Bently Nevada 149787-01 **TIM Input Card**



\$475.00

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149744 Trendmaster* Dynamic Scanning Module

Bently Nevada* Asset Condition Monitoring



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 other 4 slots are general-purpose card slots that can accept any combination of the available DSM input cards.

The DSM supports both Direct Input cards and a TIM Input card. Direct Input cards connect directly to sensors and are available for a variety of sensors as well as 4-20 mA transmitters. Direct Input cards support up to 8 channels and provide very rapid scanning. The TIM input card connects to Bently Nevada* TIM, flexiTIM, and proTIM* modules. Each TIM input card provides 2 TIM lines, and each TIM line supports up to 255 TIMs and transducers. All input card types 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

- Fully integrated with System 1 and Decision Support*
- Ethernet Modbus server with or without System 1
- Up to 150 DSMs per single data acquisition computer
- Small package, 21cm x 13 cm x 11cm (8.3 in x 5.1 in x 4.3 in)
- Choice of copper or fiber Ethernet
- Synchronous and asynchronous processing
- Automatic self-checking for DSM and Input cards, and transducers
- Up to 24 kHz high bandwidth inputs





Specifications and Ordering Information Part Number 149831-01 Rev. U (05/14)

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- Up to 16-bit high resolution sampling
- Up to 16x auto gain
- Direct inputs for:
 - 2- and 3-wire acceleration sensors
 - 2- and 3-wire velocity sensors
 - Proximity, speed, and Keyphasor* signals
 - 4-20 mA transmitters buffered outputs
- 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 510 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 System

1

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 System

1

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 per card

255 TIMs per line

Supported TIMs **Synchronous Waveforms (Software** configurable) All proTIM, flexiTIM, and TIM Frequency Span modules 32, 64, and 128 samples per 1900/15 revolution 1900/25 20 to 36,000 CPM 1900/55 Waveform Size **TIM Cable Length** 8192 samples maximum 1200 meters (4000 feet) **Filter** A/D Resolution No anti-alias filter on 14 bits synchronous path **Accuracy Asynchronous Waveforms (Software** configurable) ±2% of full-scale range **Frequency Spans Short Circuit Current** Limit 20 Hz 48 mA maximum 50 Hz **Hardware Frequency** 100 Hz Response (3 dB corners) 200 Hz 500 Hz 1/3 Hz and 20 kHz 1000 Hz 2000Hz Refer to TIM and transducer Sample Rates specifications for more information 51.2 Hz **Direct Filter** 128 Hz 2-pole high-pass, 1 Hz to 12.8 kHz 256 Hz Prime Spike Filter 512Hz 4-pole high-pass, 1 Hz to 12.8 kHz 1280 Hz 2-pole low-pass, 10 Hz to 12.8 2560 Hz kHz 5120 Hz **Rotor Region Filter** 12800 Hz 2-pole high-pass, 1 Hz to 12.8 kHz 25600 Hz 2-pole low-pass, 10 Hz to 12.8 **Spectral Lines** kHz 100 **High Frequency Filter** 200 4-pole high-pass, 1 Hz to 12.8 kHz 400 800 1600

3200 (0.5 volts max < DSM input supply)

Input Impedance Spectrum averages

> Up to 8 $211 \Omega \pm 2 \Omega$

Windowing Accuracy

> None, flat-top, or hanning ±2% of FSR

Process Variable Direct Input Card (149799-01) A/D Resolution

Inputs 14 bits

> Both blocks sampled **Full-Scale Range** simultaneously

2 blocks per card **Short Circuit Current** 4 inputs per block

Transmitter Type 37 mA maximum

4-20 mA, passive 24 Volt Transducer Direct Input Card

(149811-01) Process variable card provides

transmitter power. Inputs

Force

Mass

Configurable Process Both blocks sampled **Types**

simultaneously. Any input can be used for speed¹ or KPH.

Limit

Current 2 blocks per card Flow 4 inputs per block

(X, Y, and KHP on a single card) Frequency

¹ Direct Input Card does not Load support multi-event wheels

Transducer Type VAR

3-wire voltage mode sensors

Position Compatible Bently Power **Nevada Transducers**

Power factor 3300 Pressure 3300XL

Process speed **3300 REBAM**

Temperature 7200 Torque 330400 Valve position

330425 Voltage **Transducer Power**

Supply Voltage Weight

 $-24 \pm 5\% \text{ Vdc}$ **Transmitter Supply**

Voltage **Maximum Transducer** Current 19.5 V to 30 V

15 mA (per channel)

Specifications and Ordering Information Part Number 149831-01 Rev. U (05/14)

4-20 mA, 22.5 mA maximum

Maximum Transducer Cable Length			20 to 36,000 CPM	
J	305 m (1000 ft)	Waveform Size	0102	
Amplitude Accur	racy	Filter	8192 samples maximum	
•	1%	Filter	No anti alian filton an	
Phase Accuracy			No anti-alias filter on synchronous path	
	±1°	Asynchronous Wa	votorme (Software Configurable)	
A/D Resolution		Asynchronous Waveforms (Software Configurable) Frequency Spans		
	14 bits	requesto, epain	20 Hz	
Input Impedance	•		50 Hz	
	10 kΩ		100 Hz	
Keyphasor Input	Signals		200 Hz	
	Keyphasor speed 6 to 36,000 cpm		500 Hz	
	Duty cycle greater than 1% or 50		1000 Hz	
	us		2000 Hz	
	Full scale gap range -24 volts		5000 Hz	
	Amplitude minimum 2.0 volts peak to peak		10000 Hz	
Hardware Frequ			20000 Hz	
Response		Sample Rates		
	1/3 Hz and 24 kHz	•	51.2 Hz	
	(3 dB corners)		128 Hz	
Direct Filter			256 Hz	
	2-pole high-pass, 1 Hz to 12.8 kHz		512 Hz	
Prime Spike Filte	r:		1280 Hz	
	4-pole high-pass, 1 Hz to 12.8 kHz		2560 Hz	
	2-pole low-pass, 10 Hz to 12.8		5120 Hz	
	kHz		12800 Hz	
Rotor Region Filter			25600 Hz	
	2-pole high-pass, 1 Hz to 12.8 kHz		51200 Hz	
	2-pole low-pass, 10 Hz to 12.8 kHz	Spectral Lines		
High Frequency Filter			100	
	4-pole high-pass, 1 Hz to 12.8 kHz		200	
Sunchronous Way	oforms (Software Configurable)		400	
Synchronous Waveforms (Software Configurable) Frequency Span			800	
	32, 64, and 128 samples per		1600	
	revolution		3200	

Spectrum Averages Prime Spike Filter Up to 8 4-pole high-pass, 1 Hz to 12.8 kHz 2-pole low-pass, 10 Hz to 12.8 Windowing kHz None, flat-top, or hanning **Rotor Region Filter** Constant Current Direct Input Card (149811-02) 2-pole high-pass, 1 Hz to 12.8 kHz Inputs 2-pole low-pass, 10 Hz to 12.8 Both blocks sampled kHz simultaneously **High Frequency Filter** 2 blocks per card 4-pole high-pass, 1 Hz to 12.8 kHz 4 inputs per block **Transducer Type** Synchronous Waveforms (Software Configurable) 2-wire current mode sensors Frequency Span 32, 64, and 128 samples per Compatible Bently **Nevada Transducers** revolution 200350 20 to 36,000 CPM 330500 Waveform Size 8192 samples maximum 330525 190501 **Filter** No anti-alias filter on **Transducer Power Supply Voltage** synchronous path $-24 \pm 5\% \text{ Vdc}$ Asynchronous Waveforms (Software Configurable) **Bias Current Supply: Frequency Spans** 3.3 mA 20 Hz **Accuracy** 50 Hz 1% 100 Hz A/D Resolution 200 Hz 14 bits 500 Hz **Transducer Cable** 1000 Hz Length 2000 Hz 305 m (1000 ft) maximum for 5000 Hz compatible Bently Nevada transducers 10000 Hz **Hardware Frequency** 20000 Hz Response (3 dB corners) Sample Rates 1/3 Hz and 24 kHz 51.2 Hz 128 Hz **Direct Filter** 256 Hz

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512 Hz

2-pole high-pass, 1 Hz to 12.8 kHz

	1280 Hz		3.3 mA
	2560 Hz	Accuracy	3.3 m/r
	5120 Hz	7.000.009	
	12800 Hz		1%
	25600 Hz	A/D Resolution	
	51200 Hz		16 bits
Spectral Lines	31200112	Input Gain Stage (Manual or Auto)	
opeou ai Imeo	100		
	200		1X, 4X, 8X, 16X
	400	Hardware Freque Response (3 dB c	
	800		1/3 Hz and 24 KHz
	1600	Direct Filter	
	3200		2-pole high-pass, 1 Hz to 12.8 kHz
Spectrum Averag	ges	Prime Spike Filter	
	Up to 8		4-pole high-pass, 1 Hz to 12.8 kHz
Windowing			2-pole low-pass, 10 Hz to 12.8
	None, flat-top, or hanning		kHz
Seismic Direct Input Card (164746-01)		Rotor Region Filter	
Inputs	·		2-pole high-pass, 1 Hz to 12.8 kHz
	1 block of 8		2-pole low-pass, 10 Hz to 12.8 kHz
Transducer Type		High Frequency Filter	
	2-wire current mode sensors	3 1 /	4-pole high-pass, 1 Hz to 12.8 kHz
Compatible Bently			
Nevada Transdu	corc	Enveloping Filter	
		Enveloping Filter	
	200350	Enveloping Filter	4-pole high- pass, 2-pole low-pass
	200350 330500	Enveloping Filter	4-pole high- pass, 2-pole
	200350 330500 330525	Enveloping Filter	4-pole high- pass, 2-pole low-pass
Turanadu aan Daw	200350 330500 330525 190501	Enveloping Filter	4-pole high- pass, 2-pole low-pass 25 – 125 Hz
Transducer Powe Supply Voltage	200350 330500 330525 190501	Enveloping Filter	4-pole high- pass, 2-pole low-pass 25 – 125 Hz 50 – 250 Hz
	200350 330500 330525 190501	Enveloping Filter	4-pole high- pass, 2-pole low-pass 25 – 125 Hz 50 – 250 Hz 100 – 500 Hz
	200350 330500 330525 190501 er +24 ± 5% Vdc	Enveloping Filter	4-pole high- pass, 2-pole low-pass 25 – 125 Hz 50 – 250 Hz 100 – 500 Hz 200 – 1000 Hz
Supply Voltage	200350 330500 330525 190501 er +24 ± 5% Vdc	Enveloping Filter	4-pole high- pass, 2-pole low-pass 25 – 125 Hz 50 – 250 Hz 100 – 500 Hz 200 – 1000 Hz 400 – 2000 Hz
Supply Voltage Transducer Maxi	200350 330500 330525 190501 er +24 ± 5% Vdc imum See specific transducer	Enveloping Filter	4-pole high- pass, 2-pole low-pass 25 - 125 Hz 50 - 250 Hz 100 - 500 Hz 200 - 1000 Hz 400 - 2000 Hz 800 - 4000 Hz
Supply Voltage Transducer Maxi	200350 330500 330525 190501 er +24 ± 5% Vdc	Enveloping Filter	4-pole high- pass, 2-pole low-pass 25 - 125 Hz 50 - 250 Hz 100 - 500 Hz 200 - 1000 Hz 400 - 2000 Hz 800 - 4000 Hz 1600 - 8000 Hz

Synchronous W	/aveforms (Software configurable)	200	
Frequency span		400	
	32, 64, 128, 256, 512, or 1024	800	
	samples per revolution	1600	
	20 to 36,000 CPM at up to 25.6 k samples/second	3200	
	8192 samples maximum	Spectrum Averages	
	waveform size	Up to 255	
Filter		Windowing	
	Tracking anti-alias filter	None, flat-top, or hanning	
Waveform Av	rerages	General	
	Up to 255	Dimensions (Length x	
Asynchronous \	Waveforms (Software configurable)	Width x Height)	
Frequency Spans		21.6 cm \times 13.3 cm \times 11.4 cm (8	3.51
	20 Hz	in × 5.24 in × 4.5 in)	
	50 Hz	Weight	
	100 Hz	DSM with no input cards	
	200 Hz	0.76 kg (1.7 lbm)	
	500Hz	Input card	
	1000 Hz	0.2 kg (0.44 lbm)	
	2000 Hz	Power supply	
	5000 Hz	0.5 kg (1.1 lb)	
	10000 Hz	Mounting	
	20000 Hz	DIN rail option	
Sample Rates	•	35mm DIN rail. Requires 26.7 c	cm
•	51.2 Hz	(10.5 in) rail length.	Citi
	128 Hz	Weatherproof	
	256 Hz	housing	
	512 Hz	35mm DIN rail. Requires 26.7 ((10.5in.) rail length.	cm
	1280 Hz	Bulkhead option	
	2560 Hz	Requires 4 #8 screws required.	ı.
	5120 Hz		
	12800 Hz	Environmental Limits	
	25600 Hz	Operating Temperature	
	51200 Hz	-20 °C to +70 °C (-4 °F to +158°	' F)
Spectral Lines	S	Storage Temperature	
	100	-40 °C to +85 °C (-40 °F to +185	5 °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)

CE Approvals

EMC Directives

DSM has the CE mark and is approved for installation within the European Union and EEA regions. DSM has been designed and tested to meet the listed directives.

EMC Standards

This product is tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the listed standards, in whole or in part, documented in a technical construction file.

EN55011

1998 Generic emission standard, Part 2, Industrial environment.

EN61000-6-2

EMC Generic immunity standard, Part 2, Industrial environment.

Low Voltage Directive

DSM meets Council Directive 73/23/EEC Low Voltage when the 24 Vdc power source is approved to the Low Voltage Directive. Power Supply part number 02200794 meets this requirement.

Hazardous Area Approvals

North American:



AEx nA IIC T4; Class 1 Zone 2

Class 1 Division 2 Groups A,B,C,D

Vn = 20 to 30Vdc@Imax=750ma

T4@ -20 °C ≤ Ta ≤ +70 °C

When installed per DWG 163796



Ex nA [nL] IIC T4

T4@ -20 °C ≤ Ta ≤ +70 °C

When installed per DWG 163796

European



II 3G Ex nA [ic] IIC T4 Gc

II 3(3)G Ex nA op is [op is T4 Gc] IIC T4 Gc

II 3(3)G [Ex op is T4 Gc] IIC

SIRA13ATEX4317X

T4@ -20 °C ≤ Ta ≤ +70 °C

When installed per DWG 163796

Brazil



Ex nA [ic Gc] IIC T4 Gc

DNV 12.0029X

T4@ -20 °C ≤ Ta ≤ +70 °C

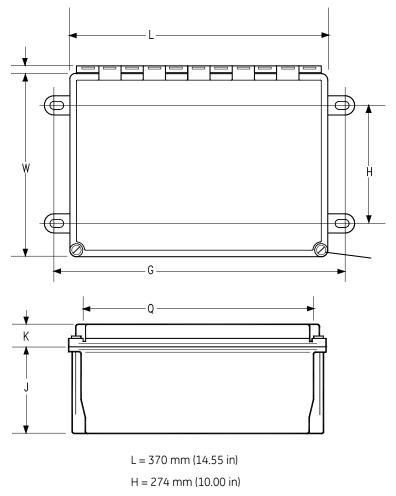
When installed per DWG 163796

Ordering Information 149744 - AXX - BXX - CXX - DXX - EXX - FXX - GXX - HXX A: Power Input			ation	Accessories Use the part numbers listed in this section to order spare parts or additional components for your Trendmaster DSM system.		
			ation			
			- DXX – EXX – FXX – GXX - HXX			
		01	110/220 V 50-60 Hz	3010/56	·	
	C	02	+24 Vdc	3010,00	DCM Madhua Funantan Caftuurus	
B:	Communicatio	n 01	10/100baseT Ethernet		DSM Modbus Exporter Software.	
		02	Fiber Optic Ethernet	149776-01		
C:	Input Board 1		'		Spare 10/100 Base T Ethernet	
		00	None		Communication Card.	
		01 02	TIM input card PV direct input card	149776-01		
		03	24V transducer direct input		Spare Fiber Optic Ethernet	
			card		Communication Card.	
		0 4	Constant current direct input	149787-01		
		0.5	card	149707-01		
D:	Input Board 2	05	Seismic direct input card		Spare TIM Line Input Card.	
U.	mpat board 2	0 0	None	149811-01		
		01	TIM input card		Spare –24V Transducer Input	
		02	PV direct input card		Card.	
		03	24V transducer direct input card	149811-02		
		0 4	Constant current direct input	2.0022.02	Spara Constant Current	
			card		Spare Constant Current Transducer Input Card.	
_	1	0 5	Seismic direct input card	4.0700.04	Transaucer input cara.	
E:	Input Board 3	00	None	149799-01		
		01	TIM input card		Spare Process Variable Input	
		02	PV direct input card		Card.	
		03	24V transducer direct input	164746-01		
		0 4	card Constant current direct input		Spare Seismic Input Card.	
		04	card	149833-01	·	
		0 5	Seismic direct input card	143033-01		
F:	Input Board 4				Blank Slot Cover.	
		00 01	None TIM input card	02200794		
		02	PV direct input card		+24V Power Supply.	
		03	24V transducer direct input	162003		
			card	102003		
		0 4	Constant current direct input		Power Supply to DSM Wiring Harness.	
		05	card Seismic direct input card		numess.	
G:	Mounting	0 3	Scisific direct input cara	162222-01		
	.	01	Bulkhead mount		Weatherproof Housing.	
		02	DIN Rail mount	161692		
H:	Approvals	03	Weatherproof enclosure		TIM Line Surge Protector Dive	
11.	Appi ovuis	00	No approvals		TIM Line Surge Protector Plug. Also requires Part 161693.	
		05	Multiple approvals			

161693		162559	
03839240	TIM Line Surge Protector Base. Also requires Part 161692.		PV/Direct 16-position DIN Rail Terminal Block. Mates with 162262.
03033240	TIM Line Cable Seal. 5.1 mm to 6.7 mm (0.20 in to 0.27 in).	43501	Low Pressure Cable Seal.
02245020		163723	
02245021	Signal Path Barrier MTL 764 (AC).		EMI Ferrite Suppressor. For round cable.
02243021	Signal Path Barrier MTL 765 (AC).	164466-01	
162261			Ethernet Component Specification.
	Trendmaster DSM SPA Cable. Mates with 162560.	172555	·
162560			Modbus Serial to Ethernet Bridge.
	SPA 5-position DIN Rail Terminal Block. Mates with 162261.	162459-01	•
162262			Trendmaster Galvanic Isolator.
	Trendmaster DSM PV/Direct Cable. Mates with 162559.		

Graphs and Figures

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



W = 319 mm (12.55 in)

G = 379 mm (14.94 in)

J = 165 mm (6.5 in)

K = 46 mm (1.61 in)

Q = 260 mm (10.25 in)

Figure 1: Weatherproof Housing Dimensions

* Denotes a trademark of Bently Nevada, Inc., a wholly owned subsidiary of General Electric Company.

Modbus is a registered trademark of Modbus-IDA.

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