V
Output high voltage (Open-drain, I = -0.6 mA, nominal)	2.0	5.0	V
Output high voltage (Open-drain, I = -8.5 mA, with external pull-up resistor)	2.0	–	V

### Counter

Number of counters ..... 1  
 Resolution ..... 32 bits  
 Counter measurements ..... Edge counting (falling edge)  
 Pull-up Resistor ..... 4.7 kΩ to 5 V  
 Maximum input frequency ..... 5 MHz  
 Minimum high pulse width ..... 100 ns  
 Minimum low pulse width ..... 100 ns  
 Input high voltage ..... 2.0 V  
 Input low voltage ..... 0.8 V

### Power Available at I/O Connector

+5 V output (200 mA maximum) ..... +5 V typical  
 +4.85 V minimum  
 +2.5 V output (1 mA maximum) ..... +2.5 V typical  
 +2.5 V output accuracy ..... 0.25 % max  
 Voltage reference temperature drift ..... 50 ppm/°C max

### Physical Characteristics

If you need to clean the module, wipe it with a dry towel.

Dimensions (without connectors) ..... 6.35 by 8.51 by 2.31 cm  
 (2.50 by 3.35 by 0.91 in.)  
 Dimensions (with connectors) ..... 8.18 by 8.51 by 2.31 cm  
 (3.22 by 3.35 by 0.91 in.)  
 Weight (without connectors) ..... 59 g (2.1 oz.)  
 Weight (with connectors) ..... 84 g (3 oz.)  
 I/O Connectors ..... USB series B receptacle  
 (2) 16-position (screw-terminal) plug headers  
 Screw-terminal wiring ..... 16 to 28 AWG  
 Screw-terminal torque ..... 0.22 to 0.25 N•m  
 (2.0 to 2.2 lb•in.)

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## Bus Interface

USB specification.....	USB 2.0 full-speed
USB bus speed.....	12 Mb/s

## Power Requirement

USB (4.10 to 5.25 VDC).....	80 mA typical
	500 mA maximum
USB Suspend.....	300 $\mu$ A typical
	500 $\mu$ A maximum

## Environmental

The USB-6008 and USB-6009 are intended for indoor use only.

### Operating Environment

Ambient temperature range.....	0 to 55 °C (tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity range.....	10% to 90%, non-condensing (tested in accordance with IEC-60068-2-56.)

### Storage Environment

Ambient temperature range.....	-40 to 85 °C (tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity range.....	5% to 90%, non-condensing (tested in accordance with IEC-60068-2-56.)

Maximum altitude..... 2,000 m (at 25 °C ambient temperature)

Pollution Degree..... 2

## Certifications and Compliances

The USB-6008 and USB-6009 are designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1
- CAN/CSA C22.2 No. 61010-1

Note For UL and other safety certifications, refer to the product label, or visit [ni.com/certification](http://ni.com/certification), search by model number or product line, and click the appropriate link in the Certification column.

## Voltages

Connect only voltages that are within the absolute maximum limits of the connection point. See pertinent specification section for appropriate limits.

## Hazardous Locations

The USB-6008 and USB-6009 are not certified for use in hazardous locations.

## Electromagnetic Compatibility

Emissions.....	EN 55011 Class A at 10 m
	FCC Part 15A above 1 GHz
Immunity.....	Industrial levels per EN 61326:1997 + A2:2001, Table 1
EMC/EMI.....	CE, C-Tick, and FCC Part 15 (Class A) Compliant

Note: The USB-6008 and USB-6009 may experience temporary variations in analog input readings when exposed to radiated and conducted RF noise. Device returns to normal operation after RF exposure is removed.

## CE Compliance

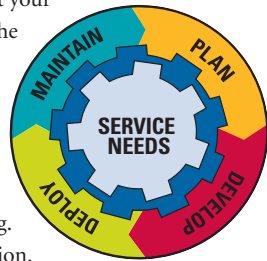
This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Low-Voltage Directive (safety).....	73/23/EEC
Electromagnetic Compatibility Directive (EMC).....	89/336/EEC

Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit [ni.com/certification](http://ni.com/certification), search by model number or product line, and click the appropriate link in the Certification column.

# NI Services and Support

NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing. Visit [ni.com/services](http://ni.com/services) for more information.



## Training and Certification

NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. NI schedules instructor-led courses in cities worldwide, or can hold a course at your facility. NI also offers a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products. Visit [ni.com/training](http://ni.com/training).

## Professional Services

The NI Professional Services Team is comprised of NI applications engineers, NI consulting services, and a worldwide National Instruments Alliance Partner Program of more than 600 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit [ni.com/alliance](http://ni.com/alliance) for more information.



## OEM Support

We offer design-in consulting and product integration assistance if you want to use our products for OEM applications. For information about special pricing and services for OEM customers, visit [ni.com/oem](http://ni.com/oem) for more information.

## Local Sales and Technical Support

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We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit [ni.com/ssp](http://ni.com/ssp).

## Hardware Services NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with [ni.com/pxiadvisor](http://ni.com/pxiadvisor).

## Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit [ni.com/calibration](http://ni.com/calibration).

## Repair and Extended Warranty

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit [ni.com/services](http://ni.com/services).



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