

# TDISecure Communication Processor

Bently Nevada\* Asset Condition Monitoring



## Description

The TDISecure Communication Processor is a multi-channel data acquisition device that acquires up to 24 channels of dynamic signals using parallel sampling with bandwidths from DC to 30kHz and can acquire an additional 24 channels of process measurement inputs configurable as 4 -20 mA or DC voltages. TDISecure is used with System 1\* Optimization & Diagnostic Software and connects to a System 1 data acquisition computer using Ethernet TCP/IP.

TDISecure can be used to replace legacy Bently Nevada communication processors such as TDXNet but more importantly can be used in new and current installations to acquire analog signals from any vibration monitor system or plant process points and bring the data into System 1 software providing you with a plant-wide view into machinery asset condition.

Effective plant asset management, and particularly effective fleet management of machinery assets often depends on remote access using condition monitoring software such as System 1. In most vibration monitor systems there is a module in the vibration monitor rack that acquires waveform data from monitors in the rack and serves the data over Ethernet to the condition monitoring software. In cases where cyber security is a significant concern a direct Ethernet connection to the vibration monitor system (the machinery protection system) may not be desirable or even allowed. TDISecure can acquire the analog signals from a machinery protection system and because it is not itself providing the protective function, it offers a cyber security solution that is more cost effective than data diodes.

### TDISecure Key Features:

- 24 dynamic analog signal inputs with parallel sampling and synchronization to a Keyphasor.
- 24 direct process measurement inputs that can be configured as independent process inputs or can be associated to a dynamic input.
- 24 Discrete inputs for Channel Alarm/OK and 4 Rack Alarm (1 per Kph) Discrete inputs.
- Ability to replicate protection system configuration for common channel types. Replication ensures data quality and integrity in cases where cyber security prevents direct connection to a machinery protection system.
- Ethernet 10/100 Base-T communication to System 1 for configuration, data collection and data display.
- Serial Data Interface (SDI) RS-232 or RS-422/485 for Modbus® communication.
- Same footprint as legacy communication processors such as TDXnet.



## Specifications

### Model Types

- TDISecure with AC power input: 2155/40-01
- TDISecure with DC power input: 2155/40-02

### Inputs / Outputs

#### Power Input:

- AC Input: 100~240VAC, 50/60Hz, 50W  
Voltage Fluctuation: <math>\pm 10\%</math>

- DC Input: 20~36VDC, 35W

#### Keyphasor\* Inputs

- Supports four Keyphasor signals with associated Keyphasor Alarm In/Out.
- Supports power for four Keyphasor Proximity Sensors.
- Supports multiple events per revolution and event ratios for speed inputs up to 20 kHz.

#### Dynamic Analog Inputs

- Supports 24 channels. Typical inputs are from buffered transducer outputs from a vibration monitor system.
- Input Impedance: 143k $\Omega$
- Frequency range: DC to 30 kHz.
- Signal range: -25V to +25V.

(Currently the full range is only available for Acceleration 2 and Velocity 2)

- Amplitude: 25V peak to peak maximum.
- Accuracy: +/-1% full scale

#### Direct Analog Inputs

- Supports 2 groups of 12 channels of differential Direct Analog Inputs.
- Each bank of 12 inputs is configurable for one of the following input types: 4~20mA, 1~5V, 0~5V, 0~10V, 2~10V.
- 4-20mA input impedance: 250 $\Omega$
- Voltage mode input impedance: 400k $\Omega$
- Frequency response: DC to 240 Hz @-3dB.
- Scan rate: 400ms for all 24 channels.
- Accuracy: 0.32% FS at 25°C (10V full scale)
- Accuracy: 0.64% FS at 25°C (4~20mA)

### Alarm/OK Discrete Inputs

- Supports Alarm/OK Discrete Inputs for 2 groups of 12 channels each for a total of 24 Alarm/OK Discrete Inputs.
- Each 12 channel bank can be configured as either Alarm Inputs or OK Inputs.
- Positive or Negative Logic is independently configurable on DI's 1 - 6, 7 - 12, 13 - 18, and 19 - 24.
- Input Logic Levels

Input Type	V <sub>IHM</sub> Minimum Input to transition to HIGH state	V <sub>IHH</sub> Minimum Input to Hold HIGH state	V <sub>ILM</sub> Maximum Input to Transition to LOW state	V <sub>ILH</sub> Maximum Input to Hold LOW state
VDC	3.60	2.15	0.90	2.38
VAC (rms)	3.00	3.00	1.68	1.68
	R <sub>ONM</sub> Maximum Resistance to transition to ON State.	R <sub>ONH</sub> Maximum Resistance to Hold ON State	R <sub>OFFL</sub> Minimum Resistance to transition to OFF State	R <sub>OFFH</sub> Minimum Resistance to Hold OFF State
Contact Closure (kOhms)	12 k $\Omega$	88.3 k $\Omega$	456 k $\Omega$	109 k $\Omega$

Maximum Input Voltage: 36 V PEAK

### Rack Alarm In/Out Inputs

- Supports 4 Rack Alarm inputs, one for each Keyphasor.
- Supports 4 Rack Alarm outputs, one for each Keyphasor. Used to daisy chain to next TDISecure Rack Alarm Inputs.
- Input Logic Levels:

Input Type	V <sub>IH</sub> Minimum HIGH input voltage	V <sub>IL</sub> Maximum LOW input voltage
VDC	4.3	1.2
VAC (rms)	3	0.8
	R <sub>on</sub> Maximum ON state Resistance	R <sub>on</sub> Minimum OFF state Resistance
Contact Closure (kohms)	7.5 k $\Omega$	28 k $\Omega$

Maximum Voltage Input: 36 V peak

Maximum Input Current: 5mA

Voltage Inputs are Isolated.

## LEDs

- OK LED: Indicates when the TDISecure System is operating properly.
- TX/RX LED: Indicates when the TDISecure is communicating internally with individual sampler cards.
- CONFIG LED: Indicates that the TDISecure has a valid configuration.
- CPU\_OK LED: Indicates when the TDISecure CPU is operating properly.

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## Data Collection

### Startup / Cooldown Data

- Data collected from speed and time intervals.
- Increasing and decreasing speed interval independently programmable.
- Initiation of transient data collection based on detecting the machine speed within one of two programmable windows.
- The number of transient events that can be collected is only limited by the available memory in the TDISecure.

### Alarm Data Collection

- Pre- and post-alarm data.
- 1 second of static values collected for 10 minutes before the event and 1 minute after the event.
- 100 ms static values collected for 20 seconds before the event and 10 seconds after the event.
- 2.5 minutes of waveform data at 10-second intervals before the alarm and 1 minute collected at 10-second intervals after the alarm.

### Static Values Data

- TDISecure will collect static values from dynamic channels and the direct input channels
- Direct input static values can be associated to a dynamic channel or be independent.
- TDISecure provides four nX static values for each dynamic point. Amplitude and phase are returned for each of the values.

### Waveform Sampling

- Collection of waveforms for the 24 dynamic channels.
- DC-coupled waveforms.

- Simultaneous Synchronous and Asynchronous data sampled during all operational modes
- User-configurable Synchronous waveform sampling rates:
  - 1024 samples/rev for 2 revolutions,
  - 512 samples/rev for 4 revolutions,
  - 256 samples/rev for 8 revolutions,
  - 128 samples/rev for 16 revolutions,
  - 64 samples/rev for 32 revolutions,
  - 32 samples/rev for 64 revolutions, and
  - 16 samples/rev for 128 revolutions.
- Asynchronous data sampled to support an 800-line spectrum at the following frequency spans:  
10 Hz, 20 Hz, 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1000 Hz, 2000 Hz, 5000 Hz, 10 kHz, 20 kHz, 30 kHz.
- Asynchronous data is anti-alias filtered.
- Channel Pairs for providing Orbit or synchronous full spectrum presentations can be split among multiple channels. For asynchronous full spectrums the channels must be within a sampler card (PCM) channel pair (30 kHz frequency span data will not be phase correlated between channel pairs).

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## Communications

### Protocols

- Modbus  
Based on AEG Modicon PI-MBUS-300 Reference Manual. Uses Remote Terminal Unit (RTU) transmission mode.

### TDISecure Host Ethernet

- Ethernet, 10Base-T and 100Base-TX. Conforms to IEEE802.3.
- BN Host Protocol and BN TDI Protocol using Ethernet TCP/IP.
- RJ-45 (telephone jack style) for 10Base-T/100Base-TX Ethernet cabling.
- Cable length: 100 meters (328 feet) maximum.

**SDI Host RS-232 (To Modbus Master if using RS232) or SDI Host RS-485 (To Modbus Master if using RS485/422)**

- RS232, 9-pin DSUB
- Configurable Baud Rate: 115.2 kbps maximum
- RS232 Cable length: 30 meters (100 feet) maximum
- RS422 & RS485, 9-pin DSUB
- RS485/422 Cable length: 1220 meters (4000 feet) maximum
- Modbus Register Map: Equivalent to 3500 Monitor System map with choice of dynamic or static register mapping, or register map matching legacy TDxnet.

**SDI Rack RS485/422 (TDISecure to TDISecure Modbus)**

- RS422 & RS485, 9-pin DSUB
- RS485/422 Cable length: 1220 meters (4000 feet) maximum

**Static Port (TDISecure to 3500 or 3300 Static Port)**

- BN DDI/SDI Protocol
- Baud Rate: 9600 bps
- Connect to a Bently Nevada Rack that supports the Static interface. (Not used in Cyber Secure Applications)
- Cable length: 30 meters (100 feet) maximum

**Analog and Discrete Input Connectivity**

TDISecure uses DSUB type connector and multi-conductor cables for Input/Output as well as individual terminations on the TDISecure.

Connection Type	Connector	Standard Cable	Option Cable (Options: variable length, connector on both or one end only).	External Termination Block
Dynamic	25 pin DSUB	02290160	131780-01	102M1605
Direct	25 pin DSUB	131780-01		102M1605
Alarm/OK	15 pin DSUB	131779-01		102M1606
Rack Alarm Input	15 pin DSUB	131779-01		102M1606

Static	15 pin DSUB	02290163	Not available	Not Available
Keyphasor Inputs	Individual Euroterminals		Shielded 3 conductor bulk cable: 02120015  Specify length	Not Available
Rack Alarm Discrete Input & output using individual termination	Individual Euro terminals		Shielded TP bulk cable: 02173006  Specify length	Not Available

**Environmental Limits**

**Operating Temperature:**

- -30 °C to +65 °C (-22 °F to +149 °F)

**Storage Temperature:**

- -40 °C to +85 °C (-40 °F to +185 °F)

**Humidity:**

- Max 95%, non-condensing

**Pollution Degree: 2**

**Installation Category: II, Indoor Use**

**Altitude: 2000m**

**Battery Life:**

- Powered TDISecure: 115 years @ 25°C (77 °F)
- Un-powered TDISecure: 19 years @ 25°C (77 °F)

**Compliance and Certifications**

**General and Electrical Safety:**

- CAN/CSA-C22.2 No. 61010-1-12  
UL 61010-1  
CSA File 150368
- EU Directive 2006/95/EC Low Voltage.  
Standard: EN 61010-1

**Electro-Magnetic Compatibility:**

- EU Directive 2004/108/EC Electromagnetic Compatibility  
Standard: EN 61326-1; EN61000-6-2;  
EN61000-6-4  
Emissions and Immunity

Specifications and Ordering Information  
Document: 102M2685  
Rev. G (03/16)

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## Hazardous Area Approvals

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](http://www.GEmeasurement.com).


### IECEX

#### Approval Option (02)

Ex nA nC IIC T4 Gc (for AC version)  
Ex nA IIC T4 Gc (for DC version)  
-25 °C ≤ Ta ≤ +60°C (for vertical orientation)  
-25 °C ≤ Ta ≤ +50°C (for horizontal orientation)

### ATEX

#### Approval Option (02)

 II 3 G Ex nA nC IIC T4 Gc (for AC version)  
II 3 G Ex nA IIC T4 Gc (for DC version)  
-25 °C ≤ Ta ≤ +60°C (for vertical orientation)  
-25 °C ≤ Ta ≤ +50°C (for horizontal orientation)

#### CSA is planned but not yet available.

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

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## Physical

### Dimensions (Width x Depth x Height)

384mm (15.12 in) x 216mm (8.50 in) x 136mm (5.36 in)

### Weight

AC Version: 4.2 kg (9.3 lb)  
DC Version: 3.9 kg (8.6 lb)

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## 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](http://www.GEmeasurement.com).

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### TDISecure

2155/40 –AA-BB-CC-DD-EE-FF-GG-HH-II-JJ-KK

#### A: Power Input Type

- 0 1 100~240 VAC
- 0 2 24 VDC

**Note:** 102M4702-01 (US AC power 1.8m cable, US field application) is the default accessory when the AC module is ordered; refer to AC Power Input Cable (Page 8/10) for the other cable option.

#### B<sup>1</sup>: Dynamic Signal Cable Shipped with TDISecure

- 0 0 No cable
- 0 1 Cable for connection to BN Monitors or an External Termination Block
- 0 2 Cable with flying leads on one end

#### C<sup>1</sup>: Static Connection Cable for Digital Connection to 3500

- 0 0 No cable
- 0 1 3500/20 Rack Connection Cable
- 0 2 3300 Rack Connection Cable

#### D<sup>1</sup>: Direct Input 1 Cable for connection of 12 Direct inputs to TDISecure

- 0 0 No cable
- 0 1 Direct Cable for use with Direct Input Termination Block
- 0 2 Direct Cable with flying leads on one end

#### E<sup>1</sup>: Direct Input 2 Cable for connection of 12 Direct inputs to TDISecure

- 0 0 No cable
- 0 1 Direct Cable for use with Direct Input Termination Block
- 0 2 Direct Cable with flying leads on one end

#### F<sup>1</sup>: Alarm/OK Input 1 Cable for connection of 12 Alarm/OK inputs to TDISecure Alarm/OK 1 Connector

- 0 0 No cable

- 0 1 Alarm/OK Cable for use with Termination Block
- 0 2 Alarm/OK Cable with flying leads on one end

#### G<sup>1</sup>: Alarm/OK Input 2 Cable for connection of 12 Alarm/OK inputs to TDISecure Alarm/OK 2 Connector

- 0 0 No cable
- 0 1 Alarm/OK Cable for use with Termination Block
- 0 2 Alarm/OK Cable with flying leads on one end

#### H<sup>1, 2</sup>: Rack Alarm Input Cable for connection of 4 Rack Alarm Inputs to TDISecure Rack Alarm Input 15 pin DSUB.

- 0 0 No cable
- 0 1 Cable for use with External Termination Block
- 0 2 Cable with flying leads on one end

#### I: Agency Approval Option

- 0 0 None
- 0 1 CSA/NRTL/C (CLASS 1 DIV 2)
- 0 2 Multi (CSA, ATEX, IECEX)

#### J: TDISecure Transient System 1 Licenses

- 0 0 None
- 0 1 12 Transient Licenses
- 0 2 24 Transient Licenses

#### K: TDISecure Static System 1 Licenses

- 0 0 None
- 0 1 12 Static Licenses
- 0 2 24 Static Licenses
- 0 3 28 Static Licenses

#### Notes:

- (1) All cables supplied under these options are 3.05 meters (10 ft) in length with DSUB connectors on both ends or with a DSUB connector on one end and flying leads on the other end. For different lengths or for assembled/unassembled options you must order separately.
- (2) You have the option to discretely wire the Rack Alarm Inputs to discrete terminals on the TDISecure. If you use the discrete wiring method you do not need the rack alarm input cable.
- (3) For connectivity to a 3500 rack with a 3500/22 TDI, use the Buffered Output I/O module (part number 147364-01), and for connectivity to a

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Specifications and Ordering Information  
Document: 102M2685  
Rev. G (03/16)

Page 6 of 10

3500 rack with a 3500/20 RIM use the Data Manager I/O module (part number 125760-01).

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## Ethernet Switches

### 162419-AXX

A: Backbone option

<b>00</b>	Backbone
<b>01</b>	100Base-FX (MT-RJ) Backbone

**NOTE:** The actual number of Ethernet ports, physical dimensions and manufacture of the hubs and switches may vary. Refer to relevant component description documents or contact your local sales representative for more information.

### Multi-port fiber optic switch with optional port types

### 178917-AXX

A: Port options

<b>00</b>	8 x 10Base-FL (ST)
<b>04</b>	8 x 100Base-FX (MT-RJ)
<b>05</b>	8 x 100Base-FX (MT-RJ) + 4 x 10/100Base-TX (RJ-45)
<b>06</b>	12 x 100Base-FX (MT-RJ) + 4 x 10/100Base-TX (RJ-45)
<b>07</b>	16 x 100Base-FX (MT-RJ)
<b>11</b>	12 x 10Base-FX (ST) + 4 x 10/100Base-TX (RJ-45)

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## Ethernet Cables

Standard 10 Base-T/100 Base-TX Shielded  
Category 5 Cable with RJ-45 connectors (solid  
conductor)

### 138131-AXXX

A: Cable Length:

<b>006</b>	6 feet (1.8 m)
<b>010</b>	10 feet (3.0 m)
<b>025</b>	25 feet (7.6 m)
<b>040</b>	40 feet (12.2 m)
<b>050</b>	50 feet (15.2 m)
<b>075</b>	75 feet (22.9 m)
<b>085</b>	85 feet (25.9 m)
<b>100</b>	100 feet (30.5 m)
<b>120</b>	120 feet (36.6 m)
<b>150</b>	150 feet (45.7 m)
<b>200</b>	200 feet (61.0 m)
<b>250</b>	250 feet (76.2 m)
<b>320</b>	320 feet (97.5 m)

## Fiber Optic Cable

### 137451-AXXXX

A: Length in feet.

10 feet to 500 feet (order in 10 foot increments).

500 feet to 6500 feet (order in 100 foot increments).

Example:

**0220** = 220 ft (67.1 m)  
**0800** = 800 ft (244 m)

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## Serial Data Interface (Modbus) Cables

SDI Host RS232 Connection (Either for configuration  
or for serial RS232 Modbus)

### 130118 - AXXXX-BXX

A: Cable Length

**0010** 10 ft (3 m)  
**0025** 25 ft (7.5 m)  
**0050** 50 ft (15 m)

B: Assembly Option

**02** Assembled

SDI Host/Rack (RS422/485) to another TDIsecure SDI  
Rack/Host

SDI Host/Rack (RS422/485) to 3300/02 or 3300/03 SDI  
Rack/Host

### 47125-AXXXX-BXX-CXX-DXX

A: Cable Length

**0003** 3 ft (0.9 m)  
**0006** 6 ft (1.8 m)  
**0010** 10 ft (3 m)  
**0025** 25 ft (7.5 m)  
**0050** 50 ft (15 m)  
**0075** 75 ft (23 m)  
**0100** 100 ft (30 m)  
**0200** 200 ft (61 m)  
**0250** 250 ft (76 m)  
**0500** 500 ft (152 m)  
**1000** 1000 ft (305 m)  
**2000** 2000 ft (610 m)  
**4000** 4000 ft (1220 m)

B: Assembly Option

**01** Not assembled  
**02** Assembled (not available for  
"A" options **2000** and **4000**)

C: Insulation Option

**01** PVC insulation  
**02** Teflon® insulation

D: Protection Option

Specifications and Ordering Information  
Document: 102M2685  
Rev. G (03/16)

- 0 0 No surge protection
- 0 1 Surge protection provided

**SDI Rack (RS422/485) to 3300/01 SDI Host**

**89967 - AXXXX-BXX-CXX**

**A: Cable Length**

- 0 0 1 0 10 ft (3 m)
- 0 0 2 5 25 ft (7.5 m)
- 0 0 5 0 50 ft (15 m)
- 0 1 0 0 100 ft (30.5 m)
- 0 2 5 0 250 ft (76 m)
- 0 5 0 0 500 ft (152 m)

**B: Assembly Option**

- 0 1 Not assembled
- 0 2 Assembled

**C: Surge Protection**

- 0 0 No surge protection
- 0 1 Surge protection provided

**SDI Host (RS422/485) to 3300/01 SDI Rack**

**89966 - AXXXX-BXX-CXX**

**A: Cable Length**

- 0 0 1 0 10 ft (3 m)
- 0 0 2 5 25 ft (7.5 m)
- 0 0 5 0 50 ft (15 m)
- 0 1 0 0 100 ft (30.5 m)
- 0 2 5 0 250 ft (76 m)
- 0 5 0 0 500 ft (152 m)

**B: Assembly Option**

- 0 1 Not assembled
- 0 2 Assembled

**C: Surge Protection**

- 0 0 No surge protection
- 0 1 Surge protection provided

**Static Data Cable for connection to Bently Nevada 3500 or 3300 Monitor System Static Connector**

**02290163**

3.05 m (10 ft) cable with 15 pin DSUB connectors on both ends.

**129386-01**

3.05 m (10 ft) TDISecure Static Connector to 3500 Rack Static Connector with 15 Pin DSUB Connector on both ends.

**Dynamic Data Cable for connection to Bently Nevada 3500 or 3300 Monitor System Dynamic Connector**

**Spare part number**

**02290160**

3.05 m (10 ft) cable with 25 pin DSUB connectors on both ends.

**Dynamic Data / Direct Input Cable**

**131780 - 01**

Pigtail cable. 25-wire cable 4.58 m (15 ft) long used for Direct (Recorder Output) and Dynamic signals.

**Alarm/OK Discrete Input / Rack Alarm Input Cable**

**131779 - 01**

Pigtail cable. 15-wire cable 4.58 m (15 ft) long used for Alarm/OK or Rack Alarm connections.

**Termination Block for connecting to Rack Alarm connector**

**103M3683-01**

DIN Rail Mount Transition Connector Adapter. Allow you to connect individual wires into a 16-pin "D" style female connector for Rack Alarm input and 3 contact inputs(reset, inhibit and trip\_mult).

**Termination Block for terminating up to 12 two-wire direct / 24 dynamic inputs.**

**102M1605**

DIN Rail Mount Transition Connector Adapter. Allow you to connect individual wires into a 25-pin "D" style female connector. Used for Direct and Dynamic signals.

**Termination Block for terminating up to 24 dynamic inputs.**

**102M8454-01**



DIN Rail Mount Transition Connector Adapter. Allows you to connect individual wires (Signal, Common, Chassis) into a 25-pin "D" style female connector. Used for Dynamic signals.

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### Termination Block for terminating up to 12 Alarm/OK two-wire discrete inputs.

### Termination Block for terminating up to 4 two-wire Rack Alarm Inputs and 4 Rack Alarm Outputs.

102M1606

DIN Rail Mount Transition Connector Adapter. Allow you to connect individual wires into a 15-pin "D" style female connector. Use for Alarm/OK or Rack Alarm connections.

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### Power Fuse

102M2430 TDIsecure AC power fuse

102M8955 TDIsecure DC power fuse

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### AC Power Input Cable

#### Field Application in the United States

102M4702-01 US AC power cable 1.8M.

#### Field Application in European Union

102M4703-01 EU AC power cable 1.8M.

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### Software

#### 3500/01 Rack Configuration Software

Version 5.0 or greater.

Rack Configuration Software is required for channel level configuration of the TDIsecure.

Order Separately

#### System 1 Optimization & Diagnostic Software

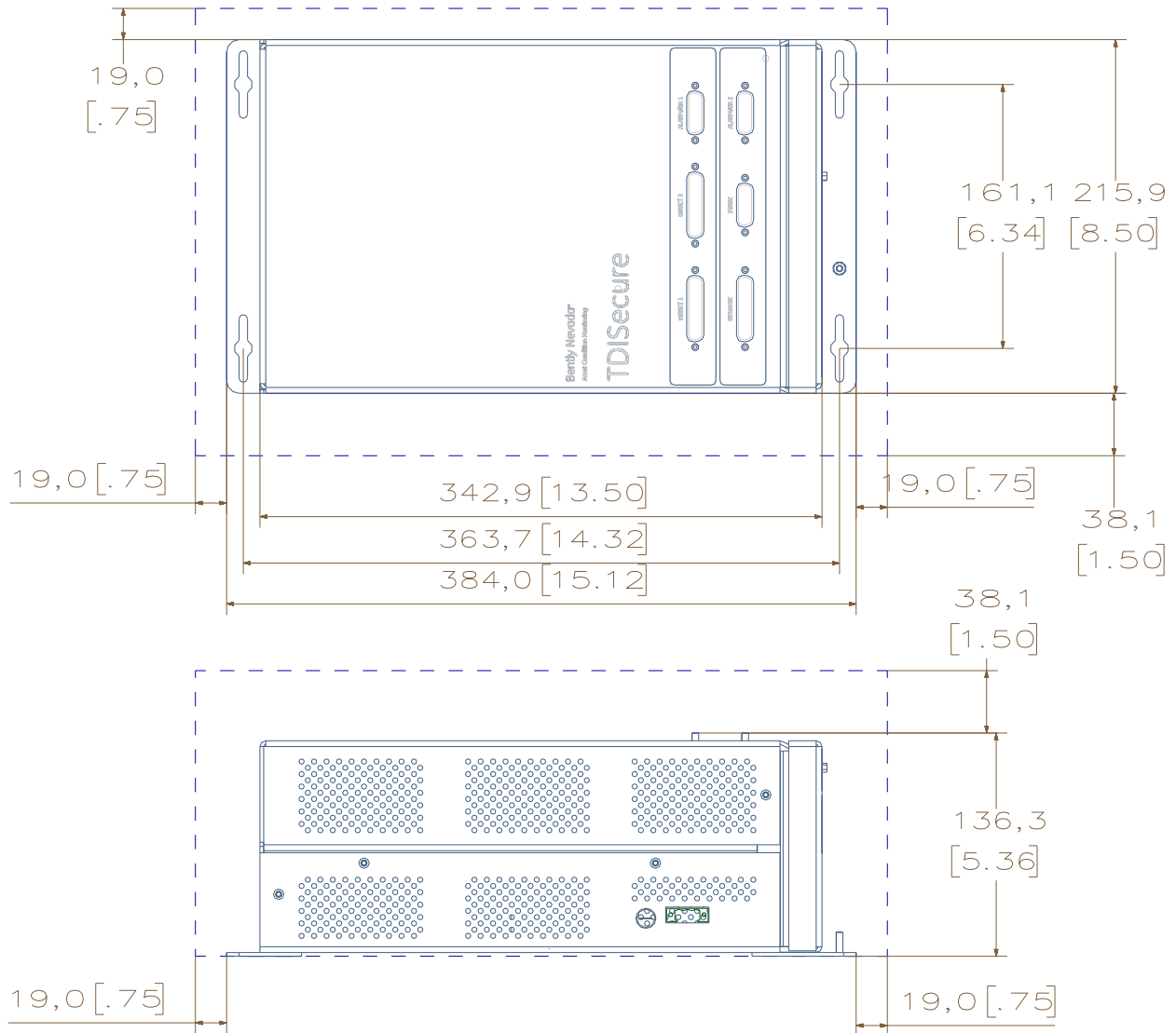
Version 6.88 or greater.

System 1 is required for configuration of condition monitoring channel and measurement parameters and for acquisition and display of data from TDIsecure.

System 1 Software must be ordered separately.

TDIsecure transient and static point licenses for System 1 are ordered as part of the TDIsecure.

## Graphs and Figures



**Figure 1: TDISecure Dimensions and Clearance**

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Specifications and Ordering Information

Document: 102M2685

Rev. G (03/16)

Page 10 of 10