Brüel & Kjær Vibro
A member of the NSK Group

VC-8000 Universal Monitoring Module
Product Specifications and Ordering Information

Overview

The VC-8000 Universal Monitoring Module (UMM) provides four channels of machinery monitoring. Each channel is individually configurable for nearly 50 different types of vibration, position, and speed measurements on rotating and reciprocating machinery (refer to page 2 for a comprehensive list of channel types and measurements returned).

The UMM occupies a single slot in a VC-8000 monitoring system rack and uses 24 Vdc instrument power as supplied by the VC-8000 Rack Connection Module (RCM). Each UMM provides all necessary transducer power, signal conditioning, alarm comparison, and relay logic functions needed to provide four channels of continuous machinery monitoring and shutdown protection. It complies with the requirements of American Petroleum Institute Standard 670 for monitoring systems and is completely configurable using VC-8000 configuration software. Up to 15 UMM cards can reside in a single 19" VC-8000 rack, providing up to 60 channels of continuous machinery protection. Each module provides basic status indication for its channels as required by API 670. When used with the optional rack touchscreen, real time display of vibration levels, alarm statuses, and other information is available for all channels concurrently on a single screen for "at a glance" convenience.

When ordered with optional condition monitoring capabilities, the module streams high-speed static and dynamic (i.e., waveform) data to the rack's System Access Module (SAM) where it is available to software such as Setpoint® CMS and/or the rack's embedded high-speed "flight recorder" on SD Card or Solid State Drive.

	Measurements Returned \ UMM Channel Types Part 1	Acceleration – Aero	Acceleration – Diagnostic	Acceleration – Enveloped	Acceleration – Low Freq	Acceleration – REB (normal)	Acceleration – REB (Slow)	Accel – REB Tracking	Acceleration – RMS (Slow)	Acceleration – Standard	Acoustic	Generic Dynamic	Radial Vib – Air Machine	Radial Vib – Diagnostic	Radial Vib – Hydro7	Radial Vib – Shaft Abs[2,6]	Radial Vib – Shaft Rel	Radial Vib – SMAX	REBAM	Velocity – Diagnostic	Velocity – Aero	Velocity – Standard	Velocity – Low Freq	Velocity – Hydro[7]	Velocity – Shaft Abs[2,6]
	Overall (wideband) amplitude			●							●														
Non-tracking Bandpass Filtered	84 dB/octave roll-on/off																								
	84 dB/oct roll-on & 72dB/oct roll-off														9[1]									9[1]	
	48 dB/octave roll-on/off	2[1]																			2[1]				
	36 dB/octave roll-on/off										8[1]														
	24 dB/octave roll-on/off		●		2[1]	●	●	●	●	2[1]										2[1]		●			●
	6 dB/octave roll-on/off											2[1]	4[1]	3[1]		●	3[1]	●	●						
	Enveloped band 1 (cage)			●																					
	Enveloped band 2 (IRBP)			●																					
	Enveloped band 3 (ORBP)			●																					
	Enveloped band 4 (Ball Spin)			●																					
	Enveloped band 5 (2X Ball Spin)			●																					
Tracking Vector Filtered	1X Amplitude - tracking vector filter		PT		PT			PT		PT			PT	PT	PT	PT	PT	PT		PT		PT	PT	PT	PT
	1X Phase - tracking vector filter		PT		PT			PT		PT				PT		PT	PT	PT		PT		PT	PT		PT
	2X Amplitude - tracking vector filter		PT							PT			PT	PT	PT		PT	PT		PT		PT		PT	
	2X Phase - tracking vector filter		PT							PT				PT			PT	PT		PT		PT			
	nX Amplitude - tracking vector filter		PT							PT			PT	PT			PT			PT		PT			
	nX Phase - tracking vector filter		PT							PT				PT			PT			PT		PT			
	Cage - tracking vector filter							PT																	
	IRBP - tracking vector filter							PT																	
	ORBP - tracking vector filter							PT																	
	Ball Spin - tracking vector filter							PT																	
	2X Ball Spin - tracking vector filter							PT																	
	4X Amplitude - tracking vector filter												PT												
	Tracking 1X band (48 dB/oct)	PT																			PT				
	Sensor DC Bias Voltage	●	●	●	●	●	●	●	●	●	●	●								●	●	●	●	●	●
	High-Freq Demodulated PK Stretch					●	●	●																	
	Rotor Region																		●						
	Prime Spike					●	●												●						
	SMAX																	●							
	Shaft absolute vibration															●									
	Probe 1 Gap Voltage													●	●	●	●	●	●						
	Probe 2 Gap Voltage																	●							

Table 1

Measurements Returned \ UMM Channel Types Part 2	Air Gap	Axial Position	Case Expansion (single)	Case Expansion (dual)[2]	Diff Expansion (DE)	Complementary DE[1]	Ramp DE – one ramp[2]	Ramp DE – two ramps[2]	Discrete Input (on/off)	Dynamic Pressure	Eccentricity	Phase Trigger / Speed[4]	Process Variable[5]	Reverse Rotation[2]	Valve Position	Zero Speed[2]	Recip - Cylinder Pressure	Recip - Rod Drop	Recip - Rod Position	Recip - Impact	Recip - Acceleration	Recip – Crank Case Velocity
Overall (wideband) amplitude																				●[3]	●	●
84 dB/octave roll-on/off										4[1]												
6 dB/octave roll-on/off																			●			
Tracking 1X band (48 dB/oct)																						
Sensor DC Bias Voltage	●									●			●							●	●	●
Digital State (hi/low or on/off)									●													
Axial Position		●																				
Axial Vibration Amplitude		●																				
Absolute Case Expansion – LVDT 1			●	●																		
Absolute Case Expansion – LVDT 2				●																		
Case Exp Difference (LVDT 1 – LVDT 2)				●																		
Composite Diff Exp (Probes 1 & 2)						●	●	●														
Position 1					●	●	●	●														
Position 2						●	●	●														
Probe 1 Gap Voltage		●			●	●	●	●			●	●		●	●				●			
Probe 2 Gap Voltage						●	●	●						●								
PP Eccentricity / Runout											●											
Min Position & Max Position											●											
Process Variable Amplitude													●									
Ecc Position											●											
Speed												●		●	●							
Rotor Acceleration												●										
Peak Speed												●			●							
Average Piston Position																		●				
Average Probe Gap																		●				
Triggered Piston Position																		PT				
Triggered Probe Gap																		PT				
Reverse Speed														●								
Number of Reverse Rotations														●								
Reverse Peak Speed														●								
Minimum Air Gap	●																					
Valve Position (% open or % closed)															●							
Zero Speed																●						
Compression Ratio																	●					
Discharge Ratio																	●					
Maximum Pressure																	●					
Minimum Pressure																	●					
Peak Rod Compression																	●					
Peak Rod Tension																	●					
Rod Reversal Degrees																	●					
Suction Pressure																	●					
Crank Angle																			●			
Rod Position Magnitude																			●			
Rod Position Phase																			●			
1X Amplitude and Phase - tracking vector filter																			PT			
Impact Count																				●		
Segmented Analysis																			8[PT]		36[PT]	

Table 2

TABLE NOTES:

●	Measurement always available.
PT	Measurement available only with a valid phase trigger signal; a single phase trigger can be associated with multiple channels in a rack.
1	Denotes the number of individually configurable bandpass regions available for the channel. Any region can be configured with filter corners for wideband (i.e., "overall") amplitude or narrowband measurements.
2	Denotes a measurement that uses two sensors and requires two UMM channels.
3	Seismic acceleration and velocity channels return a peak amplitude that is computed as peak-to-peak /2. However, recip impact channel types return a "true max" acceleration amplitude that is computed by first rectifying the signal and then detecting the peak. This amplitude detection method is unique to impact channels because the signal is almost always highly asymmetrical and pk-pk /2 will not give reliable results for setting impact count threshold levels.
4	Phase triggers may only be assigned to UMM channel 4 in rack slots 4-9. Maximum of 6 phase trigger per 16-P rack; 5 phase triggers per 8-P rack; 1 phase trigger per 4-P rack. Speed channels (no phase capabilities) can be configured for any UMM channels without restrictions.
5	UMM channels configured for process variable measurements are able to provide loop power and accept a wider variety of input signals than TMM channels. TMM channels accept 4-20mA input types only, do not provide loop power, and require an external shunt resistor. Refer to TMM datasheet S1077788 for additional information.
6	Shaft Absolute measurements use two transducers: a shaft-observing proximity probe and a casing-mounted velocity transducer. The shaft relative and casing absolute channels must reside on the same UMM. The shaft relative channel returns both shaft relative and shaft absolute parameters; the other channel returns casing absolute parameters. Shaft absolute parameters are computed as the vector combination of shaft relative displacement and integrated casing velocity (i.e., casing absolute displacement).
7	Hydro channels cannot be configured for machines with rotational speeds higher than 600 rpm.
Refer to VC-8000 Instructions (S1079330) for comprehensive information on configurable channel types and data returned for each. Some measurements shown for a given channel type are optional; they may be left un-configured if desired.	

Features and Benefits

Simple, reliable, self-contained design reduces likelihood of failures from inter-module dependencies.

Highly reliable design utilizes just three transitional connectors from signal input to relay output – significantly reducing possible failure points in the critical machinery protection path.

SIL Certified Architecture
VC-8000 is suitable for use as part of a SIS, to implement safety instrumented functions up to SIL 2 when configured, installed, and commissioned properly as per instructions provided within the Instructions (S1079330) and Safety Manuals (C107577, C107576, C107578, C107579).

Multi-state monitoring enables each process change to have unique alarm limits ensuring your machine is always protected.

Individually programmable 4-20 mA outputs – each of the four 4-20mA outputs on a UMM can be assigned to any parameter from any channel on that UMM.

Clear, intuitive labeling on both faceplate and removable connectors.

Robust protection for reciprocating compressors through segmented analysis that offers precise alarming while still filtering out noise to prevent false trips. This optimizes uptime while protecting machines from critical failures.

Individual SPDT electro-mechanical relays for each channel – can be voted with other channels whether in the same or different rack modules. **SPDT = Single Pole, Double Throw**

Convenient connection to all 4 channels of buffered signal outputs via innovative RJ45 connector (RJ45-to-BNC cables sold separately). Standard CAT5/6 cables can be used for long runs.

Flexible signal conditioning – each UMM channel can be individually configured from an available list of nearly 50 different channel types (see page 5); most channel types return multiple parameters, any or all of which can be used for alarming if desired.

Fewer channel pair constraints – A and B inputs for dual-voting axial position measurements can reside on separate UMM cards for increased reliability; XY probe pairs can reside on different rack modules as well.[1]

Up to six[2] phase reference signals in a single rack – channel 4 of any UMM in rack slots 4-9 can be configured to accept a once-per-turn phase trigger signal. Speed (no phase capabilities) can be assigned to any UMM channel, without restrictions.

NOTES:

1. Depending on relay and channel voting complexity, XY probe pairs on the same UMM can improve the total amount of relay voting logic allowed in a rack.
2. Half-size rack limited to 5 phase reference inputs (slots 4-8). Quarter-size rack limited to 1 phase reference input (slot 4).

Distributed power regulation for improved reliability – each UMM converts its 24 Vdc input power to all regulated voltages needed by on-board processors and transducers, reducing the potential for rack single-point failures compared to systems that generate regulated voltages for the entire rack in a centralized power supply.

Powerful onboard processor delivers 24-bit A-to-D resolution for highly **accurate** measurements – no potentiometers, no drift, no calibration required.

Digital MODBUS® communications via System Access Module (SAM) can be used in lieu of (or simultaneously with) analog 4-20 mA outputs for flexibility when integrating with other instrumentation.

Unparalleled ease of configuration via VC-8000 configuration software's intuitive spreadsheet-like user interface – easily cut and paste to/from Microsoft® Excel® and most other programs.

Provides loop power for process variable transmitters. Non-vibration signals from process transmitters and other devices providing ±4 to ±20 mA, +1 to +5 Vdc, 0 to ±10 Vdc, and 0 to +5 Vdc proportional signals can be easily included in the VC-8000 system for display, alarming, and trending. For 4-20mA loop-powered input devices, the UMM can be configured to provide +24V, eliminating the need for external loop power.

Simplified spare parts requirements
Because every measurement in the VC-8000 system is made with just two module types (UMMs and TMMs), only two monitoring types need to be carried as spares. For systems without temperature measurements, only a single monitoring module type is used.

No jumpers or DIP switches
Every option in the VC-8000 system is configured via software. Cards do not have to be removed from the rack.

Connectivity to condition monitoring software
When ordered with condition monitoring enabled, a UMM becomes a UMM-CM and is able to stream high-resolution waveforms to the rack's System Access Module (SAM) where it can be stored on an embedded "flight recorder" hard drive and/or SD Card, or to an external computer or AVEVA™ PI System™ server. The data can then be viewed with our Setpoint® CMS display software.

Highly Flexible Rack Control
The UMM discrete channel type can be used not only to accept and display discrete on/off type signals, but to control rack states such as trip multiply, bypass, inhibit, etc. When invoked from the wiring terminals on the RCM, these control states are applied rack wide. When invoked using UMM discrete input channels, these states can be individually applied to user-configurable groups, facilitating better control when multiple machine trains are combined in a rack, each with its own unique trip multiply, bypass, inhibit, and other control needs.

Specifications

All specifications are at +25 °C (+77° F) unless otherwise noted.

Inputs *(1/4)*	
Channels	4
Channel Types	Refer to Table 1 (page 2) and Table 2 (page 3)
Transducer Types	Accepts most common industry-standard transducers including proximity, velocity, acceleration, dynamic pressure, LVDT, and 4-20mA in any combination. Configuration software automatically compensates* for OK limits and scale factor changes when I.S. barriers are used. * Compensation is provided for passive (zener-type) barriers only. Active (i.e. galvanic isolation) barriers do not require compensation.

Proximity

B&K Vibro

- **ds82x.ds10xx**
- **ds82x.ds30xx**
- **IN-08x/INA-08x**
- **SD-08x**
- **SD-05x**
- **SDH-015x**

Metrix	Bently Nevada®
• **MX2030** (2- & 3-wire) • **MX3300** (NSv, 5, & 8 mm) • **MX7200** (5, 8, & 11 mm) • **MX3000** (.190 & .300)	• **3300** (RAM, 5, 8, & 16 mm) • **3300 XL** (NSv, 8, & 11 mm) • **7200** (5, 8, 11, & 14 mm) • **3000*/7000** (.190 & .300) • 25, 35, and 50mm * UMM compatible only with newer -24 Vdc drivers, not original -18Vdc models. -24 Vdc drivers for 3000 probes/cables readily available from Metrix and others.

Inputs *(2/4)*	
Acceleration	
B&K Vibro	
• AS-020/ASA-020 • AS-022/ASA-022 • AS-030 • AS-062/ASA-062 • AS-063/ASA-063 • AS-068/ASA-068 • AS-069/ASA-069 • AS-070 • AS-073 • AS-079 • AS-080 • AS-477	
Others	**Bently Nevada®**
All +24V IEPE sensors	330400 330425
Piezo-Velocity	
Others	**Bently Nevada®**
• **All +24V IEPE sensors**	• **330500** • **330525** • **190501**
Moving-Coil Velocity	
B&K Vibro	
• **VS-068** • **VS-069**	
Metrix	**Bently Nevada®**
• **5485C**	• **9200** (2-wire)
Aeroderivative Interface Modules	
VibroMeter	**Bently Nevada®**
• **GSI 122**	• **86517** • **86497**
LVDTs	
B & K Vibro	**Bently Nevada®**
• **2534, 1” or 2”**	• **24765** • **135613**

Inputs *(3/4)*	
	Impact
	• **Metrix IT681X**
	Dynamic Pressure
	• **Dytran 2006V2**
	Phase Trigger, Reverse Rotation, Zero Speed
	• Same sensors as listed in "proximity" section at left • +24 V Proximity Switch • Magnetic Speed Pickup
	Process Variable
	• 4-20 mA transmitters, two-wire, loop-powered and externally powered (+4 to +20 mA, -4 to -20 mA, 0 to +5V, +1 to +5V, 0 to +10V, and 0 to -10 V)
	Differential Expansion
	Metrix • **MX10037 – MX10042** (11 mm)
	Bently Nevada • **3300** (16 mm) • **3300 XL** (11 mm) • **7200** (11 & 14 mm) • **25mm, 35mm, 50mm** (Ext. Range)
	Other
	• Microphones • Discrete Inputs (dry contact, +3.3V logic, +5V logic) • Custom scale factors and OK limits are supported in the configuration software for additional flexibility, allowing compatibility with many additional transducer types not listed on this page. Consult the factory prior to use of transducers not listed above to ensure that the sensor's output impedance and power requirements are compatible with the UMM.

Inputs *(4/4)*	
Channel Voltage Range	-24 Vdc to +19 Vdc NOTE: OK limits constrained to -21 Vdc to +18.5 Vdc
Input Power Voltage	• Continuous: +22 to +30 Vdc (SIL: +23.1 to +26 Vdc) • Transient: +18 to +36 Vdc
Power Consumption	≤ 8W when input power voltage is 22 to 26 Vdc.
Transducer Input Impedance	• 3-wire proximity and acceleration: 10 kΩ • 2-wire proximity: 250 Ω • Constant-current acceleration and piezo-velocity: ≥ 60 kΩ • Moving-coil velocity: 100 kΩ

Outputs *(1/2)*	

Relays	• Number: 4 per UMM
	• Type: SPDT, form C
	• Sealant: epoxy
	• Min. Switched Current: 10 mA
	• Max switched power (resistive): 5A @ 48 Vrms or 30 Vdc
	• Maximum voltage in hazardous areas: 30 Vdc
	• Life: > 10,000 cycles
	• Software-configurable options:
	  ○ Energize or de-energize to trip
	  ○ 4 SPDT or 2 “virtual” DPDT
	  ○ Can be driven by alarm condition(s) of any channel(s) in the rack via user-programmable logic
	  ○ Any logic driving a relay can be configured for latching or non-latching operation

4-20 mA	• Number: 4 (1 per channel) • Output proportional to channel programmable full scale range* • Overrange: up to 125% of full scale (24 mA) • Max Load Resistance (RL): 950 Ω with 22 Vdc power; 1350 Ω with 30 Vdc power • Resolution: 16 bit • Update Rate: < 100 ms • Short-circuit protected: Yes • Fault Clamp Value: Programmable** * The 4-20mA outputs by default are tied to the direct (overall) value of each channel. They are programmable for other parameters (such as gap voltage or any other measurement). A single channel can be programmed to drive multiple 4-20 mA outputs. ** The fault clamp value can be individually programmed for each channel as either 2 mA or a user-selected value within the full-scale range (such as 0 thrust position).

Outputs *(2/2)*	
LEDs	• OK LED (1 per UMM) **Green** – monitor operating correctly, all channels OK **Yellow** – one or more channels are faulted **Red** – fatal hardware error **Off** – monitor has lost power • Bypass LED (1 per UMM) **On** – one or more channels bypassed **Off** – No channels bypassed • Relay LEDs (1 per channel) **On** – Relay in alarm state **Off** – Relay not in alarm state
Transducer Power	• Proximity probes* and voltage-mode accelerometers: -24Vdc (current limited to 31 mA) • Constant-current accelerometers and piezo-velocity devices: 3mA * The UMM does not provide -18 Vdc transducer power as used by certain older proximity probe systems such as the Bently Nevada 3000 series. UMM compatibility of such systems can be achieved with -24Vdc drivers readily available from Metrix, allowing the user to retain their existing probes and extension cables.
Buffered Transducer Outputs	**Locations** • All 4 channels available simultaneously via a single “quick connect” RJ45 receptacle on the front of each UMM. A special RJ45-to-4-BNC cable is available as an optional accessory (p/n 100431). • Each monitor also provides buffered output signals to the backplane where they are available via a 30-pin connector set on the Rack Connection Module. • 3 programmable BNC connectors are provided on the rack faceplate when the touchscreen display is ordered. They are dynamically assignable to any UMM channels in the rack. **Impedance** 550 Ω **Short-Circuit Protected** Yes **Signal Type** Raw (unfiltered, no integration) transducer signal in mV/engineering units

Configuration	
Method	PC-based VC-8000 configuration software
Connection Type	**Local:** Mini-B USB "on-the-go" receptacle on UMM* * When a System Access Module (SAM) is installed in the rack, the USB receptacle on any UMM can be used to configure every module in the rack.
Memory Location	Configuration data is stored in non-volatile RAM on each UMM and is retained until changed. Batteries or other power sources are not required to maintain a module's configuration data.

Signal Conditioning *(1/4)*	
A/D Resolution	24 bits
Dynamic Range	105 dB
Signal-to-Noise Ratio	105 dB
Integration	Configurable per-channel for: • None • Single (Velocity-to-Displacement or Acceleration-to-Velocity)
Peak Detection	Each channel individually configurable for: • True Peak-Peak* • True Peak** • True RMS** * Radial vibration channels only ** Seismic channels only

Signal Conditioning *(2/4)*	
Accuracy	**Vibration / Position Channels** **Direct** • Typical: ± 0.3% of full scale • Minimum: ± 1% of full scale **Gap / Bias** • Typical: ± 0.07 V • Minimum: ± 0.24 V **Speed / Phase Channels** **Phase:** ± 1 degree **Speed:** • 1 - 30 rpm: ± 0.1 rpm • 30 - 7,500 rpm: ± 1 rpm • 7,500 - 60,000 rpm: ± 0.1% • 60 - 100 krpm: ± 0.2%
Speed/Phase Channel Settings	• **Threshold:** Configurable for Auto or Manual • **Manual Threshold Range:** +18 to -22 V • **Hysteresis**: 0.2 to 2.5 V in 0.1 V increments **NOTES:** 1. The speed/phase channel type is compatible with proximity probes, magnetic pickups, and proximity switches. For phase measurements, proximity probes are recommended. 2. Speed/phase channel types are configurable for single or multiple events per revolution. Non integer values can be entered in the channel configuration settings to accommodate compound gear arrangements and complex ratios. 3. A multiple event per revolution target (such as a toothed wheel) is not recommended for phase readings. The tooth for which the system triggers will be arbitrarily selected from one machine run to the next and will not allow consistent phase readings if the phase trigger signal is interrupted and then reestablished, such as when shutting the machine down and restarting or correcting a wiring problem.

Signal Conditioning *(3/4)*	
Radial Vibration Channel Filters	**Direct** • Type: Band pass • Rollon/Rolloff: 6 dB/octave, 84 dB/octave roll-on & 72 dB/octave roll-off (hydro) • - 3 dB Passband: Configurable for 4 Hz to 4000 Hz or 1 Hz to 600 Hz
	Gap • Type: Low pass • Rolloff: 6 dB/octave • -3 dB corner: 0.09 Hz
	Fault / NOT OK • Type: Low pass • Rolloff: 6 dB/octave • -3 dB corner: 2.4 kHz
Axial Position Channel Filters	**Direct** • Type: Low pass • Rolloff: 6 dB/octave • -3 dB corner: 1.2 Hz
	Gap • Type: Low pass, • Rolloff: 6 dB/octave • -3 dB corner: 0.41 Hz
Velocity Channel Filters	**Direct** • Type: Band pass with individually adjustable LF and HF corners • Roll-on/Roll-off: 24 dB/octave (48 dB/octave for aero channel types) • Low-frequency (LF) -3 dB corner: Configurable from 2 Hz to 400 Hz* • High-frequency (HF) -3dB corner: configurable from 40 Hz to 5 kHz** * The low-frequency corner cannot be set lower than 10 Hz when signal integration is used. ** The HF corner cannot be more than 1000 x LF corner. For example, if the LF corner is set to 2 Hz, the HF corner cannot be greater than 2000 Hz.

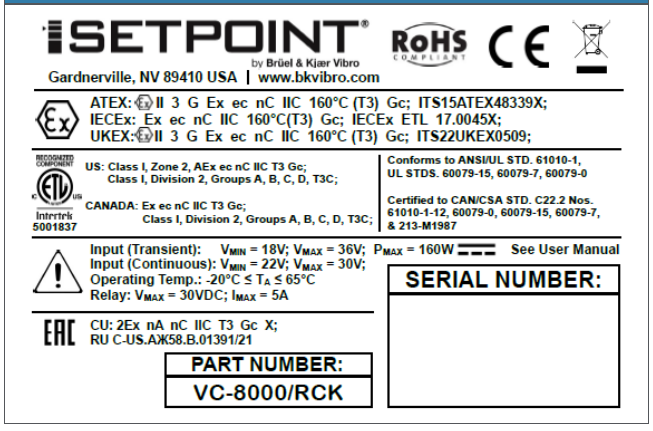
Signal Conditioning *(4/4)*	
Accelera-tion Channel Filters	**Direct** • Type: Band pass with individually adjustable LF and HF corners • Rollon/Rolloff: 24 dB/octave (48 dB/octave for aero channel types) • Low-frequency (LF) -3 dB corner: Configurable from 2 Hz to 3000 Hz* • High-frequency (HF) -3dB corner: configurable from 30 Hz to 25 kHz** * The low-frequency corner cannot be set lower than 10 Hz when signal integration is used. ** The HF corner cannot be more than 1000 x LF corner. For example, if the LF corner is set to 5 Hz, the HF corner cannot be greater than 5000 Hz.
	Bias • Type: Low pass • Rolloff: 6 dB/octave • -3dB corner: 0.05 Hz
	Fault / NOT OK • Type: Low pass • Rolloff: 6 dB/octave • -3dB corner: 2.4 kHz
Hydro Channel Filters	**Direct** • Type: Band pass with individually adjustable LF and HF corners • Roll-on/Roll-off: 84 dB/octave roll-on & 72 dB/octave roll-off • Low-frequency (LF) -3 dB corner: Configurable from 0.7 Hz to 200 Hz* • High-frequency (HF) -3dB corner: configurable from 2 Hz to 200 Hz * The low-frequency corner cannot be set lower than 10 Hz when signal integration is used.
	Bias • Type: Low pass • Rolloff: 6 dB/octave • -3dB corner: 0.02 Hz
	Fault / NOT OK • Type: Low pass • Rolloff: 6 dB/octave • -3dB corner: 2.4 kHz

Alarms	
Number	2 per measurement* (Alert and Danger) * Axial position measurements have 4 alarms (2 normal direction, 2 counter direction). A measurement may be configured with any or all of its alarms turned off. Multi-state configuration allows 15 additional alarm states to be configured.
Type	Alarming is individually configurable for each measurement as Over, Under, In Band, or Out of Band.
Multi-State	15 unique, user-defined states. A machine state can be defined by criteria of Discrete Input channels, Phase Trigger speed ranges or direction of change of speed. Each machine state can be configured with different alarming criteria.[1,2] 1. All alarm types are the same for all configured states. 2. UMM-FS does not support multi-state alarms
Con-figurable Settings	**Time Delay** • Individually adjustable per alarm, per channel • Minimum Delay: 100 ms* • Maximum Delay: 100 sec • Adj. Increments: 100 ms * Speed / phase channels have a minimum delay of 1 second to prevent misuse as part of a speed control and/or overspeed circuit. **Latching / Non-latching** Alert and Danger setpoints are individually configurable per alarm, per channel for latching or non-latching **Range** Individually adjustable, per alarm, per channel Minimum: 0% of full scale Maximum: 100% of full scale* Adj. increments: 2 decimal points of precision, in the channel's engineering units * A channel's Alert setpoint must be less than its corresponding Danger setpoint. **Enable/Disable** Any or all alarms for a channel may be enabled or disabled individually, allowing operation without setpoints (or with a reduced number of setpoints).

Environmental	
Operating Temperature	-20 °C to +65 °C
Storage Temperature	-40 °C to +85 °C
Operating Temperature Ramp	Do not exceed 0.5C/minute
Storage Temperature Ramp	Do not exceed 10C/minute
Humidity	5% to 95%, non-condensing

Physical		
Size	9.1" H x 9.0" D x 1.0" W (231 mm x 229 mm x 25 mm)	
Weight	11.4 oz (324 g)	
Rack Slots Required	One (may reside in rack slots 2-16)	
Allowable Wire	Connector	AWG
	Alarm Relays	16 – 28
	Analog Outputs	20 – 24
	Signal Inputs	16 – 28

Hazardous Area Approvals



CE Mark Directive	
ESD	Contact: 6 kV* Air: 8 kV * Criteria B
Radiated EMI Susceptibility	80 – 1000 MHz: 20 V/m* 1.4 – 2 GHz: 10 V/m* 2 – 6 GHz: 3 V/m* * Criteria A
Magnetic Field	30 A/m, Criteria A
EFT Burst	2 kV, Criteria B
EFT Surge (Signal Lines, Power Line)	2 kV line to ground, Criteria B
Conducted RFI (Signal Lines, Power Lines)	150 kHz to 80 MHz, Criteria A
Conducted RF Common Mode Immunity (Signal Lines, Power Lines)	15 Hz – 150 Hz: 10 V* 150 Hz – 1.5 kHz: 1V* 1.5 kHz – 150 kHz: 10 V* * Criteria A
Radiated EMI Emissions	30 dB µV/m @ 30 m, 30 MHz – 1000 MHz, Class A
Conducted Emission	60 dB µV/m @ 30 m, 0.5 MHz – 30 MHz, Class A
AC Power Voltage Dip Immunity	One-half period, 30% reduction, Criteria B
AC Power Voltage Dip Interruption	250 periods, 95% reduction, Criteria B
DC Power Voltage Dip Immunity	10 ms, 60% reduction, Criteria B
DC Power Voltage Dip Interruption	30 ms, 100% reduction, Criteria B
Low Voltage Directive	Council Directive 2014/35/EU Low voltage using B & K Vibro-supplied power supply (rack ordering option – CC) or other Low Voltage Directive approved supply.

Recommended Passive Intrinsic Safety Barriers	
MTL 796(-) or equal	B & K Vibro, Metrix, and Bently Nevada proximity probes Bently Nevada 330400, 330425, and 23732 accelerometers
MTL 760ac or equal	Metrix 5485C Bently Nevada 9200 (2-wire) Other compatible moving-coil velocity sensors
MTL 787(+) or equal	Metrix SA6200, SA6350, and SV6300 acceleration and velocity sensors Bently Nevada 330500, 330525, and 190501 Velomitor® sensors Other compatible constant-current accelerometers and piezo-velocity sensors

Recommended Active Intrinsic Safety Barriers with Galvanic Isolation	
Pepperl + Fuchs KFD2-VR4-Ex1.26 or equal	Metrix and Bently Nevada proximity probes Metrix and Bently Nevada moving-coil velocity sensors Metrix SA6200, SA6350, and SV6300 acceleration and velocity sensors Bently Nevada 330400, 330425, and 23732 accelerometers Bently Nevada 330500, 330525, and 190501 Velomitor® sensors Other compatible constant-current accelerometers and piezo-velocity sensors

Safety Integrity Level (SIL) Capability

VC-8000 is suitable for use as part of a SIS, to implement safety instrumented functions up to SIL 2 when configured, installed and commissioned properly as per instructions provided within the VC-8000 Machine Protection System Instructions (S1079330) and safety manuals:

- VC-8000 Backplane and Rack Safety Manual (C107579)
- VC-8000 RCM Safety Manual (C107578)
- VC-8000 TMM Safety Manual (C107576)
- VC-8000 UMM Safety Manual (C107577)

Ordering Information

Universal Monitoring Module (UMM)

When ordering spare UMM cards, use the part number below. Refer to the VC-8000 Specification (S1077785) when ordering a complete system to specify rack size, module types for each slot, faceplate, touchscreen, mounting style, and other options.

C106803.001
VC-8000/UMM-00-05 Universal Monitoring Module (ATEX, IEC, ETLc)

C107396.001
VC-8000/UMM-00-07 Functional Safety Universal Monitoring Module (ATEX, IEC, ETLc)

C107567.001
Universal Monitoring Module Condition Monitoring License*

* Ordered separately; required for condition monitoring functionality.

INFORMATION

UMM cards are shipped with default factory configuration settings, which are not necessarily suitable for any particular application. Before use, each UMM channel must be configured properly for its application via VC-8000 configuration software. This software is included with each system or UMM ordered and is also available for download at

https://www.bkvibro.com/product/software-downloads

Accessories

Breakout Cable[1]

This cable is used when connecting the channels in a single UMM to an external device such as a portable data collector with female BNC jacks. When it is necessary to simultaneously connect channels from multiple UMMs to external instruments, use two or more breakout cables. For ease-of-identification, each BNC connector is numbered under a clear heat-shrink label, corresponding to each UMM channel number. When longer cable runs are required, simply purchase standard CAT5E cable in the desired length and use an RJ45-to-RJ45 inline connector. Both are readily available from a variety of electronics suppliers.

C106692.001
BNC breakout cable assembly – RJ45 (male) to four BNC (male), 10 foot (3 m) cable length

NOTE:

1. For systems with programmable BNC jacks on the VC-8000 faceplate, this cable is not required unless simultaneous connection of more than three (3) channels at a time to an external instrument is necessary.

Manuals and Software

Manuals

A complete set of VC-8000 manuals and configuration software on USB memory stick is supplied at no extra charge with each order, but must be specified at time of ordering. If you need the instructions in other languages than available on the website please contact us.

NOTE: Manuals are published electronically in Adobe® PDF format and may be printed and freely distributed. Adobe Reader is required and can be downloaded free-of-charge from www.adobe.com.

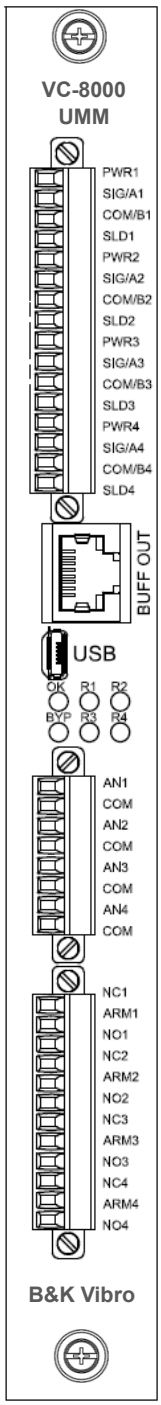
C106547.001
VC-8000 Manual and Configuration Software

USB Cable

This cable is used to connect a computer running VC-8000 Configuration Software to the USB port on UMM and TMM modules. The cable is included with part number VC-8000/CSW and does not need to be ordered separately. Order the item below only when replacing a lost or damaged cable.

C106613.001
USB 2.0 A / Mini-B Cable, 6 foot (2 m) cable length

Wiring and Outline Diagrams



Captive thumbscrew for securing UMM in VC-8000 rack slot.

Transducer Input connections (Signal, Power, Common, Shield) for channels 1-4. Connector is removable to facilitate ease of wiring.

RJ45 receptacle with buffered output signals for channels 1-4 on individual pins.

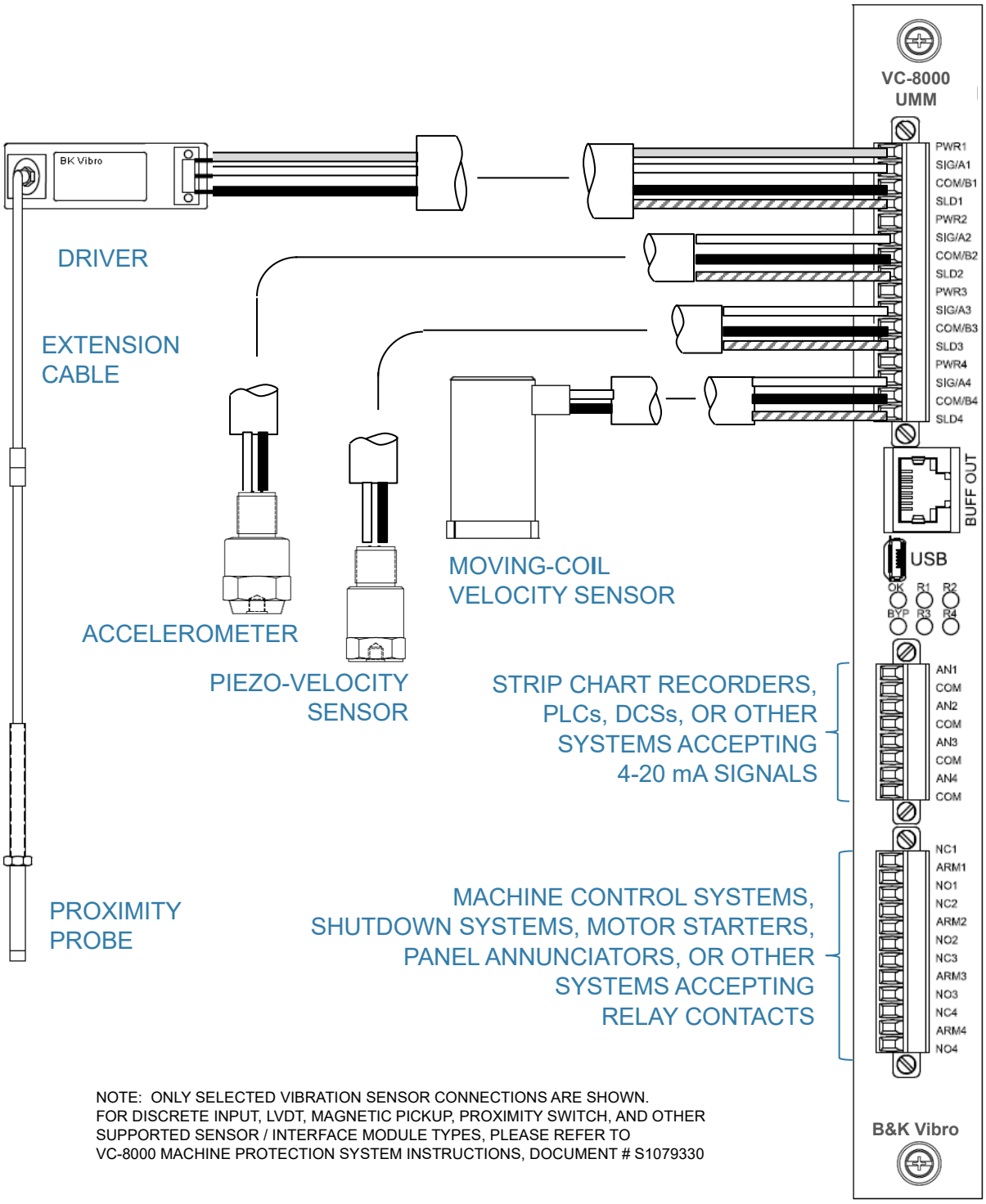
Mini-B USB receptacle for connection to VC-8000 configuration software via USB cable.

OK, BYPASS, and Relay status LEDs.

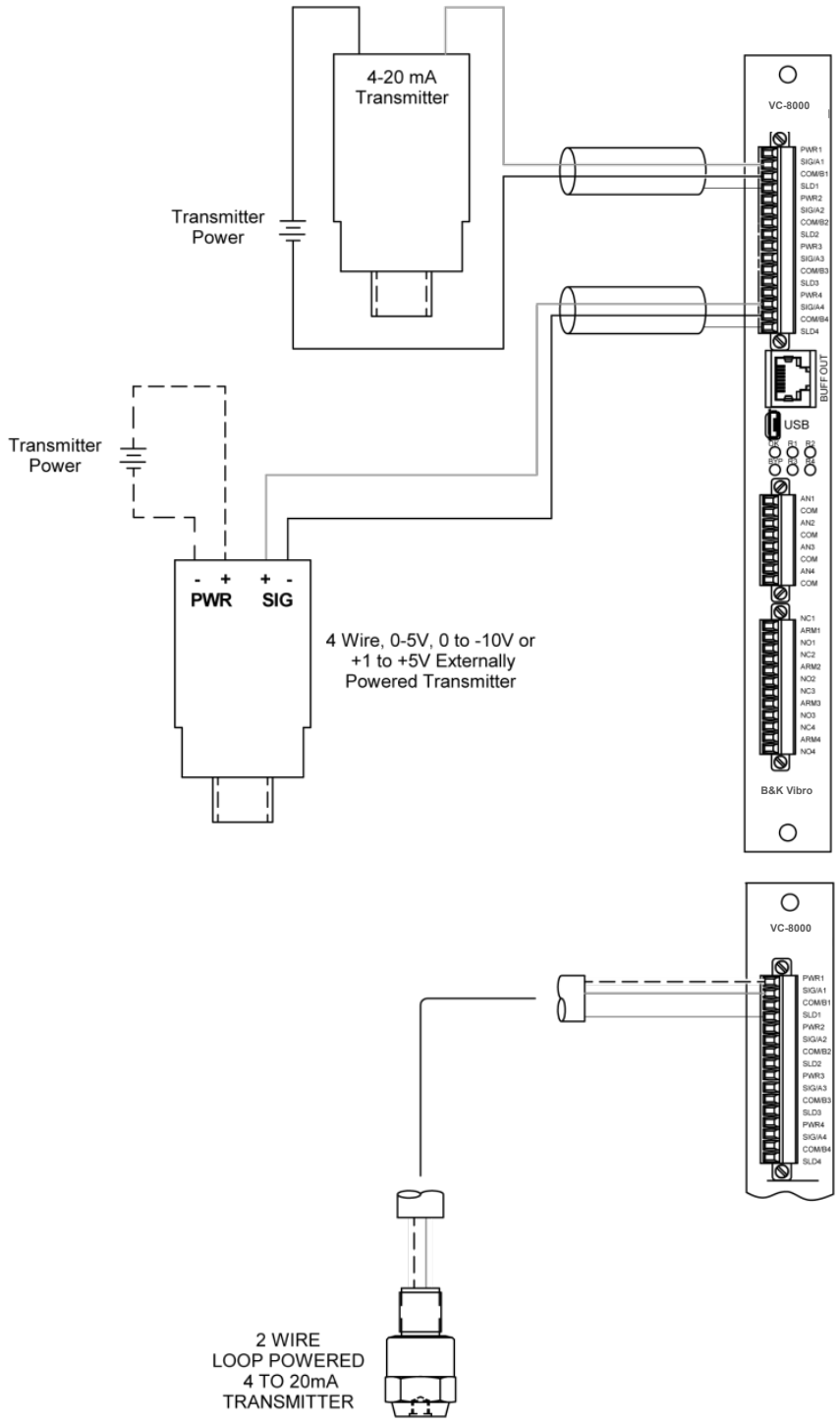
4-20 mA proportional analogue output connections for channels 1-4. Connector is removable to facilitate ease of wiring.

Mechanical relay output connections for relays 1-4. Connector is removable to facilitate ease of wiring.

Captive thumbscrew for securing UMM in VC-8000 rack slot.



NOTE: ONLY SELECTED VIBRATION SENSOR CONNECTIONS ARE SHOWN.
FOR DISCRETE INPUT, LVDT, MAGNETIC PICKUP, PROXIMITY SWITCH, AND OTHER SUPPORTED SENSOR / INTERFACE MODULE TYPES, PLEASE REFER TO VC-8000 MACHINE PROTECTION SYSTEM INSTRUCTIONS, DOCUMENT # S1079330



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Subject to technical changes