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# cDAQ-9187

# Specifications

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# Contents

cDAQ-9187 Specifications ..... 3

# cDAQ-9187 Specifications

## cDAQ-9187 Specifications

These specifications apply to the cDAQ-9187.

### Revision History

Version	Date changed	Description
379059A-01	Nov 2024	Initial release.

### Looking For Something Else?

For information not found in the specifications for your product, such as operating instructions, browse ***Related Information***.

**Related information:**

- [User Manual](#)
- [Software and Driver Downloads](#)
- [Dimensional Drawings](#)
- [Product Certifications](#)
- [Letter of Volatility](#)
- [Discussion Forums](#)
- [NI Learning Center](#)

### Definitions

***Warranted Specifications*** describe the performance of a model under stated operating conditions and are covered by the model warranty.

***Characteristics*** describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- **Typical**—describes the performance met by a majority of models.

- **Nominal**—describes an attribute that is based on design, conformance testing, or supplemental testing.

Values are **Typical** unless otherwise noted.

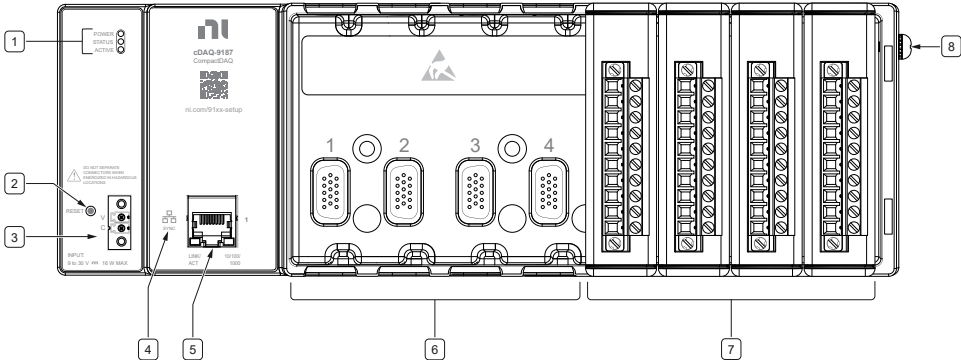
## Conditions

Specifications are valid at 25 °C unless otherwise noted.

## cDAQ-9187 Front Panel

Refer to the front panel diagram to understand the connectors, LEDs, and other features of the cDAQ-9187.

Figure 1. cDAQ-9187 Front Panel



1. POWER, STATUS, and ACTIVE LEDs
2. Reset Button
3. Power Connector
4. SYNC Logo
5. Ethernet Port, 10/100/1000 and LINK/ACT LEDs
6. Module Slots
7. Installed C Series Modules
8. Chassis Grounding Screw

## Physical Characteristics

Table 1. Physical Characteristics

Dimensions	272.8 mm × 88.1 mm × 62.3 mm (10.74 in. × 3.47 in. × 2.45 in.)
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(unloaded)	For more information, visit <a href="https://ni.com/dimensions">ni.com/dimensions</a> and search by module number.
Weight (unloaded)	1,065.9 g (37.6 oz)

## Power Connector

**Table 2.** Power connector screw terminal wiring

Gauge	0.2 mm <sup>2</sup> to 2.1 mm <sup>2</sup> (24 AWG to 14 AWG) copper conductor wire
Wire strip length	6 mm (0.24 in.) of insulation stripped from the end
Temperature rating	85 °C
Torque for screw terminals	0.20 N · m to 0.25 N · m (1.8 lb · in. to 2.2 lb · in.)
Wires per screw terminal	One wire per screw terminal

**Table 3.** Power connector securement

Securement type	Screw flanges provided
Torque for screw flanges	0.3 N · m to 0.4 N · m (2.7 lb · in. to 3.5 lb · in.)

## Analog Input

**Table 18.** Analog Input

Input FIFO size	127 samples per slot
Maximum sample rate <sup>1</sup>	Determined by the C Series module or modules
Timing accuracy <sup>2</sup>	50 ppm of sample rate
Internal base clocks	80 MHz, 20 MHz, 13.1072 MHz, 12.8 MHz, 10 MHz, 100 kHz
Number of channels supported	Determined by the C Series module or modules

1. Performance dependent on type of installed C Series module and number of channels in the task.
2. Does not include group delay. For more information, refer to the documentation for each C Series module.

# Analog Output

**Table 5.** Number of channels supported (hardware-timed task)

Regeneration	Channels Supported
Onboard regeneration	16
Non-regeneration	Determined by the C Series module or modules

**Table 6.** Number of channels supported (non-hardware-timed task)

Channels supported	Determined by the C Series module or modules
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**Table 18.** Maximum update rate

Onboard regeneration	1.6 MS/s (multi-channel, aggregate)
Non-regeneration	Determined by the C Series module or modules

**Table 8.** Analog Output Timing

Timing accuracy	50 ppm of sample rate
Internal base clocks	80 MHz, 20 MHz, 13.1072 MHz, 12.8 MHz, 10 MHz, 100 kHz

**Table 9.** Output FIFO size

Onboard regeneration	8,191 samples shared among channels used
Non-regeneration	Determined by the C Series module or modules

**Table 10.** Analog Output Waveform

AO waveform modes	<p>Non-periodic waveform,</p> <p>periodic waveform regeneration mode from onboard memory,</p> <p>periodic waveform regeneration from host buffer including dynamic update</p>
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# Digital Waveform Characteristics

**Table 18.** Waveform acquisition (DI) FIFO

Parallel modules	511 samples per slot
Serial modules	63 samples per slot

**Table 12.** Waveform generation (DO) FIFO (parallel modules)

Slots	Samples per slot
Slots 1 to 4	2,047 samples per slot
Slots 5 to 8	1,023 samples per slot



**Note** When parallel modules in a digital task are in slots 1 through 4, FIFO is 2,047 samples per slot for all slots. When any parallel module in a digital task is in slots 5 through 8, FIFO is 1,023 samples per slot for all eight slots.

**Table 13.** Waveform generation (DO) FIFO (serial modules)

Slots	Samples per slot
Slots 1 to 8	63 samples per slot

**Table 14.** Digital input sample clock frequency

Streaming to application memory	System-dependent
Finite	0 MHz to 10 MHz

**Table 15.** Digital output sample clock frequency

Streaming to application memory	System-dependent
Regeneration from FIFO	0 MHz to 10 MHz
Finite	0 MHz to 10 MHz

**Table 16.** Digital waveform timing

Timing accuracy	50 ppm
Internal base clocks	80 MHz, 20 MHz, 13.1072 MHz, 12.8 MHz, 10 MHz, 100 kHz

## General-Purpose Counters/Timers

**Table 18.** General-Purpose Counter/Timers

Number of counters/timers	4
Resolution	32 bits
Counter measurements	Edge counting, pulse, semi-period, period, two-edge separation, pulse width
Position measurements	X1, X2, X4 quadrature encoding with Channel Z reloading; two-pulse encoding
Output applications	Pulse, pulse train with dynamic updates, frequency division, equivalent time sampling
Internal base clocks	80 MHz, 20 MHz, 13.1072 MHz, 12.8 MHz, 10 MHz, 100 kHz
External base clock frequency	0 MHz to 20 MHz
Base clock accuracy	50 ppm
Output frequency	0 MHz to 20 MHz
Inputs	Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down
Routing options for inputs	Any module PFI, analog trigger, many internal signals
FIFO	Dedicated 127-sample FIFO

## Frequency Generator

**Table 18.** Frequency generator

Number of channels	1
Base clocks <sup>3</sup>	20 MHz, 10 MHz, 100 kHz
Divisors	1 to 16 (integers)
Base clock accuracy	50 ppm

3. Base clocks can be synchronized with other chassis using the network synchronization feature.



Output	Any module PFI terminal
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## Module PFI Characteristics

**Table 34.** Module PFI Characteristics

Functionality	Static digital input, static digital output, timing input, and timing output
Timing output sources <sup>4</sup>	Many analog input, analog output, counter, digital input, and digital output timing signals
Timing input frequency	0 MHz to 20 MHz
Timing output frequency	0 MHz to 20 MHz

## Digital Triggers

**Table 34.** Digital triggers

Source	Any module PFI terminal
Polarity	Software-selectable for most signals
Analog input function	Start Trigger, Reference Trigger, Pause Trigger, Sample Clock, Sample Clock Timebase
Analog output function	Start Trigger, Pause Trigger, Sample Clock, Sample Clock Timebase
Counter/timer function	Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down

## Module I/O States

**Table 34.** Module I/O States

At power-on	Module-dependent. Refer to the documentation for each C Series module.
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4. Actual available signals are dependent on type of installed C Series module.

# Time-Based Triggers and Timestamps

**Table 34.** General Time-Based Triggers and Timestamps

Number of time-based triggers	5
Number of timestamps	4

**Table 34.** Analog input

Time-based triggers	Start Trigger, Sync Pulse
Timestamps	Start Trigger, Reference Trigger, First Sample

**Table 24.** Analog output

Time-based triggers	Start Trigger, Sync Pulse
Timestamps	Start Trigger, First Sample

**Table 25.** Digital input

Time-based triggers	Start Trigger
Timestamps	Start Trigger, Reference Trigger, First Sample

**Table 26.** Digital output

Time-based triggers	Start Trigger
Timestamps	Start Trigger, First Sample

**Table 27.** Counter/timer input

Time-based triggers	Arm Start Trigger
Timestamps	Arm Start Trigger

**Table 28.** Counter/timer output

Time-based triggers	Start Trigger, Arm Start Trigger
Timestamps	Start Trigger, Arm Start Trigger

## Network Interface

**Table 34.** Network interface

Network protocols	TCP/IP, UDP
Network ports used	HTTP:80 (configuration only), TCP:3580; UDP:5353 (configuration only), TCP:5353 (configuration only); TCP:31415; UDP:7865 (configuration only), UDP:8473 (configuration only)
Network IP configuration	DHCP + Link-Local, DHCP, Static, Link-Local
High-performance data streams	7
Data stream types available	Analog input, analog output, digital input, digital output, counter/timer input, counter/timer output, NI-XNET <sup>5</sup>
Default MTU size	1,500 bytes

## Ethernet

**Table 34.** Ethernet

Number of ports	1 port
Network interface	1000 Base-TX, full-duplex; 1000 Base-TX, half-duplex; 100 Base-TX, full-duplex, 100 Base-TX, half-duplex; 10 Base-T, full-duplex; 10 Base-T, half-duplex
Communication rates	10/100/1,000 Mb/s, auto-negotiated
Maximum cabling distance	100 m/segment
Maximum hops per line <sup>6</sup>	15

## Timing and Synchronization

**Table 34.** Timing and synchronization

Protocol	IEEE 802.1AS for network synchronization over 1000 Base-TX, full-duplex
Network synchronization	<1 $\mu$ s

- When a session is active, CAN or LIN (NI-XNET) C Series modules use a total of two data streams regardless of the number of NI-XNET modules in the chassis.
- With default software configuration. For information about creating reliable Ethernet-based systems, visit [ni.com/info](http://ni.com/info) and enter Info Code `cdaqenet`.

accuracy <sup>7</sup>	
Network synchronization accuracy with optimized configuration <sup>8</sup>	<100 ns



**Note** IEEE 1588 protocol is supported in NI-DAQmx 18.1 and later. When configured to use IEEE 1588, performance of synchronization may vary from these specifications.

## Safety Voltages

Connect only voltages that are within these limits.

**Table 34.** Safety voltages

V terminal to C terminal	30 V maximum, Measurement Category I
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## Measurement Category



**Caution** Do not connect the product to signals or use for measurements within Measurement Categories II, III, or IV.



**Attention** Ne pas connecter le produit à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour effectuer des mesures dans ces catégories.



**Warning** Do not connect the product to signals or use for measurements within Measurement Categories II, III, or IV, or for measurements on MAINS circuits or on circuits derived from Overvoltage Category II, III, or IV which may have transient overvoltages above what the product can withstand. The

- I/O synchronization is system-dependent. For information about network synchronization accuracy, visit [ni.com/info](http://ni.com/info) and enter Info Code syncacc.
- I/O synchronization is system-dependent. Assumes a system containing one hop with optimized C Series module selection. For information about achieving high accuracy synchronization, visit [ni.com/info](http://ni.com/info) and enter Info Code cdaqsync.

product must not be connected to circuits that have a maximum voltage above the continuous working voltage, relative to earth or to other channels, or this could damage and defeat the insulation. The product can only withstand transients up to the transient overvoltage rating without breakdown or damage to the insulation. An analysis of the working voltages, loop impedances, temporary overvoltages, and transient overvoltages in the system must be conducted prior to making measurements.



**Mise en garde** Ne pas connecter le produit à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour des mesures dans ces catégories, ou des mesures sur secteur ou sur des circuits dérivés de surtensions de catégorie II, III ou IV pouvant présenter des surtensions transitoires supérieures à ce que le produit peut supporter. Le produit ne doit pas être raccordé à des circuits ayant une tension maximale supérieure à la tension de fonctionnement continu, par rapport à la terre ou à d'autres voies, sous peine d'endommager et de compromettre l'isolation. Le produit peut tomber en panne et son isolation risque d'être endommagée si les tensions transitoires dépassent la surtension transitoire nominale. Une analyse des tensions de fonctionnement, des impédances de boucle, des surtensions temporaires et des surtensions transitoires dans le système doit être effectuée avant de procéder à des mesures.

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as **MAINS** voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.



**Note** Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are for other circuits not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

# Power Requirements



**Note** Some C Series modules have additional power requirements. For more information about C Series module power requirements, refer to the documentation for each C Series module.



**Note** Sleep mode for C Series modules is not supported in the cDAQ-9187.



**Note** When operating the cDAQ-9187 in hazardous locations, you must use the power connector with an external power supply rated for hazardous locations. The power supply included in the cDAQ-9187 kit is intended only for desktop use. For all other applications use the included 2-position power connector plug and a power supply rated for your application power requirements. Visit [ni.com](http://ni.com) to find hazardous locations-certified power supplies.

**Table 34.** Power requirements

Voltage input range	9 V to 30 V (measured at the cDAQ-9187 power connector)
Maximum power consumption <sup>9</sup>	16 W



**Note** The maximum power consumption specification is based on a fully populated system running a high-stress application at elevated ambient temperature and with all C Series modules consuming the maximum allowed power.

**Table 34.** Power connector

Power input connector	2 positions 3.5 mm pitch mini-combicon screw terminal with screw flanges, Sauro CTMH020F8-0N002
Power input mating connector	Sauro CTF020V8, Phoenix Contact 1714977, or equivalent

9. Includes maximum 1 W module load per slot across rated temperature and product variations.

## Environmental Guidelines



**Notice** Failure to follow the mounting instructions in the product documentation can cause temperature derating.



**Notice** This product is intended for use in indoor applications only. Use NI-9917 and NI-9918 industrial enclosures to protect the device in harsh, dirty, or wet environments.

## Environmental Characteristics

Temperature	
Operating	-40 °C to 70 °C <sup>10</sup>
Storage	-40 °C to 85 °C
Humidity	
Operating	10% to 90% RH, noncondensing
Storage	5% to 95% RH, noncondensing
Ingress protection	IP40
Pollution Degree	2
Maximum altitude	5,000 m
Shock and Vibration	

10. When operating the cDAQ-9187 in temperatures below 0 °C, you must use the PS-15 power supply or another power supply rated for below 0 °C.

Operating vibration	
Random	5 g RMS, 10 Hz to 500 Hz
Sinusoidal	5 g, 10 Hz to 500 Hz
Operating shock	30 g, 11 ms half sine; 50 g, 3 ms half sine; 18 shocks at 6 orientations

To meet these shock and vibration specifications, you must panel mount the system.



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