SHINKAWA

VM-7 MONITORING SYSTEM

Condition Monitoring System of Large Rotating Machines

New Monitor Derived from Advanced and

VM-7 Monitoring System – Simple, Highly Functioning and Consistent

Experienced Sensor Technology

Performance

Monitoring System for Rotating Machinery

The VM-7 Monitoring System is ideal for condition monitoring of turbines, compressors and electric generators in petrochemical plants and power plants. Monitoring parameters include shaft vibration, casing vibration, axial position, rotation speed and bearing temperature, as required by the American Petroleum Institute, in the API standard 670, “Machinery Protection Systems”. As a full Turbine Supervisory Instrument (TSI), the VM-7 Monitoring System, supports all parameters for protecting and monitoring critical equipment; differential expansion, valve position and eccentricity, etc.

Analysis and Diagnostic System Connection

To protect critical rotating machinery such as turbines and compressors, there is an increasing need for acquisition, analysis and diagnostics of vibration at machine startup/shutdown (transient data), as well as vibration analysis at rated operation. The VM-742B Network Communication Module connects directly to the infiSYS RV-200 Large Rotating Machinery Analyzing System, allowing for direct analysis of defects from virtually any computer.

Reliability and Maintainability

The VM-7 Monitoring System has a redundant power supply and redundant network communication to dramatically reduce the risks of monitoring disruption due to power failure or communication network failure.
All modules can be installed/removed from the front which allows for hot swap of modules without having to connect/disconnect wirings at the back.

Comprehensive System

One, 19”, VM-7 Monitoring System rack can hold up to 44 vibration/displacement acquisition channels (11 four channel cards), or 66 temperature channels (11 six channel cards), or a combination of the two.

(If all slots are occupied.)

Create Own System

The VM-701B Vibration/Displacement Monitor Module can be configured to take 11 different types of measurements, including vibration, thrust, differential expansion, etc, covering all elements of condition monitoring of rotating machinery. Users can configure the modules to meet their monitoring needs*1.

(*1 VM-772B Device Config is required.)

Configurable Alarm Relays

Each monitor module has 6 relays for users to set up AND/OR and special alarm logics for desired channels of the monitor modules in the same rack for desired alarms.
The VM-721B 18-Channel Relay Module is available for a system which requires additional alarm contacts configured for any combination of any channel of any monitor module in the rack.

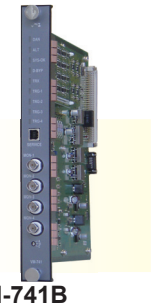
Environmental Achievement

The VM-7 Monitoring System features sustainable advancement. Lead-free soldering, disassembled-by-material design for easy recycling and ABS resin, which does not generate harmful gas if it is burned, are the few examples.

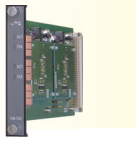
※ For details of specifications, outline drawings, or model code numbers, go to the Shinkawa Sensor Technology website (http://www.sst-shinkawa.co.jp).

MONITOR MODULES

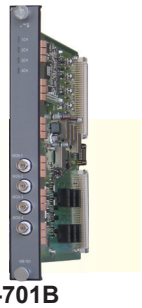
VM-75□B
Power Supply Module



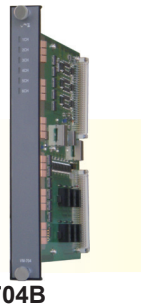
VM-741B
Local Communication & Phase Marker Module



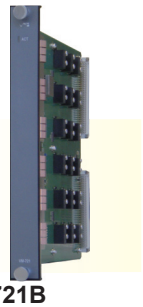
VM-742B
Network Communication Module



VM-701B
Vibration/Displacement Monitor Module



VM-704B
Temperature Monitor Module



VM-721B
18-Channel Relay Module

○ VM-76□B Instrument Rack

6U, 19 in.
482.6 (W) x 265.9 (H) x 350 (D) mm

VM-761B – Features European I/O terminal type.
VM-762B*1 – Features D-sub I/O connector type.

(*1 Under development)

○ VM-75□B Power Supply Module

Rated voltage types: 100-240 VAC, 24 VDC*2 or 110 VDC
Up to two power supply modules can be mounted on a rack for redundant power supply.

(*2 Under development)

○ VM-741B Local Communication & Phase Marker Module

Transmits data from back communication port to local display PC via dedicated Ethernet to display bar graphs of measured values and alarm status.

(Requires VM-771B MCL View installed on display PC.)

Also, communicates with service PC via front USB port for configuration of monitor module.

(Requires VM-772B Device Config installed on service PC.)

○ VM-742B Network Communication Module

Communicates data between the VM-7 Monitoring System and DCS, PLC or to most any control systems. It also provides communications direct with the infiSYS View Station for data analysis.
For DCS, measured values, analysis data (0.5X, 1X, 2X, Not-1X)*3 and alarm status are output via Ethernet using Modbus/TCP protocol or RS-485 using Modbus/RTU.
For the infiSYS View Station, measured values, analysis data*3 and waveform data*3 are output via dedicated Ethernet.

(*3 Available with the optional analysis boards installed on vibration monitor modules.)

○ VM-70□B Monitor Module

Receives input signals from various transducers, including vibration/displacement transducers, acceleration/velocity transducers, thermocouples and RTD, processes them according to the monitoring parameters, and outputs the measured values and alarm contact.

Six alarm relays are available for each monitor module.
If the optional analysis board is installed on VM-701B or VM-702B, it performs analysis based on the received phase marker signals (max. 4 channels per rack) and vibration waveform signals (max. 44 channels per rack), and then transmits the analysis data to the infiSYS View Station via VM-742B.

Note: For monitoring parameters and the number of channels of each

○ VM-721B 18-Channel Relay Module

Provides 18 alarm contacts that are independent from monitor modules.
Users can program AND/OR or 2 out of 3 logics with any channels of any modules within the rack.

MONITORING PARAMETERS

Monitor Module		Monitoring Parameter	Number of Inputs	Number of Outputs	Input Transducer
VM-701B Vibration / Displacement Monitor Module		Displacement Vibration	4	4	FK or VK
		Velocity Vibration	4	4	CV
		Acceleration Vibration	4	4	CA
		Dual Path Vibration	2	4	CV or CA
		Thrust Position	4	4	FK or VK
		Differential Expansion (Single Input)	4	4	FK or VK
		Ramp Differential Expansion	4	2	FK or VK
		Complementary Input Differential Expansion	4	2	FK or VK
		Case Expansion/Complementary Expansion	3	3	FK, VK & LS + VM-21
		Case Expansion	4	4	LS + VM-21
		Valve Position	4	4	LS + VM-21
VM-702B Absolute Vibration Monitor Module		Shaft Relative Vibration and Shaft Absolute Vibration or Casing Vibration	4*1	4*2	FK or VK & CV (2 systems)
VM-703B Tachometer & Eccentricity Monitor Module	CH1 CH2	Rotor Speed	2	2	FK, RD or MS
	CH2	Rotor Acceleration	0	1	Rotor Speed of CH1
	CH1 & CH2	Reverse Rotation	2	2	FK, RD or MS
	CH3	Eccentricity	1	2	FK or VK
VM-704B Temperature Monitor Module		Temperature	6	6	TC or RTD
VM-706B Rod Drop Monitor Module		Rod Drop	4 1 (PM)	4	FK or VK & RD

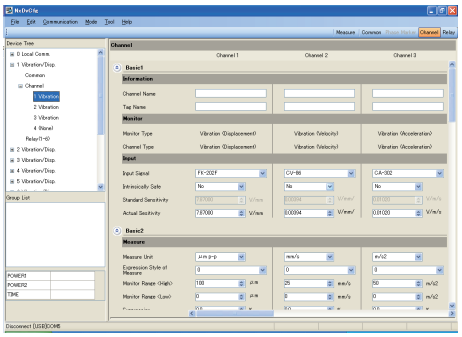
***1) 2 sets of 2 inputs for 2 measuring points.**
***2) 2 sets of 2 outputs for 2 measuring points.**

SOFTWARE

○ VM-771B MCL View

MCL View displays measurement values and other monitoring status of each module. (Software installation is required.)

Bar graph screen
(current value display) ▶



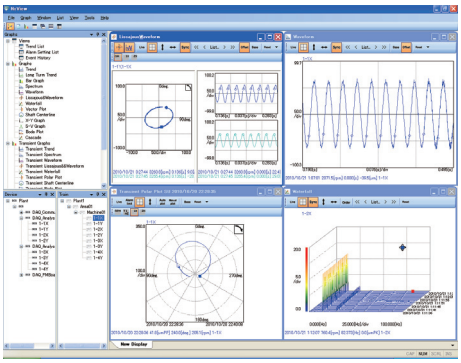
○ VM-772B Device Config

Device Cofig allows users to configure the monitoring system in or out of the field.
PC can be connected to the USB port of the rack.

◀ Device Config screen

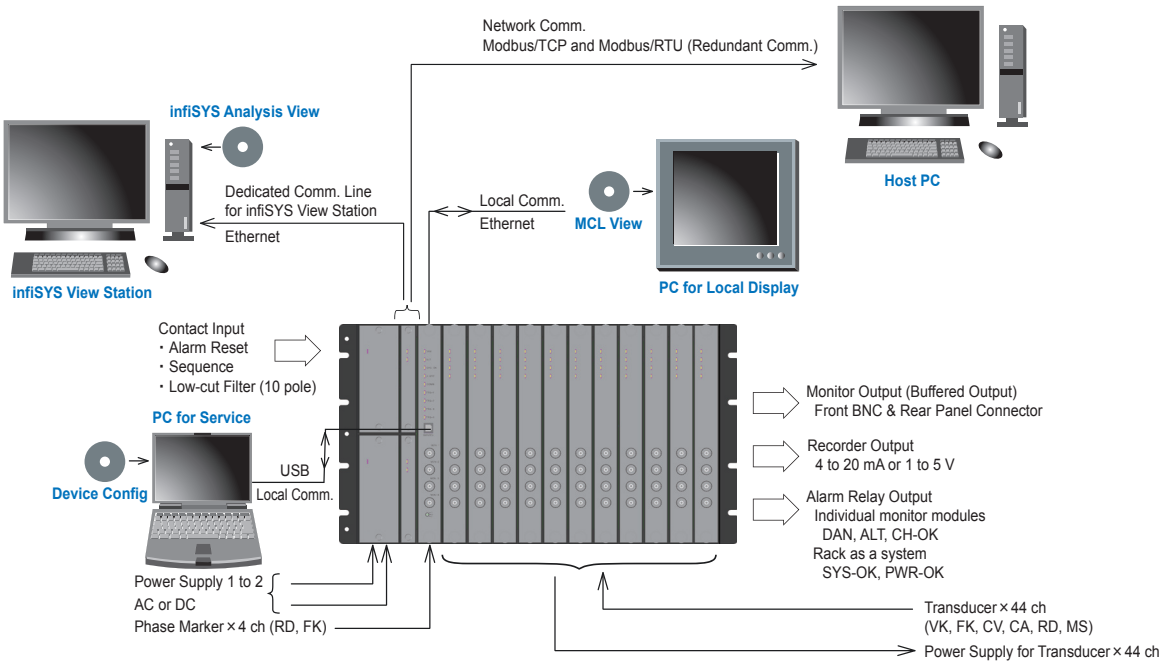
○ VM-773B infiSYS Analysis View

infiSYS Analysis View displays measured values, analysis plots and diagnostic results.
Note; optional analysis board must be specified when ordering to obtain analysis and diagnostic functions, i.e., VM-701B/ALY or VM-702B/ALY.



infiSYS View Station Screen ▶

TYPICAL SYSTEM CONFIGURATION



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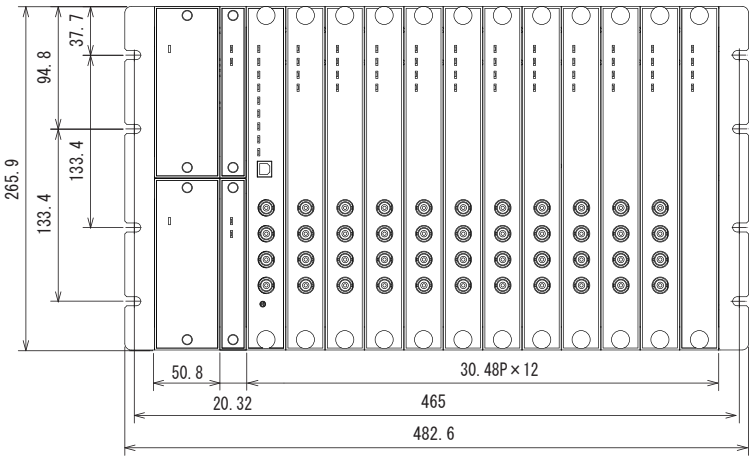
PRIMARY SPECIFICATIONS

Module	Item	Specifications
Instrument Rack	Size	482.6 (W) × 265.9 (H) × 350.0 (D) mm
	Max. number of Mountable Modules	・Power Supply Module･･･2 ・Network Communication Module･･･2 ・18-Channel Relay Module･･･1 ・Local Communication & Phase Marker Module･･･1 ・Monitor Module･･･11 * For module and mountable slot number, refer to the chart on page 6, “MOUNTABLE MODULE SLOT NUMBER”.
Power Supply Module	Power (rating)	100-240 VAC / 110 VDC / 24 VDC (Module for 24 VDC is under development.)
Local Communication & Phase Marker Module	Phase Marker Input	RD-05A or FK-202F Transducer × 4 channels
	Communication Port	Front USB × 1 (for PC for service and maintenance purpose) Rear Ethernet 100 Base-TX × 1 (for PC for permanent display)
	Software Screen View	* MCL View installation on PC required. [Bar graph screen] (current value display): Measured value (numeric and bar graph displays), GAP (bias) voltage indication, alarm setting value, alarm status, channel bypass status, danger bypass status, Power OK status, tag name, serial No., channel name [Train screen]: Machine train diagram, measured value, alarm setting value [Trend graph screen]: Cursor function [Relay status screen]: Relay status, relay logic
Monitor Module	Digital Display Accuracy (on Display Software for PC)	Vibration/displacement/eccentricity: ±1.0% of F.S. at 25 ℃ / ±2.0% of F.S. at 0 to 65 ℃ Rotation speed: ±(0.003% of rdg. + 1 digit) at 25 ℃ / ±(0.03% of rdg. + 1 digit) at 0 to 65 ℃ Temperature: ±(1.0% of F.S. + 1℃) at 25 ℃ / ±(2.0% of F.S. + 1℃) at 0 to 65 ℃
	Recorder Output (4 to 20 mA or 1 to 5 V)	Vibration/displacement/eccentricity: ±1.0% of F.S. at 25 ℃ / ±2.0% of F.S. at 0 to 65 ℃ Rotation speed: ±1.0% of F.S. at 25 ℃ / ±2.0% of F.S. at 0 to 65 ℃ Temperature: ±(1.0% of F.S. + 1℃) at 25 ℃ / ±(2.0% of F.S. + 1℃) at 0 to 65 ℃
	Number of Alarm Contact Outputs	SPDT × 6 points
	Vibration Analysis Capability (Available with analysis board installed)	Number of points of vibration analysis: Up to 44 points* (vibration channels of VM-701B) * When 11 modules are installed. Analysis item: Amplitude : 0.5X, 1X, 2X, nX1*, nX2*, nX3*, nX4*, Not-1X, Sp-p max Phase : 0.5X, 1X, 2X, nX1*, nX2*, nX3*, nX4* * nX amplitude and phase can be monitored on the infiSYS View Station.
18-Channel Relay Module	Number of Alarm Contact Output	SPST × 18 points
Network Communication Module	Communication Protocol	Modbus/TCP: Ethernet 10 Base-T / 100 Base-TX (communication ports at rear side) Modbus/RTU: RS-485
	Communication Item	・Measured value ・Gap voltage ・Danger alarm status ・Alert alarm status ・OK alarm status ・Danger Bypass status ・Danger & Alert Set value ・OK limits set value ・Alarm set multiplier status ・Low-cut filter (10 pole) ON/OFF status ・Power-OK status ・Analysis data (available with analysis board installed): amplitude and phase of 0.5X, 1X and 2X and amplitude of Not-1X

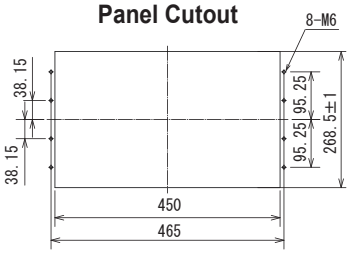
OUTLINE DRAWING OF THE RACK

Dimension : mm

VM-76☐B Instrument Rack Frontpanel View

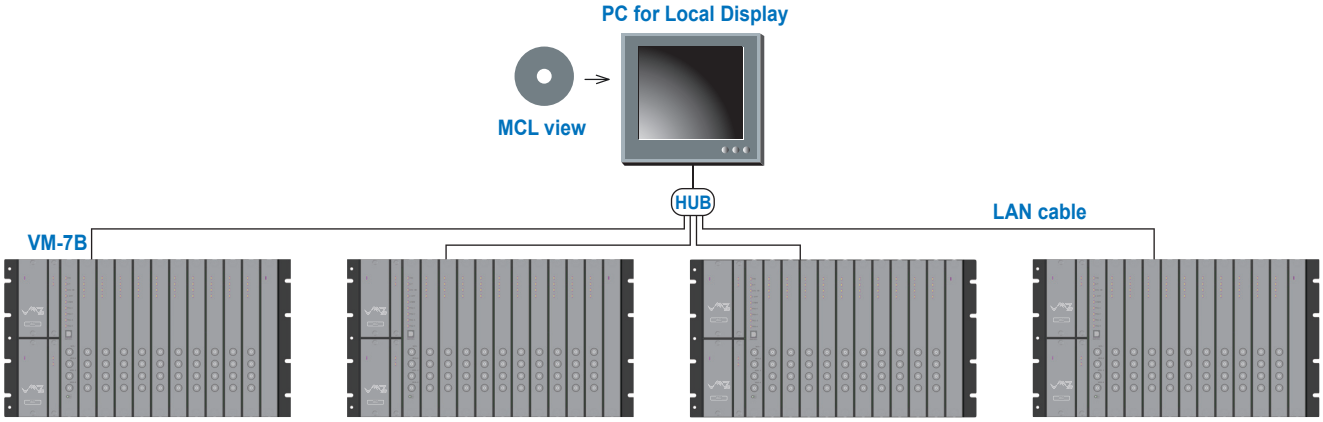


Panel Cutout

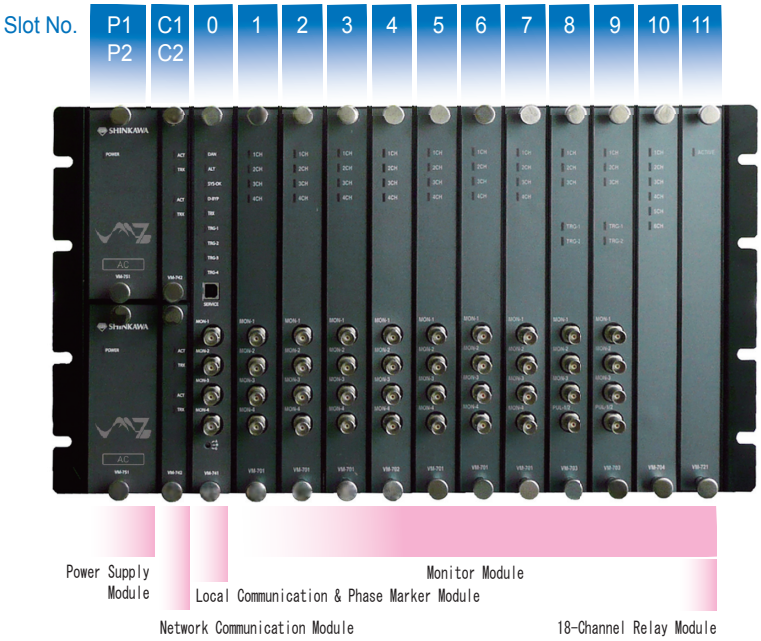


LOCAL PC CONNECTION

Up to 4 VM-76☐B instrument racks can be connected to local PC. (MCL View software installation is required.)



MOUNTABLE MODULE SLOT NUMBER



Module	Slot No.															
	P1	P2	C1	C2	0	1	2	3	4	5	6	7	8	9	10	11
VM-75☐1B Power Supply Module (primary)	○															
VM-75☐2B Power Supply Module (secondary)		○														
VM-742B Network Communication Module			○	○												
VM-741B Local Communication&Phase Marker Module					○											
VM-701B Vibration/Displacement Monitor Module						○	○	○	○	○	○	○	○	○	○	○
VM-702B Absolute Vibration Monitor Module						○	○	○	○	○	○	○	○	○	○	○
VM-703B Tachometer&Eccentricity Monitor Module						○	○	○	○	○	○	○	○	○	○	○
VM-704B Temperature Monitor Module						○	○	○	○	○	○	○	○	○	○	○
VM-706B Rod Drop Monitor Module						○	○	○	○	○	○	○	○	○	○	○
VM-721B 18-Channel Relay Module																○
VZ-71 30mm (W) Blank Panel					– *1	○	○	○	○	○	○	○	○	○	○	○
VZ-75 20mm (W) Blank Panel			○	○												
VZ-76 50mm (W) Blank Panel	– *2	○														

***1) Local Communication & Phase Marker Module is installed in slot 0 with any rack design.**

***2) Primary power supply is installed in slot P1.**

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Published in Jul. 2011

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* Specifications, outline drawings and other written information can be changed without notice.

Printed in Japan 11009E1.2-11XXX