

# 149744 Trendmaster Dynamic Scanning Module (DSM)

## Datasheet

Bently Nevada Machinery Condition Monitoring

149831 Rev. AC



## Description

The 149744 Trendmaster Dynamic Scanning Module (DSM) is a compact rack-based data acquisition system that is fully integrated with System 1 software. The DSM rack has a total of 5 card slots. The first slot is dedicated for communications and will accept either the copper or fiber Ethernet card. The second slot is reserved. The 3rd to 5th slots are TIM Input card or reserved.

The TIM input card connects to Bently Nevada TIM and proTIM modules. Each TIM input card provides 2 TIM lines, and each TIM line supports up to 254 channels. Input cards offer high-resolution sampling with onboard real-time processing. Onboard processing is the key to the powerful and efficient features available with the DSM platform. Because each input card can process data locally, the DSM can return post-processed variables to the host computer and reduce the required network bandwidth. If the host computer requires raw data, the DSM can also return waveforms and spectrums.

## Modbus Communications Capability

The introduction of a Modbus digital interface now permits DSMs to communicate directly with process control and automation systems without the need for additional hardware. This capability provides a low-cost entry-level alternative to System 1 that uses the basic trending and alarming functionality that is integral to existing process control systems. All DSMs now include Modbus over TCP/IP capability and require only the DSM Modbus Exporter software to configure all the DSM inputs and define the Modbus interface. The DSM requires the Modbus Serial to Ethernet Bridge for RS232/485 Modbus communication. See the accessory section of this datasheet for the Modbus Exporter software and Serial to Ethernet Bridge part numbers.



## DSM Features

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- Fully integrated with System 1 and Decision Support
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- Ethernet Modbus server with or without System 1
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- Up to 150 DSMs per single data acquisition computer
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- Small package, 21cm x 13 cm x 11cm (8.3 in x 5.1 in x 4.3 in)
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- Choice of copper or fiber Ethernet
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- Synchronous and asynchronous processing
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- Automatic self-checking for DSM and Input cards, and transducers
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- Up to 24 kHz high bandwidth inputs
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- Up to 16-bit high resolution sampling
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- Up to 16x auto gain
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- TIM (Transducer Interface Module) support for:
    - Acceleration, velocity, and proximity sensors
    - 4-20 mA, 1-5 V, and 0-10 V transmitters
    - J and K thermocouples and platinum RTD
    - Up to 508 channels per card
- 
- Onboard processing for:
    - True RMS and peak-peak
    - 1X, 2X, and not 1X variable
    - User configurable high-pass and band-pass filters
    - Integrated variables and waveforms
    - Configurable spectrums up to 3200 lines
    - Spectrum windowing, averaging, and overlap
    - Standard and enhanced high-frequency enveloping
-

## Specifications

### DSM Rack (149744)

Input Voltage	Power connector located on communications card. 20 to 30 Vdc
Input Power	18 watts maximum
Fuse Rating	1 amp slow-blow

### 10/100 TX Copper Ethernet Card (149776-01)

Status LED	Tri-color LED indicates status of DSM and input modules with combinations of colors and flash rates
Link/Activity LED	Tri-color LED indicates network link status
Connector Type	RJ45

Communications	
DSM to System 1	TCP/IP UDP for initialization
Modbus	Operates with or without System1 Modbus over TCP/IP Up to 6 clients 0.5 sec response time
Baud Rate	10 Base T or 100 Base TX, auto-negotiating
Cable Length	100 meters (328 feet) Category 5, twisted pair

### 100 FX Fiber Ethernet Card (149776-02)

Status LED	Tri-color LED indicates status of DSM and input modules with combinations of colors and flash rates
Link/ACT LED	Tri-color LED indicates network link status
Connector type	MT-RJ

Communications	
DSM to System 1	TCP/IP UDP for initialization
Modbus	Operates with or without System1 MODBUS over TCP/IP Up to 6 clients 0.5 sec response time

Operation Protocol	TCP/IP, BN protocol UDP for initialization only
Baud Rate	100 base FX only
Cable Length	400 meters (1312 feet) multimode fiber optic cable (half duplex) 2000 meters (6562 feet) multimode fiber optic cable (full duplex)

### TIM Input Card (149787-01)

Input Lines	Both lines sampled simultaneously 2 lines per card 127 pro-TIMs per line
Supported TIMs	All proTIM modules 1900/15 1900/25 1900/55
TIM Cable Length	1200 meters (4000 feet)
A/D Resolution	14 bits
Accuracy	±2% of full-scale range
Short Circuit Current Limit	43 mA maximum
Hardware Frequency Response (3 dB corners)	1/3 Hz and 20 kHz Refer to TIM and transducer specifications for more information
Direct Filter	2-pole high-pass, 1 Hz to 12.8 kHz
Prime Spike Filter	4-pole high-pass, 1 Hz to 12.8 kHz 2-pole low-pass, 10 Hz to 12.8 kHz
Rotor Region Filter	2-pole high-pass, 1 Hz to 12.8 kHz 2-pole low-pass, 10 Hz to 12.8 kHz
High Frequency Filter	4-pole high-pass, 1 Hz to 12.8 kHz

### Synchronous Waveforms (Software configurable)

Frequency Span	32, 64, and 128 samples per revolution 20 to 36,000 CPM
Waveform Size	8192 samples maximum
Filter	No anti-alias filter on synchronous path

## Asynchronous Waveforms (Software configurable)

Frequency Spans	20 Hz 50 Hz 100 Hz 200 Hz 500 Hz 1000 Hz 2000Hz
Sample Rates	51.2 Hz 128 Hz 256 Hz 512Hz 1280 Hz 2560 Hz 5120 Hz 12800 Hz 25600 Hz
Spectral Lines	100 200 400 800 1600 3200
Spectrum averages	Up to 8
Windowing	None, flat-top, or hanning

## General

Weight	
DSM with no input cards	0.76 kg (1.7 lbm)
Input card	0.2 kg (0.44 lbm)
Power supply	0.5 kg (1.1 lbm)
Mounting	
DIN rail option	35mm DIN rail. Requires 26.7 cm (10.5 in) rail length.
Weatherproof housing	35mm DIN rail. Requires 26.7 cm (10.5in.) rail length.
Bulkhead option	Requires 4 #8 screws required.

## Environmental Limits

Operating Temperature	20 °C to +65 °C (-4 °F to +149° F)
Storage Temperature	-40 °C to +85 °C (-40 °F to +185 °F)
Operating or Storage Humidity	95%, non-condensing 100% condensing when installed in weatherproof housing with power applied.
Vibration	2 g's (10 to 55 Hz) 10 g's (55 to 500 Hz)
Shock	6-inch drop to plywood surface (installed in terminal base)

## 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

EN 61000-6-2 :2005  
 EN 61000-6-4:2007 +A1:2011  
 EMC Directive 2014/30/EU

### RoHS

RoHS Directive 2011/65/EU

### ATEX

EN 60079-0: 2012/A11:2013  
 EN 60079-11:2012  
 EN 60079-15:2010  
 EN 60079-28:2015 (DSM 149744 only)  
 EN 60079-31:2014 (TMGI 162459-01 only)  
 ATEX Directive 2014/34/EU

### Maritime

ABS 2009 Steel Vessels Rules  
 1-1-4/7.7,4-8-3/1.11.1,4-9-7/13

## Hazardous Area Approvals



For the detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (108M1756) available from [Bently.com](http://Bently.com).

## CSA/NRTL/C (Approval Options 05)

Installed with intrinsically safe zener barriers per drawing 112M7732	Ex ia IIC T4 Ga Class I Zone 0: AEx ia IIC T4 Ga Class I, Div 1 Groups A, B, C & D Class II, Groups E, F & G Class III T4 @ -40° C ≤ Ta ≤ +100° C (-40° F ≤ Ta ≤ +212° F)
Installed without barriers per drawing 112M7732	Ex nA IIC T4 Gc Class I Zone 2: AEx nA IIC T4 Gc Class I, Div 2 Groups A, B, C & D T4 @ -40° C ≤ Ta ≤ +100° C (-40° F ≤ Ta ≤ +212° F)

## ATEX/IECEX

### ProTIMs (200200 and 200250)

	II 1 G Ex ia IIC T4 GC II 3 G Ex nA IIC T4 Gc T4 @ Ta = -40°C to +100°C
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### Trendmaster DSM (149744)

	II 3 G Ex nA IIC T4 GC II 3(3) G Ex nA [ic] IIC T4 Gc II 3(3) G Ex nA op is [op is T4 Gc] IIC T4 Gc T4 @ Ta = -20°C to +65°C
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### TMGI (162459-01)

	II (1) G [Ex ia Ga] IIC II(1) D [Ex ia Da] IIIC II 3 (1) G Ex nA [is Ga] IIC T4 Gc II 3(1) D Ex tc [ia Da] IIIC T140°C Dc IP5X T4 @ Ta = -20°C to +65°C
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## Ordering Information



For the detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (108M1756) available from [Bently.com](http://Bently.com).

## Trendmaster DSM

### 149744 -AA-BB-CC-DD-EE-FF-GG- HH

<b>A: Power Input</b>	
<b>0 1</b>	110/220 V 50-60 Hz
<b>0 2</b>	+24 Vdc *
<b>B: Communication</b>	
<b>0 1</b>	10/100baseT Ethernet
<b>0 2</b>	Fiber Optic Ethernet
<b>C: Input Board 1</b>	
<b>0 0</b>	None
<b>D: Input Board 2</b>	
<b>0 0</b>	None
<b>0 1</b>	TIM input card
<b>E: Input Board 3</b>	
<b>0 0</b>	None
<b>0 1</b>	TIM input card
<b>F: Input Board 4</b>	
<b>0 0</b>	None
<b>0 1</b>	TIM input card
<b>G: Mounting</b>	
<b>0 1</b>	Bulkhead mount
<b>0 2</b>	DIN Rail mount
<b>0 3</b>	Weatherproof enclosure
<b>H: Approvals</b>	
<b>0 0</b>	No approvals
<b>0 5</b>	Multiple approvals (CSA/ATEX/IECEX)



\* External power supplies must be sourced separately for orders requiring region specific hazardous area approvals.

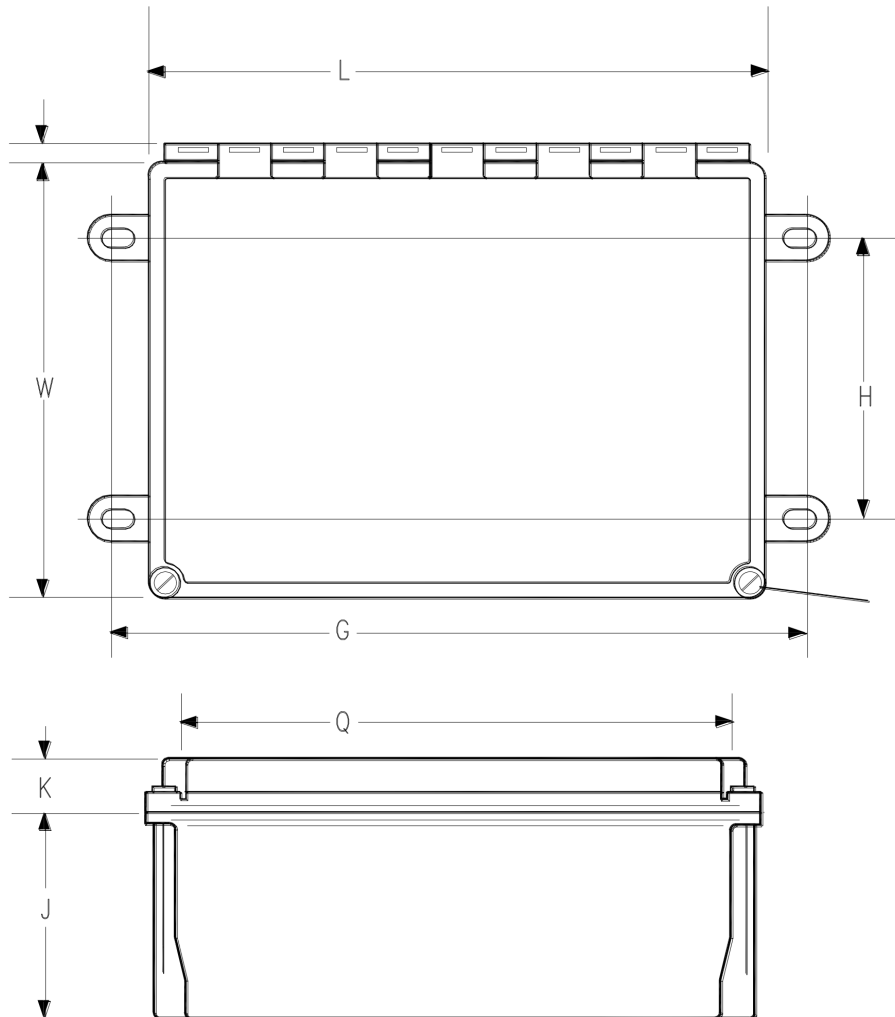
## Accessories

Use the part numbers listed in this section to order spare parts or additional components for your Trendmaster DSM system.

3060/56	DSM Modbus Exporter Software
149776-01	Spare 10/100 Base T Ethernet Communication Card.
149776-02	Spare Fiber Optic Ethernet Communication Card.
149787-01	Spare TIM Line Input Card.
149833-01	Blank Slot Cover.
02200794	+24 V Power Supply *
162003	Power Supply to DSM Wiring Harness.
162222-01	Weatherproof Housing.
161692	TIM Line Surge Protector Plug. Also requires Part 161693.
161693	TIM Line Surge Protector Base. Also requires Part 161692.
03839240	TIM Line Cable Seal. 5.1 mm to 6.7 mm (0.20 in to 0.27 in).
162261	Trendmaster DSM SPA Cable. Mates with 162560.
162560	SPA 5-position DIN Rail Terminal Block. Mates with 162261.
43501	Low Pressure Cable Seal.
163723	EMI Ferrite Suppressor. For round cable.
164466-01	Ethernet Component Specification.
172555	Modbus Serial to Ethernet Bridge.
162459-01	Trendmaster Galvanic Isolator.
149823	Trendmaster DSM User Guide
Bently_Manuals	Customer DVD containing all Bently Manuals, FWD, App Notes, and Install Guides in all available languages

## Graphs and Figures

Note: All dimensions shown in millimetres (inches) except as noted.



1. L = 370 mm (14.55 in)
2. H = 274 mm (10.00 in)
3. W = 319 mm (12.55 in)
4. G = 379 mm (14.94 in)
5. J = 165 mm (6.5 in)
6. K = 46 mm (1.61 in)
7. Q = 260 mm (10.25 in)

**Figure 1: Weatherproof Housing Dimensions**

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