VM-7
MONITORING SYSTEM

SPECIFICATIONS

VM-703B TACHOMETER & ECCENTRICITY MONITOR MODULE

CE

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

VM-703B /NB1 /CS1 /TRP /TB□

Non-incendive		Monitor Function	Tropical spec.	I/O terminal block for	
1	Class I Division 2 CSA	Custom setup		1	VM-761B instrument rack
				2	VM-762B instrument rack

Specification

INPUT

- Input points (tachometer) : 2 points
- Input points (eccentricity) : 1 point
- Input impedance : Approx. 50kΩ
  (Magnetic pickup input : Approx. 5kΩ)
- Max input voltage range : 100Vp-p
- Hysterics set value : 1V, 2V, 5V

INPUT TRANSDUCER for TACHOMETER (Only Channel 1 and Channel 2)

- Proximity transducer : FK-202F, RD-05A
- Magnetic pickup : MS-160, MS-240
- Input channel : Channel1, Channel2

INPUT TRANSDUCER for ECCENTRICITY (Only Channel 3)

- Proximity transducer : FK-202F, FK-302F, VK-202A, VK-202P, VK-302P VC-020
- Input channel : Channel3

SYNCHRONIZED SIGNAL SOURCE

- VM-703B : Channel1 (this module)
- VM-741B : Input via internal mother board(2ch)

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 a buffer amplifier.
  Location : BNC (Front) and connector (Back)
  Output impedance : Approx. 100Ω (Max. 5mA)
- Pulse output : Shaped pulse signal is output via a buffer amplifier.
  Location : BNC (Front) and connector (Back)
  Output impedance : Approx. 1kΩ (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*1, ±2% of F.S. at 0°C to 65°C*1
  - Max. load resistance : 600Ω (current mode)
  - Output impedance : Approx. 500Ω (voltage mode)
  - Insulation resistance : 10MΩ at 100VDC
  - Burnout function : Downscale 0%, Downscale 0mA / 0mV
- Transducer power supply:
  - Proximity transducer : -24VDC / 25mA Max.
- Contact output :
  - Number of relay : 6 points (logic changeable)
  - Contact type : Dry contact (SPDT)
  - Enagization method : Normally de-energized or Normally energized field changeable
  - Contact capacity : 250VAC/5A, 30VDC/5A

Note) *1 At calibrate frequency.(only Eccentricity)

SPEED RELAY (Only Channel 1 and Channel 2)

- Speed relay set point : 4 points (HH, H, L, LL), from 0.1rpm to 100% of monitor range, field changeable.
- Speed relay hysterics : 0 to 100 rpm (1rpm step, field changeable)
- Speed relay mode : Over speed / Under speed
- Speed relay set accuracy : ±1 digit or less (on digital indicator)
- Relay reset : AUTO-RESET or SELF-HOLD field changeable.

ALARM (Only Channel 3)

- Alarm set point : Eccentricity (P-P) monitoring
  2 points (DANGER, ALERT),
  from 0 to 100% of monitor range, field changeable
  Eccentricity (Direct) monitoring
  4 points
  (H-DANGER, H-ALERT, L-DANGER, L-ALERT),
  from -50 to +50% of monitor range, field changeable
- Alarm set accuracy : ±(0.2% of F.S.+1digit) or less at 25°C
- Alarm set repeat : ±1digit or less at 25°C
- Alarm delay time : 0 to 99 sec (0.1 sec step, field changeable)
- Alarm reset : AUTO-RESET or SELF-HOLD field changeable.
- Alarm bypass function : Block off alarm output (DANGER)

TACHOMETER

- Min. pulse width : 50μsec
- Min. measured frequency : 0.01Hz
- Max. measured frequency: 10kHz
- Input voltage : Less than 100Vp-p

ROTOR SPEED MONITORING

- Accuracy : ±(0.003% of rdg. +1digit) at 25°C
  ±(0.03% of rdg. +1digit) at 0°C to 65°C
- Min. display rotation speed*2 : Regardless of the enable or disable the setting, it display until the rotational speed of the lower of the under-speed relay (L, LL).
- No. of input pulse : 1 to 200 pulse/rev.

ROTOR ACCELERATION MONITORING

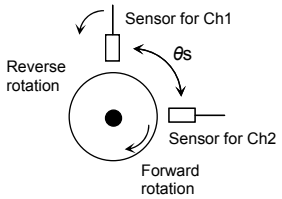
- Accuracy : ±20 digit at 0 to 65°C
- No. of input pulse : 1 to 200 pulse/rev.
  (60 or 120 pulse/rev. is recommended.)

REVERSE ROTATING MONITORING

- Accuracy : ±(0.003% of rdg. +1digit) at 25°C
  ±(0.03% of rdg. +1digit) at 0°C to 65°C
- Min. display rotation speed*2 : Regardless of the enable or disable the setting, it display until the rotational speed of the lower of the under-speed relay (L, LL).
- No. of input pulse : 1 to 60 pulse/rev.

Note)*2 Rotational speed below the measurement limit frequency of the monitor can not be set.The rotational speed of the lower limit, can be calculated by the following formula.
Rotational speed of the lower limit [rpm]
=0.01[Hz] × 60 × (Gear ratio / Pulse number per revolution)

Note)
The angle between the sensors shall be as follows :
$\theta s=(90+360n)/Z$
[n=0,1,2,3•••, Z:Numbers of the teeth]
θs is recommended to be within 90 to 270° and to satisfy the above equation.rotation

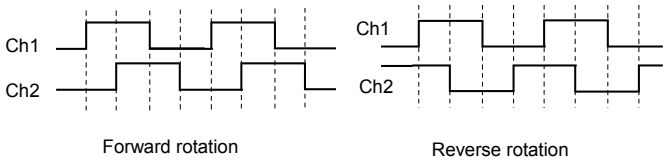


VM-703B TACHOMETER & ECCENTRICITY MONITOR MODULE

Specification

REVERSE ROTATING MONITORING

Note) If there is a key groove of 180 ° in the attached example of the previous page, the pulse is detected from the axis of rotation as shown in the following figure.



Forward rotation　　Reverse rotation

ECCENTRICITY MONITORING

Phase marker	:	Selection from three kinds Ch1 input , Phase marker 1 (from VM-741B Phase marker) Phase marker 2 (from VM-741B Phase marker)	
P-P Monitoring	:	Accuracy	: ±1% of F.S. at 25°C*1 ±2% of F.S. at 0°C to 65°C*1
		Measure range	: 1 to 300rpm, 1 to 600rpm
		Output channel	: Ch3
Direct Monitoring	:	Accuracy	: ±1% of F.S. at 25°C ±2% of F.S. at 0°C to 65°C
		Measure range	: 1Hz or less.
		Zero shift function	: -50 to +50% of the monitor range.
		Output channel	: Ch4

Note) *1　At calibrate frequency.

Number of Teeth and Setting Angle θs

Number of teeth	Setting Angle θs (deg.)								Setting accuracy (deg.)
1	90.0	———	———	———	———	———	———	———	±30.0
2	225.0	———	———	———	———	———	———	———	±15.0
3	150.0	270.0	———	———	———	———	———	———	±10.0
4	112.5	202.5	———	———	———	———	———	———	± 7.5
5	90.0	162.0	234.0	———	———	———	———	———	± 6.0
6	135.0	195.0	255.0	———	———	———	———	———	± 5.0
7	115.7	167.1	218.6	270.0	———	———	———	———	± 4.3
8	101.3	146.3	191.3	236.3	———	———	———	———	± 3.8
9	90.0	130.0	170.0	210.0	250.0	———	———	———	± 3.3
10	117.0	153.0	189.0	225.0	261.0	———	———	———	± 3.0
11	106.4	139.1	171.8	204.5	237.3	270.0	———	———	± 2.7
12	97.5	127.5	157.5	187.5	217.5	247.5	———	———	± 2.5
13	90.0	117.7	145.4	173.1	200.8	228.5	256.2	———	± 2.3
14	109.3	135.0	160.7	186.4	212.1	237.9	263.6	———	± 2.1
15	102.0	126.0	150.0	174.0	198.0	222.0	246.0	270.0	± 2.0
16	95.6	118.1	140.6	163.1	185.6	208.1	230.6	253.1	± 1.9
20	94.5	112.5	130.5	148.5	166.5	184.5	202.5	220.5	± 1.5
	238.5	256.5	———	———	———	———	———	———	
30	99.0	111.0	123.0	135.0	147.0	159.0	171.0	183.0	± 1.0
	195.0	207.0	219.0	231.0	243.0	255.0	267.0		
36	92.5	102.5	112.5	122.5	132.5	142.5	152.5	162.5	± 0.8
	172.5	+10.0 step						262.5	
40	92.3	101.3	110.3	119.3	128.3	137.3	146.3	155.3	± 0.8
	164.3	+9.0 step						263.3	
60	91.5	97.5	103.5	109.5	115.5	121.5	127.5	133.5	± 0.5
	139.5	+6.0 step						265.5	

Note)　*3　The above setting angle θs is selected to satisfy θs=(90+360n)/Z and to be within 90 ≤ θs ≤ 270.

*4　The setting accuracy of the setting angle θs shall be ±30.0/Z.

*5　For gears not listed in the table above, calculate the setting angle referring to *3, *4.

*6　The pulses of both channels inputted should be overlapped to judge the direction of the rotation.
Especially, when the number of the teeth is small or an irregular shaped gear is used, great caution is necessary.

Acceptable　　Not Acceptable

VM-703B TACHOMETER & ECCENTRICITY MONITOR MODULE

CE

Specification

ENVIRONMENTAL CONDITION

Operating temperature	: 0 to +65°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)	1piece (7072NAB)
	Recorder output terminal block plug (6pin) FRONT-MC-1.5/6-STF-3.81 (PHOENIX CONTACT)	2pieces *8 (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) *7 D-sub plugs and hoods are not included in this code. Please make necessary arrangement separately, if required.
*8 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 (Tachometer)

Monitoring	: Tachometer
Monitor range	: 0 to 5000rpm
Input sensor	: FK-202F (non-intrinsic safety)
Input points	: 2 points
Input impedance	: 50kΩ
Input pulsepoints	: 60 pulse/rev
Input speed / indicated speed changed ratio	: 1

INPUT (Eccentricity P-P)

Monitor range	: 0 to 100μm
Input sensor	: FK-202F (non-intrinsic safety)
Input impedance	: 50kΩ
Measure range	: 1 to 600rpm
Phase marker	: Ch1 (this module)

INPUT (Eccentricity Direct)

Monitor range	: -50 to +50μm
Polarity	: Direct

WAVE SHAPE (Tachometer)

Trigger mode	: AUTO
Hysterics set value	: 1V

PULSEOUTPUT (Tachometer)

Output channel	: Ch1

SPEED RELAY SET (Tachometer)

HH set point	: 3600rpm (Over speed)
H set point	: 3000rpm (Over speed)
L set point	: 10rpm (Under speed)
LL set point	: 10rpm (Under speed)
Speed relay hysterics	: 10rpm
Reset	: AUTO-RESET

OK ALARM (Tachometer)

OK set point	: -1.4V (Low)
Reset	: AUTO-RESET

OK ALARM (Eccentricity)

OK set point	: -1.4V (Low), -18.8V (High)
Reset	: AUTO-RESET

ALARM (Eccentricity P-P)

DANGER set point	: 80μm
ALERT set point	: 60μm
Alarm delay time	: 3sec (DANGER, ALERT)
Alarm reset	: AUTO-RESET

ALARM (Eccentricity Direct)

Set point	: Not used

RECODER OUTPUT

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

CONTACT

Contact (RELAY1)	: HH-1 (tachometer)
Contact (RELAY2)	: H-1 (tachometer)
Contact (RELAY3)	: L-1 (tachometer)
Contact (RELAY4)	: LL-1 (tachometer)
Contact (RELAY5)	: DANGER-3 (Eccentricity P-P)
Contact (RELAY6)	: ALERT-3 (Eccentricity P-P)
Enagization method	: Normaly de-energized

OTHERS

Suppression set value	: 0% (Only eccentricity P-P)
First out	: OFF
Timed OK channel defeat	: ON
Burnout	: Downscale 0%

Alarm Contact Operation

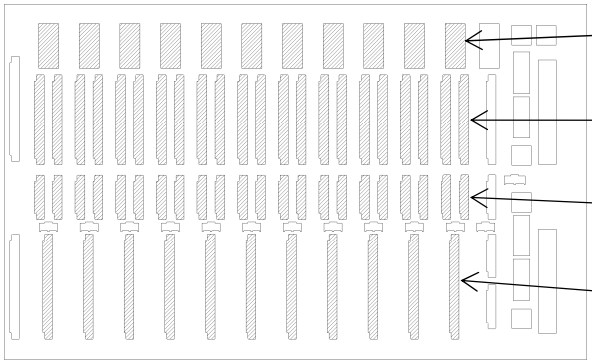
Contact type	Energization method	Power OFF	Power ON	
			Normal state	Alarm state
N.O. contact	NORMALLY DE-ENERGIZED	OPEN	OPEN	CLOSE
	NORMALLY ENERGIZED	OPEN	CLOSE	OPEN
N.C. contact	NORMALLY DE-ENERGIZED	CLOSE	CLOSE	OPEN
	NORMALLY ENERGIZED	CLOSE	OPEN	CLOSE

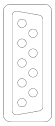
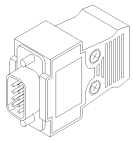
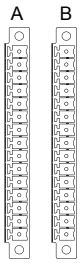
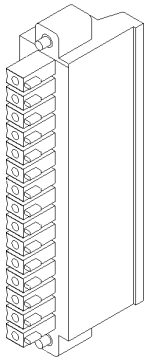
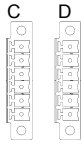
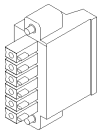
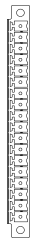
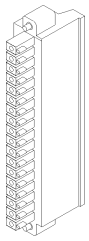
VM-703B TACHOMETER & ECCENTRICITY MONITOR MODULE

CE

Plug/ Terminal Block (Connector) Pin Assignment

VM-761B 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 PUL, 9 COM		Plug 7072NAD Hood 7072NAG
②		A1 CH1 SIG, A2 CH1 COM, A3 N/A, A4 CH1 POW, A5 CH1 SHIELD, A6 CH2 SIG, A7 CH2 COM, A8 N/A, A9 CH2 POW, A10 CH2 SHIELD, A11 CH3 SIG, A12 CH3 COM, A13 N/A, A14 CH3 POW, A15 CH3 SHIELD; B1 N/A, B2 N/A, B3 N/A, B4 N/A, B5 N/A, B6 N/A, B7 N/A, B8 N/A, B9 N/A, B10 N/A, B11 N/A, B12 N/A, B13 N/A, B14 N/A, B15 N/A		Note2) 7072NAB
③		C1 REC1 +, C2 REC1 -, C3 REC2 +, C4 REC2 -, C5 REC3 +, C6 REC3 -; D1 REC4 +, D2 REC4 -, D3 N/A, D4 N/A, D5 N/A, D6 N/A		7072NAC
④		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

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.

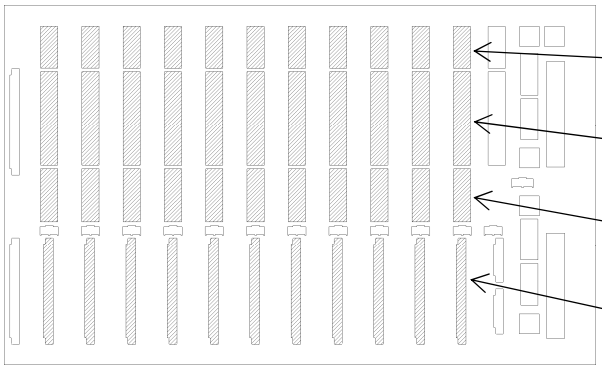
VM-703B TACHOMETER & ECCENTRICITY MONITOR MODULE

CE

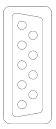
Plug/ Terminal Block (Connector) Pin Assignment

VM-762B Instrument Rack

(Back)



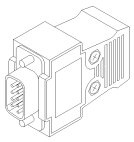
① Back of Instrument Rack



① Plug/ Terminal Block (Connector) Pin Assignment

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

① Fitting Plug

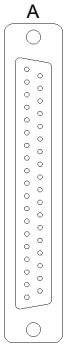


① Part Code

Plug
7072NAD
Hood
7072NAG

② Back of Instrument Rack

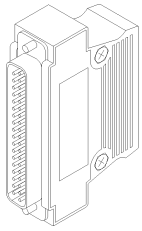
A



② Plug/ Terminal Block (Connector) Pin Assignment

A1	CH1 IN	A20	N/A
A2	CH1 COM	A21	N/A
A3	N/A	A22	N/A
A4	CH1 POW	A23	N/A
A5	CH1 SLD	A24	N/A
A6	CH2 IN	A25	N/A
A7	CH2 COM	A26	N/A
A8	N/A	A27	N/A
A9	CH2 POW	A28	N/A
A10	CH2 SLD	A29	N/A
A11	CH3 IN	A30	N/A
A12	CH3 COM	A31	N/A
A13	N/A	A32	N/A
A14	CH3 POW	A33	N/A
A15	CH3 SLD	A34	N/A
A16	N/A	A35	N/A
A17	N/A	A36	N/A
A18	N/A	A37	N/A
A19	N/A		

② Fitting Plug

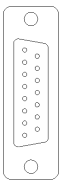


② Part Code

Plug
7072NAF
Hood
7072NAJ

③ Back of Instrument Rack

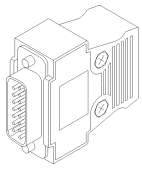
C



③ Plug/ Terminal Block (Connector) Pin Assignment

C1	REC1 +	C9	REC4 +
C2	REC1 -	C10	REC4 -
C3	REC2 +	C11	N/A
C4	REC2 -	C12	N/A
C5	REC3 +	C13	N/A
C6	REC3 -	C14	N/A
C7	N/A	C15	N/A
C8	N/A		

③ Fitting Plug



③ Part Code

Plug
7072NAE
Hood
7072NAH

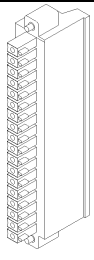
④ Back of Instrument Rack

E

④ 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.

④ Fitting Plug



④ Part Code

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.