



Product Specifications

VC-6000 Monitoring System

Monitoring Module – SM-610-123

6x Vibration, 1x Speed, 3x Axial Displacement Channels, 8x DC Outputs, 4x Relays

The VC-6000 Monitoring System hardware is used for both stand-alone safety monitoring and condition monitoring using the Compass 6000 monitoring software modules and database. The VC-6000 offers various standard monitoring modules, power supply modules and communication modules. These Product Specifications describe the SM-610-123.

Applications

The SM-610 series of VC-6000 Monitoring Modules are designed to provide protective monitoring of various types of industrial machines. The SM-610-123 is specifically designed for monitoring casing and shaft vibration of a machine. It can also be used to monitor speed and axial displacement.

General Description

The features and functions common to all SM-610 Monitoring Modules are briefly listed below. Please refer to the VC-6000 Product Specifications (BPS 0044) for more information.

- Interfacing with the CI-6xx Communication Modules
- High speed digital signal processor
- Relay outputs (logic controlled)
- OK-relay status indication
- Extensive local LED indication
- Flash memory for storing settings and local logbook
- High speed reaction time - 10ms
- Alarm limits with programmable hysteresis and response delay time
- Global trip multiply and override
- Extensive self-monitoring functions
- System bus interface to other modules
- Buffered vibration outputs



Inputs

- 6x vibration signals – up to 4x dual-point measurements
- 3x axial displacement signals
- 1x speed/phase reference signal
- 3x binary input signals

Outputs

- 8x analogue DC outputs
- 4x relays (2x Danger, 2x Alert):
 - 2x axial – 2-out-of-3 voting logic
 - 2x vibration – 1-out-of-4 voting logic

Measurements

- Up to 4x bandpass (ISO 7919 or ISO 10816)
- Up to 2x S_{max} or Max(X-Y)
- 7x DC – 3x axial, 4x static shaft position
- 1x RPM

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Input Channel Configuration Combinations

	Monitoring Module – SM-610-123 6x Vibration, 1x Speed, 3x Axial Displacement Channels, 8x DC Outputs, 4x Relays																				
No. of Inputs ¹	Channel Types																Additional Measurements			Relay's	
	Dual-point Vibr. ² (ISO)	DC-out	Single-point Vibr ² (ISO)	DC-out	Axial Pos.	DC-out	Speed	DC-out	Rod Drop	DC-out	Rel. Exp.	DC-out	Eccentricity	DC-out	DC Input (Process, Absolute Exp)	DC-out	Bin. in	Vector ³	BP	Tracking BP	
	10	4	2	2	2	3	3	1	1								3				2x 2oo3 for Axial
	9/10	2	1	3/4 ³	3	3	3	1	1								3				2x 1oo4 for Radial (4: 2x Dual-point & 2x Single-point)
	8/10	-	-	4/6 ³	4	3	3	1	1								3				
	¹ The number of input signals is the sum total of the channels shown in yellow. ² Dual-point measurements can alternatively be set up as single-point measurements. ³ There is a limitation with regard to the number of DC-out's (e.g. 6 single-point vibration have only 4 DC-out available – this is not important for condition monitoring applications, however, for safety monitoring requiring DC-out for the primary measurements it is important to know).																				

¹ The number of input signals is the sum total of the channels shown in yellow.

² Dual-point measurements can alternatively be set up as single-point measurement.

Signal Flow Diagrams

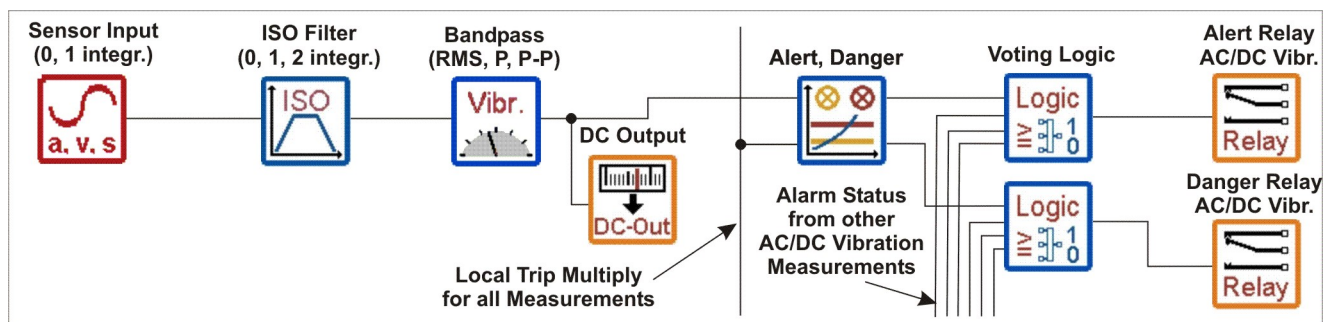


Figure 1. Single-point AC/DC vibration input (2 channels). Separate 1-out-of-4 voting logic is used for all vibration measurements for Alert and Danger relay control.

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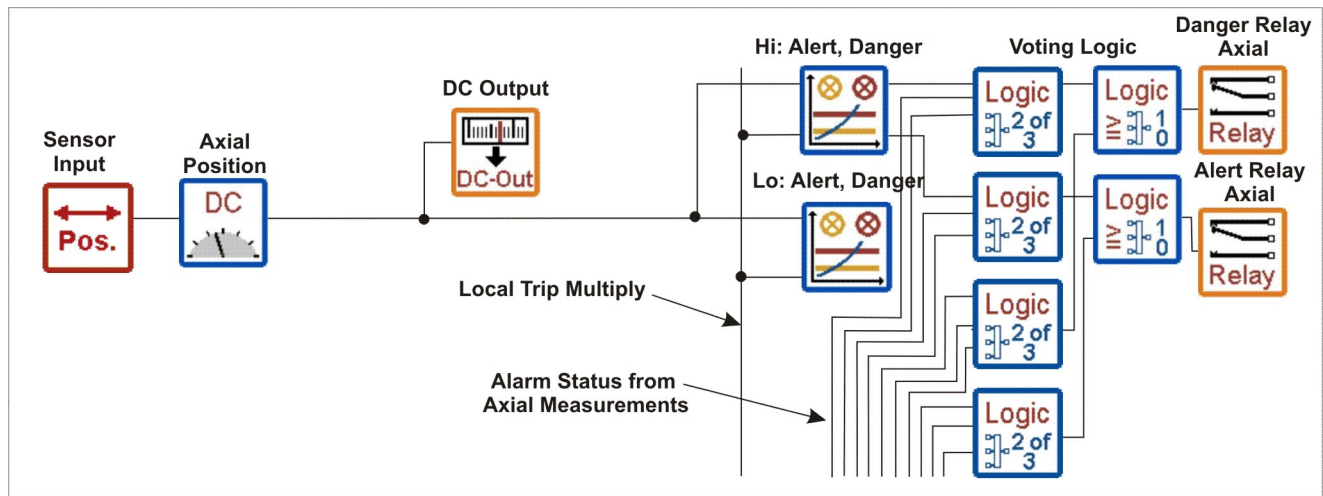


Figure 2. Axial displacement inputs (3 channels). Separate 2-out-of-3 voting logic for Alert and Danger relay control.

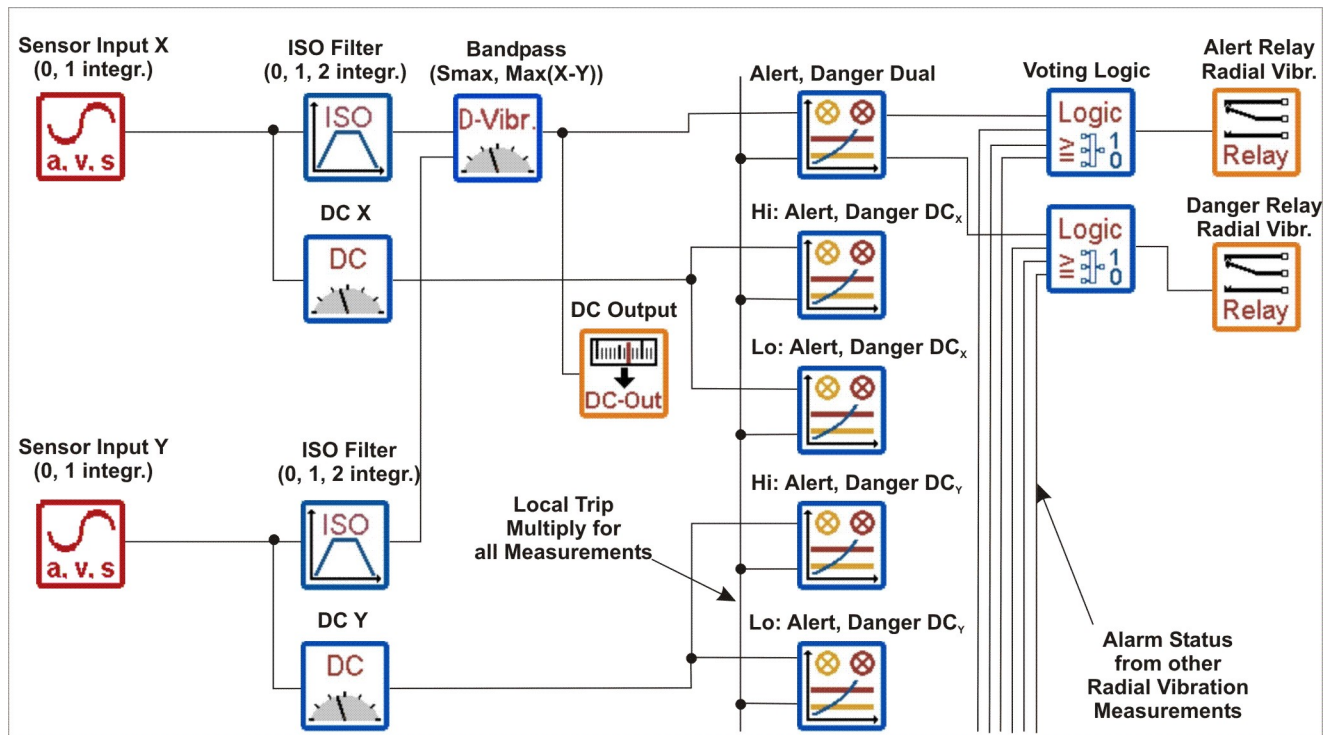


Figure 3. Dual-point AC/DC vibration input (up to 4 channels – 2 pairs). Separate 1-out-of-4 voting logic is used for all vibration measurements for Alert and Danger relay control.

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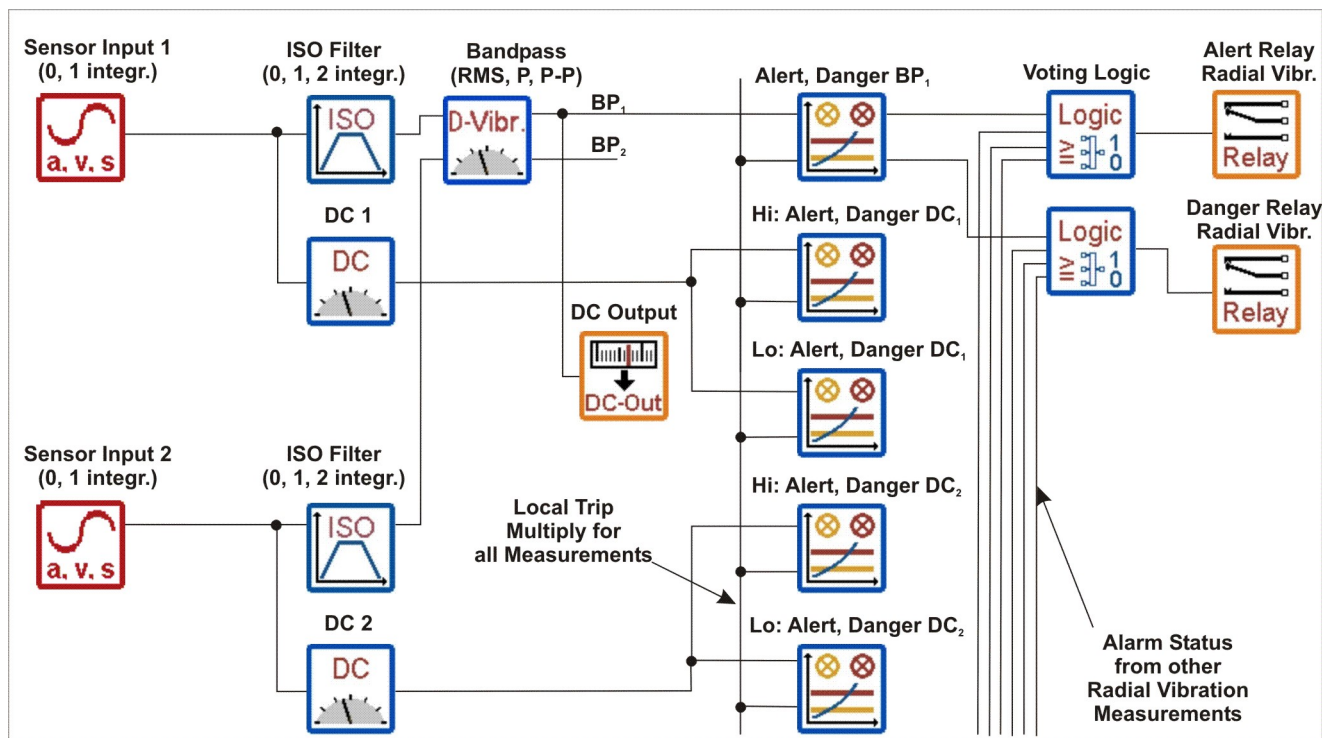


Figure 4. A single-point AC/DC vibration input (Figure 2) can alternatively be set up from a dual-point input. Separate 1-out-of-4 voting logic is used for all vibration measurements for Alert and Danger relay control.

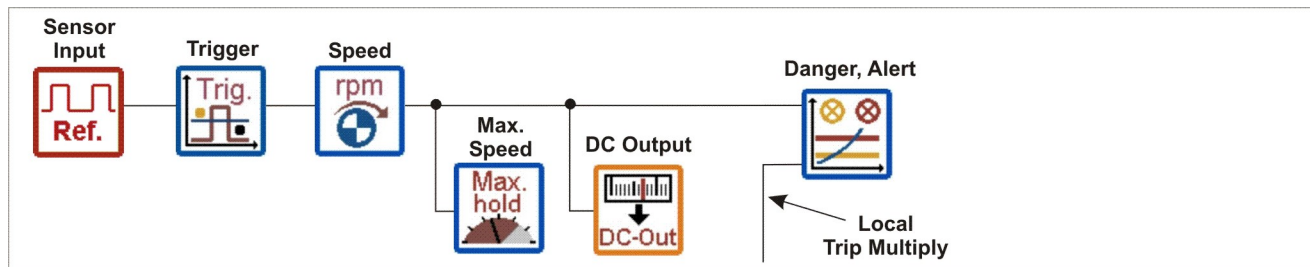


Figure 5. Speed/phase reference sensor input (1 channel).

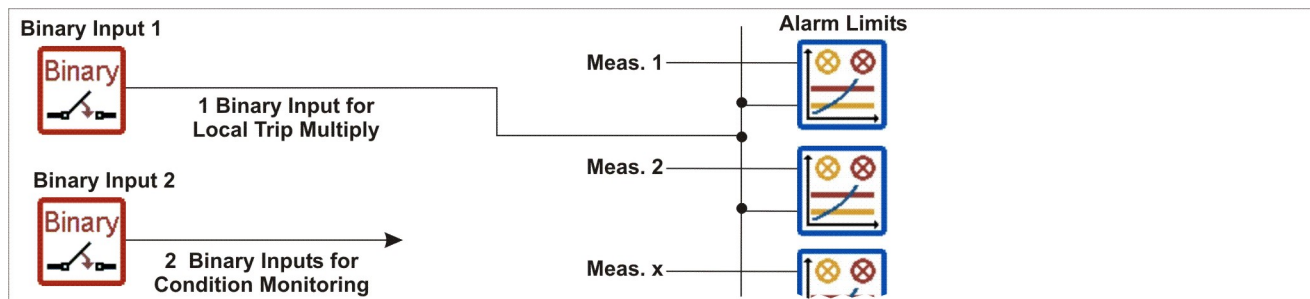


Figure 6. Binary input (3 channels – 1x for local trip multiply of all measurement alarm limits, 2x for condition monitoring purposes).

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Technical Specifications

The specifications given below are specific for the SM-610-102 Monitoring Module. See the VC-6000 Product Specifications for features and functions common to all SM-610 Monitoring modules.

AC/DC Vibration Sensor Inputs

Input voltage range –21.5 to –1V

Input frequency range:

Accelerometer/velocity sensor 0.6Hz to 20kHz

Displacement sensor DC to 20kHz

Input impedance:

Accelerometer >800k Ω

Velocity sensor 50k Ω

Displacement sensor >800k Ω

Gain:

Accelerometer:

No integration 1 to 80 ($\pm 0.75\%$)

Analogue integration 1 to 80 ($\pm 2.75\%$)

Velocity sensor 1 to 80 ($\pm 0.75\%$)

Displacement sensor 1 ($\pm 0.75\%$)

Sensitivity:

Accelerometer adjustable (typ. 100 or 10mV/g)

Velocity sensor adjustable (typically 100mV/mm/s)

Displacement sensor adjustable (typ. 8mV/ μ m)

Common mode rejection:

DC to 30kHz typically 90dB

30kHz to 100kHz typically 85dB

Maximum accelerometer input signal (100mV/g):

No integration 1.25 to 80g peak

Analogue integration 12.5 to 150mm/s peak

Sensor power:

Sensor supply –24VDC $\pm 2\%$

Maximum current 30mA

Speed/Phase Reference Sensor Inputs

Input voltage range –21.5 to –1V

Input frequency range DC to 20kHz

Input impedance >800k Ω

Gain 1 ($\pm 0.75\%$)

Common mode rejection:

DC to 10kHz typically 90dB

10kHz to 100kHz typically 85dB

Sensor power:

Sensor supply –24VDC $\pm 2\%$

Maximum current 30mA

Binary Inputs

Input impedance 3.3k Ω

Response time 5ms

Minimum current load 5mA

Maximum contact voltage ± 50 V

Signal status LOW:

Nominal input voltage 0V

Input voltage range –50 to 6.6V

Maximum input current 2mA

Signal status HIGH:

Nominal input voltage 24V

Input voltage range 16.5 to 50V

Maximum input current 5mA

Buffered Outputs

Minimum output load 100k Ω

Output gain 1 ($\pm 2\%$)

Cross-talk typically –90dB (up to 50kHz)

Inherent noise (1Hz to 50kHz) typically 10mV RMS

Output impedance <100 Ω

Frequency range DC to 50kHz (phase shift <5%)

Output offset $\leq \pm 13$ mV

Analogue DC Outputs

Current output:

Current range 4 to 20mA or 0 to 20mA

Maximum output load 500 Ω

Accuracy <2.4% of measured value

Offset <20 μ A

Voltage output:

Voltage range 0 to 10V or 2 to 10V

Minimum output load 1k Ω

Accuracy <1.3% of measured value

Offset <9.5mV

Relay Outputs

Nominal working voltage 24V

Maximum current 100mA

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Measurements

Meas. Name	Frequency Range	Measuring Time	Detection	Alarm Limits	Measuring Range	Units ¹	Accuracy (25°C, 80Hz, 0-Peak)
Bandpass (ISO 10816)	HP: 1 to 20Hz ⁵ (-1dB) LP: 1kHz (-1dB) 18dB/Octave (ISO 2954)	Adjustable 100ms to 100s in steps of 100ms	RMS, Peak, Peak- peak	1x Alert, 1x Danger	80g	g	±(0.08g + 0.75% of measured value)
					150mm/s (1 integration ²)	mm/s	±(0.6mm/s + 2.75% of measured value)
					100mm/s	mm/s	±(0.1mm/s + 0.75% of measured value)
Bandpass (ISO 7919)	HP: 1 to 20Hz ⁵ (-1dB) LP: 1kHz (-1dB) 18dB/Octave (ISO 2954)	Adjustable 100ms to 100s in steps of 100ms	RMS, Peak, Peak- peak	1x Alert, 1x Danger	2000µm	µm	±(10.0µm + 1.0% of measured value)
S _{max}	HP: 1 to 20Hz ⁵ (-1dB) LP: 1kHz (-1dB) 18dB/Octave (ISO 2954)	Adjustable 100ms to 100s in steps of 100ms	Peak	1x Alert, 1x Danger	2000µm	µm	±(10.0µm + 1.0% of measured value)
X-Y _{max}	HP: 1 to 20Hz ⁵ (-1dB) LP: 1kHz (-1dB) 18dB/Octave (ISO 2954)	Adjustable 100ms to 100s in steps of 100ms	RMS, Peak, Peak- peak	1x Alert, 1x Danger	80g	g	±(0.08g + 0.75% of measured value)
					150mm/s (1 integration ³)	mm/s	±(0.6mm/s + 2.75% of measured value)
					100mm/s	mm/s	±(0.1mm/s + 0.75% of measured value)
					2000µm	µm	±(10.0µm + 1.0% of measured value)
DC (static shaft position)	-	Adjustable 10ms to 100s	-	2x Alert, 2x Danger	2mm	µm	±(2.0µm + 1.0% of measured value)
DC (axial)	-	Adjustable 10ms to 100s	-	2x Alert, 2x Danger	2000µm	µm	±(10.0µm + 1.0% of measured value)
RPM (also Max. RPM)	Signal slope: +/- Trigger level ⁴ (manual or automatic): -21.5 to -1V; adjustable in steps of 0.1V Hysteresis: 0 to 25; adjustable in steps of 0.1	Adjustable 10ms to 100s	RPM	1x Alert, 1x Danger	0.06 to > 1200000 RPM RPM multiplier and divider adjustable from 1 to 99999	RPM	Speed >10000rpm: ±0.01% of measured value Speed 100 to10000 rpm: ±1 rpm Speed < 100 rpm: ±0.1 rpm (one pulse per revolution)

¹ Metric and imperial units can be used; Metric units are shown only as an example.

² One analogue integration is possible. An additional digital integration can be done but this will result in less accuracy.

³ One analogue integration is possible.

⁴ Please refer to the sensor input for the allowed input signal.

⁵ The High-Pass (HP) corner frequencies above 10Hz (12,5;16; 20) are available only in case no analogue signal integration has been selected.

Brüel & Kjær Vibro reserves the right to change specifications without notice

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