Product Specifications

VC-6000 Monitoring System
Monitoring Module – SM-610-109
6x Vibration, 2x Speed Channels, 8x 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. This Product Specification describes the SM-610-109.

Applications

The SM-610 series of VC-6000 Monitoring Modules are designed to provide protective monitoring of various types of industrial machines. The SM-610-109 is specifically designed for monitoring AC/DC vibration of a machine with up to two shafts turning at different speeds.

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 – single-point measurement
- 2x speed/phase reference signals
- 3x binary input signals

Outputs

- 8x analogue DC outputs
- 6x relays (3x Alert, 3x Danger) – 1-out-of-2 voting logic

Measurements

- 6x bandpass (ISO 7919 or ISO 10816)
- 6x DC static shaft position
- 2x RPM

Product Specifications - VC-6000 Monitoring Module – SM-610-109

Input Channel Configuration Combinations

No. of Inputs [1]	Monitoring Module – SM-610-109 6x Vibration, 2x Speed Channels, 8x DC Outputs, 6x Relays																Additional Measurements			Relay's
	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	2x 1oo2 for each Radial sensor pair
8			6	6			2	2									3				
	[1] The number of input signals is the sum total of the channels shown in yellow.																			

[1] The number of input signals is the sum total of the channels shown in yellow.
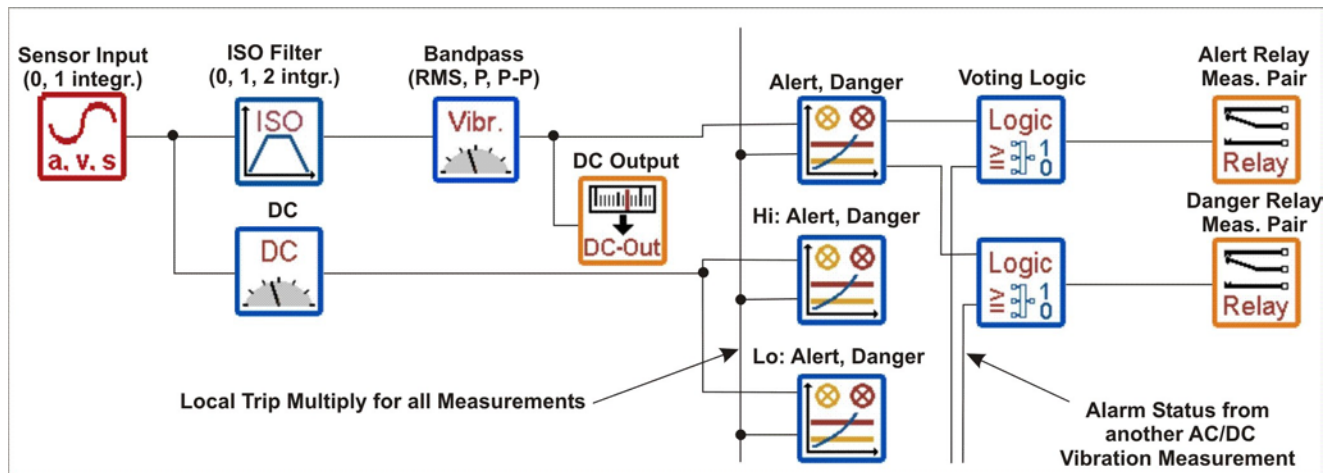
Signal Flow Diagrams

Figure 1. Single-point AC/DC vibration input (6 channels). Separate 1-out-of-2 voting logic is used for Alert and Danger relay control.
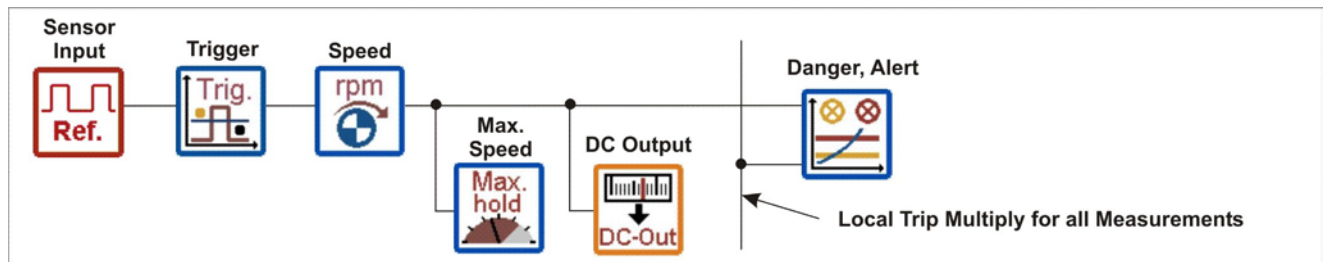

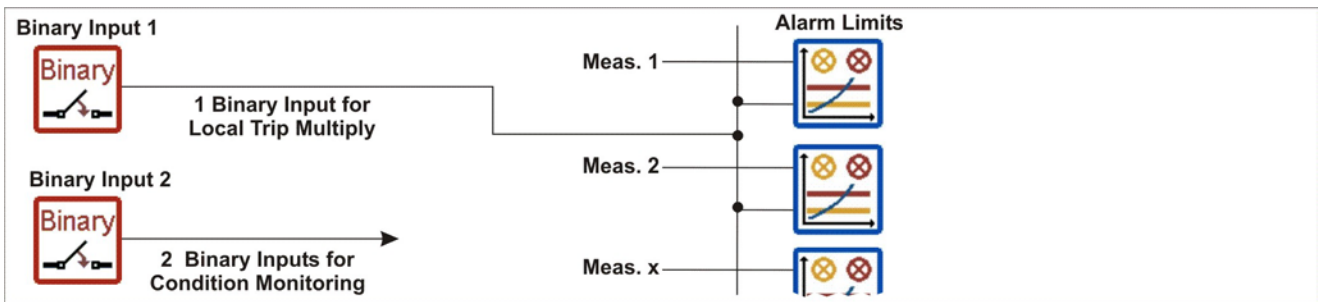*Figure 2. Speed/phase reference sensor input (2 channels).*

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-610-109 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

Product Specifications - VC-6000 Monitoring Module – SM-610-109

Buffered Outputs

Minimum output load ....min. 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	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 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)
DC (static shaft position)	-	Adjustable 10ms to 100s	-	2x Alert, 2x Danger	2mm	μm	±(2.0μm + 1.0% of measured value)
RPM (also Max. RPM)	Signal slope: +/- Trigger level[3] (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] Please refer to the sensor input for the allowed input signal.

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