Brüel & Kjær Vibro

Product Specifications

VC-6000 Monitoring System
Monitoring Module – SM-610-107
8x Vibration, 2x Axial Displacement Channels, 10x DC Outputs, 6x 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-610-107.

Applications

The SM-610 series of VC-6000 Monitoring Modules are designed to provide protective monitoring of various types of industrial machines. The SM-610-107 is specifically designed for monitoring AC/DC vibration and axial position of a machine, such as a steam turbine.

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

- 8x vibration signals – up to 4x dual-point measurements
- 2x axial displacement signals
- 3x binary input signals

Outputs

- 10x analogue DC outputs
- 6x relays (3x Danger, 3x Alert):
  - 2x vibration – 1-out-of-8 voting logic for dual-point
  - 4x axial – 1-of-2 voting logic

Measurements

- Up to 8x Bandpass (ISO 7919 or ISO 10816)
- Up to 4x S_{max} or Max(X-Y)
- 10x DC - 2x axial, 8x static shaft position

Input Channel Configuration Combinations

	Monitoring Module – SM-610-107 8x Vibration, 2x Axial Displacement Channels, 10x DC Outputs, 6x 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	8	4	-		2	2											3				
9/10	6	3	1/ 2[3]	1	2	2											3				
9/10	4	2	2/ 4[3]	2	2	2											3				
9/10	2	1	3/ 6[3]	3	2	2											3				2x 1oo2 for each Axial
9/10	-	-	4/ 8[3]	4	2	2											3				2x 1oo8 for Radial
	[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. [3] The vector values (1n, 2n, Jn, Kn magnitude and phase, residual values, and overall RMS) are for condition monitoring purposes only.																				

[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.

Signal Flow Diagrams

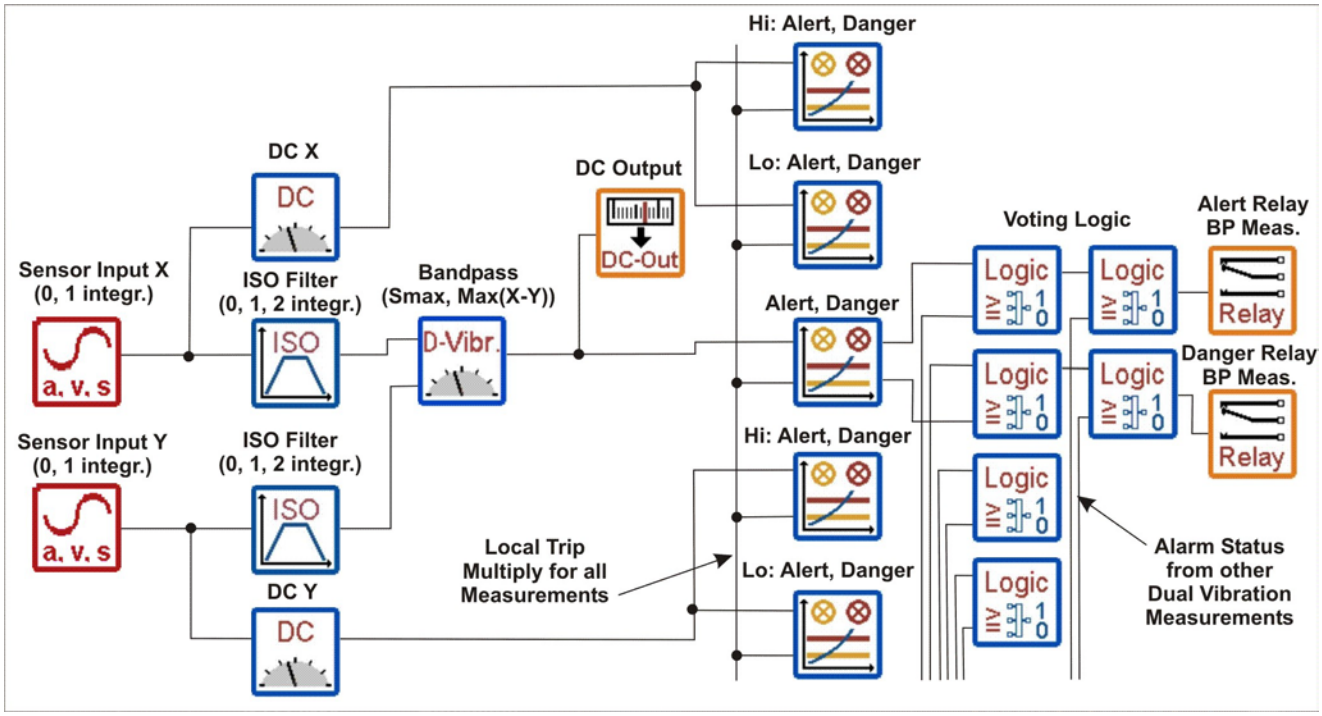


Figure 1. Dual-point AC/DC vibration input (up to 8 channels – 4 pairs). Separate 1-out-of-4 voting logic is used for all bandpass measurements for Alert and Danger relay control.

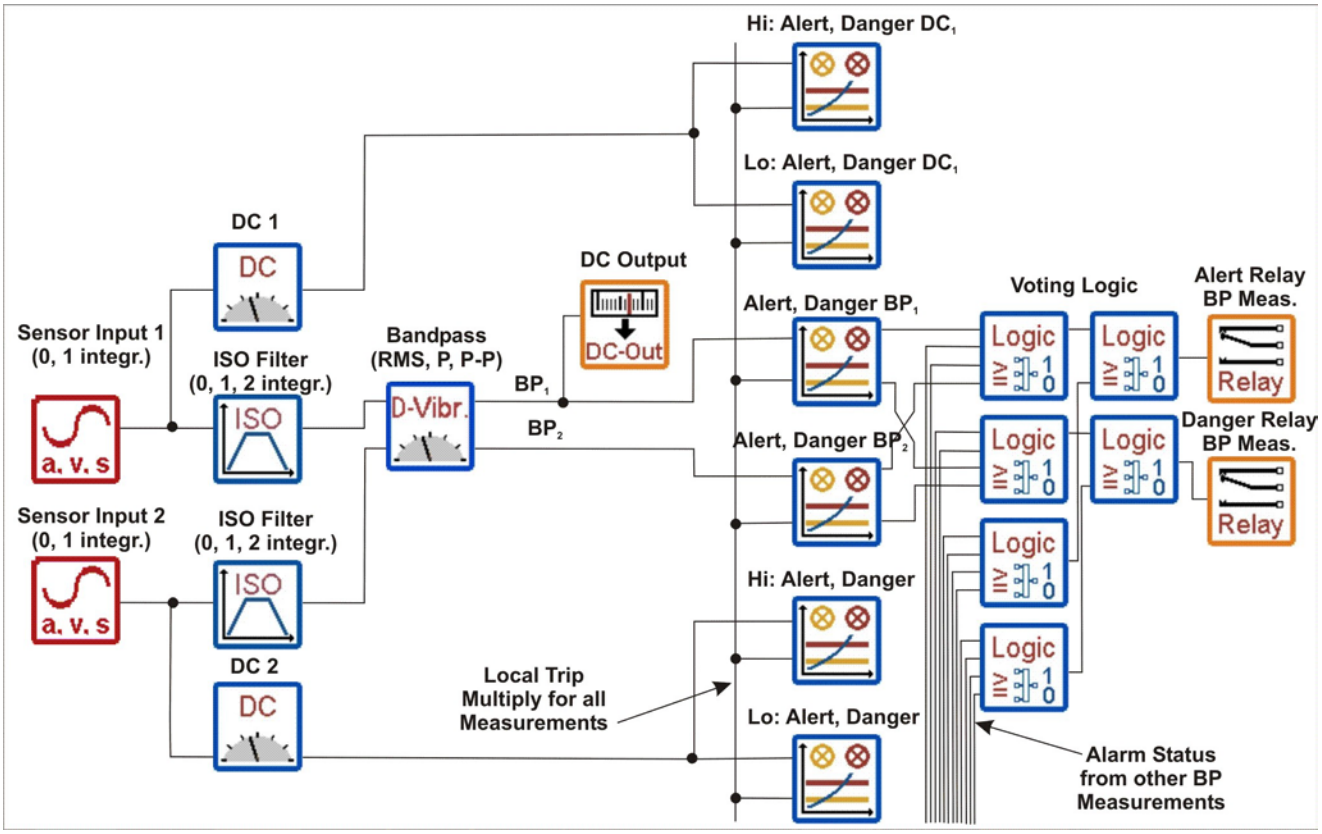


Figure 2. Two single-point AC/DC vibration inputs can alternatively be set up from a dual-point input (Figure 1). Up to 8 channels. Separate 1-out-of-8 voting logic is used for measurement point pairs for Alert and Danger relay control.

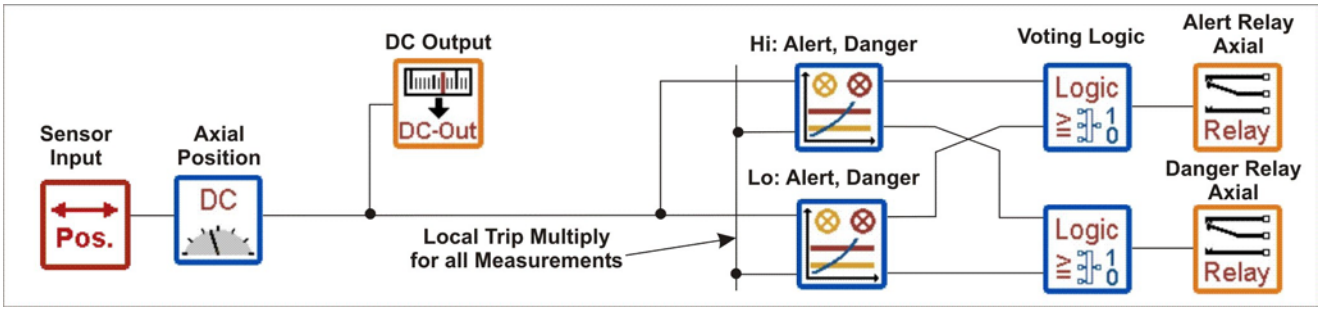


Figure 3. Axial displacement input (2 channels). Separate 1-out-of-2 voting logic is used for axial Alert and Danger relay control.

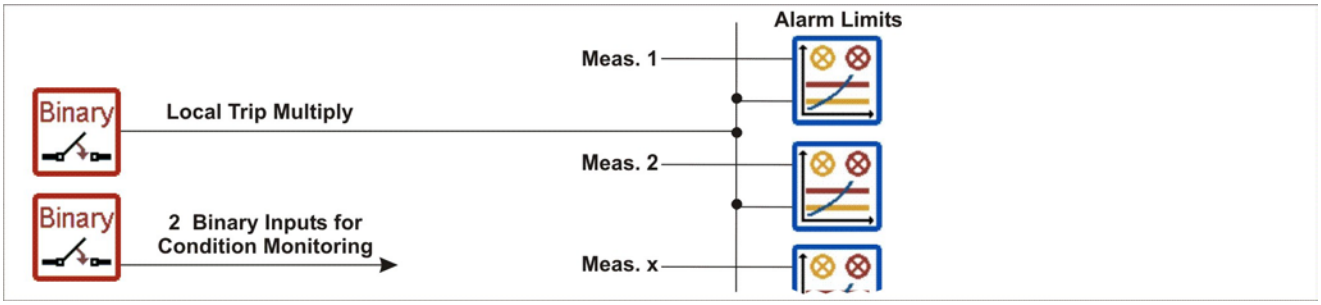


Figure 4. Binary input (3 channels – 1x for local trip multiply of all measurement alarm limits, 2x for condition monitoring purposes).

Technical Specifications

The specifications given below are specific for the SM-610-107 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 ..... >800kΩ
- Velocity sensor 50kΩ
- Displacement sensor ..... >800kΩ

Gain:
- Accelerometer:
  - No integration ..... 1 to 80 (±0.75%)
  - Analogue integration ..... 1 to 80 (±2.75%)
- Velocity sensor ..... 1 to 80 (±0.75%)
- Displacement sensor ..... 1 (±0.75%)

Sensitivity:
- Accelerometer ..... adjustable (typ. 100 or 10mV/g)
- Velocity sensor . adjustable (typically 100mV/mm/s)
- Displacement sensor ..... adjustable (typ. 8mV/μm)

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 ±2%
- Maximum current 30mA

Binary Inputs

Input impedance 3.3kΩ
Response time 5ms
Minimum current load 5mA
Maximum contact voltage ..... ±50V

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 100kΩ
Output gain ..... 1 (±2%)
Cross-talk ..... typically −90dB (up to 50kHz)
Inherent noise (1Hz to 50kHz) ..... typically 10mV RMS
Output impedance ..... <100Ω
Frequency range ..... DC to 50kHz (phase shift <5%)
Output offset ..... ≤ ±13mV

Analogue DC Outputs

Current output:
- Current range ..... 4 to 20mA or 0 to 20mA
- Maximum output load 500Ω
- Accuracy ..... <2.4% of measured value
- Offset ..... <20μA

Voltage output:
- Voltage range ..... 0 to 10V or 2 to 10V
- Minimum output load 1kΩ
- Accuracy ..... <1.3% of measured value
- Offset ..... <9.5mV

Relay Outputs

Nominal working voltage 24V
Maximum current 100mA

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 10Hz (-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 150mm/s (1 integration[2])	g mm/s	±(0.08g + 0.75% of measured value) ±(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 10Hz (-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 10Hz (-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)
$X\text{-}Y_{max}$	HP: 1 to 10Hz (-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 150mm/s (1 integration[3])	g mm/s	±(0.08g + 0.75% of measured value) ±(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)

[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.

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

Brüel & Kjær Vibro A/S
2850 Nærum – Denmark
Tel.: +45 7741 2500
Fax: +45 4580 2937
E-mail: info@bkvibro.com

Brüel & Kjær Vibro GmbH
64293 Darmstadt – Germany
Tel.: +49 (0) 6151 428 1100
Fax: +49 (0) 6151 428 1200
E-mail: info@bkvibro.de