Orbit DCM

Datasheet

Bently Nevada Machinery Condition Monitoring

175M5867 Rev. H

Description

Orbit Distributed Condition Monitoring (DCM) is a high speed, synchronous, and distributed condition monitoring solution at the edge for plantwide connectivity.

Bently Nevada's advanced signal processing algorithms, combined with machine operating state evaluation and versatile high resolution data collection capabilities, enable greater asset reliability and diagnostic capabilities when coupled with System 1 for a complete solution.

Key benefits of Orbit DCM include:

- Reliable and robust signal processing
- Simultaneous channel sampling
  - 16 Dynamic Channels
  - 4 Speed (Keyphasor)
  - 4 Digital Inputs
- System 1 configurability
- Offline data retention
- High-speed state evaluation
- 4-severity level alarming
- High resolution data capture (flight recorder)
- 10/100/1000 BASE-T RJ45 and RS485 Interfaces
- Modbus client/server support on TCP and RTU
- Industrial rated CSA CID2, ATEX/IECEx Zone 2

Benefits of using Orbit DCM include:

- Supports many common sensor types
- Improved planning for maintenance schedules
- Early detection of machine or process issues
- Cost savings from reduced machinery downtime

Orbit DCM combined with System 1 supports a condition-based maintenance program that identifies problems before assets begin to fail.

Bently Nevada
a Baker Hughes business

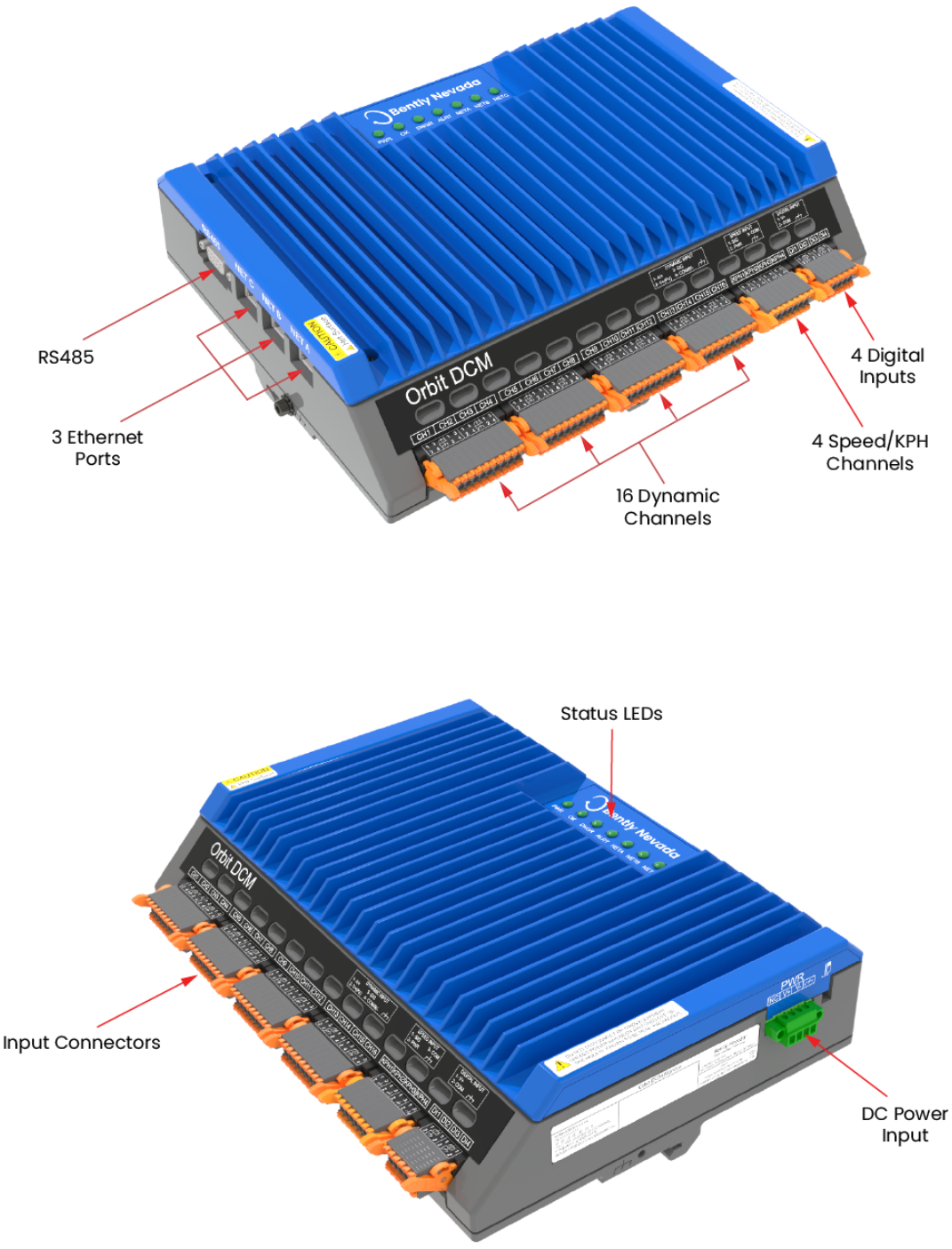

Figure 1: Orbit DCM

Specifications

Input Channel Specifications

Dynamic Channels

Channels 1-16 are dedicated Dynamic Channels that can be used to measure vibration and process signals.

Users can configure Dynamic Channels as any one of the following transducer channel types: Acceleration, Velocity, Radial Vibration (Displacement), Thrust (Axial Displacement), Dynamic Pressure, and Dynamic Process Variable.

Total Dynamic Channels	16
Signal Range	+22 V to -22 V +10 V to -10 V
Dynamic Range	108 dB @ fs = 102.4 ksps
A/D Sampling	102.4 ksps
Bandwidth	0 to 40 KHz
Accuracy	AC (Direct pk, rms): 1.5% relative of full scale DC (Gap, Bias): 2.5% relative of full scale
Input Impedance	100 KΩ
IEPE Sensors	10 mA Power Supplied, 0 V-20 V

Orbit DCM only provides 10 mA power (constant current) for IEPE Sensors. Proximitors, Accelerometers, and Sensors that require power must be externally powered. For more information, refer to the Orbit DCM Field Wiring Diagrams (document 175M6282).

Speed/Keyphasor Channels

KPH 1-4 are dedicated Speed/Keyphasor Channels.

Each Speed Channel supports magnetic pick-up sensors, Proximitors, tachometers, and encoders as speed inputs. Speed Channels support multiple events per revolution and speed ratios for multiple shafts.

Total KPH Channels	4
Signal Range	3.5 V to -23 V -50 V to +50 V (magnetic pickups)
Input Impedance	10 KΩ
Speed Range	1 to 120,000 RPM *Supports multiple events per revolution up to a maximum of 30 kHz (30,000 pps).* *Supports machine stopped detection.*
Speed Accuracy	±0.1 RPM at 1 RPM-100 RPM ±1 RPM at 100 RPM-10,000 RPM 0.1% for speed > 10,000 RPM
Events per Revolution (EPR)	1 to 5,000 (configurable)
Input Frequency	Up to 30 kHz (30,000 pps)
Auto Threshold	Use for any input above 3 RPM for 1 event/revolution. Keyphasor Pulse Width must be greater than or equal to 10 micro-seconds.

Manual Threshold	User selectable from +3 V to -22 V. Use for any input above 1 RPM for 1 event/revolution. Keyphasor Pulse Width must be greater than or equal to 5 micro-seconds.
Signal Amplitude	Minimum 5 Vpp for pulse-width less than 10 micro-seconds and greater than or equal to 5 micro-seconds. Minimum 2 Vpp for pulse-width less than 10 micro-seconds.
Transducer Power Supply	-24 VDC, 40 mA (for each KPH channel)

Digital Inputs (DI)

DI 1-4 support digital inputs from TTL voltage inputs, switches with varying resistance, and potential-free contacts.

Total Digital Inputs	4
Levels Supported	5 V TTL Compatible (High: Open Drain)

Device Key Features

Measurements

Supported Scalar (Static Data) Measurements	Direct, Bias, Speed, Gap, RMS, Integrated, nX, Bandpass
Supported Waveforms & Spectra (Dynamic Data)	Asynchronous, Synchronous, Demodulation (Peak Demod and Eclassic algorithms)
Supported Frequency Range	Up to 40 KHz
Samples per Waveform	Configurable up to 32k samples
Demodulation Bandwidth	125 Hz to 20 KHz
Spectrum Window Techniques	Flat Top, Hanning, Blackman, Rectangular
Spectrum Based Extractions	Spectral Overall, Energy & Peak extractions*
Supported Spectral Lines	For waveforms: up to 12,800 For spectra: up to 3,200
Long-Time Waveforms	Continuous Waveforms captured for up to 30 minutes and up to 40 kHz of Fmax.

*Using System 1.

Data Historization

Data can be historized in four different modes: time-based, state-based, alarm data capture, and transient events.

Time-Based	Static data: every 30 seconds Dynamic data: every 10 minutes
Total Storage Buffer	7 days typical
High Resolution Data Collection (Alarm Data Capture) for Scalar Measurements	Pre-Alarm: 10 mins. data with 1 s resoltuion 20 s data with 100 ms resolution
	Post-Alarm: 1 min data with 1 s resolution 10 s data with 100 ms resolution

High Resolution Data Collection (Alarm Data Capture) for Dynamic Measurements	Pre-Alarm: 2.5 mins data with 10 s resolution
	Post-Alarm: 1 min data with 10 s resolution
Transient Data Capture	Time Based and RPM Based data collection for Start-up / Shutdown, Overspeed (up to 50 ms resolution)

Orbit DCM is not intended to serve as a machinery protection system or to be part of a machinery protection loop. Although alarm statuses and values can be retrieved from the device via Modbus RTU and Modbus TCP interfaces, these digital communications are also not intended for use as part of a shutdown loop.

Alarming

Setpoints per Measurement	4 Severity Levels
Alarming Types	In-Band, Out-of-Band, Over, Under
Alarm Latching & Reset	Available with Reset via S1 Software
Alarm Processing	Every 1 second
Event & Data	Events generated and Hi-Res data storage for every alarm

State Evaluation

Maximum User-Defined States	12 states
Trigger Definition	User configurable on Scalar Measurements & Status
Data Storage	Hi-Res data storage for State change
State Evaluation	Every 1 second
State-Based Alarming	State-based alarming on every Scalar measurement

Communication Protocols

System 1-Protocol	Bently Nevada Proprietory protocol for communication with S1 and Orbit Studio
Modbus TCP/IP Client/Server	For data imports and exports from external controllers & DCS via Ethernet
Modbus RTU Client/Server	For data imports and exports* to external controllers & DCS via Serial RS485

*Modbus RTU Server is supported only for point-to-point connection for the first release.

Device Specifications

Input Power

Input Voltage Range	18-32 Vdc, 24 Vdc Nominal
Operating Current	1.76 A max., Steady State
Operating Power	26.4 W
Maximum Inrush Current	2.5 A, 5 ms max. duration
Overvoltage Category	OVC 1

Ethernet Ports (Independent)

Network A	RJ45, 10/100/1000 BASE-T, Network DHCP Port

Network B	RJ45, 10/100/1000 BASE-T, Local Static IP
Network C	RJ45, 10/100/1000 BASE-T, Local Static IP

RS485 (Serial)

Baud Rate	Up to 115,200
Full Scale Data Range	1 to 65,535
Module Address Range	1 to 255
Cable Length	Up to 75 m

LEDs

Power LED	Indicates Device Input Power Status
OK LED	indicates when the system is functioning properly
Danger LED	indicates a Danger / Alarm Level 4 Condition
Alert LED	indicates an Alert / Alarm Level 3 Condition
Net A	Indicates Ethernet Port A has a valid Link to end user application
Net B	Indicates Ethernet Port B has a valid Link to end user application
Net C	Indicates Ethernet Port C has a valid Link to end user application

Physical

Dimensions	Length: 291 mm (11.5 in) Width: 211 mm (8.3 in) Height: 79 mm (3.1 in)
Weight	2.7 kg (5.9 lbs)
Mounting	DIN Rail Mounting or Bulkhead Mounting

Environmental Limits

Operating Temperature	-30°C to 65°C (-22°F to 149°F) (EN/IES 60068-2-2)* -30°C to 60°C (-22°F to 140°F) when installed in IP66 Weatherproof (WP) housing (P/N 178M6853)*
Storage Temperature	-40°C to 85°C (-40°F to 185°F) (EN/IES 60068-2-2)
Temperature Change	Change rate of 1°C per minute in accordance to EN/IEC 60068-2-1
Relative Humidity	0% to 95% non-condensing for operation and storage
Pollution Degree	Pollution Degree 2 (working voltage < 30 Vrms or 60 Vdc)
IP Rating	IP20 according to EN/IEC 60529 without Cabinet, IP66 in Cabinet
Altitude During Operation	2000 m (6561 ft.) max.

*Operating temperature is measured 1 inch below the system in natural airflow conditions.

Compliance and Certifications

FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

EMC

European Community Directive:

2014/30/EU

Standards:

EN IEC 61326-1; Electrical equipment for measurement, control, and laboratory use

EN 61000-6-2; Immunity for Industrial Environments

EN 61000-6-4; Emissions for Industrial Environments

India-Battery EPR Marking

GE Oil & Gas India Private Limited

EPR Certificate No.: 1.1595372902047E+20

Electrical Safety

European Community Directive:

2014/35/EU; Low Voltage Directive

Standards:

UL 61010-1

EN 61010-1

CSA C22.2 No. 61010-1-12; Safety requirements for electrical equipment for measurement, control, and laboratory use

ROHS

European Community Directive

2011/65/EU

Cybersecurity

Security II

Designed to meet IEC 62443-4-2 Security Level 2

Hazardous Area Approvals

For the detailed listing of country and product-specific approvals, refer to the *Approvals Quick Reference Guide (108M1756)*.

For additional technical documentation, please log in to bntechsupport.com and access the Bently Nevada Media Library.

cNRTLus

Class I, Zone 2: AEx/Ex ec IIC T4 Gc;
Class I, Division 2, Groups A, B, C, D T4

T4 @ Ta = -30°C ≤ Ta ≤ +65°C

ATEX/IECEx

Ex II 3 G Ex ec IIC T4 Gc

T4 @ Ta = -30°C ≤ Ta ≤ +65°C

Specific Conditions of Use:

1. The device shall be installed in an additional enclosure that provides an ingress protection rating not less than IP54 and meets the enclosure requirements of IEC 60079-0.
2. The equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC 60664-1.
3. Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value at the supply terminals to the equipment.
4. Power supplies must be Class I, Division 2 or Class I, Zone 2 compliant for hazardous area installations.
5. Tightening torque for bulkhead mounting – 11.6 in•lb or 1.3 N•m. Tightening torque for DIN Rail mounting – 25 to 35 in•lb or 2.8 to 3.95 N•m.

WARNING

HAZARDOUS ENVIRONMENT

DO NOT DISCONNECT OR OPEN EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

Ordering Information

For the detailed listing of country and product-specific approvals, refer to the *Approvals Quick Reference Guide (108M1756)*.

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Orbit DCM

60M800-AA-BBB

AA: Mounting	
01	Bulkhead Mounting
02	DIN Rail Mounting (35 mm x 15 mm x 1 mm)
BBB: Agency Approvals	
00	None
05	Multiple Approvals (IECEx, ATEX, cNRTLus)

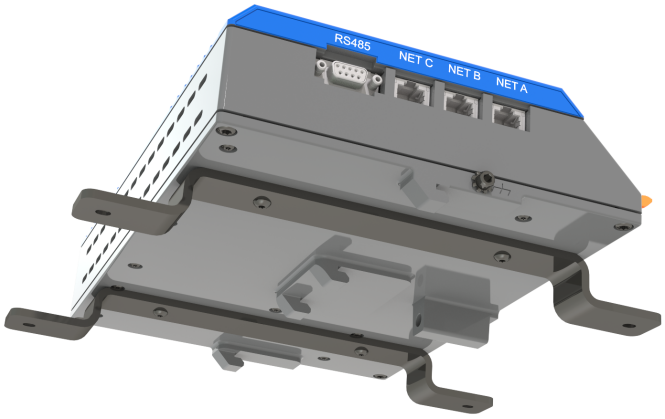

Figure 1: Bulkhead Mounting Option

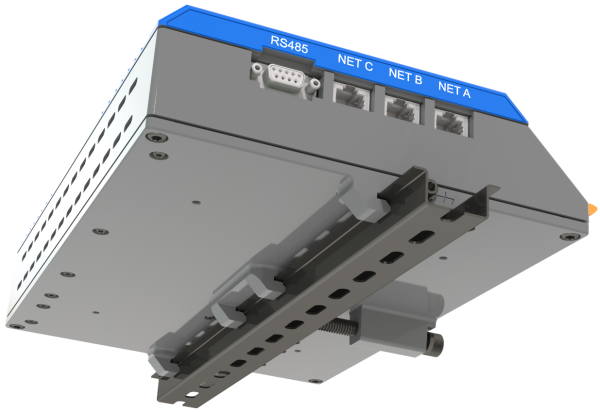

Figure 2: DIN Mounting Option

Spares

00580438	Power Connector
168M9928	Dynamic Channels Input Connector (4 channels per connector)
168M9930	Speed Channel Input Connector (4 channels per connector)
168M9932	Digital Input Connector (4 channels per connector)

DIN Rail Mounting Option		
P/N	Description	QTY
131660-1300	DIN Rail (35 mm x 15 mm x 1 mm)-330 mm Length	1
174M0670	Allen Bolt	1
149302	Rail Caps	2
172M8854	Washer	1

Bulkhead Mounting Option		
P/N	Description	QTY
174M1763-01	Mounting Brackets	2
176M7418	Mounting Screws	4

The part numbers listed above are for spare parts only. These materials will be supplied with the device according to the ordered part numbers.

Accessories

60X/XPS01	Industrial Power Supply 24 VDC, 240 W (Refer to the associated datasheet, 142M8947, for details.)
178M6853	NEMA 4X/IP66 WP Housing (SS316) Size: 26x26x10 in* *Refer to the Operating Temperature in Environmental Limits on page 6.
187M0702-01	NEMA 4X/IP66 Housing (SS304) Size: 30x30x12 in
138131-AAA	CAT5 CABLE†

†AAA is length in feet, with options: 3, 6, 10, 25, 40, 50, 75, 85, 100, 120, 150, 220, 250, 320 feet

Additional Information

175M5868	Orbit DCM User Guide
175M6282	Orbit DCM Field Wiring Diagram
60X/CFG	Orbit Studio Configuration Software

Supported Sensors

Sensor Type Supported	Power	Channel Type	Bently Nevada Part Numbers
Dynamic Channels			
Proximitor System	External	Radial Vibration (Displacement)	3300 XL Series
Accelerometer (3 wire)	External	Acceleration[1]	330400, 330425, 330450 23733, 24145, 350501
IEPE Sensors (2 wire)	10 mA Power Supplied	Acceleration[1,2] Velocity[1,2]	AM/AS Series
Transducers, Convertors, or Sensors with output range within -22V to +22V	External	Process Variable[2]	-
Dynamic Pressure Sensors	External	Dynamic Pressure	350300
Thermocouples, RTD (when used with suitable transmitters with Voltage Output)[3]	External	Process Variable	-
Dual Output Sensor (Vibration + Temperature) (Requires 2 Dynamic Channels)	10 mA for IEPE Vibration Sensor	1st Channel - Acceleration 2nd Channel - Process Variable[4]	181M6049
Triaxial Sensors (Requires 3 Dynamic Channels)	10 mA for IEPE Sensor	All 3 Channels - Acceleration[5]	-
Speed Channels			
Proximitor System	-24 VDC Power by Device	Speed/KPH	3300 XL Series

Sensor Type Supported	Power	Channel Type	Bently Nevada Part Numbers
Magnetic Pick-up Sensors[6]	External	Signal Range -50 V to +50 V	-
Tachometer, Encoders	External	Signal Range -23 V to +3.5 V	-
Proximity Switches	-	Speed/KPH	-

For additional information on the sensors, refer to respective datasheets or contact the Bently Nevada technical support team.
All sensors can be configured using a custom transducer configuration.
Note: Bently Nevada performs an evaluation if a non-Bently Nevada sensor is used with the device.

[1]*Includes the ability to integrate these measurements to provide additional measurement types.*

[2]*Transmitters that provide signals in the 4-20 mA format can be used with Orbit DCM by connecting them via converters or transmitters that convert these signals to a voltage format (refer to Field Wiring Diagrams 175M6282). These transmitters can be configured as process variables in System 1 and Orbit Studio.*

[3]*Refer to Field Wiring Diagrams 175M6282 for more information.*

[4]*Use Pin 1 for Acceleration Signal and Pin 3 for Temperature Signals.*

[5]*Use Pin 1 for all 3 input channels (Acceleration signals).*

[6]*To measure speed signals with a pulse width greater than 6 µs or amplitude greater than 2 V pk-pk at lower speeds, adjust the hysteresis to a lower value.*

Graphs and Figures

Dimensions shown are in inches [millimeters].

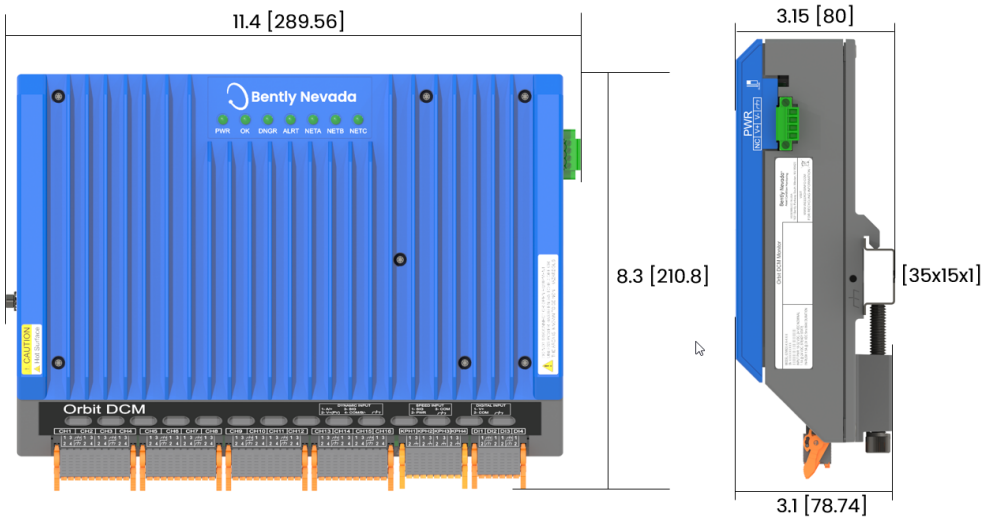

Figure 1: General Dimensions

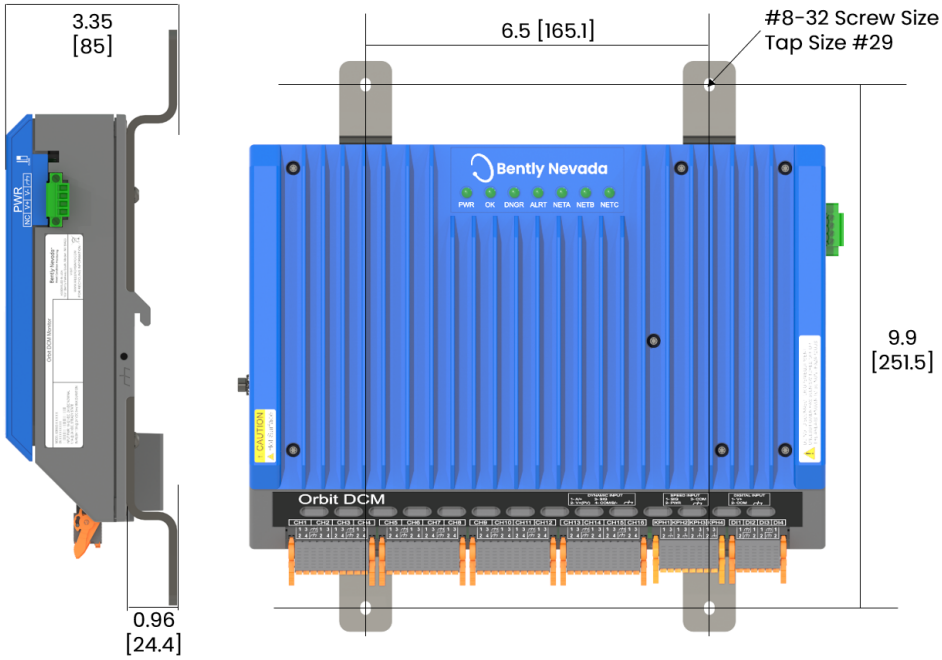

Figure 2: Bracket Mounting Dimensions

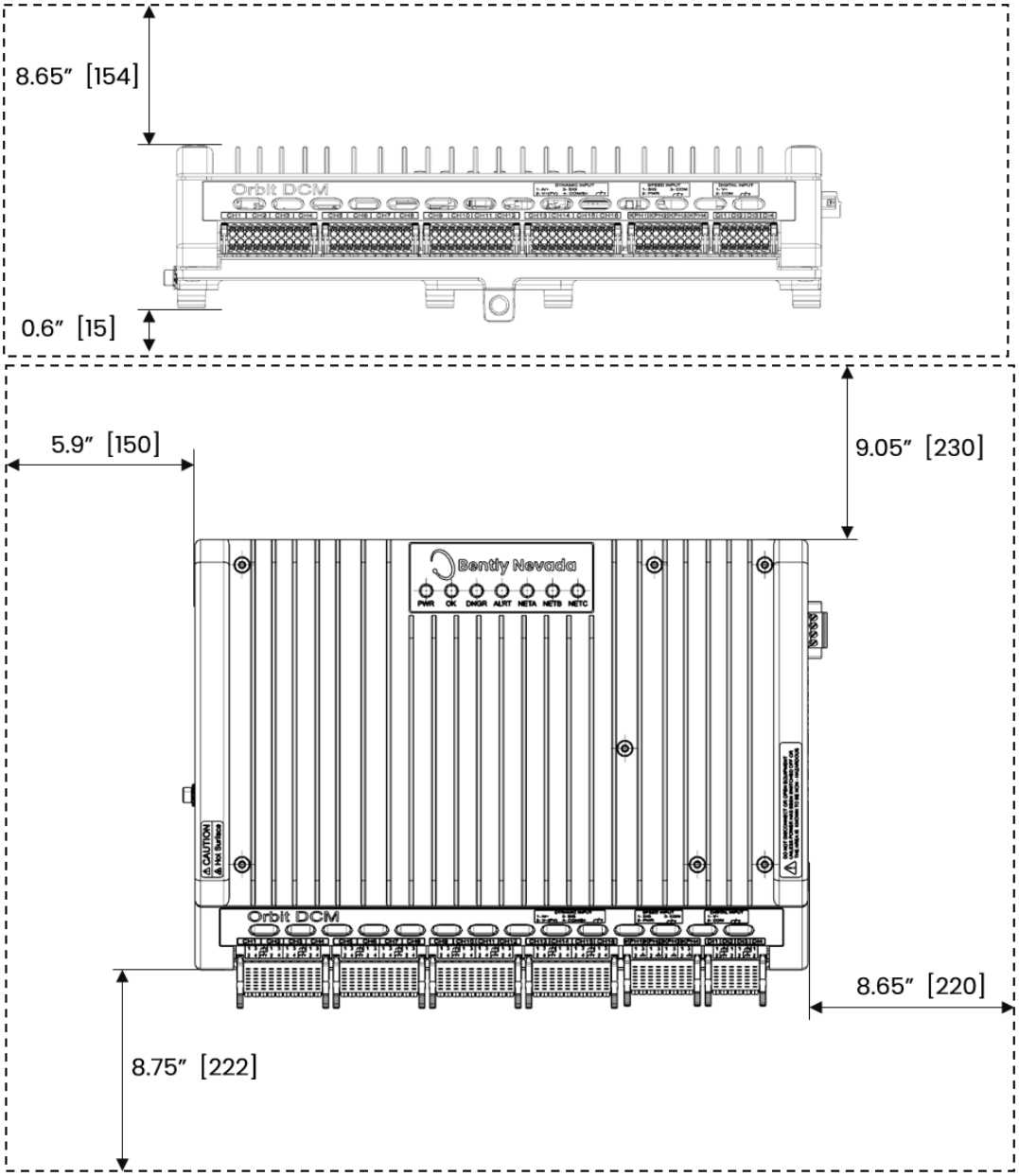

Figure 3: Recommended Minimum Clearance

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