VM-7
MONITORING SYSTEM

SPECIFICATIONS

VM-701B VIBRATION / DISPLACEMENT MONITOR MODULE

Model Code / Additional Spec. Code (No entry if additional spec. code is not specified.)

VM-701B /PM□ /AL□

Phase Marker Function		Analysis Function	
0	Without	0	Without
1	With (When "/ALY" is requested)	Y	With

/NB1 /CS1 /CS2 /TRP /TB□

Non-incendive		Monitor Function	Analysis Function	Tropical spec.	I/O terminal block for	
1	CSA C/US: Class I, Division 2, Groups A,B,C and D	Custom setup	Custom setup (When "/ALY" is requested)		1	VM-761B instrument rack
					2	VM-762B instrument rack

*1 Please check the input rated power of the rack. Refer to the specification sheet, "VM-75□B POWER SUPPLY MODULE (Specification No. 31109E1.1 or later).

Specification

INPUT (VIBRATION/DISPLACEMENT)

Input points : 4point
Input impedance : Approx. 50kΩ
(Current signal input: Approx. 250Ω)

INPUT TRANSDUCER (VIBRATION/DISPLACEMENT)

Displacement vibration input : FK-202F, FK-452F, FK-302F, VK-202A, VK-452A, VK-202P, VK-302P, VC-020
Velocity vibration input : CV-88, CV-87, CV-86
Acceleration vibration input : CA-302, CA-72
Displacement input : FK-202F, FK-452F, FK-302F, FK-602F, FK-143F, FK-263F
VK-202A, VK-452A, VK-302P, VK-602P, VK-143P, VK-263P, VC-253
Other input : VM-21P
Voltage signal (Input range:-10V to +10V)
Current signal (Input range:4mA to 20mA)

INPUT (Phase Marker) (When "/PM1" is requested)

Input point (tachometer) : 1point
Input impedance : 50kΩ
Input voltage range : Less than 50Vp-p
Min. pulse width : 50μsec
Hysterics set value : 1V, 2V, 5V
Maximum rotation speed : 60,000rpm

INPUT TRANSDUCER (Phase Marker) (When "/PM1" is requested)

Proximity transducer : FK-202F
RD-05A

SYNCHRONIZED SIGNAL SOURCE

Another VM-701B or VM-706B : input via transducer input terminal.
VM-741B : input via internal mother board.

OTHERS

OUTPUT

Indicators : OK LED (Green)
When channel is normal : ON, When alarming : Flashing
TRG LED (Yellow)
When rotational pulse is not detected : ON
When rotational pulse is detected : Flashing

Monitor output : Input signal is output via buffer amplifier.
Location : BNC (Front) and connector (Back)
Output impedance : Approx. 100Ω (Max.5mA)

Pulse output (When "/PM1" is requested) : Shaped pulse signal is output via a buffer amplifier.
Location : BNC (Front)
Output impedance : Approx. 100Ω (Max. 5mA)
Signal level : 0V (V_{OL}), 5V (V_{OH})

Synchronized signal output
: Shaped pulse signal is output via a buffer amplifier.
Location : Terminal (Back)
VM-761B : D5/D6
VM-762B : 15pin D-SUB 13, 14
Output impedance : Approx. 100Ω (Max.5mA)
Signal level : 0V (V_{OL}), 5V (V_{OH})

Recorder output : Voltage or current output proportional to measurement value.
Measurement value of each channel can be assigned to any output channel of its own module.
Number of output points : 4 points.
Output range : 1 to 5V, 4 to 20mA,
0 to 5V, 0 to 10V
I/O conversion accuracy : ±1% of F.S. at 25°C*2
±2% of F.S. at 0°C to 65°C *2
Max. load resistance: 600Ω (current mood)
Output impedance: Approx. 500Ω (voltage mood)
Insulation resistance: 10MΩ at 100VDC
Burnout function: Downscale 0%
Downscale 0mA / 0mV

Transducer power supply :
Proximity transducer : -24VDC±10% / 25mA Max.
Piezoelectric transducer : +24VDC±10% / 4mA (constant current)

Contact output :
Number of relay : 6 points (logic changeable)
Contact type : Dry contact (SPDT)
Energization method
: Normally de-energized or
Normally energized field changeable.
Contact capacity : 250VAC/5A, 30VDC/5A

Output to analysis software (When "/ALY" is requested)
Dynamic data : Synchronous waveform, Asynchronous waveform
Static data : Amplitude (0.5X, 1X, 2X, nX (n=0.01 to 8.00), Not-1X,$S_{(p\text{-}p)\ max}$)
Phase (0.5X, 1X, 2X, nX (n=0.01 to 8.00))
Rotation speed
Refer to the specification sheet of VM-773B infiSYS ANALYSIS VIEW.

Note) *2 At calibrate frequency.

VM-701B VIBRATION / DISPLACEMENT MONITOR MODULE

Specification

ALARM

Alarm set point : Vibration monitoring
2 points (DANGER, ALERT), from 0 to 100% of monitor range, field changeable
Displacement monitoring
4 points (H-DANGER, H-ALERT, L-DANGER, L-ALERT), from -50% to +50% of monitor range, field changeable

Alarm set accuracy : Vibration, Displacement
±(0.2% of F.S.+1digit) or less at 25°C

Alarm set repeatability : ±1digit or less at 25°C

Alarm delay time : 0 to 99sec (0.1 sec step, field changeable)

Alarm reset : AUTO-RESET or SELF-HOLD field changeable.

Alarm bypass function : Block off alarm output (DANGER)

VIBRATION (OVER ALL) MONITORING

Rectification : Root Mean Square (RMS)
Peak-to-Peak (p-p)
Peak-to-Peak (p-p) rectification for low speed

Note)
- Rectification is calculation method to convert vibration waveform to amplitude which may be different from monitor range scale.
  (Ex. p-p conversion scale by RMS rectification)
- Refer to Table1 for rectification selection.
- The peak rectification is recommended when high speed response time and true p-p rectification are preferred. The RMS rectification is recommended when noise resistance or runout inhibition are preferred.

(O:YES ×:NO)

Transducer	Monitor Range (Parameter)	Rectification		
		RMS	p-p	p-p rectification for low speed
Displacement (VK, FK)	Displacement Vibration (p-p)	O	O	O
Velocity (CV)	Displacement Vibration (p-p)	O	O	×
	Velocity Vibration (rms)	O	×	×
	Velocity Vibration (peak)	O	×	×
Acceleration (CA)	Velocity Vibration (rms)	O	×	×
	Velocity Vibration (peak)	O	×	×
	Acceleration Vibration (rms)	O	×	×
	Acceleration Vibration (peak)	O	×	×

Table 1 Selection table for rectification

Root Mean Square (RMS)
Recommend monitoring range : 100 to 1000μm, 10 to 100mm/s, 1 to 20g
Accuracy : ±1% of F.S. at 25°C*3
±2% of F.S. at 0°C to 65°C*3
HPF : 2Hz to 1kHz (-3dB)*3 (4 pole)
9.5Hz to 100Hz (-3dB)*4 (10 pole)
LPF : 200Hz to 10kHz (-3dB)*4 (4 pole)

Peak-to-Peak (p-p)
Recommend monitoring range : 100 to 1000μm
Accuracy : ±1% of F.S. at 25°C*3
±2% of F.S. at 0°C to 65°C*3
HPF : 2Hz to 100Hz (-3dB)*4 (2 pole)
9.5Hz to 100Hz (-3dB)*4 (10 pole)
LPF : 500Hz to 1kHz (-3dB)*4 (4 pole)

Note) *3 At calibrate frequency.
*4 There is un-match combination.
(See "Vibration (Over All) Monitoring (Selection Table for Filter Set Value P.6, 7".)

Peak-to-Peak (p-p) rectification for low speed
Recommend monitoring range : 100 to 1000μm
Accuracy : ±3% of F.S. at 2Hz at 25°C
HPF : 0.2Hz (-3dB), (1 pole)
9.5Hz to 100Hz (-3dB) (10 pole)
LPF : 500Hz to 1kHz (-3dB), (4 pole)

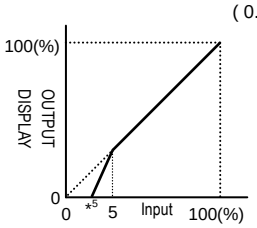
Note)
- Applicable, only for displacement transducer input and displacement vibration measurement.
- Basically, phase marker signal are required. When no phase marker signal is input, rise time speed may be deteriorate at normal speed range.
- Standard high-pass filter (4 pole, 2 pole) cannot be selected.
(See "Vibration (Over All) Monitoring (Selection Table for Filter Set Value P.6, 7".)

VIBRATION (OVER ALL) MONITORING

Sequence function : Used to prevent alarm output that is caused by excessive vibration during machine startup. Block off the DANGER/ALERT alarm, or switch the alarm setup value to another number magnified by setup number.
Sequence Setup :Block off
1 to 10 (0.1 step, field changeable)

⚠ WARNING
In case the SEQ. magnification number is setup from 2 to 10, the alarm setup value magnified by setup number while the SEQ. circuit is in progress should stay at or lower than 110% of the maximum monitor range. If the number is more than 110% of the monitor range the alarm may not output.

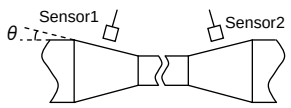
Suppression function
: If the vibration value is less than the setup value, this function is forced to suppress the measured vibration value and recorder output.
*5 Suppression Setup Value: 0 to 5%
(0.1% step, field changeable)



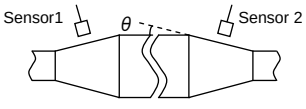
Input/Output characteristic

DISPLACEMENT MONITORING

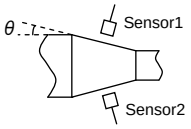
Accuracy : ±1% of F.S. at 25°C
±2% of F.S. at 0°C to 65°C
Frequency response : Approx. 0.5Hz (-3dB)
Zero shift function : -50 to +50% of monitor range
Lamp angle (θ) : 4 to 90 degree



Type 1



Type 1



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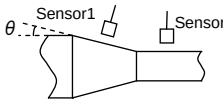

Type 3

Operation function : Addition/Subtraction
Ch1 + Ch2, Ch2 + Ch3, Ch3 + Ch4
Ch1 - Ch2, Ch2 - Ch3, Ch3 - Ch4

Note)
- When this monitor is used for intrinsically safe explosion proof construction, the OK alarm set point may fall within the range, depending on the input transducer and the specified monitoring range.

ANALYSIS FUNCTION (When "/ALY" is requested)

Amplitude accuracy : Overall 0.5X, 1X, 2X, nX (n=0.01 to 10.00), Not-1X
: ±3% of F.S. at 25°C
±5% of F.S. at 0°C to 65°C
(for machine speed less than 30000 r/min)
$S_{(p-p)\,max}$: ±5% of F.S. at 25°C
±7% of F.S. at 0°C to 65°C

Phase accuracy : 0.5X, 1X, 2X : ±3 deg of rdg. at 25°C
±6 deg of rdg. at 0°C to 65°C

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Revised Oct. 2019

VM-701B VIBRATION / DISPLACEMENT MONITOR MODULE

Specification

ENVIRONMENTAL CONDITION

Operating temperature : 0 to +65°C
Operating temperature at explosion proof construction
: 0 to +60°C
Storage temperature : -30 to +85°C
Relative humidity : 20 to 95%RH (non-condensing)

POWER CONSUMPTION

Module : Less than 15W

MATERIAL AND FINISH

Face plate : ABS (Black)
Sheet : Polyester tough top (Gray)
Base plate : Alminium alloy (Silver)

MASS

Body : Max. 1.0kg (2.2lb)

ACCESSORY SPECIFICATION CODE/IDENTIFIED BY TB☐

Code	Accessory	Quantity (Part Code)
/TB1	Transducer input terminal block plug (15pin) FRONT-MC-1.5/15-STF-3.81 (PHOENIX CONTACT)	2pieces*7 (7072NAB)
	Recorder output terminal block plug (6pin) FRONT-MC-1.5/6-STF-3.81 (PHOENIX CONTACT)	2pieces*7 (7072NAC)
	Contact output terminal block plug (18pin) FRONT-MC-1.5/18-STF-3.81 (PHOENIX CONTACT)	1piece (7072NAA)
/TB2	Contact output terminal block plug (18pin) FRONT-MC-1.5/18-STF-3.81 (PHOENIX CONTACT)	1piece (7072NAA)

Note) *6 D-sub plugs and hoods are not included in this code. Please make necessary arrangement separately, if required.

*7 When individually ordering specify the parts code, it is require to arrange for a necessary amount.

⚠ WARNING
Some functions may not be available with old version.
For details, please refer to "infiSYS Family Improvement Information" (6H16-011).

Default Value

INPUT (VIBRATION/DISPLACEMENT)

Monitoring : Vibration monitor (Displacement vibration input)
Monitor range : 0 to 100µm p-p
Input transducer : FK-202F (non-intrinsic safety)
Input points : 4points
Input impedance : 50kΩ

INPUT (PHASE MARKER) (When "/PM1" is requested)

Input transducer : RD-05A
Pulse polarity : Positive
Hysterics set value : 1V
Trigger level : -18V

RECTIFICATION

Rectification : Root Mean Square (RMS)

FILTERING

Low cut-off frequency : 5Hz (4 pole)
High cut-off frequency : 4kHz

ALARM

DANGER set point : 80µm
ALERT set point : 60µm
OK set point (Vibration/Displacement)
: -1.4V (Low), -18.8V (High)
OK set point (Phase Marker) (When "/PM1" is requested)
: -1.4V (Low)
Alarm delay time : 3sec (DANGER, ALERT)
Alarm reset : AUTO-RESET

RECORDER OUTPUT

Output range : 4 to 20mA (4mA at the burnout)

CONTACT OUTPUT

Contact (RELAY1) : OR logic (DANGER-1 / DANGER-2)
Contact (RELAY2) : OR logic (ALERT-1 / ALERT-2)
Contact (RELAY3) : OR logic (NOT-OK-1 / NOT-OK-2)
Contact (RELAY4) : OR logic (DANGER-3 / DANGER-4)
Contact (RELAY5) : OR logic (ALERT-3 / ALERT-4)
Contact (RELAY6) : OR logic (NOT-OK-3 / NOT-OK-4)
Energization method : Nomally de-energized

OTHERS

Sequnce set value : 1
Suppression set value : 0%
First out : OFF
Timed OK channel defeat : ON
Burnout : Downscale 0%

OTHERS

Alarm Contact Operation

Contact type	Energization method	Power OFF	Power ON	
			Normal state	Alarm state
N.O. contact	NORMALLY DE-ENERGIZED	OPEN	OPEN	CLOSE
	NORMALLY ENERGIZED	OPEN	CLOSE	OPEN
N.C. contact	NORMALLY DE-ENERGIZED	CLOSE	CLOSE	OPEN
	NORMALLY ENERGIZED	CLOSE	OPEN	CLOSE

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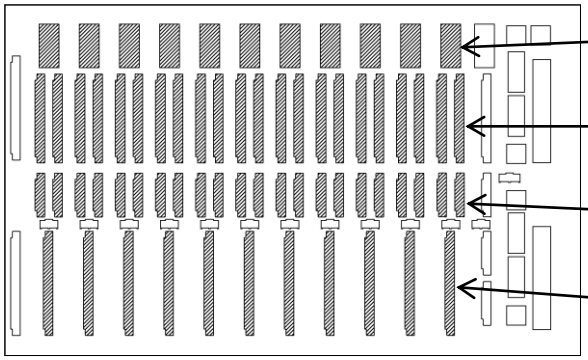
VM-701B VIBRATION / DISPLACEMENT MONITOR MODULE

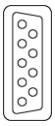
CE

Plug/ Terminal Block (Connector) Pin Assignment

VM-761B Instrument Rack (Back)



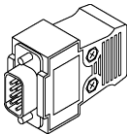
① Back of Instrument Rack



Plug/Terminal Block (Connector) Pin Assignment

1	CH1 MON	6	CH3 MON
2	CH1 COM	7	CH3 COM
3	CH2 MON	8	CH4 MON
4	CH2 COM	9	CH4 COM
5	N/A		

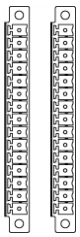
Fitting Plug



Part Code

Plug
7072NAD
Hood
7072NAG

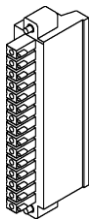
② Back of Instrument Rack



Plug/Terminal Block (Connector) Pin Assignment

A1	CH1 SIG	B1	CH4 SIG
A2	CH1 COM	B2	CH4 COM
A3	N/A	B3	N/A
A4	CH1 POW	B4	CH4 POW
A5	CH1 SHIELD	B5	CH4 SHIELD
A6	CH2 SIG	B6	Φ SIG
A7	CH2 COM	B7	Φ COM
A8	N/A	B8	N/A
A9	CH2 POW	B9	Φ POW
A10	CH2 SHIELD	B10	Φ SHIELD
A11	CH3 SIG	B11	PUL SIG
A12	CH3 COM	B12	PUL COM
A13	N/A	B13	N/A
A14	CH3 POW	B14	N/A
A15	CH3 SHIELD	B15	PUL SHIELD

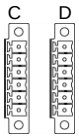
Fitting Plug



Part Code

Note2)
7072NAB

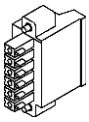
③ Back of Instrument Rack



Plug/Terminal Block (Connector) Pin Assignment

C1	REC1 +	D1	REC4 +
C2	REC1 -	D2	REC4 -
C3	REC2 +	D3	N/A
C4	REC2 -	D4	N/A
C5	REC3 +	D5	PUL OUT
C6	REC3 -	D6	PUL COM

Fitting Plug



Part Code

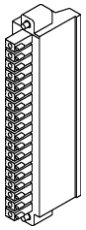
Note2)
7072NAC

④ Back of Instrument Rack

Plug/Terminal Block (Connector) Pin Assignment

E1	RL1 N.O.	E10	RL4 N.O.
E2	RL1 COM	E11	RL4 COM
E3	RL1 N.C.	E12	RL4 N.C.
E4	RL2 N.O.	E13	RL5 N.O.
E5	RL2 COM	E14	RL5 COM
E6	RL2 N.C.	E15	RL5 N.C.
E7	RL3 N.O.	E16	RL6 N.O.
E8	RL3 COM	E17	RL6 COM
E9	RL3 N.C.	E18	RL6 N.C.

Fitting Plug



Part Code

7072NAA

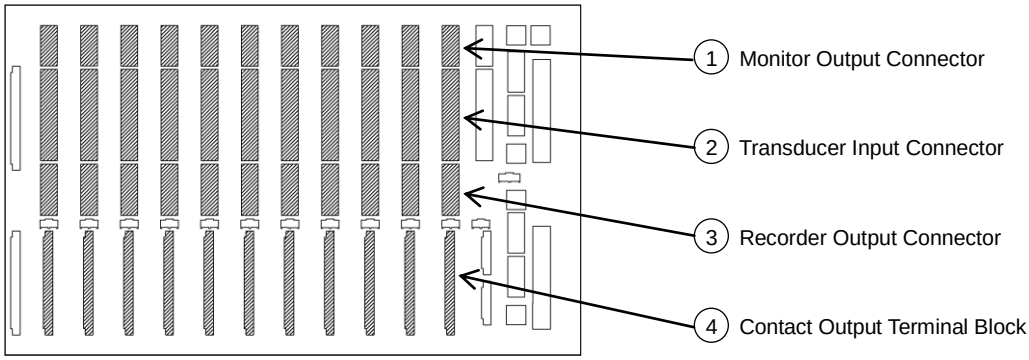
Note1) For the accessory specification code "/TB1", the fitting terminal block plugs ②③④ are included. For the accessory specification code "/TB1", the D-sub plug and hood ① are not included. If required, please make necessary arrangement separately referring to the part code above.

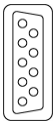
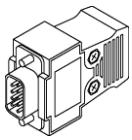
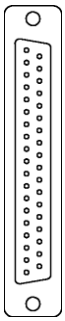
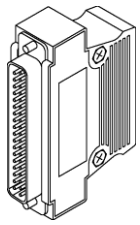
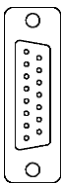
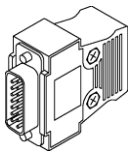
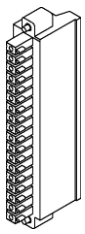
Note2) When individually ordering specify the parts code, it is require to arrange for a necessary amount.

VM-701B VIBRATION / DISPLACEMENT MONITOR MODULE

Plug/ Terminal Block (Connector) Pin Assignment

VM-762B Instrument Rack
(Back)



	Back of Instrument Rack	Plug/Terminal Block (Connector) Pin Assignment	Fitting Plug	Part Code
①		1 CH1 MON, 2 CH1 COM, 3 CH2 MON, 4 CH2 COM, 5 N/A; 6 CH3 MON, 7 CH3 COM, 8 CH4 MON, 9 CH4 COM		Plug 7072NAD Hood 7072NAG
②	A 	A1 CH1 IN, A2 CH1 COM, A3 N/A, A4 CH1 POW, A5 CH1 SLD, A6 CH2 IN, A7 CH2 COM, A8 N/A, A9 CH2 POW, A10 CH2 SLD, A11 CH3 IN, A12 CH3 COM, A13 N/A, A14 CH3 POW, A15 CH3 SLD, A16 N/A, A17 N/A, A18 N/A, A19 N/A; A20 CH4 IN, A21 CH4 COM, A22 N/A, A23 CH4 POW, A24 CH4 SLD, A25 Φ IN, A26 Φ COM, A27 N/A, A28 Φ POW, A29 Φ SLD, A30 PUL IN, A31 PUL COM, A32 N/A, A33 N/A, A34 PUL SLD, A35 N/A, A36 N/A, A37 N/A		Plug 7072NAF Hood 7072NAJ
③	C 	C1 REC1 +, C2 REC1 -, C3 REC2 +, C4 REC2 -, C5 REC3 +, C6 REC3 -, C7 N/A, C8 N/A; C9 REC4 +, C10 REC4 -, C11 N/A, C12 N/A, C13 PUL OUT, C14 PUL COM, C15 N/A		Plug 7072NAE Hood 7072NAH
④	E 	E1 RL1 N.O., E2 RL1 COM, E3 RL1 N.C., E4 RL2 N.O., E5 RL2 COM, E6 RL2 N.C., E7 RL3 N.O., E8 RL3 COM, E9 RL3 N.C.; E10 RL4 N.O., E11 RL4 COM, E12 RL4 N.C., E13 RL5 N.O., E14 RL5 COM, E15 RL5 N.C., E16 RL6 N.O., E17 RL6 COM, E18 RL6 N.C.		7072NAA

Note) For the accessory specification code "/TB2", the fitting terminal block plug ④ is included.
For the accessory specification code "/TB2", the D-sub plugs and hoods ①②③ are not included.
If required, please make necessary arrangement separately referring to the part code above.

VM-701B VIBRATION / DISPLACEMENT MONITOR MODULE

Vibration (Over All) Monitoring (Selection Table for Filter Set Value)

Root Mean Square (RMS)

(○:YES ×:NO)

		HPF <4 pole>												
		2Hz	5Hz	10Hz	20Hz	25Hz	30Hz	40Hz	50Hz	60Hz	100Hz	300Hz	500Hz	1000Hz
LPF	200Hz	○	○	○	○	×	×	×	×	×	×	×	×	×
	300Hz	○	○	○	○	○	○	×	×	×	×	×	×	×
	400Hz	○	○	○	○	○	○	○	×	×	×	×	×	×
	500Hz	○	○	○	○	○	○	○	○	×	×	×	×	×
	600Hz	○	○	○	○	○	○	○	○	○	×	×	×	×
	800Hz	○	○	○	○	○	○	○	○	○	×	×	×	×
	1000Hz	○	○	○	○	○	○	○	○	○	○	×	×	×
	2000Hz	×	○	○	○	○	○	○	○	○	○	×	×	×
	3000Hz	×	○	○	○	○	○	○	○	○	○	○	×	×
	4000Hz	×	○	○	○	○	○	○	○	○	○	○	×	×
	5000Hz	×	○	○	○	○	○	○	○	○	○	○	○	×
	6000Hz	×	×	○	○	○	○	○	○	○	○	○	○	×
	8000Hz	×	×	○	○	○	○	○	○	○	○	○	○	×
	10000Hz	×	×	○	○	○	○	○	○	○	○	○	○	○

		HPF <10 pole>						
		9.5Hz	12Hz	14Hz	15Hz	40Hz	60Hz	100Hz
LPF	200Hz	○	○	○	○	×	×	×
	300Hz	○	○	○	○	×	×	×
	400Hz	○	○	○	○	○	×	×
	500Hz	○	○	○	○	○	×	×
	600Hz	○	○	○	○	○	○	×
	800Hz	○	○	○	○	○	○	×
	1000Hz	○	○	○	○	○	○	○
	2000Hz	○	○	○	○	○	○	○
	3000Hz	○	○	○	○	○	○	○
	4000Hz	○	○	○	○	○	○	○
	5000Hz	○	○	○	○	○	○	○
	6000Hz	×	×	○	○	○	○	○
	8000Hz	×	×	○	○	○	○	○
	10000Hz	×	×	○	○	○	○	○

OTHERS

VM-701B VIBRATION / DISPLACEMENT MONITOR MODULE

Vibration (Over All) Monitoring (Selection Table for Filter Set Value)

Peak-to-Peak (p-p)

(○:YES ×:NO)

		HPF <2 pole>									
		2Hz	5Hz	10Hz	20Hz	25Hz	30Hz	40Hz	50Hz	60Hz	100Hz
LPF	500Hz	○	○	○	○	○	○	○	○	×	×
	600Hz	○	○	○	○	○	○	○	○	○	×
	800Hz	○	○	○	○	○	○	○	○	○	×
	1000Hz	○	○	○	○	○	○	○	○	○	○

		HPF <10 pole>						
		9.5Hz	12Hz	14Hz	15Hz	40Hz	60Hz	100Hz
LPF	500Hz	○	○	○	○	○	×	×
	600Hz	○	○	○	○	○	○	×
	800Hz	○	○	○	○	○	○	×
	1000Hz	○	○	○	○	○	○	○

Peak-to-Peak (p-p) rectification for low speed

		HPF <1 pole>
		0.2Hz
LPF	500Hz	○
	600Hz	○
	800Hz	○
	1000Hz	○

		HPF <10 pole>						
		9.5Hz	12Hz	14Hz	15Hz	40Hz	60Hz	100Hz
LPF	500Hz	○	○	○	○	○	×	×
	600Hz	○	○	○	○	○	○	×
	800Hz	○	○	○	○	○	○	×
	1000Hz	○	○	○	○	○	○	○

OTHERS