

## Product Datasheet - Technical Specifications



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## WebDAQ 504 Datasheet

Internet Enabled Vibration/Acoustic Logger



*The WebDAQ 504 intelligent logger features remote monitoring and control of real-time acoustic and vibration data.*

### Highlighted Features

- Four simultaneous analog inputs
  - AC/DC coupling
  - IEPE excitation current
- Real-time FFTs for continuous monitoring and analysis
- Four isolated DIO for triggers and alarms
- Log data to internal storage or mapped network storage
- Share folders to view files over a local network
- Export data to csv, UFF, or binary for use in other applications
- Alarm and event notifications with email and SMS messaging
- Easy, flexible task scheduling
- Configurable read/write access
- No driver software to install
- Built-in web server
- Remote monitoring and control
- WiFi support

## Overview

The WebDAQ 504 is a stand-alone, acoustic and vibration logger designed for remote monitoring and control. All the intelligence is built into the WebDAQ, eliminating the need for a PC or additional software. By using the embedded WebDAQ web server, users can easily configure simple or sophisticated applications, log vibration data, update digital outputs and/or send notifications based on alarm conditions, and view real-time data from any location and any device with a web browser.

The WebDAQ 504 performs high-accuracy measurements from up to four IEPE (Integrated Electronic Piezoelectric) sensors. Housed in a heavy-duty chassis, the WebDAQ 504 is rugged enough for industrial applications such as noise and vibration testing.

## Integrated Software and Hardware

The WebDAQ Series embedded OS and web server provides an all-in-one package for stand-alone data logging and alarming. Users can monitor and control their applications from anywhere with a web browser. The WebDAQ web

server is optimized for both desktop and mobile use. Users can perform data acquisition tasks from phones, tablets, and laptops with a single, intuitive user interface.

## Remote Access and Control

Install the WebDAQ 504 on any network and access it using any device with a web browser to remotely monitor and control all operations.

## Wireless Communication

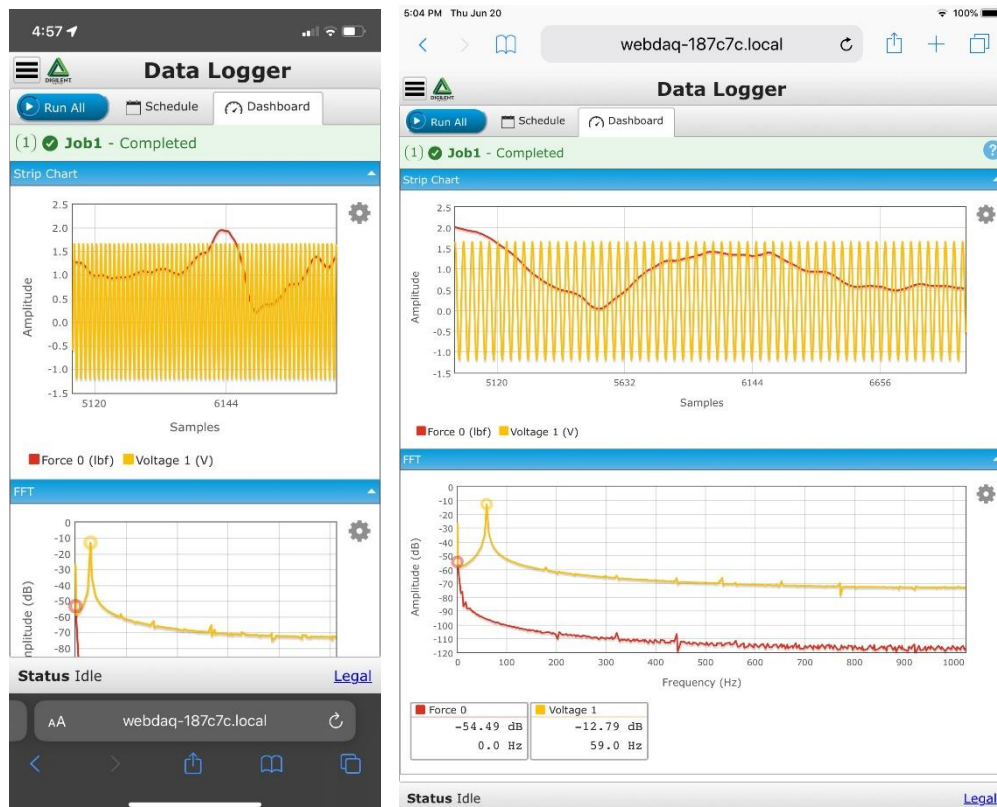
After the WebDAQ is detected on a wired network, users can connect an approved WiFi adapter to the rear panel and communicate with the WebDAQ over a wireless network. Refer to our website for a list of the WiFi adapters approved for use with WebDAQ Series hardware.

## Flexible Triggering

Start or stop the acquisition based on analog or digital thresholds, alarm states, or date/time values. On-demand push button triggering is also supported.

## WebDAQ Web Interface

An embedded web server provides a clean, intuitive interface to access all configuration and data management tasks. Hardware, trigger, and alarm settings are contained in a single task, or “job”. Multiple “jobs” can be run in a “schedule” for more complex data logging applications. For example, users can create a schedule of jobs in which one job automatically runs after an alarm condition is triggered on a different job, such as when a digital input changes.



Device-independent operation lets you remotely monitor and control the WebDAQ 504 from any device with a web browser.

# Introduction

## Easy Setup – Powerful Capabilities

Jobs are the building blocks of WebDAQ. The ability to define different data logging jobs, or tasks, and add them to a schedule unleashes flexibility not seen in any other data logger.

Whether you want to set up a simple logging task or a complex task, jobs and a schedule make it easy and straightforward.

### What is a Job?

The basic building block of WebDAQ, a job defines channel configuration, logging options, start and stop conditions, and alarming.

### What is a Schedule?

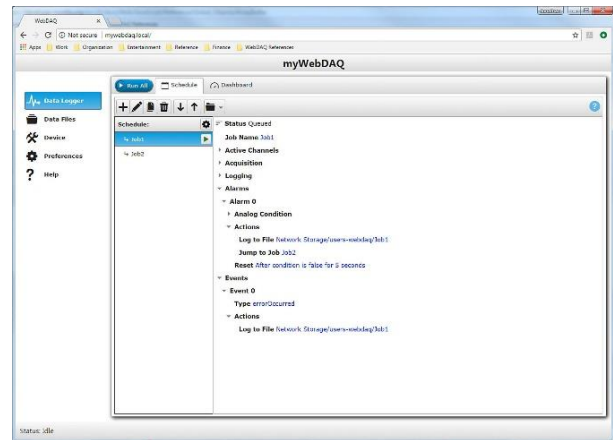
A schedule is a collection of jobs that gives flexibility to dynamically change data logging attributes, such as sampling rate, active channels configuration, or alarm levels.

### Example:

Switching from static acquisition to dynamic acquisition.

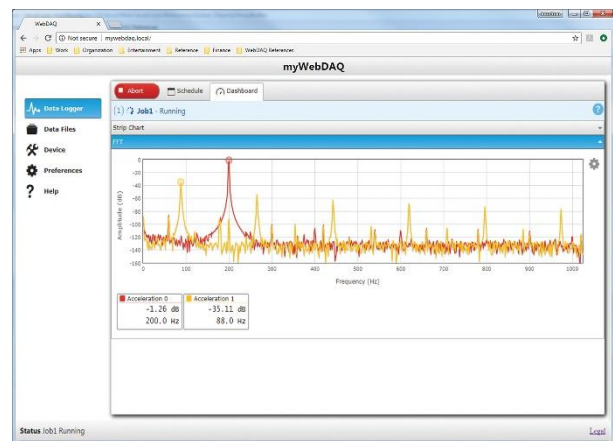
#### 1 Schedule and 2 Jobs

Users can easily set up a job for a slow, static acquisition and a fast dynamic acquisition. When a trigger condition is met (i.e. over/under alarm), Job 1 (slow acquisition) ends and Job 2 (fast acquisition) begins. When the trigger condition returns to normal, job 1 can be restarted.



### Clear, Concise, Data Displays

WebDAQ users don't need to rely on the small screens and difficult to navigate displays of most other loggers. With WebDAQ's intuitive web interface, users can easily see their data and alarm conditions in real time or after the acquisition is complete.



## Features

### Alarm and Event Notifications

Create multiple alarms using analog or digital channel sources. Configure alarms to reset and re-arm when the condition clears or reset them remotely with your browser. View the alarm status on the web interface. Users can configure one or more events to record when a job is started, stopped, or triggered, or if an error condition is detected. Receive alarm and event notifications on one or more addresses using email and SMS messaging.

### Virtually Unlimited Storage

Store data files and configuration settings locally in internal flash memory or save to external media or network folders. Users can map a network drive or FTP server as the location to log data or store files. Easily transfer files between WebDAQ storage locations and mapped network storage locations.

### Share Folders

Users can share a WebDAQ storage location or specific folder over a local network.

### Real-Time Data Display

View data as it is acquired or from a stored file. Data can be plotted on strip chart and FFT displays. Users can specify a range of data to view and zoom in or out. Real-time FFTs allow continuous monitoring and analysis. Users can apply windowing parameters with software.

### Control Read and Write Access

Users can control who can view and modify job settings by defining a password and setting the security level for the admin account. A “share” password can be used to access a shared folder or FTP server running on the WebDAQ.

### Run the Schedule on Startup

Automatically run the schedule when the system starts up. Multiple jobs in the schedule are run consecutively.

### Real-Time Clock

A real-time clock provides an absolute time reference for timestamping data. The clock can be set to any time zone and may be synchronized to the internet time server.

### Simultaneous Sampling

The WebDAQ performs simultaneous measurements from up to four analog inputs at rates of up to 51.2

KS/s per channel. Users can configure each input for voltage or IEPE sensor measurements.

### Sensor Measurements

Users can configure IEPE channels to measure acceleration, sound pressure, velocity, and force. AC coupling is automatically enabled for IEPE channels. WebDAQ provides a minimum of 4 mA excitation current and IEPE compliance voltage up to 19 V to drive internal circuitry. Users can configure voltage channels for AC or DC coupling.

### FFT Display

An FFT is displayed for each active channel in a job on a single FFT plot. The WebDAQ 504 performs a spectrum function on the time-domain data and displays the amplitude of the frequency response. The data is scaled in dB based on the full-scale range of the sensor for that channel.

Users can configure the window type to apply to the FFT data for each channel. The following window types are supported: Hann, Hamming, Blackman-Harris, Blackman, Flattop, or None (Uniform).

The peak amplitude and frequency can be shown or hidden, as desired.

### FFT Triggering

An FFT trigger can be used for starting or stopping an acquisition. Users can configure the channel to use as the FFT trigger source, the FFT size, and the window type to apply to the FFT data for the trigger. The following window types are supported for the FFT trigger: Hann, Hamming, Blackman-Harris, Blackman, Flattop, or None (Uniform).

The WebDAQ 504 performs a Power Spectrum function on the time-domain data of the selected FFT trigger source.

The power frequency band and the total power in band threshold level to use for the FFT trigger are user-configurable.

Users can also specify the number of samples to acquire before the trigger occurs.

### Anti-alias Filtering

Built-in anti-alias filters automatically adjust to the sampling rate. Analog and digital filtering accurately represents in-band and out-of-band signals. Signals within the passband have frequency-dependent gain.

A stopband filter attenuates all signals above the stopband frequency.

### Isolated Digital I/O

The four isolated digital I/O lines can be used either as triggers to start or stop the acquisition or as alarm outputs.

### Flexible Power Requirements

A Provide power with the 9 volt, 2.2 amp supply that ships with the device, or connect any 6 to 16 DC supply.

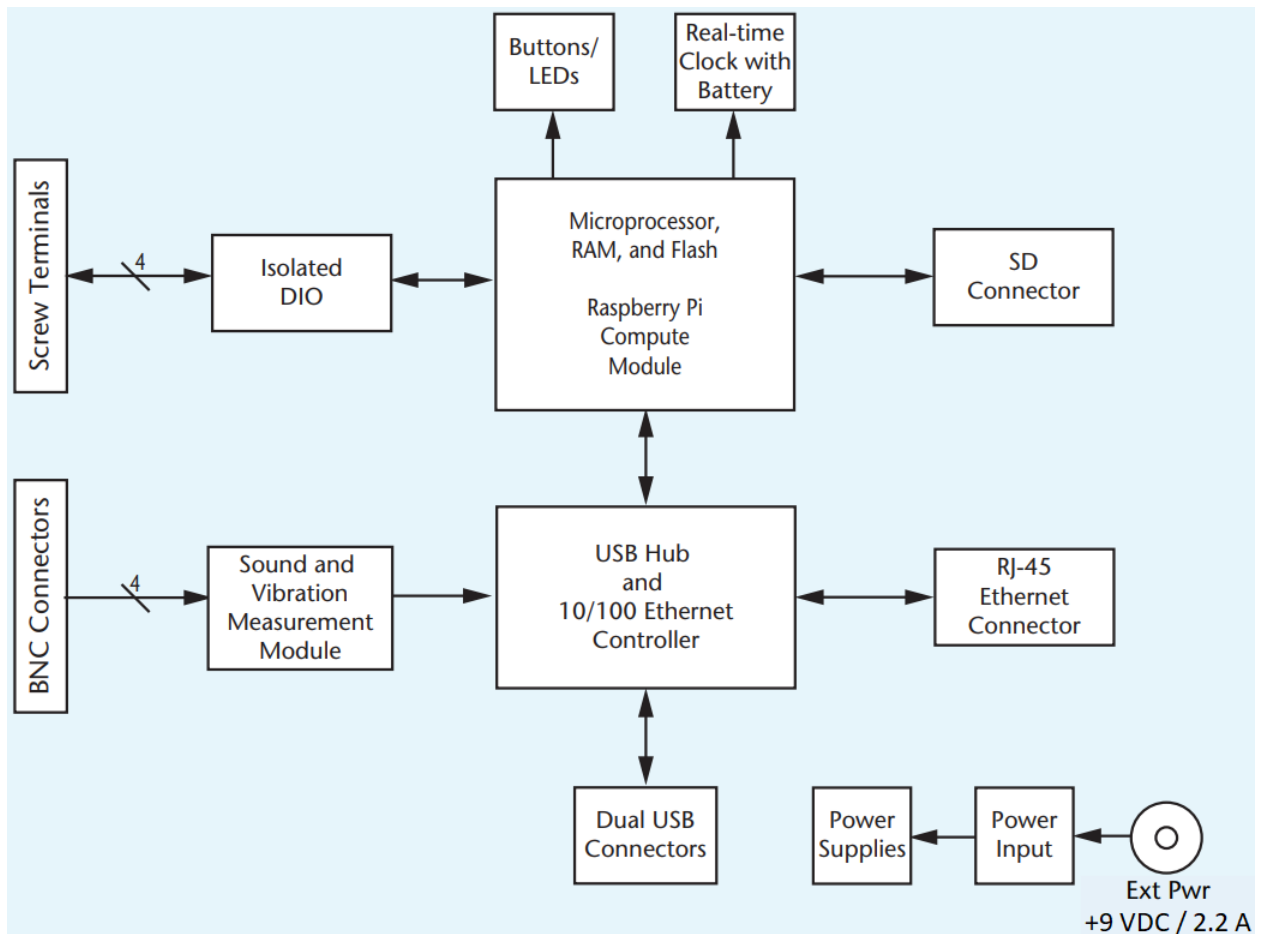
### Firmware Updates

Device firmware is bundled with the operating system and web server in one update file. This allows the WebDAQ to be updated in the field.

### Calibration

The WebDAQ is factory-calibrated using a NIST-traceable calibration process. Specifications are guaranteed for one year. Return the device to the factory for recalibration.

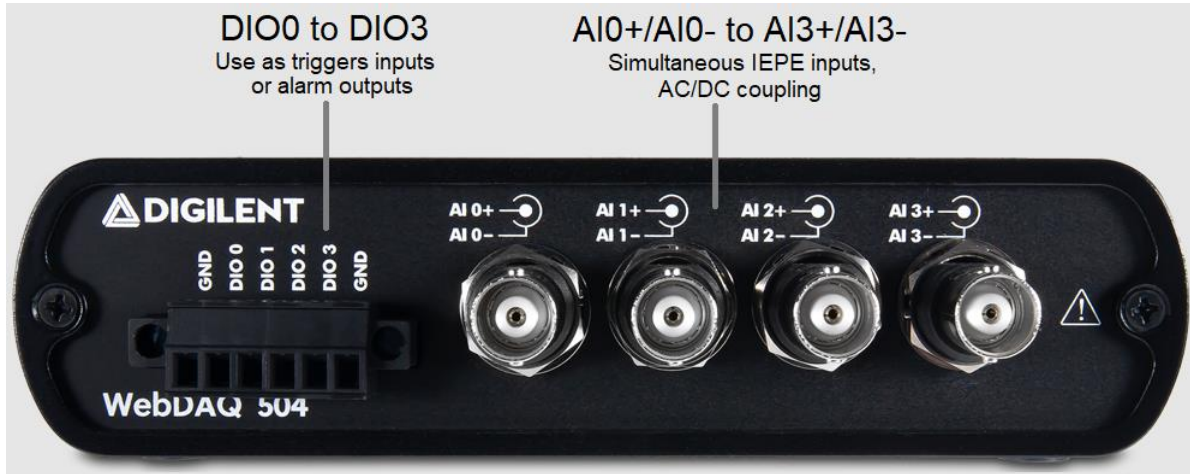
## Functional Block Diagram



# Front and Rear Panels

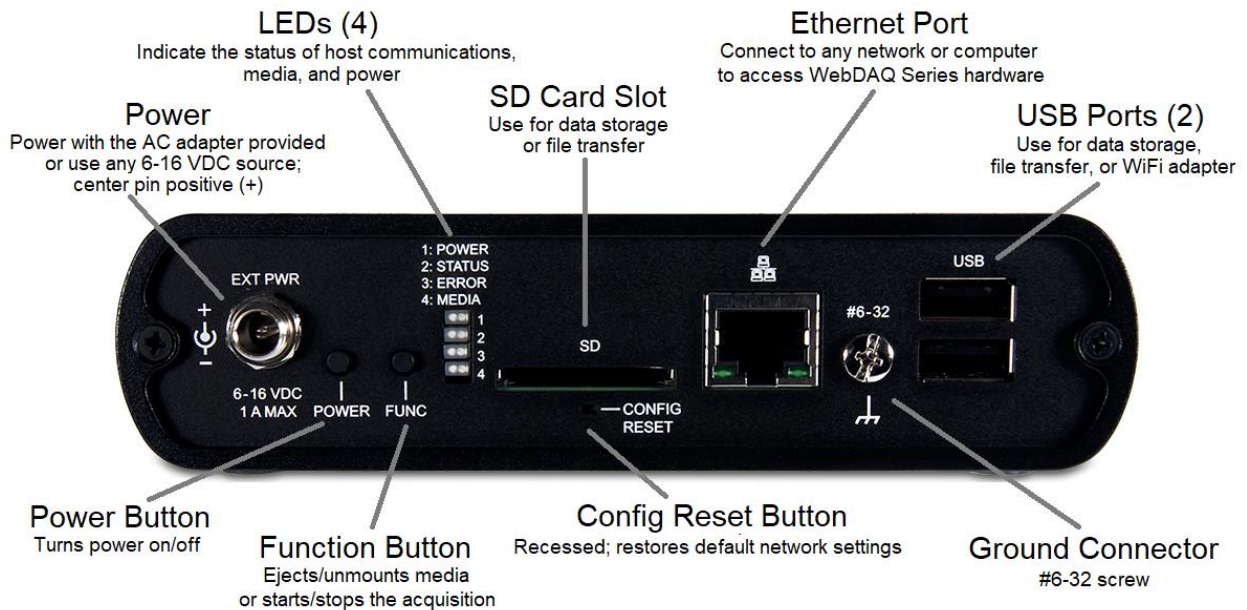
## Front Panel

BNC connectors and detachable screw terminals allow quick sensor and digital connections.



## Rear Panel

The rear panel provides Ethernet and power connections, LED indicators, dual USB ports, one SD card slot, buttons, and a ground connector.



## Specifications

All specifications are subject to change without notice. Typical for 0 °C to 50 °C unless otherwise specified.

### Analog Input

- Number of channels: 4 analog input channels
- ADC resolution: 24 bits
- Type of ADC: Delta-Sigma (with analog prefiltering)
- Sampling mode: Simultaneous
- Internal master timebase ( $f_M$ )
  - Frequency: 13.1072 MHz
  - Accuracy:  $\pm 50$  ppm max
- Data rate range ( $f_s$ ): 1.652 kS/s min, 51.2 kS/s max. The data rate must remain within the appropriate data range.
- Data rates ( $f_s$ ):  $(f_M \div 256)/n$ , where  $n = 1, 2, \dots, 31$ .
- Input coupling: AC/DC, software-selectable
- AC cutoff frequency
  - $-3$  dB: 0.5 Hz
  - $-0.1$  dB: 4.6 Hz max
- Input range:  $\pm 5$  V
- AC voltage full-scale range:  $\pm 5$  Vpk min,  $\pm 5.1$  Vpk typ,  $\pm 5.2$  Vpk max
- Common-mode voltage range, AI- to earth ground:  $\pm 2$  V max
- IEPE excitation current; software selectable on/off: 2.0 mA min, 2.1 mA typ
- Power-on glitch: 90  $\mu$ A for 10  $\mu$ s
- IEPE compliance voltage: 19 V max
- Overvoltage protection, with respect to chassis ground
  - Signal source connected to AI+ and AI-:  $\pm 30$  V
  - Low-impedance source connected to AI+ and AI-:  $-6$  V to 30 V
- Input delay:  $(40 + 5/512)/f_s + 2.6$   $\mu$ s
- Gain drift: 0.14 mdB/ $^{\circ}$ C (16 ppm/ $^{\circ}$ C) typ, 0.45 mdB/ $^{\circ}$ C (52 ppm/ $^{\circ}$ C) max
- Offset drift: 19.2  $\mu$ V/ $^{\circ}$ C typ, 118  $\mu$ V/ $^{\circ}$ C max
- Channel-to-channel matching
  - Phase ( $f_{in}$  in kHz):  $f_{in} \times 0.045^{\circ} + 0.04$  max
  - Gain 0.01: dB typ, 0.04 dB max
- Passband
  - Frequency:  $0.45 \times f_s$
  - Flatness ( $f_s = 51.2$  kS/s):  $\pm 40$  mdB (pk-to-pk max)
- Phase nonlinearity,  $f_s = 51.2$  kS/s:  $\pm 0.45^{\circ}$  max
- Stopband
  - Frequency:  $0.55 \times f_s$
  - Rejection: 100 dB
- Alias-free bandwidth:  $0.45 \times f_s$
- Oversample rate:  $64 \times f_s$
- Crosstalk (1 kHz):  $-110$  dB
- CMRR,  $f_{in} \leq 1$  kHz, 40 dB min: 47 dB typ
- SFDR,  $f_{in} = 1$  kHz,  $-60$  dBFS: 120 dB
- Input impedance



- Differential: 305 k $\Omega$
- AI– (shield) to chassis ground: 50  $\Omega$

Measurement Accuracy			
Measurement Conditions		% Reading (Gain Error)	% Reading (Offset Error) <sup>1</sup>
Calibrated	0 °C to 50 °C max	$\pm 0.34\%$ , $\pm 0.03$ dB $\pm$	$\pm 0.14\%$ , $\pm 7.1$ mV
	25 °C $\pm 5$ °C typ	$\pm 0.07\%$ , $\pm 0.006$ dB	$\pm 0.01\%$ , $\pm 0.5$ mV

Idle Channel and Noise Density			
Idle Channel	51.2 kS/s	25.6 kS/s	2.048 kS/s
Noise	97 dBFS	99 dBFS	103 dBFS
	50 $\mu$ V <sub>rms</sub>	40 $\mu$ V <sub>rms</sub>	25 $\mu$ V <sub>rms</sub>
Noise density	310 nV/ $\sqrt$ Hz	350 nV/ $\sqrt$ Hz	780 nV/ $\sqrt$ Hz

Total Harmonic Distortion (THD)		
Input Amplitude	Condition	Specification
Input amplitude	–1 dBFS	1 kHz: –95 dB 8 kHz: –87 dB
	–20 dBFS	1 kHz: –95 dB 8 kHz: –80 dB
Intermodulation distortion (–1 dBFS)	DIN 250 Hz/8 kHz 4:1 amplitude ratio	–80 dB
	CCIF 11 kHz/12 kHz 1:1 amplitude ratio	–93 dB

### Digital input/output

- Digital type: CMOS (Schmitt trigger) input / open drain output
- Number of I/O: One port of 4 bits
- Configuration: Bit configurable for input or output
- Power on conditions: Power on reset is input mode
- Pull-up configuration: Each bit is pulled up to 5 V with a 100 k $\Omega$  resistor
- Input frequency range: DC – 10 kHz
- Input high voltage threshold: 1.9 V min, 3.6 V max
- Input low voltage threshold: 2.3 V max, 1.0 V min
- Schmitt trigger hysteresis: 0.6 V min, 1.7 V max
- Input high voltage limit: 15 V absolute max
- Input low voltage limit: –0.5 V absolute min, 0 V recommended min
- Output off state leakage current: 10  $\mu$ A max
- Output sink current capability: 100 mA max (continuous) per output pin
- Output transistor on-resistance (drain to source): 1.6  $\Omega$

### Network

- Ethernet type: 100 Base-TX, 10 Base-T

<sup>1</sup> Range = 5.1 Vpk.

- Communication rates: 10/100 Mbps, auto-negotiated
- Connector: RJ-45, 8 position
- Cable length: 100 meters (328 feet) max

### Network Configuration

- Network IP configuration: DHCP, link-local, static
  - DHCP may be disabled by the user and a static IP address assigned
  - If DHCP is enabled but is unsuccessful at obtaining an IP address the device will fall back to link-local and request the IP address 169.254.100.100.
- Network device name: The name used for detecting the device using mDNS (zero-conf). This name may be changed using the web interface.
- Network name publication: By mDNS
- User accounts: *admin* and *share*. These accounts are case-sensitive and cannot be changed using the web interface.

### Factory default settings

- Factory default IP address: 192.168.0.101
- Factory default subnet mask: 255.255.255.0
- Factory default Gateway: 192.168.0.1
- Factory default DHCP setting: DHCP + link-local enabled
- Factory default password for admin account: *admin*. Passwords are case sensitive and can be changed using the web interface.
- Factory default password for share account: *share*. Passwords are case sensitive and can be changed using the web interface.
- Factory default device name: webdaq-xxxxxx, where xxxxxx is the last 6 digits of the MAC address (printed on the label on the underside of the device).
- **Note:** When factory defaults are restored, any shared folders or mapped drives are reset.

### USB ports

- Number of USB ports: Two, for connection to a mass storage device or approved WiFi adapter.
- USB device type: USB 2.0 (high-speed)
- Device compatibility: USB 1.1, USB 2.0, USB 3.0

### SD memory card slot

- Memory card type: SD, SDHC, SDXC, MMC, TransFlash
- File systems supported: FAT16, FAT32, exFAT, ext2/3/4, NTFS

### Push buttons

- Power (POWER):
  - W1 jumper installed (factory default): Turns device on or off.
  - W1 jumper removed (device on when power is applied): Reboots the device.
- Function (FUNC): Unmounts external media, or starts/stops an acquisition.
- Reset (CONFIG RESET): Restores network and alarm settings to factory default values.

### Ground connector

- Connector port for the #6-32 ground screw.

#### Power

- Input voltage: Center positive, 6 VDC to 16 VDC
- Input wattage: 4 W typ, 10 W max
- External AC adapter: 9 VDC, 2.2 amps, 110 VAC to 240 VAC input range
- Battery: One 3 V button cell lithium battery (BR1225 or CR1225); replaceable

#### Shock

- Operating shock: 30 g, 11 ms half sine; 18 shocks at 6 orientations

#### Mechanical

- Dimensions (L × W × H): 158.8 × 146.1 × 38.1 mm (6.25 × 5.75 × 1.50 in.)
  - With BNC connectors: 178.8 × 146.1 × 38.1 mm (7.04 × 5.75 × 1.50 in.)
- Weight: 680 g (1.5 lb)

#### Environmental

- Operating temperature range: : 0 °C to 50 °C max operating, –40 °C to 85 °C storage
- Ingress protection: IP 30
- Humidity: 10-90% RH, noncondensing (Operating), 5-95% RH (Storage)
- Maximum altitude: 2,000 m (6,562 ft)
- Pollution Degree: 2
- The WebDAQ 504 is intended for indoor use only but may be used outdoors if installed in a suitable enclosure.