



# Product Specifications

## VC-6000 Monitoring System Monitoring Module – SM-610-108 8x Vibration Channels, 8x 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. These Product Specifications describe the SM-610-108.

### Applications

The SM-610 series of VC-6000 Monitoring Modules are designed to provide protective monitoring of various types of industrial machines. The SM-610-108 is specifically designed for monitoring casing and/or shaft vibration of a machine with up to four bearing supports.

### 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

### Outputs

- Up to 8x analogue DC outputs
- 8x relays (4x Alert, 4x Danger) – 1-out-of-2 voting logic for single-point measurements

### Measurements

- Up to 8x bandpass (ISO 7919 or ISO 10816)
- Up to 4x  $S_{max}$  or Max(X-Y)
- 8x DC static shaft position

Input Channel Configuration Combinations

| Monitoring Module – SM-610-108<br>8x Vibration Channels, 8x DC Outputs, 8x Relays  |                                     |        |                                       |        |            |        |       |        |          |        |           |        |              |        |                                  |        |         |                         |    |             |         |
|--|-------------------------------------|--------|---------------------------------------|--------|------------|--------|-------|--------|----------|--------|-----------|--------|--------------|--------|----------------------------------|--------|---------|-------------------------|----|-------------|---------|
| No. of Inputs <sup>1</sup>   | Channel Types                       |        |                                       |        |            |        |       |        |          |        |           |        |              |        |                                  |        |         | Additional Measurements |    |             | Relay's |
|  | Dual-point Vibr. <sup>2</sup> (ISO) | DC-out | Single-point Vibr. <sup>2</sup> (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 <sup>3</sup>     | BP | Tracking BP |         |
| 8  | 8                                   | 4      | -                                     | -      |            |        |       |        |          |        |           |        |              |        |                                  |        |         |                         |    |             |         |
| 8  | 6                                   | 3      | 2                                     | 2      |            |        |       |        |          |        |           |        |              |        |                                  |        |         |                         |    |             |         |
| 8  | 4                                   | 2      | 4                                     | 4      |            |        |       |        |          |        |           |        |              |        |                                  |        |         |                         |    |             |         |
| 8  | 2                                   | 1      | 6                                     | 6      |            |        |       |        |          |        |           |        |              |        |                                  |        |         |                         |    |             |         |
| 8  | -                                   | -      | 8                                     | 8      |            |        |       |        |          |        |           |        |              |        |                                  |        |         |                         |    |             |         |
| <sup>1</sup> The number of input signals is the sum total of the channels shown in yellow.<br><sup>2</sup> Dual-point measurements can alternatively be set up as single-point measurements. |                                     |        |                                       |        |            |        |       |        |          |        |           |        |              |        |                                  |        |         |                         |    |             |         |

<sup>1</sup> The number of input signals is the sum total of the channels shown in yellow.

<sup>2</sup> Dual-point measurements can alternatively be set up as single-point measurements.

Signal Flow Diagrams

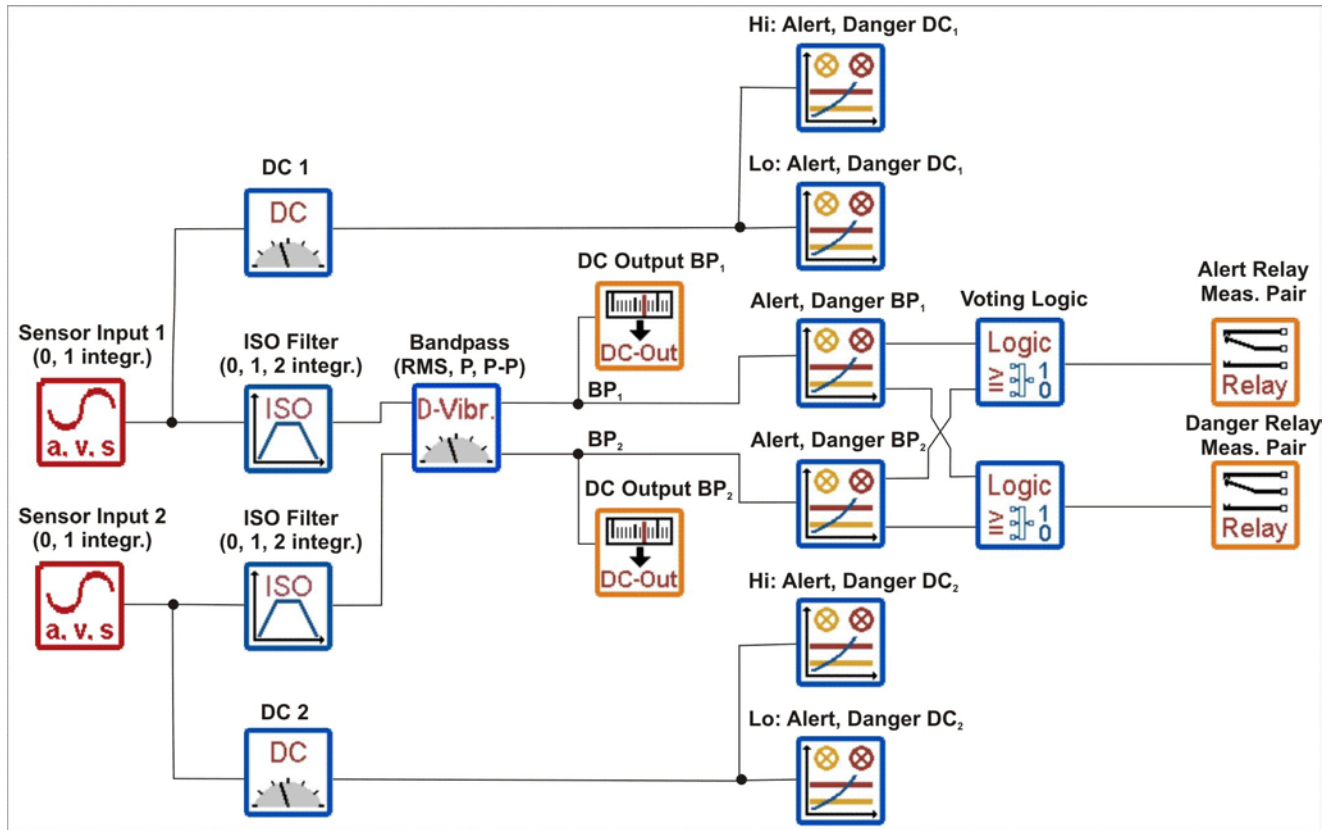


Figure 1. Single-point AC/DC vibration inputs (up to 8 channels). Separate 1-out-of-2 voting logic is used for bandpass measurements for Alert and Danger relay control.

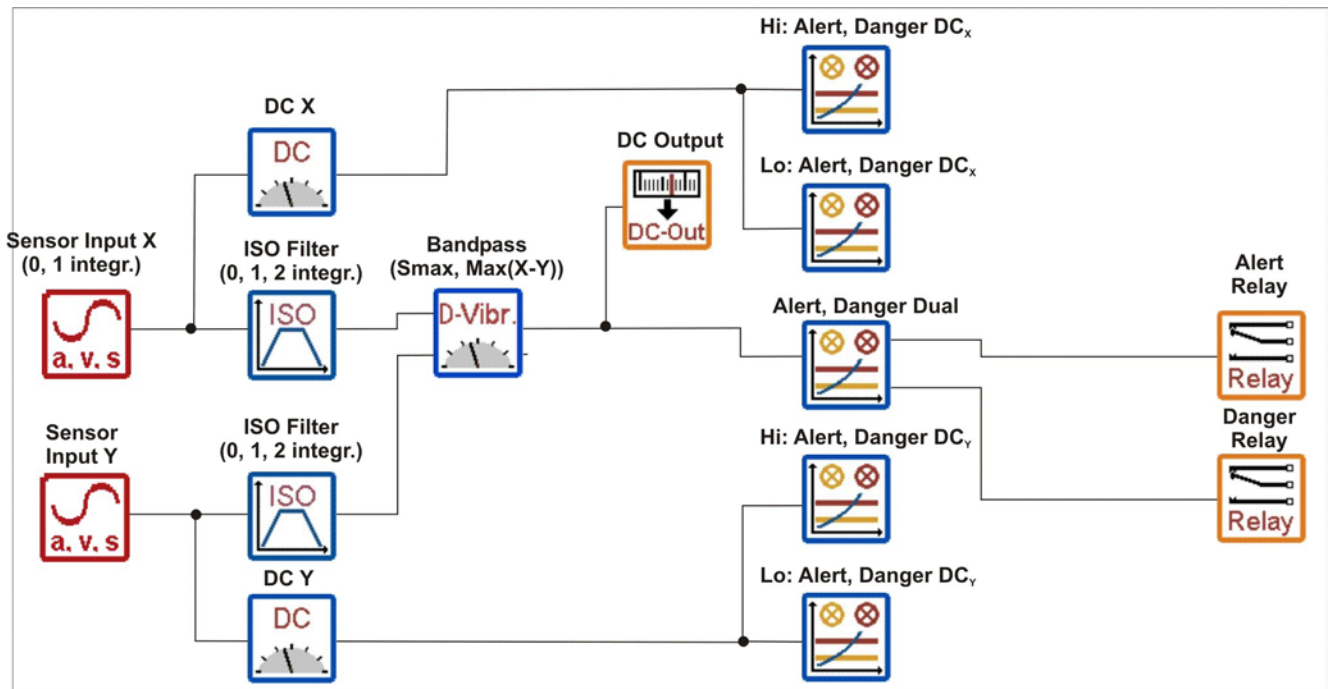


Figure 2. A dual-point AC/DC vibration input can alternatively be set up from two single-point AC/DC vibration inputs (Figure 1). There can be up to 8 channels – 4 pairs. 2 relays per measurement pair.

## Technical Specifications

The specifications given below are specific for the SM-610-108 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

### 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 <sup>1</sup> | Accuracy (25°C, 80Hz, 0-Peak)        |
|----------------------------|---|---|----------------------|---------------------|---------------------------------------|--------------------|--------------------------------------|
| Bandpass (ISO 10816)       | HP: 1 to 10Hz (-1dB)<br>LP: 1kHz (-1dB)<br>18dB/Octave (ISO 2954) | Adjustable<br>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 <sup>2</sup> ) | 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)<br>LP: 1kHz (-1dB)<br>18dB/Octave (ISO 2954) | Adjustable<br>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 <sub>max</sub>           | HP: 1 to 10Hz (-1dB)<br>LP: 1kHz (-1dB)<br>18dB/Octave (ISO 2954) | Adjustable<br>100ms to 100s in steps of 100ms | Peak                 | 1x Alert, 1x Danger | 2000µm                                | µm                 | ±(10.0µm + 1.0% of measured value)   |
| X-Y <sub>max</sub>         | HP: 1 to 10Hz (-1dB)<br>LP: 1kHz (-1dB)<br>18dB/Octave (ISO 2954) | Adjustable<br>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 <sup>3</sup> ) | 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<br>10ms to 100s                    | -                    | 2x Alert, 2x Danger | 2mm                                   | µm                 | ±(2.0µm + 1.0% of measured value)    |

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

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

<sup>3</sup> One analogue integration is possible.

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