Brüel & Kjær Vibro

Product Specifications

VC-6000 Monitoring System
Monitoring Module – SM-610-138
4x Vibration (Vector Measurements), 1x Speed Channel, 7x DC Outputs, 8x 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. This Product Specifications describes the SM-610-138.

Applications

The SM-610 series of VC-6000 Monitoring Modules are designed to provide protective monitoring of various types of industrial machines. The SM-610-138 is specifically designed for monitoring AC/DC vibration of a machine. This includes vector measurements.

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

- 4x vibration signals – up to 2x dual-point measurements
- 1x speed/phase reference signal
- 3x binary input signals

Outputs

- 7x analogue DC outputs
- 8x relays (4x Alert, 4x Danger) – 1-out-of-2 voting logic

Measurements

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

Input Channel Configuration Combinations

No. of Inputs[1]	Monitoring Module – SM-610-138 4x Vibration (Vector Measurements), 1x Speed Channel, 7x DC Outputs, 8x Relays																			Relay's
	Channel Types																Additional Measurements			
	Dual- point Vibr.[2] (ISO)	DC-out	Single-point Vibr (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	2x 1oo2 for each One-point Channel A (1 BP, 2 BP) 2x 1oo2 for each Tw o-point
5	4	2	4	4			1	1									3	4			
	[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 measurement.

[3] The vector values (1n, 2n, Jn, Kn magnitude and phase, residual values, and overall RMS) are for condition monitoring purposes only.

Signal Flow Diagrams

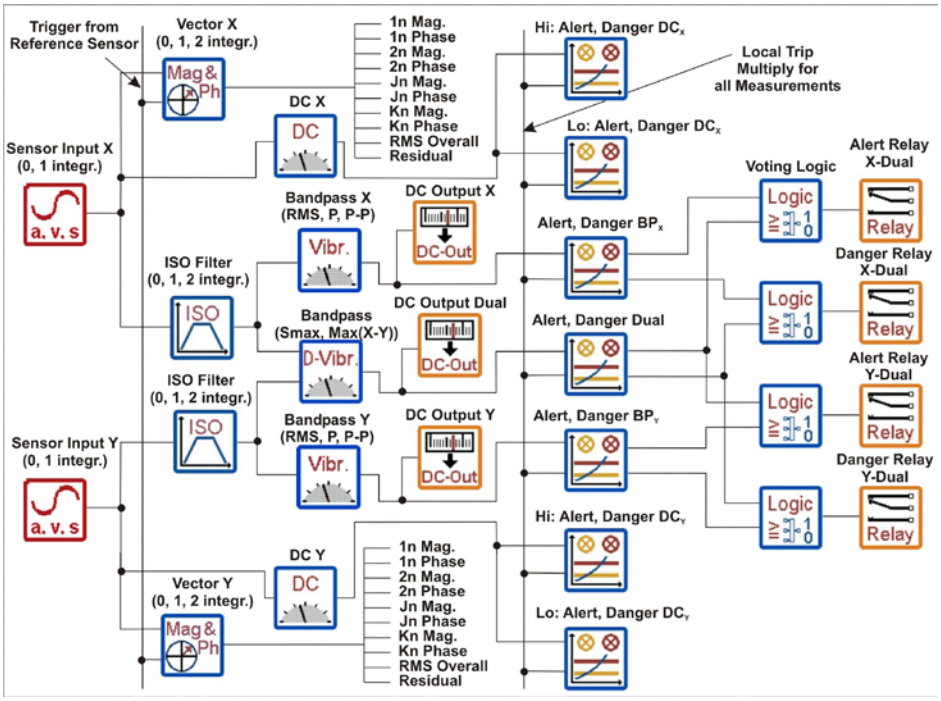

Figure 1. Dual-point AC/DC vibration input (up to 4 channels – 2 pairs). Two single-point AC/DC vibration inputs can alternatively be set up from a dual-point input. Vector measurements are for condition monitoring purposes only. Separate 1-out-of-2 voting logic is used for Alert and Danger relay control.

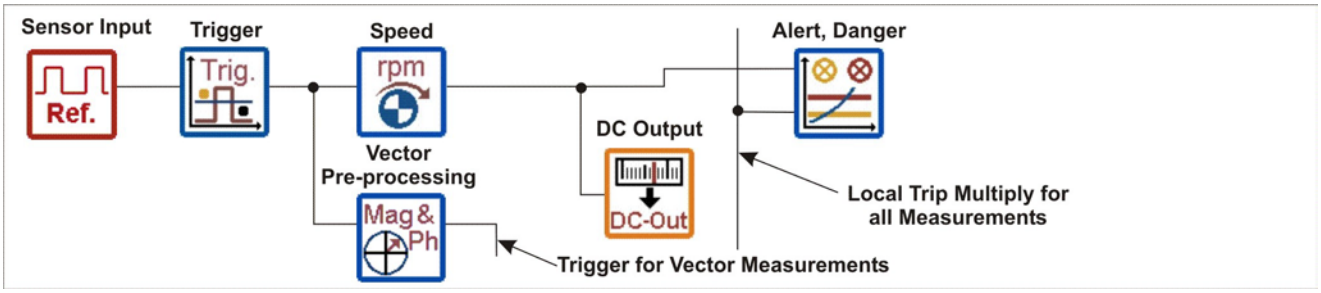

Figure 2. Speed/phase reference sensor input (1 channel).

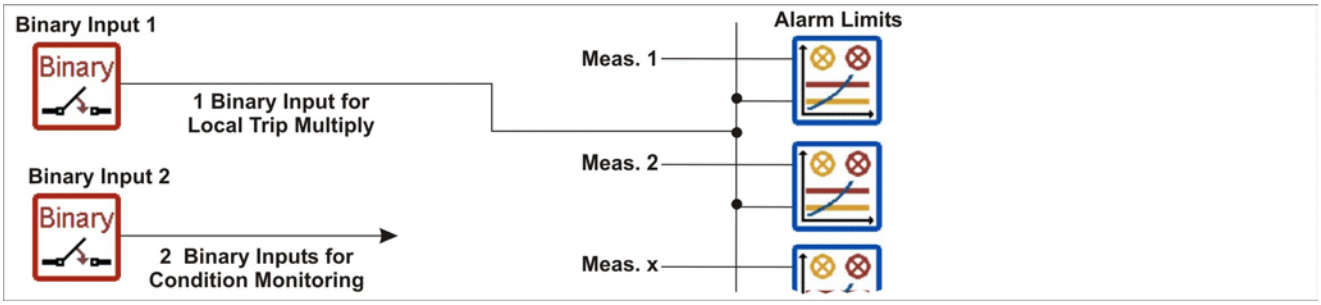

Figure 3. Binary input (3 channels – 1x for local trip multiply of all measurement alarm limits, 2x for condition monitoring purposes).

Technical Specifications

The specifications given below are specific for the SM-610-138 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

Speed/Phase Reference Sensor Inputs

Input voltage range ..... –21.5 to –1V
Input frequency range ..... DC to 20kHz
Input impedance..... >800kΩ
Gain..... 1 (±0.75%)

Common mode rejection:
- DC to 10kHz .....typically 90dB
- 10kHz to 100kHz .....typically 85dB

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-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)
Vector (1n, 2n, Jn, Kn, RMS overall and Residual value)	Fundamental: 0.33Hz-1kHz Bandwidth: 22%, 11%, 6%, 3% Upper freq.: 5kHz	Computed from bandwidth	RMS, Peak, Peak-peak	None	Jn: 0.5n to 20n Kn: 4n to 20n	g, mm/s, µm [4]	Magnitude: <1% + 0.2% of measured value Phase 10 to 200Hz: <2° Phase 5 to 500Hz: <4°
RPM	Signal slope: +/- Trigger level [5] (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] One analogue integration is possible. An additional digital integration can be done without loss of accuracy.
[5] Please refer to the sensor input for the allowed input signal.

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

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