Product Specifications

VC-6000 Monitoring System
Monitoring Module – SM-610-140
6x Rod Drop, 3x Speed Channels, 12x DC 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-610-140.

Applications

The SM-610 series of VC-6000 Monitoring Modules are designed to provide protective monitoring of various types of industrial machines. The SM-610-140 is specifically designed for monitoring rider ring wear of up to six cylinders of a reciprocating compressor.

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 rod drop sensor signals
- 3x speed/phase reference signals
- 3x binary inputs (trip multiplier)

Outputs

- 12x analogue DC outputs

Measurements

- DC – 6x cyclic, 6x static shaft position
- 3x RPM

Input Channel Configuration Combinations

	Monitoring Module – SM-610-140 6x Rod Drop, 3x Speed Channels, 12x DC Outputs																	Additional Measurements			Relay's
No. of Inputs[1]	Channel Types																				
	Dual-point Vibr.[2] (ISO)	DC-out	Single-point Vibr (ISO)	DC-out	Axial Pos.	DC-out	Speed	DC-out	Rod Drop	DC-out[2]	Rel. Exp.	DC-out	Eccentricity	DC-out	DC Input (Process, Absolute Exp)	DC-out	Bin. in	Vector[3]	BP	Tracking BP	
9							3		6	12							3				
	[1] The number of input signals is the sum total of the channels shown in yellow. [2] 2x DC-out per Rod-Drop Chanel: 1x CYDC and one 1x DC.																				

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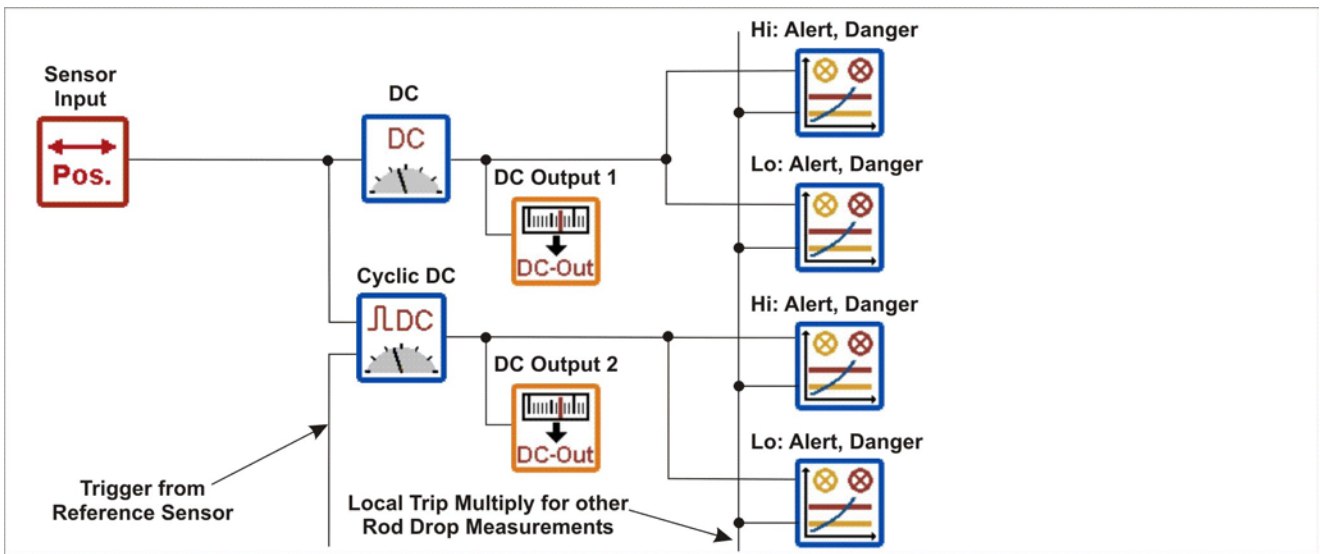
Signal Flow Diagrams

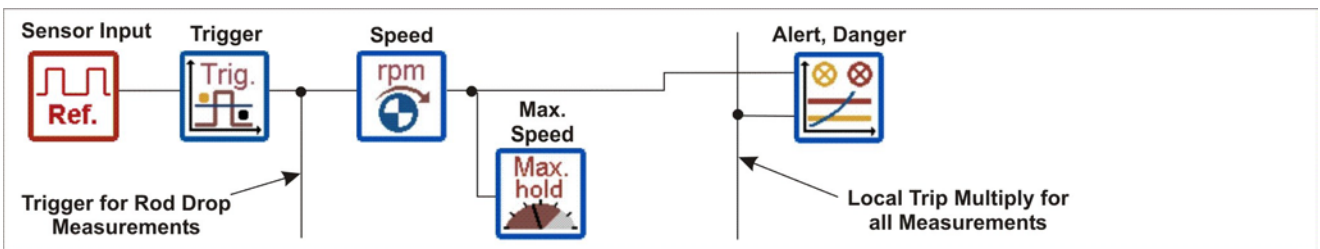*Figure 1. Rod drop input (6 channels).*

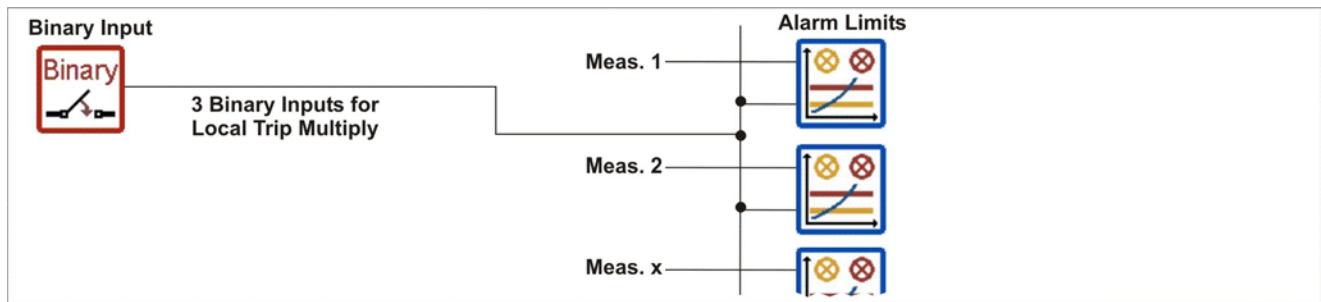*Figure 2. Speed/phase reference sensor input (3 channels).*

Figure 3. Binary input (3 channels – 1 for each measurement group).

Technical Specifications

The specifications given below are specific for the SM-610-140 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

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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

Measurements

Meas. Name	Frequency Range	Measuring Time	Detection	Alarm Limits	Measuring Range	Units[1]	Accuracy (25°C, 80Hz, Peak)
DC (static shaft position)	-	Adjustable 10ms to 100s	-	2x Alert, 2x Danger	2mm	μm	$\pm$(2.0μm + 1.0% of measured value)
DC (cyclic)	-	Adjustable 10ms to 100s	-	2x Alert, 2x Danger	2mm	μm	$\pm$(2.0μm + 1.0% of measured value)
RPM (also Max. RPM)	Signal slope: +/- Trigger level [2] (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: $\pm$0.01% of measured value Speed 100 to10000 rpm: $\pm$1 rpm Speed < 100 rpm: $\pm$0.1 rpm (one pulse per revolution)

[1] User-defined units. Sensor input signal units indicated here
[2] Please refer to the sensor input for the allowed input signal.

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