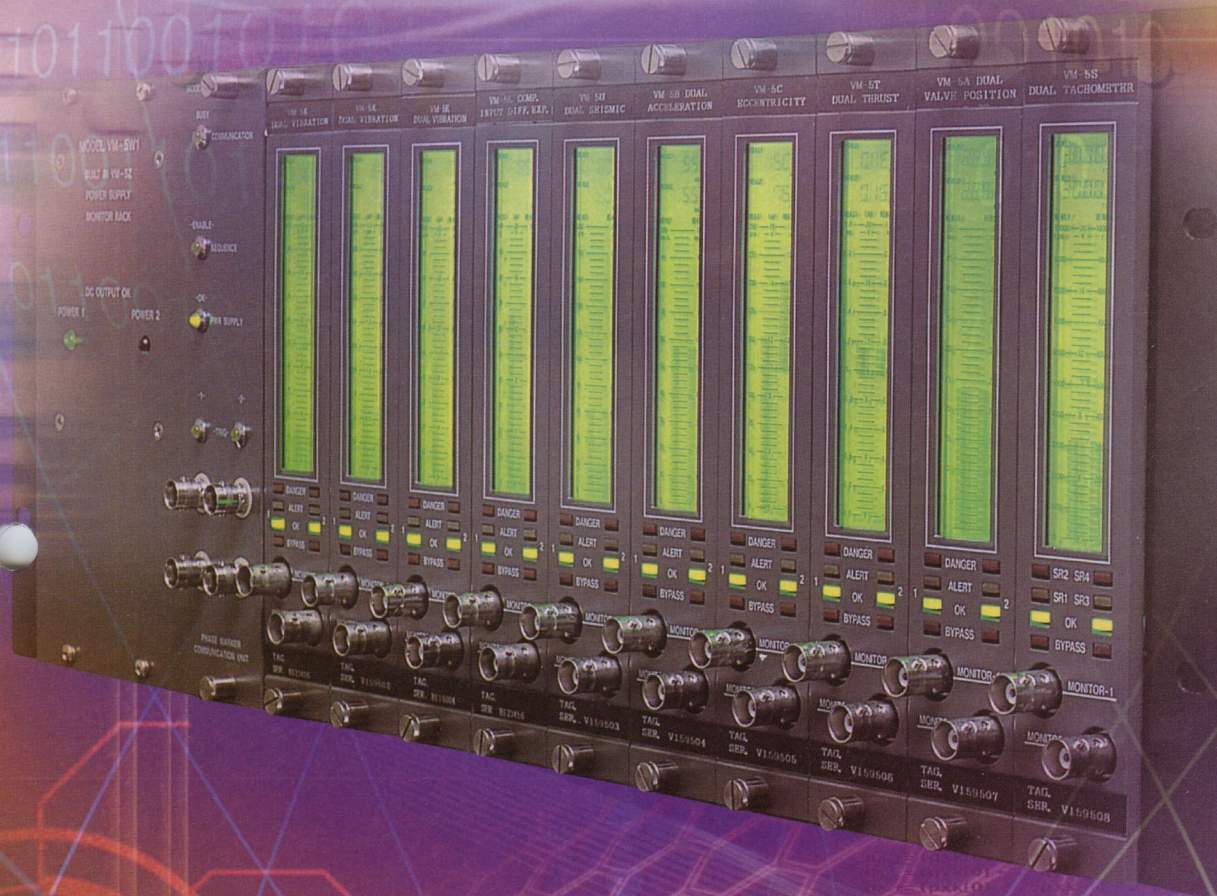


VM-5

series

MONITOR

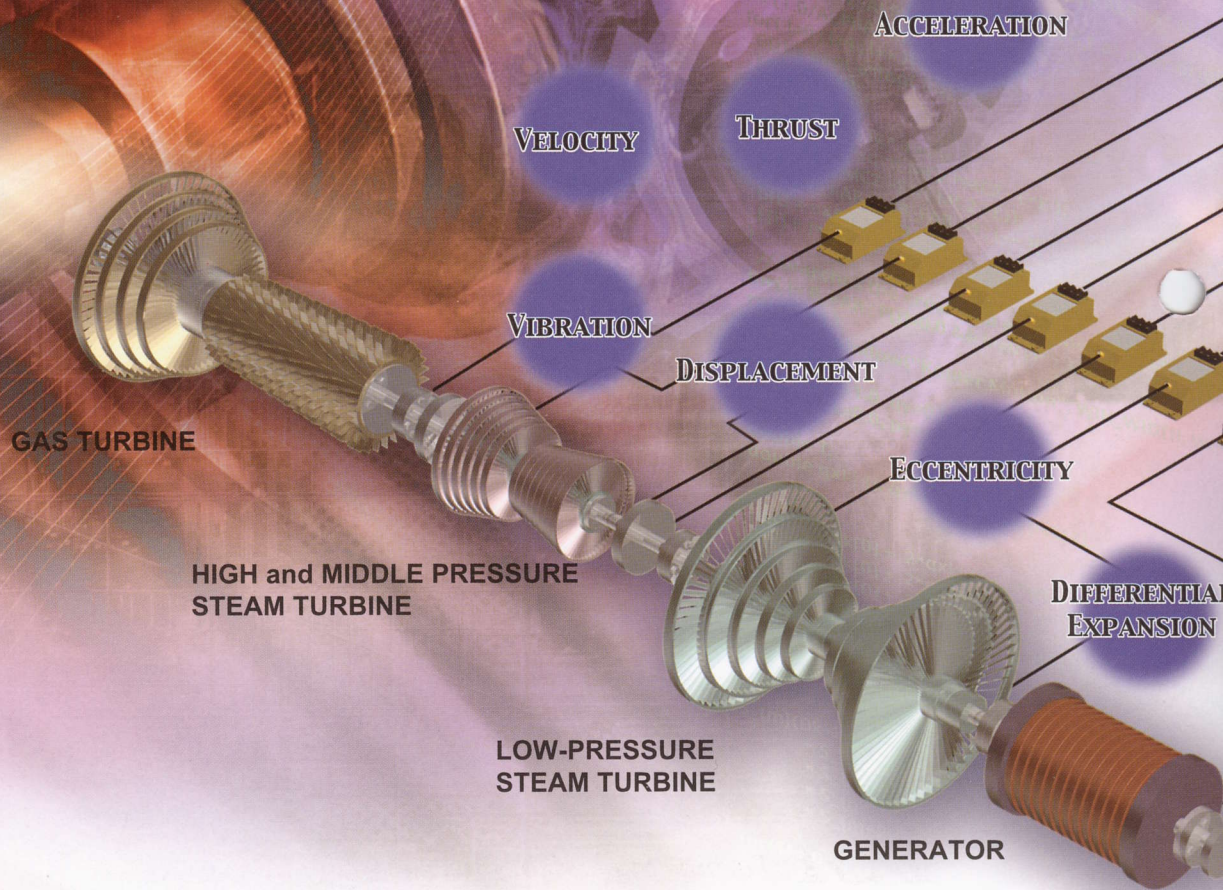


SHINKAWA Sensor Technology, Inc.

MONITORING SYSTEM FOR ALL ROTATING MACHINERY

VM-5 SERIES MONITOR

The VM-5 Series Monitors are designed in accordance with the American Petroleum Institute (API) Standard 670 for use on rotating machinery. The 8-slot and 10-slot Rack Mounting types, and the Single Unit type with a built-in power supply, are available so that these Monitors can flexibly respond to any system design from medium- and small-scale rotating machinery to TSI (Turbine Supervisory Instrumentation) for generator purpose large turbines. In addition, the designs are user-friendly so that all operations and checks can be performed from the Monitor fronts without stopping operation. They also include all functions necessary for monitoring various variables of rotating machinery from displacement and vibration to zero-speed, thereby enabling any system design corresponding to the machinery type and scale.



NG MACHINERY, FROM LARGE TO SMALL

MONITOR FOR TSI, VM-5

The VM-5 Series provides 18 different Monitor units, including vibration, displacement and rotation. Several types of failure detection features are available. Especially for TSI (Turbine Supervisory Instrumentation) and other large rotating machinery, essential items, such as vibration, shaft position, eccentricity and differential expansion are precisely monitored.



➔ RV-100 Large Rotating Machinery Analysis / Diagnostics System or Host PC.

VM-5 series Monitor

TRANSDUCERS
(VK series, CV/CA series, LVDT, RD series, MS series)

FLEXIBLE CONFIGURATION

VM-5 consists of the Monitor unit, relay module, power supply unit and instrument rack. The instrument rack is available in Rack Mounting types (VM-5H3, VM-5W1) and Single Unit type (VM-5G). Flexible selection depends upon the size of the target.

TEMPERATURE

CASE EXPANSION

VALVE POSITION

ROTATION

REVERSE ROTATION

INPUT SENSOR

SHINKAWA transducer products for input for the VM-5 Series have an excellent reputation and high reliability. The specification of each sensor can fit all requests, and stable monitoring conditions are guaranteed.

TSI Turbine Supervisory Instrumentation

VM-5 SERIES

1 DATA COMMUNICATION

Through the use of the VM-5P Communication / Phase Marker Unit or VM-53 Dual Communication Unit, measurement data and status data can be output to PC. Additionally, alarm settings can be done from a PC.

2 RELIABLE HIGH QUALITY SYSTEM

The VM-5W1 Dual Power Supply Instrument Rack can hold two VM-5Z Power Supply Units. Therefore, in case one power supply fails, power is still provided. The VM-5Z0 Power Supply Backup Module Unit supports system operation in case of power failure, for up to 0.2 sec., and occurs during maximum load conditions.

3 ANALYSIS, DIAGNOSIS SYSTEM

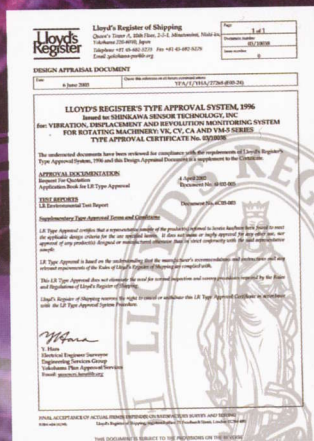
Using the RV-100 Large Rotating Machinery Analyzing System, detailed diagnosis of rotating machinery failure is possible.
* Look at the SHINKAWA home page about the RV-100 system.



Flexible Configuration for All Rotating

4. APPROVALS

For ease of operation in all applications, the VM-5 has acquired and declared various standards for inside and outside the country, such as Shipping Classification and CE Marking Standards.



SHIPPING CLASSIFICATION STANDARD

The Shipping Classification Standard applies when using the VM-5 as an exclusive rotating machine surveillance meter. Approval must be authorized in each country in which the equipment is used.

- [NK] = Japan
- [KR] = South Korea
- [LR] = England (Lloyd Standard)

CE MARKING STANDARD

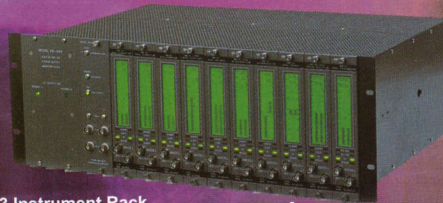
CE Marking is the mark upon which a pasting duty was imposed when circulating a product in the European market. The mark declares that the target product conforms to the European Community instruction demands.

System Composition

The VM-5 Series has two kinds of instrument racks – the Rack Mounting type, VM-5H3 (8-slot) and VM-5W1 (10-slot), and the Single Unit type with a built-in power supply.

Installation

With the Rack Mounting type, install Monitor units into the front panel, and related module units into the rear panel. The communication unit and power supply unit are also installed into the rear panel. The Single Unit rack comes with a preinstalled relay module, so additional module unit installment is unnecessary.



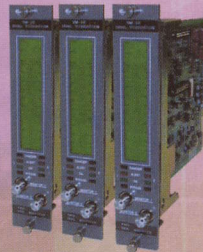
VM-5H3 Instrument Rack
VM-5W1 Dual Power Supply
Instrument Rack



VM-5G
Single Unit Instrument Rack

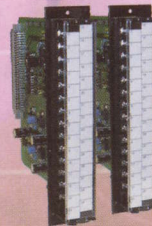
Machinery

MONITOR UNIT



- VM-5K Dual Vibration Monitor
- VM-5U Dual Seismic Monitor
- VM-5B Dual Acceleration Monitor
- VM-5M Dual Path Monitor
- VM-5C Eccentricity Monitor
- VM-5T Dual Thrust Monitor
- VM-5D Dual Differential Expansion Monitor
- VM-5N Ramp Differential Expansion Monitor
- VM-5L Complementary Input Differential Expansion Monitor
- VM-5J Case Expansion/Complementary Differential Expansion Monitor
- VM-5E Dual Case Expansion Monitor
- VM-5A Dual Valve Position Monitor
- VM-5S Dual Tachometer
- VM-5Q Reverse Rotation Monitor
- VM-5R Tachometer
- VM-51 Rod Drop Monitor
- VM-52 Bottom Hold Monitor
- VM-5F Dual Temperature Monitor
(*Not applicable for VM-5G rack)

MODULE UNIT



* Module units cannot be installed in the VM-5G Rack.

- VM-5Y Relay Module Unit
- VM-5X Interface Unit
- VM-5P Communication / Phase marker Unit
- VM-53 Dual Communication Unit
- VM-5Z Power Supply Unit
- VM-5Z0 Power Supply Backup Module Unit

VM-5 SERIES

VM-5 SERIES

MONITOR UNIT

VM-5 Series Monitor units are installed into the front panel of each instrument rack. The LCD display, each display light, and BNC output terminals neatly fit in the slim face panel. (Display styles vary.)

Bar graphs and digital measurement value indications are used on the display, and are easily readable. Bar graphs are also used to indicate DANGER and ALERT. These are also shown clearly. When the alarm sounds, each alarm LED is lit, and therefore easily visually confirmed.

Common Specification

RECORDER OUTPUT	Voltage or current output proportional to monitor range. 1 to 5VDC (Output impedance: 250Ω) 4 to 20mADC (Max. load resistance: 500Ω) Option: 0 to -10VDC, 0 to 10VDC, 0 to -5VDC, 0 to 5VDC (Output impedance: 100Ω) Output point : 2 points
MONITOR OUTPUT (FROM FRONT, REAR PANEL)	Input signal is output via a buffer amplifier. Output impedance: Approx. 100Ω
OPERATING TEMPERATURE	0 to 65 deg.C



Vibration	VM-5K	Dual Vibration Monitor
	VM-5U	Dual Seismic Monitor
	VM-5B	Dual Acceleration Monitor
	VM-5M	Dual Path Monitor
Eccentricity Displacement	VM-5C	Eccentricity Monitor
	VM-5T	Dual Thrust Monitor
Differential Expansion	VM-5D	Dual Differential Expansion Monitor
	VM-5N	Ramp Differential Expansion Monitor
	VM-5L	Complementary Input Differential Expansion Monitor
	VM-5J	Case Expansion/Complementary Differential Expansion Monitor
	VM-5E	Dual Case Expansion Monitor
Rotation	VM-5A	Dual Valve Position Monitor
	VM-5S	Dual Tachometer
	VM-5Q	Reverse Rotation Monitor
Temperature	VM-5R	Tachometer
	VM-5F	Dual Temperature Monitor
Others	VM-51	Rod Drop Monitor
	VM-52	Bottom Hold Monitor

VIBRATION

VM-5K Dual Vibration Monitor

Inputs signals from the VK Series Vibration Transducers corresponding to 2 channels. Simultaneously provides 2 points of shaft vibration monitoring within one unit.

VM-5B Dual Acceleration Monitor

Inputs signals form the CA Series Acceleration Transducer corresponding to 2 channels.

VM-5U Dual Seismic Monitor

Inputs signals from the CV Series Velocity Transducer corresponding to 2 channels.

VM-5M Dual Path Monitor

Simultaneously monitors the velocity/acceleration and displacement/velocity vibration of rotating machinery detected by CV Series Velocity Transducer or CA Series Acceleration Transducer. Detects machine failures early on and informs the operator of these failures.

	VM-5K Dual Vibration Monitor	VM-5U Dual Seismic Monitor	VM-5B Dual Acceleration Monitor	VM-5M Dual Path Monitor
INPUT TRANSDUCER	VK series, VC series	CV series	CA series	CV series, CA series
INPUT POINT	2 points			1 point
MONITOR RANGE	0 to 500 μm pk-pk (0 to 15 mils pk-pk)	0 to 500 μm pk-pk (0 to 20 mils pk-pk) or 0 to 50 mm/s pk (0 to 2 in/s pk) or 0 to 50 mm/s rms (0 to 2 in/s rms)	0 to 200 m/s^2 pk (0 to 20 G pk) or 0 to 100 mm/s pk (0 to 2 in/s pk) or 0 to 200 m/s^2 rms (0 to 20 G rms) or 0 to 100 mm/s rms (0 to 2 in/s rms)	0 to 200 m/s^2 (0 to 20 G) pk or rms or 0 to 50 mm/s (0 to 2in/s) pk or rms or 0 to 100 mm/s (0 to 2in/s) pk or rms or 0 to 500 μm pk-pk (0 to 20 mils pk-pk)
RECORDER OUTPUT CONVERSION ACCURACY	+/- 0.5% of F.S. at 100Hz at 25 deg.C +/- 2.0% of F.S. at 100Hz at 0 to 65 deg.C			
ALARM SET POINT	4 points (DANGER1, ALERT1, DANGER2, ALERT2)			

DISPLACEMENT

VM-5C Eccentricity Monitor

Monitors the shaft deflection (eccentricity pk-pk) of the turbine rotor at machine start-up and turning.

VM-5T Dual Thrust Monitor

Monitors the shaft position of rotating machinery. Inputs thrust displacement signals from the VK Series Transducers and monitors shaft position.

	VM-5C Eccentricity Monitor	VM-5T Dual Thrust Monitor
INPUT TRANSDUCER	VK series, RD series, MS series, VC series	VK series, VC series
INPUT POINT	2 points	
MONITOR RANGE	Monitor range : 0 to 1,000 μm pk-pk(0 to 50 mils pk-pk) Monitor range direct : -500 to 0 to +500 μm (- 25 to 0 to +25 mils)	-2.0 to 0 to +2.0 mm(-80 to 0 to +80 mils)
RECORDER OUTPUT CONVERSION ACCURACY	+/- 1.0% of F.S. at 25 deg.C +/- 2.0% of F.S. at 0 to 65 deg.C	+/- 0.5% of F.S. at 25 deg.C +/- 2.0% of F.S. at 0 to 65 deg.C
ALARM SET POINT	Eccentricity pk-pk : 2 points (DANGER1, ALERT1) Direct : 4 points (H-DANGER2, H-ALERT2, L-ALERT2, L-DANGER2)	8 points (H-DANGER1, H-ALERT1, L-ALERT1, L -DANGER1, H-DANGER2, H-ALERT2, L -ALERT2, L-DANGER2)

VM-5 SERIES

DIFFERENTIAL EXPANSION

VM-5D Dual Differential Expansion Monitor

Measures the differential expansion caused by thermal expansion of the rotor and casing. Inputs the expansion of the rotor away from the thrust bearing detected with the VK Series Transducer to measure the differential expansion.

VM-5L Complementary Input Differential Expansion Monitor

Measures the differential expansion caused by the thermal expansion of the rotor and casing. Receives input from two sensors installed in a complementary arrangement and can measure the differential expansion to twice the sensor range.

VM-5E Dual Case Expansion Monitor

Inputs the casing expansion signal from the LS Series LVDT Linear Variable Differential Transformer and displays them on LCDs.

VM-5N Ramp Differential Expansion Monitor

Measures the differential expansion caused by the thermal expansion of the rotor and casing. Inputs the expansion of the rotor detected by the VK Series Transducers installed on the rotor ramp away from the thrust bearing, then outputs the computed differential expansion, thereby eliminating the measurement error resulting from rotor lifting caused by oil film, etc.

VM-5J Case Expansion / Complementary Differential Expansion Monitor

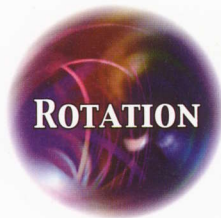
Measures differential thermal expansion between the rotor and case of rotating machinery. Accepts the output of the VM-5L Complementary Input Differential Expansion Monitor and the case expansion signal from the LVDT, performs compensation, and computes the differential expansion value.

VM-5A Dual Valve Position Monitor

Inputs the valve position signal from the LS Series LVDT linear Variable Differential Transformer and displays them on LCDs.

	VM-5D Dual Differential Expansion Monitor	VM-5N Ramp Differential Expansion Monitor	VM-5L Complementary Input Differential Expansion Monitor
INPUT TRANSDUCER	VK-143P, VK-263P, VC series		
INPUT POINT	2 points		
MONITOR RANGE	-10 to 0 to +10mm (-0.5 to 0 to +0.5inch) or 0 to 20mm(0 to 1.0inch)	-25 to 0 to +25mm (-1.0 to 0 to +1.0inch) or 0 to 50mm(0 to 2.0inch)	0 to 75mm (0 to 2.0inch) or -25 to 0 to +25mm (-1.0 to 0 to +1.0inch)
RECORDER OUTPUT CONVERSION ACCURACY	+/- 0.5% of F.S. at 25 deg.C +/- 2.0% of F.S. at 0 to 65 deg.C		
ALARM SET POINT	8 points (H-DANGER1, H-ALERT1, L-ALERT1, L-DANGER1, H-DANGER2, H-ALERT2, L-ALERT2, L-DANGER2)	4 points (H-DANGER, H-ALERT, L-ALERT, L-DANGER)	

	VM-5J Case Expansion / Complementary Differential Expansion Monitor	VM-5E Dual Case Differential Monitor	VM-5A Dual Valve Position Monitor
INPUT TRANSDUCER	CH1:1 to 5V CH2:-10 to 0 to +10V	VM-11P	
INPUT point	2 points		
MONITOR RANGE	CH1:-7 to 0 to +12mm CH2:0 to +50mm	0 to 100mm (0 to 4.0inch)	0 to 300mm
RECORDER OUTPUT CONVERSION ACCURACY	CH1: +/- 1.0% of F.S. at 25 deg.C +/- 2.0% of F.S. at 0 to 65 deg.C CH2: +/- 0.5% of F.S. at 25 deg.C +/- 2.0% of F.S. at 0 to 65 deg.C	+/- 0.5% of F.S. at 25 deg.C +/- 2.0% of F.S. at 0 to 65 deg.C	
ALARM SET POINT	4 points (H-DANGER, H-ALERT, L-ALERT, L-DANGER)	8 points (H-DANGER1, H-ALERT1, L-ALERT1, L-DANGER1, H-DANGER2, H-ALERT2, L-ALERT2, L-DANGER2) In case of differential operation, 4 points (H-DANGER, H-ALERT, L-ALERT, L-DANGER)	8 points (H-DANGER1, H-ALERT1, L-ALERT1, L-DANGER1, H-DANGER2, H-ALERT2, L-ALERT2, L-DANGER2)



VM-5S Dual Tachometer

Monitors the rotor speed of the shaft and zero-speed.

VM-5R Tachometer

Monitors the rotor speed and rotor acceleration of the shaft, and can set speed comparison values to the rotor velocity or rotor acceleration independently.

VM-5Q Reverse Rotation Monitor

Provides detection of reverse revolutions, indicating peak reverse speed values that have occurred.

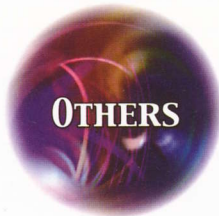
	VM-5S Dual Tachometer	VM-5Q Reverse Rotation Monitor	VM-5R Tachometer
INPUT TRANSDUCER	VK series, RD series, MS series, VE series, VC series	VK series, RD series, VE series, VC series	VK series, RD series, MS series, VE series, VC series
INPUT POINT	2 points		1 point
MONITOR RANGE	Up to 99,999rpm	Forward or Reverse, Up to 20,000rpm	Velocity : 20,000rpm Acceleration : -9,999 to +9,999rpm/min
RECORDER OUTPUT CONVERSION ACCURACY	+/- 0.5% of F.S. at 25 deg.C +/- 2.0% of F.S. at 0 to 65 deg.C		Velocity : +/- 0.5% of F.S. at 25 deg.C +/- 2.0% of F.S. at 0 to 65 deg.C Acceleration : +/- (20rpm/F.S.) x100 +/- 0.5% of F.S. at 25 deg.C +/- (20rpm/F.S.) x100 +/- 2.0% of F.S. at 0 to 60 deg.C
SPEED RELAY SET POINT	4 points (SR1, SR2, SR3, SR4)	Forward (SR1, SR2) Reverse (SR3, SR4)	4 points (SR1, SR2, SR3, SR4)



VM-5F Dual Temperature Monitor

This monitor is designed to monitor the temperature of rotating machinery. It inputs signals from grounded/non-grounded thermocouples, or 3-wire/4-wire RTDs and displays them on LCDs.

	VM-5F Dual Temperature Monitor
INPUT TRANSDUCER	Thermocouple or RTD
INPUT POINT	2 points
MONITOR RANGE	0 to 1,000 deg.C (0 to 2,000 deg.F)
RECORDER OUTPUT CONVERSION ACCURACY	<=500 deg.C (1,000 deg.F) of monitor range : +/- 1.0 deg.C (1.8deg.F) +/- 0.5% of F.S. >500 deg.C (1,000 deg.F) and <= 1,000 deg.C (00 deg.F) of monitor range : +/- 2.0 deg.C(3.6 deg.F) +/- 0.5% of F.S.
ALARM RELAY SET POINT	8 points (H-DANGER1, H-ALERT1, L-ALERT1, L-DANGER1, H-DANGER2, H-ALERT2, L-ALERT2, L-DANGER2)



VM-51 Rod Drop Monitor

Monitors the gap between the piston rod set as the target and the sensing surface of the sensor for rod drop measurement (VK / VC) so as to synchronize with the phase marker, and then converts the gap thus measured to the amount of rider ring abrasion.

VM-52 Bottom Hold Monitor

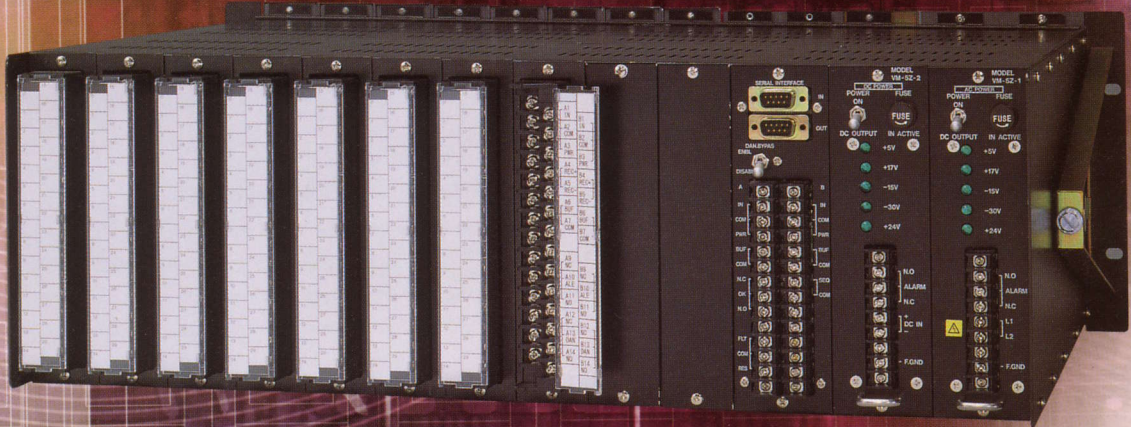
Monitors the gap between the piston set as the target and the sensing surface of the sensor for rider ring abrasion measurement (PK) to obtain the amount of abrasion.

	VM-51 Rod Drop Monitor	VM-52 Bottom Hold Monitor
INPUT TRANSDUCER	VK series	PK-452P, VK-452A
INPUT POINT	2 points	
MONITOR RANGE	0 to 10.0mm	0 to 4.5mm
RECORDER OUTPUT CONVERSION ACCURACY	+/- 1.0% of F.S. at 25 deg.C +/- 2.0% of F.S. at 0 to 65 deg.C	
ALARM RELAY SET POINT	8 points (H-DANGER1, H-ALERT1, L-ALERT1, L-DANGER1, H-DANGER2, H-ALERT2, L-ALERT2, L-DANGER2)	

VM-5 SERIES

MODULE UNIT

This unit is available in several different styles - Relay, Interface, Communication, Phase Marker, Power Supply unit, etc., and provides high functioning and reliability. To use, install into the front or rear panel of the instrument rack (VM-5H3 Instrument Rack or VM-5W1 Dual Power Supply Instrument Rack).



VM-5 SYSTEM COMBINATION				VM-5G SINGLE UNIT INSTRUMENT RACK	VM-5H3 INSTRUMENT RACK	VM-5W1 DUAL POWER SUPPLY INSTRUMENT RACK
MONITOR	VIBRATION	VM-5K	Vibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5U	Velocity Vibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5B	Acceleration Velocity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5M	Velocity Acceleration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	DISPLACEMENT	VM-5C	Eccentricity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5T	Thrust	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	DIFFERENTIAL EXPANSION	VM-5D	Differential Expansion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5N	Differential Expansion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5L	Differential Expansion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5J	Differential Expansion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5E	Expansion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5A	Valve Position	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	ROTATION	VM-5S	Rotation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5Q	Reverse Rotation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5R	Rotation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TEMPERATURE	VM-5F	Temperature		VM-5Y7	VM-5Y7	
OTHERS	VM-51	Rod Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	VM-52	Bottom Hold	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
RELAY		VM-5Y		<input type="checkbox"/>	<input type="checkbox"/>	
INTERFACE		VM-5X		<input type="checkbox"/>	<input type="checkbox"/>	
COMMUNICATION PHASE MARKER		VM-5P		<input type="checkbox"/>	<input type="checkbox"/>	
		VM-53		<input type="checkbox"/>	<input type="checkbox"/>	
POWER SUPPLY		VM-5Z		<input type="checkbox"/>	<input type="checkbox"/>	
		VM-5Z0		<input type="checkbox"/>	<input type="checkbox"/>	

VM-5Y1,2,3

Relay Module Unit

These units are designed for use with VM-5 Series Monitors. Mounted on the rear panel of the VM-5H3 or VM-5W1 Instrument Rack, they output contact signals such as input abnormal, alert and danger alarms for sequence control. Using 10mm-pitch two column large-sized terminal block, there is no complicated wiring involved.

STANDARD SPECIFICATION

RELAY POINT	4 points (DANGER1, ALERT1, DANGER2, ALERT2) 2 points (DANGER, ALERT) 6 points (DANGER1, ALERT1, DANGER2, ALERT2, OK1, OK2)	CONTACT LIFE	100,000 times or greater (rated load)
POWER OUTPUT FOR TRANSDUCER	4mA, 24VDC (Input code : 1) -24VDC, 40mA (Input code 2)	PROTECTIVE CONSTRUCTION	Plastic Seal
CONTACT RATING (Load resistance)	250VAC, 5A 30VDC, 5A	TEMPERATURE RANGE	Operating Temperature : 0 to 65 deg.C Storage Temperature : -30 to +85 deg.C Relative Humidity : 20 to 95%RH (non-condensing)
		WEIGHT	Max. 0.4kg

VM-5Y4,5,6

Relay Module Unit

These units are the connector type Relay Module. Mounted on the rear panel of the VM-5H3 or VM-5W1 Instrument Rack, VM-5Y4 and 6 can output the recorder output and alarm output signal, and VM-5Y5 can output the buffer output and alarm output signal through the D-sub connector. They also output contact signals of the sequence control for input abnormal, alert and danger alarms from the terminal block. An arc suppressor (optional) absorbs the arc discharge between contacts to prevent damage to the internal circuits.

STANDARD SPECIFICATION

RELAY POINT	5 points (DANGER1, ALERT1, DANGER2, ALERT2, OK)	INPUT/OUTPUT CONNECTOR TERMINAL BLOCK (VM-5Y4.6)	D-Sub 9P connector 1pc CN1 : Recorder output 2CH Alarm output L : -1 to +1V H : 4V to 6V OK, ALERT, DANGER 2 points each
POWER OUTPUT FOR TRANSDUCER (VM-5Y4.5)	Input code 1 : 2-wire constant current power supply : 4mA, 24VDC Input code 2 : -24VDC, 40mA		
POWER OUTPUT FOR PICKUP (VM-5Y6)	+12VDC, 40mA	(VM-5Y5)	D-Sub 9P connector 1pc CN1 : Buffer output 1CH Alarm output L : -1 to +1V H : 4V to 6V OK 1point, ALERT, DANGER 2 points each
CONTACT RATING (Load resistance)	250VAC, 5A 30VDC, 5A		
CONTACT LIFE	100,000 times or greater (rated load)		
PROTECTIVE CONSTRUCTION	Plastic Seal		
TEMPERATURE RANGE	Operating Temperature : 0 to 65 deg.C Storage Temperature : -30 to +85 deg.C Relative Humidity : 20 to 95%RH (non-condensing)		
WEIGHT	Max.0.4 kg		
			Terminal block 16pc Input transducer : 2CH Contact output (OR state of CH1 and 2) ALERT, DANGER 2 points each
			Terminal block 16P Input transducer : 1CH Contact output : OK1 point, ALERT, DANGER 2 points each
			Recorder output : 1CH

* That module units can not correspond to isolation recorder output specification.

VM-5Y7

RELAY MODULE UNIT

Designed for use with the VM-5F Dual Temperature Monitor. Mounted on the rear panel of the VM-5H3 or VM-5W1 Instrument Rack, it outputs a contact signal of sequence control for alert and danger alarms.

STANDARD SPECIFICATION

RELAY POINT	4 points (DANGER1, ALERT1, DANGER2, ALERT2)	TEMPERATURE RANGE	Operating Temperature : 0 to 65 deg.C Storage Temperature : -30 to +85 deg.C Relative Humidity : 20 to 95%RH (non-condensing)
CONTACT RATING (Load resistance)	250VAC, 5A 30VDC, 5A	WEIGHT	Max. 0.4kg
CONTACT LIFE	100,000 times or greater (rated load)		
PROTECTIVE CONSTRUCTION	Plastic Seal		

VM-5X1,2,3 INTERFACE UNIT

Distribute and output the recorder output from the VM-5 Series Monitor Units. They also output analog signals distributed from the VM-5X2,3 Interface Unit I/O module mounted on the rear panel of the VM-5H3 or VM-5W1 Instrument Rack. Using a 10mm-pitch two column large-sized terminal block, there is no complicated wiring (VM-5X2). The VM-5X3 Interface Unit I/O Module (connector type) outputs recorder output from the D-sub connector.

STANDARD SPECIFICATION (VM-5X1)

INPUT	1 to 5VDC or 4 to 20mADC Input point : 2 points
INPUT IMPEDANCE	1 to 5VDC : Approx. 1M Ω 4 to 20mADC : Approx. 250 Ω
OUTPUT	Voltage or current output proportional to input 1 to 5VDC (Output impedance 250 Ω) 4 to 20mADC (Max. load resistance : 500 Ω) Output point : 8 points (4 output points per 1 input point)
OUTPUT CONVERSION ACCURACY	+/- 0.5% of F.S. at 25 deg.C +/- 2.0% of F.S. at 0 to 60 deg.C
TEMPERATURE RANGE	Operating temperature : 0 to 65 deg.C Storage temperature : -30 to +85 deg.C Relative humidity range : 20 to 95%RH (non-condensing)
MATERIAL & FINISH	Face plate : Aluminum Munsell N-4.0 (equiv.)
WEIGHT	Max. 0.5kg

(VM-5X2)

TEMPERATURE RANGE	Operating temperature : 0 to 65 deg.C Storage temperature : -30 to +85 deg.C Relative humidity : 20 to 95%RH (non-condensing)
WEIGHT	Max. 0.4kg

(VM-5X3)

INPUT/OUTPUT CONNECTOR TERMINAL BLOCK	D-Sub 9P connector 1pc CN1 : Recorder output 2 CH x 1 point Terminal block 16pc Input : 2CH Recorder output 2 CH x 3 points
TEMPERATURE RANGE	Operating temperature : 0 to 65 deg.C Storage temperature : -30 to +85 deg.C Relative humidity : 20 to 95%RH (non-condensing)
WEIGHT	Max. 0.4kg

VM-5P1,2,3 COMMUNICATION/PHASE MARKER UNIT

Accommodated in a VM-5H3 or VM-5W1 Instrument Rack, these units process phase marker signals, and provide OK alarm contact output and internal power supply voltage failure detection. VM-5P1,2 also performs an external communication function via the serial interface (RS-232C / RS-485).

VM-5P1,2 continuously scan the measurement value, set gap voltage, OK status, DANGER bypass status, ALERT status, DANGER status, and First-out status related to a VM-5 Series monitoring unit, then transmits data after receiving requests.

STANDARD SPECIFICATION

POWER SUPPLY	Supplied from instrument rack (VM-5H3 or VM-5W1)
INPUT TRANSDUCER	VK, RD series
SIGNAL	Phase marker 2ch Max. Output impedance : Approx. 10k Ω
INPUT VOLTAGE RANGE	100Vpk-pk or less (VM-5P1,2) 0 to 25VDC (VM-5P3)
BUFFER OUTPUT	Phase marker signal : 2ch Output impedance : 50 Ω
PULSE OUTPUT	Shaped pulse signal is output via a buffer amplifier. Signal level : -1 to +1V (P _L), 4 to 6V (P _H)
TRANSDUCER POWER SUPPLY	-24VDC +/- 1V, 20mA
COMMUNICATION DATA*	Measurement value, Set up voltage, OK state, ALERT state, DANGER state, First out state, DANGER bypass state, Input signal (dynamic), Waveform (Only when DANGER detected)
BAUD RATE*	300 to 9600bps (RS-232C) 300 to 19.2kbps (RS-485)
NODE TO NODE*	RS-232C : 50ft (15m) Max. (distance between nodes) RS-485 : 4,000ft (1,200m) Max. (distance between nodes)
TRANSMISSION MODE*	Asynchronous half duplex, CTS controlled (RS-485)
CLOCK*	Internal clock
CHARACTER LENGTH*	8 bit

PARITY BIT*	EVEN (even number)
STOP BIT*	1 bit
TEMPERATURE RANGE	Operating temperature : 0 to 65 deg.C Storage temperature : -30 to +85 deg.C Relative humidity : 20 to 95%RH (non-condensing)
MATERIAL AND FINISH	Face plate : Aluminum Munsell N-4.0 (equiv.)
WEIGHT	Monitor : Max. 0.6kg

*Only VM-5P1,2

VM-53 DUAL COMMUNICATION UNIT

This unit has two independent serial ports. While inserted in a relay module slot of the VM-5H3 or VM-5W1 Instrument Rack, it collects static data in the rack by the Modbus protocol and then sends it to an external host computer. In addition, as this unit can be daisy chain-connected, it enables data collection from two or more racks.

STANDARD SPECIFICATION

COMMUNICATION DATA	measurement value, set gap voltage, OK state, ALERT state, DANGER state, DANGER bypass state, CH bypass state	PROTOCOL	Modbus® AEG Modicon PI-MBUS-300 Reference Manual Uses Remote Terminal Unit (RTU) Transmission mode. Modbus is a registered trademark of Modicon, Inc.
INPUT/OUTPUT CONNECTOR	D-Sub 9P 4 pc (CN1 to CN4)	ID SETTING	Set range 1 to 10 (can be changed with connected PC)
SERIAL INTERFACE	RS-232 or RS-485 (can be changed by internal switch)	TERMINAL SETTING	ON or OFF (can be changed by internal switch)
BAUD RATE	1200,2400,4800,9600,19200 bps (RS-232) 1200,2400,4800,9600,19200,38400 bps (RS-485)	PHASE MARKER OK STATUS	TB (Valid) or FIX (Invalid) (can be changed by internal switch)
DATA LENGTH	7 bit or 8 bit (can be changed with connected PC)	TEMPERATURE RANGE	Operating temperature : 0 to 65 deg.C (without battery) / 0 to 50 deg.C (with battery) Storage temperature : -30 to +85 deg.C (without battery) / -20 to +55 deg.C (with battery) Relative humidity : 20 to 95%RH (non-condensing)
PARITY	ODD (odd number), EVEN (even number), NONE (none) (can be changed with connected PC)	WEIGHT	Max. 0.4kg
STOP BIT	1 bit or 2 bit (can be changed with connected PC)		
FLOW CONTROL	None		

VM-5Z1,2,3,4 POWER SUPPLY UNIT

Provides DC power to each VM-5 Series unit mounted in the same instrument rack. A fault in the power supply is indicated by lighting of the power supply OK lamp and alarm contact output.

STANDARD SPECIFICATION

ALARM CONTACT OUTPUT	Function : OK Contact capacity (load resistance) : 250VAC, 5A 30VDC, 5A Contact type : C contact / Dry contact	DIELECTRIC STRENGTH	2000VAC, one minute (VM-5Z1,2,4) Between power supply and GND : 1500VAC, one minute (VM-5Z3)
RELAY MODE	Normally energized	POWER CONSUMPTION	VM-5Z1 : 265VA or less VM-5Z2 : 135W or less VM-5Z3 : 170W or less VM-5Z4 : 265VA or less
CONTACT LIFE	100,000 times or greater (rated load)	TEMPERATURE RANGE	Operating temperature : 0 to 65 deg.C (VM-5Z1,2,4) 0 to 50 deg.C (VM-5Z3) Storage temperature : -30 to +85 deg.C Relative humidity : 20 to 95%RH (non-condensing)
PROTECTIVE CONSTRUCTION	Plastic sealed	MATERIAL AND FINISH	Panel : Aluminum Munsell N-1.0 (equiv.)
INSULATION RESISTANCE	Between power supply and GND : 100MΩ or more at 500VDC Between power supply and alarm contact : 100MΩ or more at 500VDC (VM-5Z1,2,4) Between GND and alarm contact : 100MΩ or more at 500VDC (VM-5Z1,2,4)	WEIGHT	Max. 2.2kg (VM-5Z1,4) ,Max. 3.0kg (VM-5Z2,3)

VM-5Z0 POWER SUPPLY BACKUP MODULE UNIT

Backs up the DC power supplied to each VM-5 Series units mounted in the VM-5H3 or VM-5W1 Instrument Rack, at the time of an instantaneous electric power failure.

STANDARD SPECIFICATION

INSTALLABLE UNIT	This module unit takes up the same space in the VM-5H3 or VM-5W1 instrument rack as two monitor units.	TEMPERATURE RANGE	Operating temperature : 0 to 50 deg.C Storage temperature : -30 to +85 deg.C Relative humidity : 20 to 95%RH (non-condensing)
BACKUP TIME	0.2 sec. at Max. load	WEIGHT	0.6kg (Face panel excluded)

VM-5 SERIES INSTRUMENT RACK

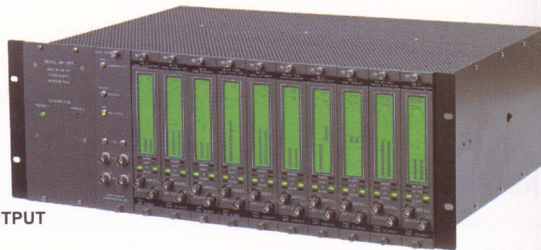
The VM-5 Series Instrument Rack is available in 2 different types, the Mounting type and Single Unit type. The Mounting type also has two versions available, the VM-5H3 (Max. 8 monitor units) and the dual power supply VM-5W1 (Max. 10 monitor units).



VM-5 SYSTEM COMBINATION				VM-5G SINGLE UNIT INSTRUMENT RACK	VM-5H3 INSTRUMENT RACK	VM-5W1 DUAL POWER SUPPLY INSTRUMENT RACK
MONITOR	VIBRATION	VM-5K	Vibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5U	Velocity Vibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5B	Acceleration Velocity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5M	Velocity Acceleration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	DISPLACEMENT	VM-5C	Eccentricity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5T	Thrust	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	DIFFERENTIAL EXPANSION	VM-5D	Differential Expansion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5N	Differential Expansion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5L	Differential Expansion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5J	Differential Expansion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5E	Expansion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5A	Valve Position	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	ROTATION	VM-5S	Rotation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		VM-5Q	Reverse Rotation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VM-5R		Rotation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
TEMPERATURE	VM-5F	Temperature		VM-5Y7	VM-5Y7	
OTHERS	VM-51	Rod Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	VM-52	Bottom Hold	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
RELAY		VM-5Y		<input type="checkbox"/>	<input type="checkbox"/>	
INTERFACE		VM-5X		<input type="checkbox"/>	<input type="checkbox"/>	
COMMUNICATION PHASE MARKER		VM-5P		<input type="checkbox"/>	<input type="checkbox"/>	
		VM-53		<input type="checkbox"/>	<input type="checkbox"/>	
POWER SUPPLY		VM-5Z		<input type="checkbox"/>	<input type="checkbox"/>	
		VM-5Z0		<input type="checkbox"/>	<input type="checkbox"/>	

VM-5W1 DUAL POWER SUPPLY INSTRUMENT RACK

Designed to accommodate the VM-5Z Power Supply Unit. The VM-5 Series Monitor and VM-5Y Relay Module Unit mounts on a standard panel. This rack can accommodate one (1) VM-5P Communication/Phase Marker Unit, and up to ten (10) VM-5 Series Monitors with a VM-5Y Relay Module for each unit. A duplex power supply is obtained by mounting two VM-5Z power Supply Unit.



- API STANDARD 670 COMPLIANT
- ALERT AND DANGER ALARM CONTACT OUTPUT
- DUAL POWER SUPPLY
- OK CONTACT OUTPUT

STANDARD SPECIFICATION

INPUT FOR OPERATION	Alarm reset (normally open) Sequence (normally open) Filter enable (normally open) Contact type : Dry contact	ALARM CONTACT OUTPUT	Function : System OK (common to all channels) Contact capacity : Load resistance : 250 VAC, 5A Contact type : C contact, Dry contact
CONTACT LIFE	100,000 times or more (rated load)	TEMPERATURE RANGE	Operating Temperature : 0 to 65 deg.C Relative Humidity : 20 to 95%RH (non-condensing)
PROTECTIVE CONSTRUCTION	Plastic sealed	WEIGHT	Max. 10kg

VM-5H3 INSTRUMENT RACK

Accommodates the VM-5P Communication/Phase Marker Unit and VM-5 Series monitors. This rack can accommodate one (1) VM-5P, and up to eight (8) VM-5 Series Monitors with VM-5Y Relay Module Unit and VM-5Z Power Supply Unit for every unit accommodated.



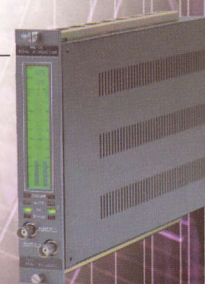
- API STANDARD 670 COMPLIANT
- ALERT AND DANGER ALARM CONTACT OUTPUT
- OK CONTACT OUTPUT

STANDARD SPECIFICATION

INPUT FOR OPERATION	Alarm reset (normally open) Sequence (normally open) Filter enable (normally open) Contact type : Dry contact	ALARM CONTACT OUTPUT	Function : System OK (common to all channels) Contact capacity : Load resistance : 250 VAC, 5A 30VDC, 5A Contact type : C contact, Dry contact
CONTACT LIFE	100,000 times or more (rated load)	TEMPERATURE RANGE	Operating Temperature : 0 to 65 deg.C Relative Humidity : 20 to 95%RH (non-condensing)
PROTECTIVE CONSTRUCTION	Plastic sealed	WEIGHT	Max. 9kg

VM-5G0,1,2 SINGLE UNIT INSTRUMENT RACK

This type of instrument rack consists of a power supply for each VM-5 Series Monitor (except the VM-5 Communication/Phase Marker Unit and VM-5F Temperature Monitor Unit), SPDT (DAN. 1, DAN. 2, ALE. 1, ALE. 2) four (4) point relay and OK relay.



- API STANDARD 670 COMPLIANT
- ALERT AND DANGER ALARM CONTACT OUTPUT
- OK CONTACT OUTPUT
- POWER OUTPUT (85 to 264VAC/48 to 64Hz)
- STAND ALONE TYPE RACK

STANDARD SPECIFICATION

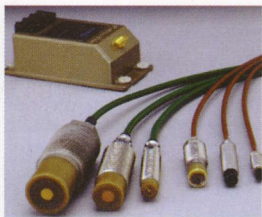
RELAY POINT	5 points (DANGER1, ALERT1, DANGER2, ALERT2, OK)	INSULATION RESISTANCE	Between power supply and GND : 100MΩ at 500 VDC Between GND and alarm contact : 100MΩ at 500 VDC
CONTACT RATING ((Load resistance)	250VAC, 0.2A 30VDC, 2A	DIELECTRIC STRENGTH	Between power supply and GND : 1,500VAC, one minute
CONTACT LIFE	100,000 times or more (rated load)	POWER CONSUMPTION	VM-5G0 : 40VA or less VM-5G1 : 30W or less VM-5G2 : 40W or less
CONTACT METHOD	SPDT (DAN1, DAN2, ALE1, ALE2, OK) 5 points	TEMPERATURE RANGE	Operating Temperature : 0 to 65 deg.C Storage Temperature : -30 to +85 deg.C Relative Humidity : 20 to 95%RH (non-condensing)
PROTECTED CONSTRUCTION	Plastic sealed	WEIGHT	Rack : Max. 1.6 kg Bezel : Max.0.2 kg
POWER OUTPUT FOR TRANSDUCER	4mA, 24VDC (Input code : 1) -24VDC, 20mA (Input code : 2) 1CH : -24VDC, 40mA 2CH : -24VDC, 20mA (Input code : 3)		
INPUT FOR OPERATION	Contact for alarm reset (normally open) Contact for sequence (normally open) Contact type : Dry contact		

VM-5 SERIES

VM-5 SERIES OPTIONS

Functions can be upgrade by specifying the following options :

RMS RECTIFIER	Able to measure true effective value.	VM-5K, VM-5U, VM-5B, VM-5M
INSULATE OUTPUT CARD	Insulate from other circuits.	VM-5 series all monitor units
RECORDER OPTION OUTPUT CARD	Applications where an other-than-standard recorder output is required.	VM-5 series all monitor units
TROPICAL SPECIFICATION	Improve durability against humidity.	All VM-5 series
SHIPPING STANDARD NK, KR, LR	Applies when products are used for shipping rotating machinery monitors.	VM-5K, VM-5U, VM-5B, VM-5M, VM-5C, VM-5T, VM-5D, VM-5N, VM-5L, VM-5E, VM-5A, VM-5S, VM-5Q, VM-5R, VM-5X, VM-5P, VM-5Z1 to 4, VM-5Y1 to 6, VM-5G0, VM-5H3, VM-5W1
CE MARK	Indicates CE mark.	VM-5 series all monitor units, VM-5Y1 to 6, VM-5G1, VM-5P3, VM-5H3, VM-5Z3/4, VM-5W1



VK series VIBRATION TRANSDUCER

Measure shaft vibration, shaft position, differential expansion, eccentricity, etc. Since eddy-current type is employed, measurement is possible without contact. VK-A is a standard vibration transducer that conforms to the U.S. API Standard 670. Also VK-P for long-range measurement, and a long cable type VK-R are available.

- INTRINSIC SAFETY EXPLOSION CONSTRUCTION. TIIS, FM, CSA, ATEX
- NOT AFFECTED BY LUBRICATING OIL OR DUST.
- CE MARK



CV/CA series TRANSDUCER

Piezoelectric type transducer for bearing and casing vibration measurement. CV Series Velocity Transducer and CA Series Acceleration Transducer are available.

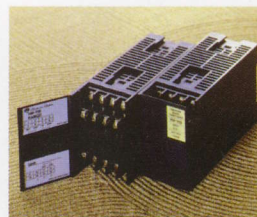
- MAX. VELOCITY VIBRATION 1,270 mm/s pk
- SENSITIVITY 3.94 mV/mm/s pk
- TEMPERATURE RANGE -50 to +120 deg.C



RD series TACHO DRIVER

Eddy-current, non-contact revolution detection transducer designed to measure the rotating speed and zero speed.

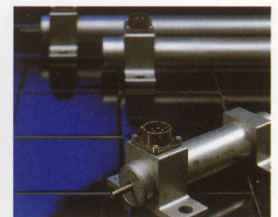
- FAULT DETECTION FUNCTION
- WIDE MEASURING RANGE
- SENSOR TOP IS NOT AFFECTED BY LUBRICATING OIL OR DUST.
- INTRINSIC SAFETY EXPLOSION CONSTRUCTION TIIS, CSA, ATEX



VM-11 series SIGNAL CONDITIONER

VM-11 series accept the signal from transducers installed on rotating machinery and convert it to 4 to 20 mADC or 1 to 5 VDC output.

- FULL LINE-UP OF MODELS FOR DISPLACEMENT, VELOCITY AND ACCELERATION INPUT.
- AVAILABLE IN RACK, DIN RAIL OR WALL MOUNTING.
- BURN-DOWN FUNCTION
- VIBRATION WAVE FORM OUTPUT FOR DETAILED DIAGNOSIS.



LS series LVDT (Linear Variable Differential Transformer)

The LS series LVDT is a highly reliable linear transformer that provides long range measurement of turbine valve opening and casing expansion. It has a broad range of applications due to its durability and measuring accuracy.

- VARIOUS TYPES OF MEASURING RANGE.
- NINE RANGES 0-50 to 0-450 mm.
- LINEARITY +/- 0.2 % of F.S.
- INTRINSIC SAFETY EXPLOSION CONSTRUCTION CSA, FM (when VM-11P used together.)

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



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