



Product Specification

VC-6000 Monitoring System Monitoring Module – SM-610-A05

User-Defined: up to 2 x Vibration inputs, up to 2 x Phase Reference/Speed; up to 10 x Process signals (resp. Air-Gap Measurements); up to 9 x Binary Inputs with 6 Relay outputs

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-A05.

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-A05 is specifically designed as a “user-defined” monitoring module, where there are a number of selectable differential inputs and outputs. This is useful for monitoring machines with special applications. The second purpose of the SM-610-A05 is offering a free-configurable voting logic. Using the various input channels allowing logic combinations over different SM-610-xxx module, even in different racks.

General Description

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

- Interfacing with the CI-620 Communication Module
- High speed digital signal processor
- Relay outputs (logic controlled)
- Module OK-relay status indication
- Extensive local LED indication
- Flash memory for storing settings and local logbook
- High speed reaction time
- 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 input signal outputs



Inputs

- Up to 2 x vibration and/or speed input channels
 - Up to 10 x process signals inputs channels and/or Air Gap sensor signals
 - 9 x binary input channels
 - Up to 2 x speed inputs, with one dedicated for 1x Master ^{1,2} (central) trigger input signal
1 x Slave input channel
- ¹ Providing trigger signals to other SM-610-xxx modules.
² Air Gap measurements need one trigger input as minimum.

Measurements

The measurements available depend on the inputs selected. These can include up to:

- 2 x speed/phase reference – rotation direction, zero speed, run up, coast down
- 2 x vibration measurement (rms, peak, peak-peak)

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- Bandpass – 2 x single-point or 1x dual-point pairs with user-defined **ISO filters**
- 10 x process signals – DC measurement
- 10 x Air gap measurement – Minimum peak

operators AND, OR, NOT, and () can be used in a user-defined voting logic with any combination of measurement alarm limits and binary inputs.

Outputs

- 6 x relays (any combination of Alert and Danger). Selectable for any AC/DC measurement alarm limits. Relay logic

Input Channel Configuration Combinations

Sum of Inputs	Channel Types						Output Relay
	Dual-point Vibr. (ISO) ¹	Single-point Vibr. (ISO) ¹	Speed / Phase refer.	Air Gap Minimum Peak	DC Input (e.g. Process, Absolute Exp.)	Binary	
21	2	-	-	-	10	9	6
21	1	1	1	5	5	9	6
21	1	2 (1x Slave) ²	5	5	5	9	6
21	2	1(Slave)	5	5	5	9	6
21	1	2 (1xSlave) ²	10	-	-	9	6
21	-	2	10	-	-	9	6
21	1	1	-	10	10	9	6
21	-	2	-	10	10	9	6
21	2	1(Slave)	10	-	-	9	6
21	2	1(Slave)	-	10	10	9	6
21	1	1	10	-	-	9	6
21	1	2 (1xSlave) ²	-	10	10	9	6
21	1	2 (1xSlave) ²	5	5	5	9	6
21	-	2	5	5	5	9	6

¹ A dual-point band-pass measurement can alternatively be set up as two single-point measurements and vice versa.

² 1 x speed/reference sensor connected physically to the module, 1 x additional Slave trigger input chosen

Signal Flow Diagrams

User Definable Measurement Channel Inputs (maximum subject to overall input allocation, with trip-multiply).

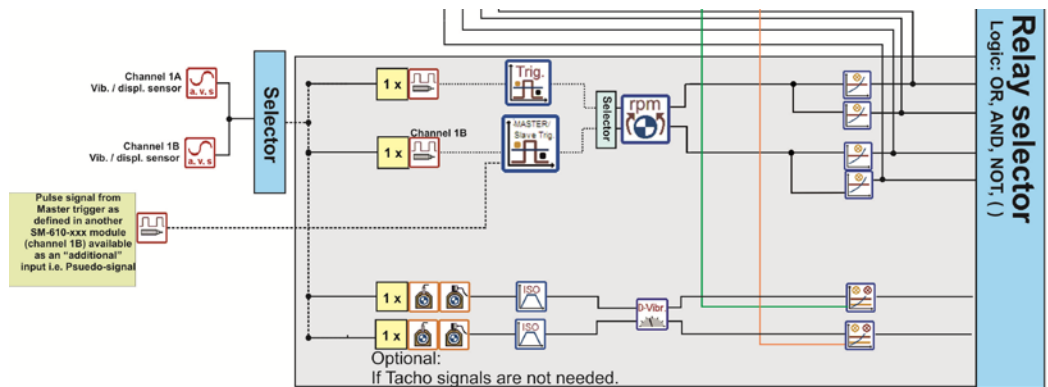


Figure 1. Phase/speed reference sensor input (up to 2 channels). Channel 1B can be designated as a master speed/phase reference channel for distribution to other SM-610-xxx modules in up to 4 racks. Or the trigger signal can be received from another SM-610-xxx module (Slave Trigger). If no speed signal is needed the channels can be configured for vibration measurements.

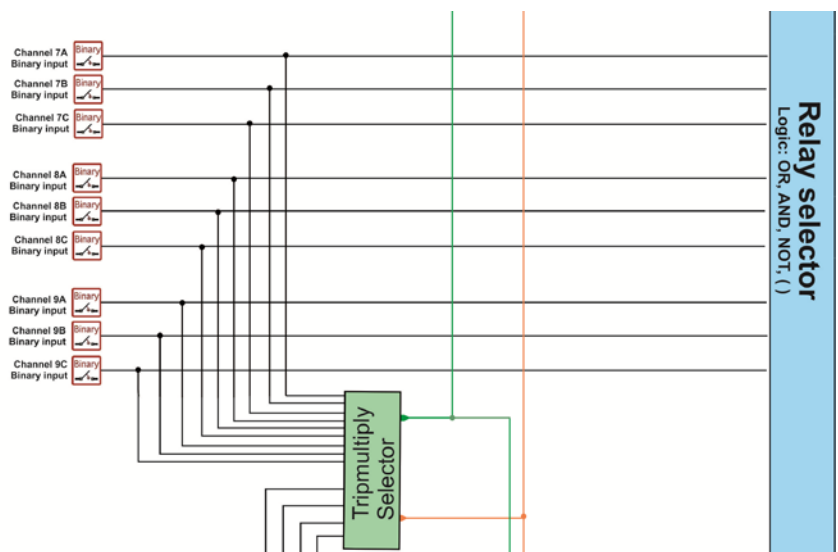


Figure 2: 9 x binary input channels that go directly into the relay selector with a free configurable voting logic. All binary inputs can be used for Trip Multiply signals (Logic operations are possible).

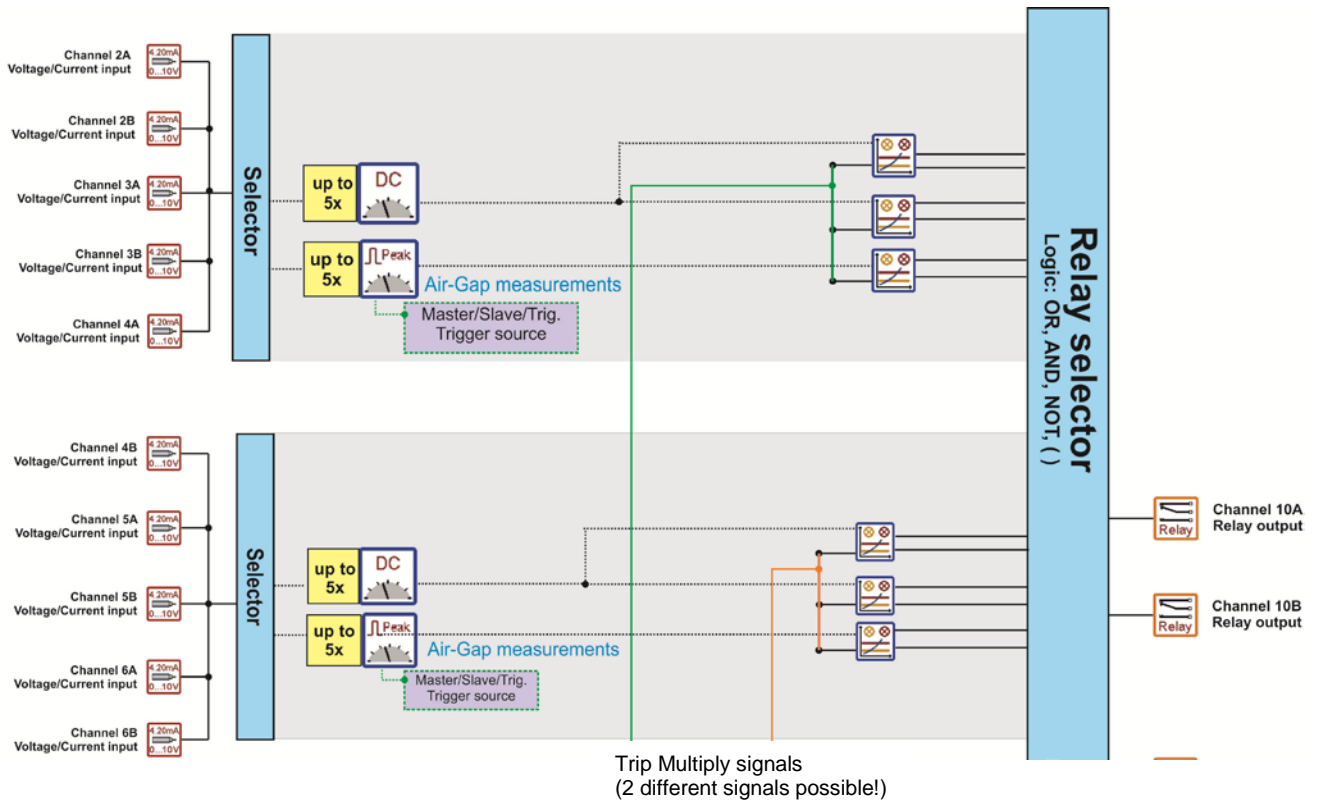


Figure 3. 10 process channel inputs which can also be used for measuring the minimum Air Gap. All measurements are monitored with Alert and Danger limits. Monitoring output is available for the relay selector with free voting logic.

Technical Specifications

The specifications given below are specific for the SM-610-A05 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 -21.5V to -1V

Input frequency range:

Accelerometer/velocity sensor 1Hz to 20kHz
Displacement sensor DC to 20kHz

Input impedance:

Accelerometer >800k Ω
Velocity sensor 50k Ω
Displacement sensor >800k Ω

Gain:

Accelerometer sensor:
No integration 1 to 80
Analogue integration 1 to 80
Velocity sensor 1 to 80
Displacement¹ sensor 1

Sensitivity:

Accelerometer adjustable (e.g. 100mV/g)
Velocity sensor adjustable (e.g. 100mV/mm/s)
Displacement sensor adjustable (e.g. 8mV/ μ m)

Common mode rejection:

DC to 30kHz typically 90dB
30kHz to 100kHz typically 85dB

Maximum accelerometer input signal (100mV/g):

No integration 1.25g to 80g peak
Analogue integration 12.5mm/s to 150mm/s peak

Sensor power:

Sensor supply -24VDC \pm 2%
Maximum current 30mA

Speed/Phase Reference Sensor Inputs

Input voltage range -21.5V to -1V
Input frequency range DC to 20kHz
Input impedance >800k Ω
Gain 1

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
Accuracy response time 5ms
Minimum current load 5mA
Maximum contact voltage \pm 50V

Signal status LOW:

Nominal input voltage 0V
Input voltage range -50V to 6.6V
Maximum input current 2mA

Signal status HIGH:

Nominal input voltage 24V
Input voltage range 16.5V to 50V
Maximum input current 5mA

Process Inputs

Input current range \pm 30mA
Input voltage range \pm 14V
Input frequency range DC to 20kHz
Input impedance (voltage input) 200k Ω
Input current load 100 Ω
Sensitivity adjustable
Gain 1 (\pm 1%)
Sensor power external

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 13mV

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: 1Hz 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 ²	mm/s	±(0.6mm/s + 2.75% of measured value)
					100mm/s	mm/s	±(0.1mm/s + 0.75% of measured value)
Minimum Peak Air Gap	DC to 20kHz	Adjustable 100 ms to 100 s in steps of 100 ms	Minimum, (Maximum, Peak, Peak-Peak, RMS, Mean)	1x Alert, 1x Danger	2 – 10V	V	±(9.0mV+ 1.0% of measured value)
DC (process)	DC to 20kHz	Adjustable 10ms to 100s	-	2x Alert, 2x Danger	±14V	V	±(9.0mV+ 1.0% of measured value)
					±30mA	mA	±(0.2µA+ 1.0% of measured value)
RPM	Signal slope: +/- Trigger level (manual or automatic): -1.0 V to -21.5 V; adjustable in steps of 0.1V Hysteresis: 0 to 25V; adjustable in steps of 0.1V	Adjustable 10ms to 100s	RPM	1x Alert, 1x Danger	0.06 to > 1500000 RPM RPM multiplier and divider adjustable from 1 to 99999	RPM	Speed >10000rpm: ±0.01% of measured value Speed 100 to 10000 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 loss accuracy.

Please Note:

For Condition Monitoring all kinds of adapted measurements are possible.

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

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