Описание на системы наблюдения состояния ветрогенераторов. Модель 60M100

BENTLY
Nevada

Bently Nevada 60M100 Monitor

Bently Nevada* Asset Condition Monitoring

Description

The 60M100 Condition Monitoring System provides continuous on-line monitoring of Wind Turbine machine trains using sophisticated signal processing algorithms and machine operating states. The 60M100 Monitoring System, as a part of Condition Based Maintenance, lets wind turbine owners know, months in advance, that a turbine defect exists before failure of turbine assets occur. Bently Nevada's Condition Monitoring Solution can save turbine owners hundreds of thousands to millions of dollars per year in lost revenue, depending on the size of the wind farm. Turbine owners can expect to see cost savings from several sources including reduced crane costs, as well as early detection and damage minimization. Moreover, turbine owners will experience a reduction in unnecessary turbine outage and production loss.

The 60M100 Monitor is a capable and flexible system that can be used as an independent standalone condition monitoring system, a networked distributed collection of inter-operating systems, or as an integrated part of a machine OEM's control & instrumentation package. The 60M100 monitor includes features and advantages not provided in other systems. The monitor systems have all functionality required for condition monitoring of Wind Turbine machine trains including signal conditioning, alarming, configuration, speed inputs, and control system communication. The system components are:

- 60M100 monitor
- Adapt.wind software
- Transducers and cables

Sophisticated signal processing algorithms extract dozens of measurements and health indices from each accelerometer point and can be custom tuned to specific bearing and gear box characteristics.

imagination at work

60M100 Overview

The 60M100 Condition Monitoring System is specifically designed for continuous permanent monitoring of wind turbine generator machine trains. It is designed for monitoring applications that require extremely high reliability and availability. Applications that will be addressed by the 60M100 System include but are not limited to:

    Tower Sway
    Main Bearing
    Main Rotor
    Gear Boxes
        - All Internal Bearings
        - All Gear Meshes
        - Debris Monitoring
    Generator Bearings
    Generator Grounding

Special configuration or modifications to a standard monitor can be addressed through Bently Nevada's Custom Products Engineering. Contact your local Bently Nevada sales professional for further information.

60M100 Digital Communications

The 60M100 System includes digital communication capabilities for connection to ADAPT software using proprietary protocols via Ethernet connections. Moreover, the system provides extensive communication capabilities of all monitored values and statuses for integration with process control and other automation systems using Ethernet TCP/IP communications capabilities. It permits Ethernet communications with other 60M100 systems and System Software. Supported protocols include:

Modbus/TCP
Industry standard Modbus protocol over TCP. The 60M100 supports both server and client mode.

60M100 System Description

The 60M100 is a powerful and versatile Condition Monitoring system that provides basic monitoring functions and advanced signal processing and rules in a compact, robust unit. The module conditions the input signals to make various measurements and compares the conditioned signals with user-programmable alarms.

Capable of taking input from different sensor types, the 60M100 System can support up to 12 dynamic channel inputs, two Keyphasor signals, and digital communications. Channel 1 through channel 10 interface with 2-wire ICP type accelerometers. Channels 11 and 12 can be configured to interface with either 2-wire ICP type transducers or 3-wire proximity probes. Each dynamic channel can be independently configured with flexible signal processing options. The Keyphasor channels interface to either 3-wire proximity probes or other speed sensors which are powered externally.

The module provides enhanced capability for monitoring rolling element bearing machinery and gearing through its 24 bit Analog/Digital conversion and 40 kHz bandwidth design.

The 60M100 System is not a substitute for hard wired safety systems, nor does it replace the standard systems for the acquisition of operational data of the wind turbine.

Specifications

60M100 System Electrical Specifications

Input Power

Min: 18 Vdc
Max: 36 Vdc

Current

Max: 1.7 A

Inrush Current

Max: 2.7 A, less than 5 ms

60M100 Processor Module Specifications

Inputs

Max: 12 dynamic signals and 2
Keyphasor signals

Dynamic Range

110 dB @ fs = 102.4 ksps

Signal/Noise Ratio

110 dB @ fs = 102.4 ksps

A/D Conversion

Sigma-Delta   24 bits nominal

Bandwidth

0 to 40 kHz

Outputs

Two Independent Ethernet ports

Net A: 10/100 BaseT
Network DHCP Port

Net B: 10/100 BaseT
Local Static IP Port

Buffered Signal Outputs

Two 15 pin DSUB connector
550 ohm output impedance

LEDs

POWER LED

Indicates when a proper power
input is present.

OK LED

Indicates when the system is
functioning properly.

Danger LED

Indicates an Danger Alarm
condition

Alert LED

Indicates an Alert condition

Kph 1 OK LED

Indicates that Keyphasor signal 1
is triggering.

Kph 2 OK LED

Indicates that Keyphasor signal 2
is triggering.

NetA

Indicates that Network A has a
valid link

TX/RX A

Indicates that network traffic is
flowing on Network A

Net B

Indicates that Network B has a
valid link

TX/RX B

Indicates that network traffic is
flowing on Network B

Accuracy

Direct pk or rms

Within ± 0.5% of full-scale typical,
± 1.1% Worst Case

Bias

+0.4 V / -0.8 V typical,

+0.8 V / -1.34 V Worst Case.

**Rotor, Mesh and
Fault
Frequencies**

± 6.7% typical, ± 9.7% Worst Case

**Bearing
Frequencies**

± 6.7% typical, ± 9.7% Worst Case

Tower Sway

± 0.16 m/s^2 (0.016 g) typical

± 0.23 m/s^2 (0.023 g) Worst Case

Kurtosis

± 1% 50 Hz to 10,000 Hz

± 3% 1 Hz to 49.9 Hz

**Generator
Electrical Noise**

± 1% 50 Hz to 10,000 Hz

± 3% 1 Hz to 49.9 Hz

Crest Factor

Within ± 0.5% of full-scale typical,
± 1.1% Worst Case

*Minimum
Amplitude for
Crest Factor,
Skewness, and
Kurtosis
measurements*

0.6 m/s^2 (0.06 g)

Alarming
Modes

5 modes + default mode

Modes are determined from
Generator Power

Mode 1: 25% to 40% power

Mode 2: > 40% to 55% power

Mode 3: > 55% to 70% power

Mode 4: > 70% to 85% power

Mode 5: > 85% power

Setpoints

2 Levels: Warning and Alarm

Time Delay

300 seconds (fixed) for all
measurements

Latching

All alarm statuses are latching

Dynamic Data

**Asynchronous
Waveform**

8192 samples, 320 ms

**Synchronous
Waveform**

8192 samples

4 revolutions, 2048 samples/rev

8 revolutions, 1024 samples/rev

16 revolutions, 512 samples/rev

32 revolutions, 256 samples/rev

64 revolutions, 128 samples/rev

Spectrums

Main Bearing

8 revolutions, 1024 samples/rev

3200 lines Sync Enveloped

Gearbox Stages

    3200 lines Sync Enveloped

    3200 lines Sync High Res

    Number of revolutions and samples per revolution vary based on the selected asset.

Generator Inboard / Outboard

    64 revolutions, 128 samples/rev

    3200 lines Sync Enveloped

    3200 lines Sync High Res

Tower Sway

    15.625 Hz, 200 lines

Anti-Alias

    -80 dB minimum

Update Rate

    30 seconds

Historical Data Storage Rate

    4 Hours

Data Storage

    2 Weeks (typical, no alarms)

Keyphasor Signal Inputs

Speed Range

    1 to 120,000 rpm

    Limited to 2,000 rpm for Wind Turbines

Speed Resolution

    1 to 100 rpm ± - 0.1 rpm

    100 to 2000 rpm ± 1 rpm

Gap

    ±8.2 mV typical

    ±22.3 mV worst case

Supported Transducers

Acceleration Channels

    TurningPoint TP100 Accelerometer

Keyphasor Channels

    Turck Ni8–M18T–AP6X7M, externally powered

    Bently Prox Probes

Oil Particle Sensors

    GasTOPs

    Macom

Proximity Channel (for Shaft Crack Detection)

    Bently Prox Probe 3300 XL 11mm

60M100 System Environmental Specifications

Operating Temperature Range

    -40 C to +70 C

    (-40 F to 158 F)

Storage Temperature Range

    -45 C to +85 C

    (-49 F to 185 F)

Relative Humidity

    0% to 95% non-condensing

    Operating and Storage

Pollution Degree

    Pollution Degree 2 (Working voltage < 30 Vrms or 60 Vdc)

Physical

Dimensions

> 8.88 X 5.89 X 2.17 inches [225 X 150 X 55 mm] (See Figure 1)

Weight

> 1.4 kg (3 lbs)

Mounting

> Din Rail Mounting

Compliance and Certifications

EMC

> Standards:
>
> EN 61000-6-2 Immunity for Industrial Environments
> EN 55011/CISPR 11 ISM Equipment
> EN 61000-6-4 Emissions for Industrial Environments
>
> European Community Directives:
>
> EMC Directive 2004/108/EC

Electrical Safety

> Standards:
> EN 61010-1
>
> European Community Directives:
> 2006/95/EC Low Voltage

For further certification and approvals information please visit the following website:
http://www.GEmeasurement.com/

Ordering Information

For a detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (document 108M1756) located at the following website: www.GEmeasurement.com.

60M100: Bently Nevada 60M100 Condition Monitor (Monitor Only)

AA: Approvals

> **00** – Standard

60M100_KIT: Bently Nevada 60M100 Condition Monitoring System Kit

AAA: Configuration

> **XX1** – GE 1.X MW
> **XX2** – GE 2.X MW
> **XX3** – GE 2.3-107
> **XX4** – GE 2.5 MW PMG
> **020** – Vestas V82
> **022** – Vestas V110/V110 After Market
> **026** – Vestas V110/V110 Factory
>   Enclosure
> **028** – Vestas 3MW Onshore

BB: Approvals

> **00** – None

Spares

3701 Software Package with Options 3701/00-AA-BB-CC

AA: Order Type

> **01** – Initial Purchase
>
> **99** – SW Update DVD

BB: Licensing

> **00** – Update
>
> **01** – 200 Turbine Farm
>
> **02** – 33 Turbine Farm

CC: Software Version

> **01** – Latest[†]

[†]The 60M100 monitor is only compatible with software version 1.9 or later.

3701 Server and Monitor with Options 3701/11-AA-BB

AA: Server Computers

> **00** – None
>
> **01** – Hi Perf Tower
>
> **02** – Hi Perf Rack
>
> **03** – Compact Server
>
> **04** – Compact Server (O & M Building)

BB: Monitors

> **00** – None
>
> **01** – 19-Inch TFT Flat Panel

Sensors and Cables

323394

Turningpoint TP100
Accelerometer
100 mV/g, 0.5 - 14,000 Hz

200355

Low Frequency Accelerometer
100 mV/g, 0.2 - 10,000 Hz

287844

Accelerometer Mounting Stud
1/4 -28 to M8x1.25 SST

284613-050

Accelerometer Cable, 15.2 m (50ft)
with straight connector

284613-030

Accelerometer Cable, 9.1 m (30ft)
with straight connector

284622-050

Accelerometer Cable, 15.2 m (50ft)
with right angle connector

284622-030

Accelerometer Cable, 9.1 m (30ft)
with right angle connector

138131

CAT5 Cable. Minimum cable
length is 3 feet. Maximum cable
length is 320 feet. Cable lengths
are 3, 6, 10, 25, 40, 50, 75, 85, 100,
120, 150, 200, 250, and 320 feet.

323314-01

Buffered output cable, 15-pin
DSUB to 7 SMA connectors

323314-02

Buffered output cable, 15-pin
DSUB to 7 BNC connectors

Accessories

283624

Surge Protector

284005

Surge Protector Cover

104M4408-01

3701/60A to 60M100 Retrofit
Mounting Kit

Miscellaneous

04425545

Grounding Wrist Strap (Single use
only)

Graphs and Figures
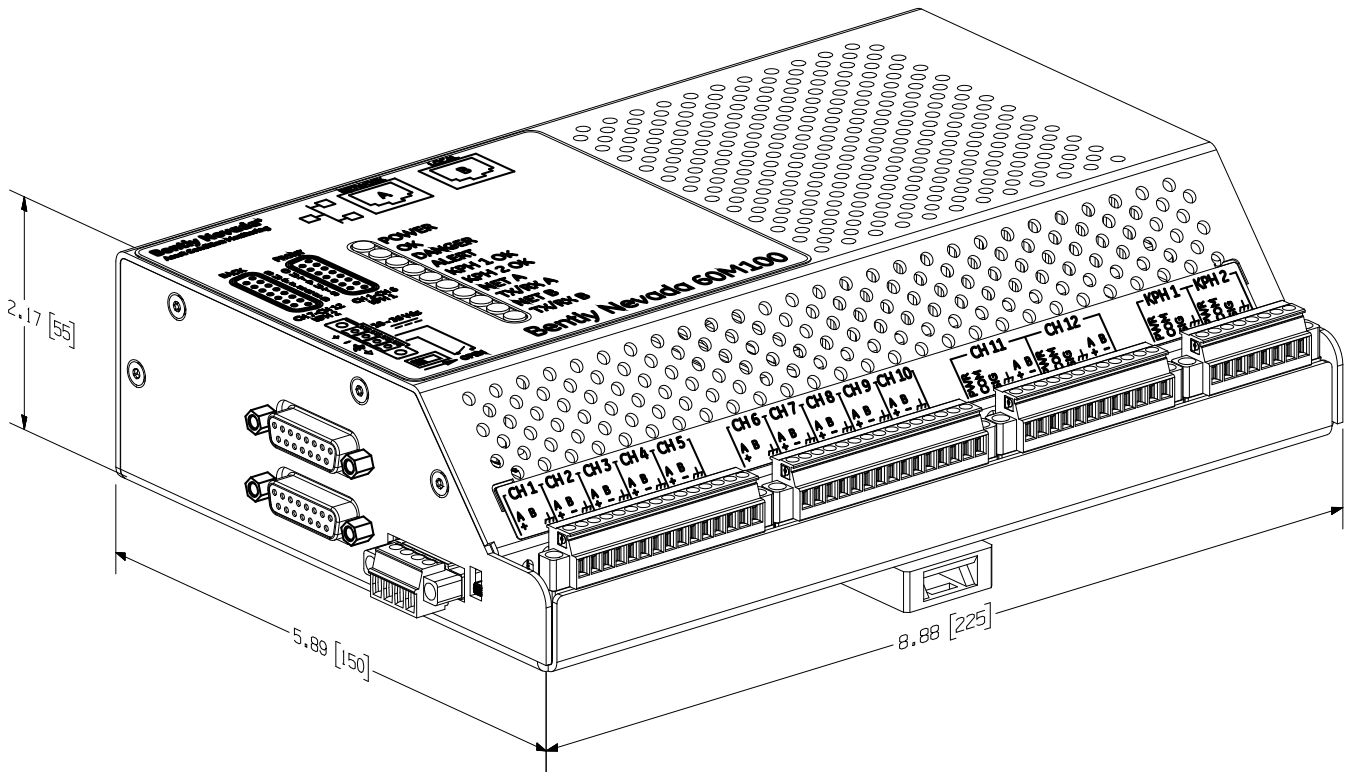
Figure 1: 60M100 Monitor Overall Dimensions
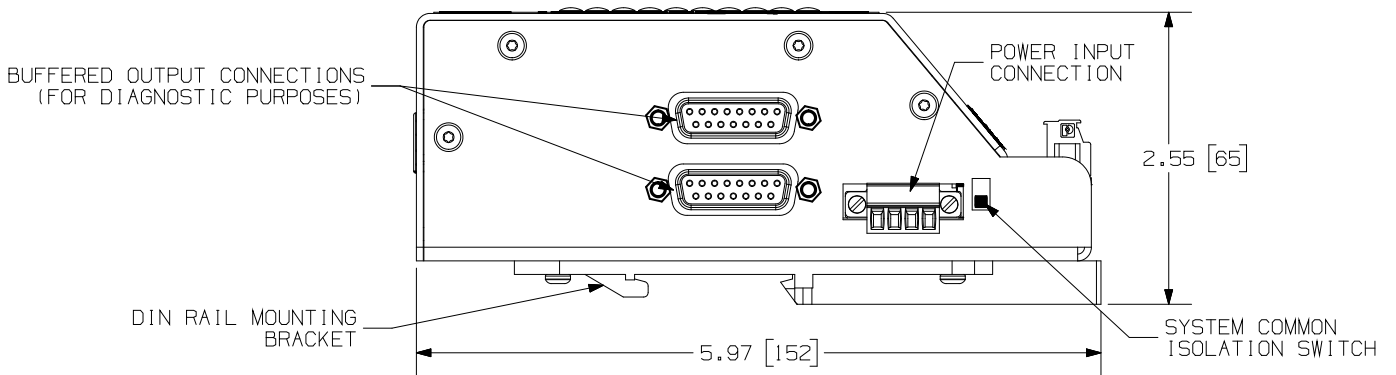
Figure 2: 60M100 Monitor Side View
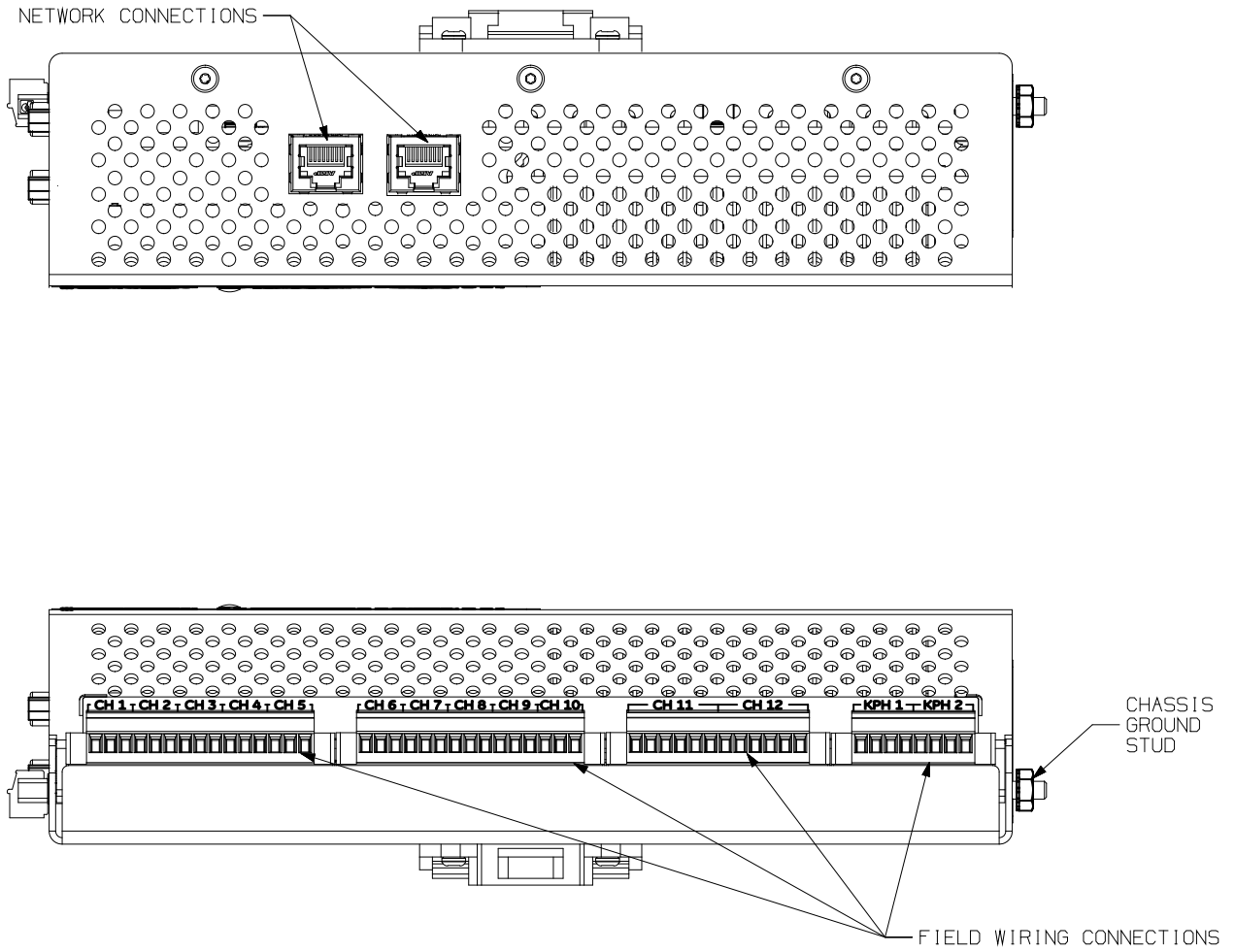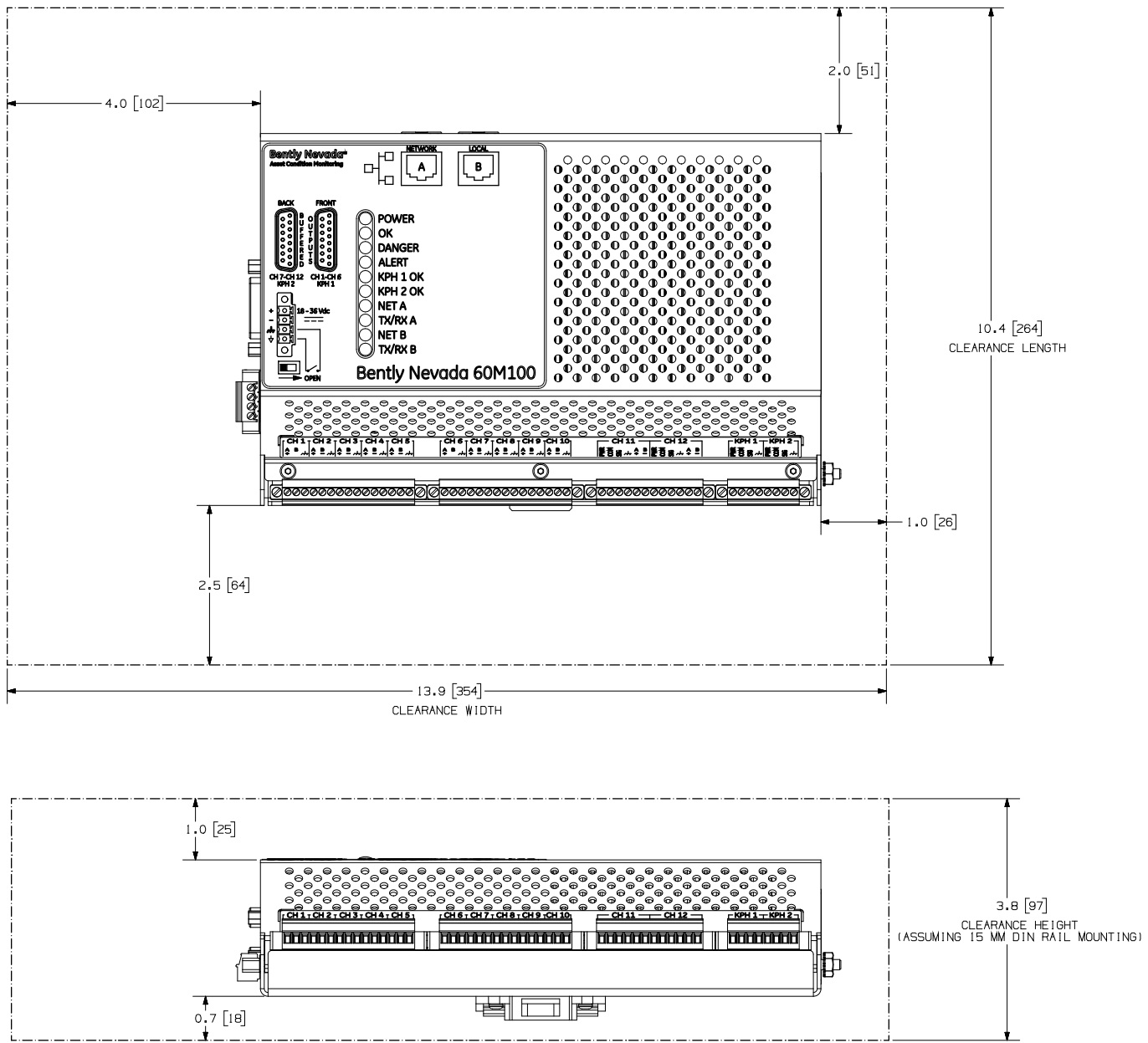
Figure 3: 60M100 Monitor Top and Bottom Views

Figure 4: Recommended minimum clearance window for cable terminations and monitor cooling

BENTLY
Nevada