

Digital Tachometers/Sensors and Peripherals

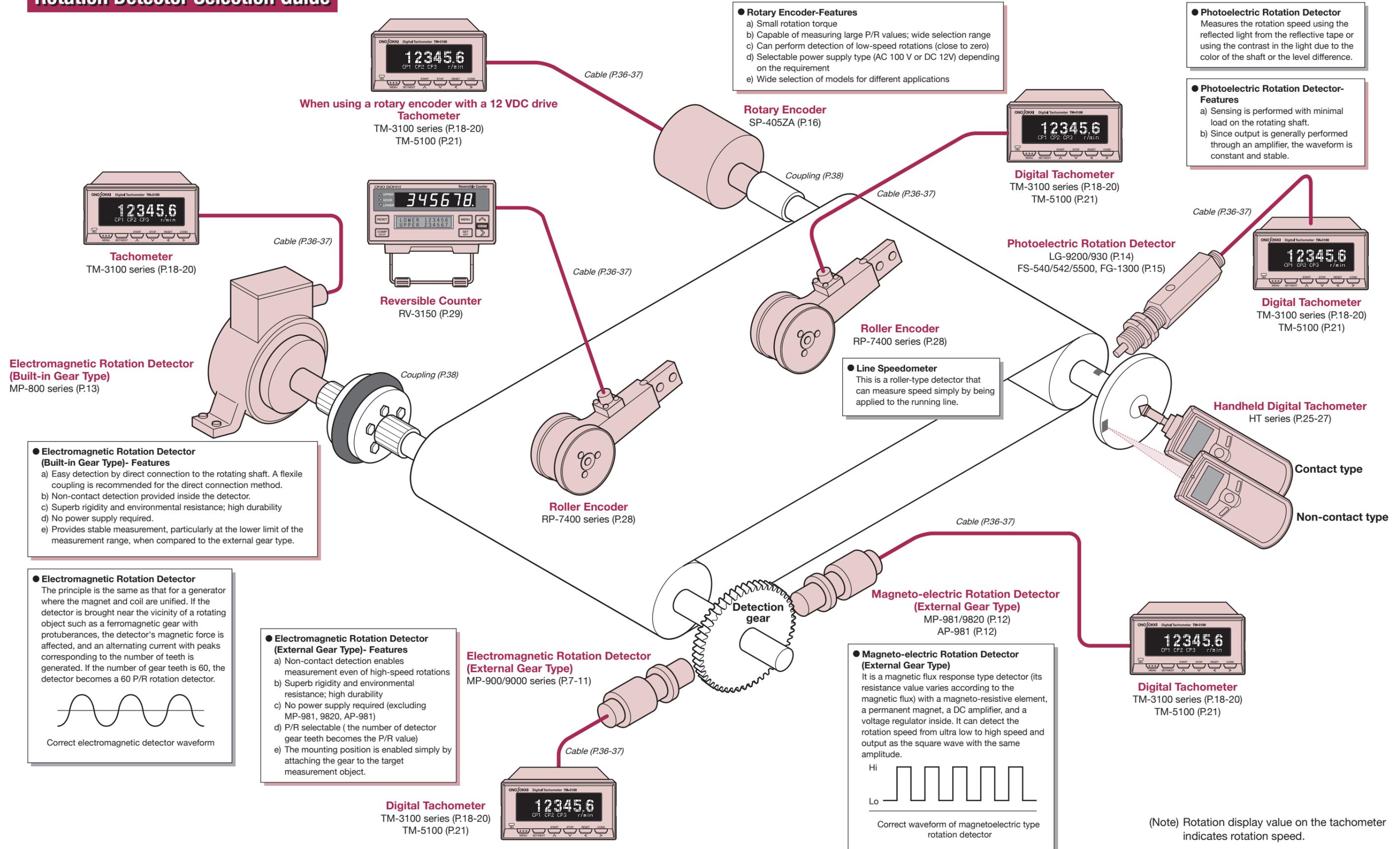
LG/SP/MP/RP series
FV/FT/PA/TM series



ONOSOKKI

Diverse lineup that Ono Sokki is proud of. Choose the product that satisfies your need.

Rotation Detector Selection Guide



Rotation Display Unit Selection Guide

	Appearance	Model No.	Output, Specifications, etc.	Power Requirement (Power Supply for the Detector)	Compatible Detectors	Page No.
For General-Purpose Model		TM-3110	Display only	100 to 240 VAC (12 VDC/100 mA)	MP series SP-405ZA LG series RP series	p. 18-20
		TM-3120	BCD output			
		TM-3130	Analog output			
		TM-3140	Comparator output			
Multifunction Model		TM-5100	BCD output Analog output Comparator output RS-232C 2-channel calculation	100 to 240 VAC (5 VDC/150 mA) (Total of A and B channels) (12 VDC /150 mA) (For each A and B channel)	MP series LG series RP series	p. 21
Advanced Model		FT-2500	Analog output Comparator output Pulse output RS-232C FFT calculation	100 to 240 VAC (12 VDC/100 mA)	FT-0501 (Rotation detector for DC motor) Sound/vibration sensors	p. 22- 23

Note1: Please refer to "Table of Signal Cable" on page 36 and 37 to select the suitable signal cable.

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Rotation Detector

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Electromagnetic Type (External Gear Type)	

[Modules 1 to 3]		
General-purpose type	MP-9100	7 to 11
With a directly attached cable	MP-911	7 to 11
High speed rotation type	MP-9120	7 to 11
Oil-proof type	MP-930	7 to 11
Oil-proof/Heat-resistant type (up to 150 °C)	MP-935	7 to 11
Heat-resistant type (up to 220 °C)	MP-936	7 to 11
Long body type (105 mm)	MP-940A	7 to 11
Long body type (81 mm)	MP-954	7 to 11
Compact type (M12)	MP-950	7 to 11
Compact type (M8)	MP-962	7 to 11
Ultra-compact type (M5)	MP-992	7 to 11
[Compact module]		
For modules 0.5 to 1	MP-9200	7 to 11
[Medium module]		
For modules 3 to 10	MP-963	7 to 11

Magneto-electric Type (External Gear Type)

Low-to-medium speed	MP-981	12
High speed	MP-9820	12
Acid-resistant/water proof	AP-981	12

Electromagnetic Type (Built-in Gear Type)

Low-to-medium speed	MP-810/820/830/837	13
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Optical Fiber	FS-540/542/5500, FG-1300	15

Rotary Encoder

Ultra-compact type	SP-405ZA	16
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Digital Tachometer

General-purpose Use		
Display only	TM-3110	18 to 20
BCD output	TM-3120	18 to 20
Analog output	TM-3130	18 to 20
Comparator output	TM-3140	18 to 20

Multifunction Type

Multifunction tachometer	TM-5100	21
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Advanced Model

Advanced tachometer	FT-2500	22, 23
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Handheld Tachometer

Advanced handheld tachometer		
FFT calculation type	FT-7200	24

Handheld Digital Tachometer

Multifunction type	HT-5500	25
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Liner motion speedometer (made to order)	ST-1210	30,31
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Rotation Detector

Notes on Detection Gears

•Detection Gear

In general, gear made with soft metals (S45C, SS400, etc.) is used as a detection gear, which has magnetic body and large magnetic permeability. When measuring the rotation speed, if the gate time of the counter is 1 second, it can be read directly by the counter using the gear with 60 P/R.

•Shape of a Detection Gear

Fig.1 shows detector output waveforms from various types of external rotors (detection gears etc.)

Involute gear is the most suitable for detection gear.

*Note

- Distortion might appear in output waveform, such as high frequency distortion when triangular teeth / square teeth / round teeth / partially missing teeth are used.
- If the gear is magnetized, output voltage decreases or the abnormal waveform is output due to interference with the permanent magnet inside the detector.

Abbreviation of gears: M=Module Z=number of teeth D=diameter of gear

$$M = \frac{D}{Z+2} \quad \frac{N \text{ (r/min)} \times Z \text{ (number of teeth)}}{60 \text{ (s)}} = C \text{ (Hz)} \quad \text{When } Z=60, N=C$$

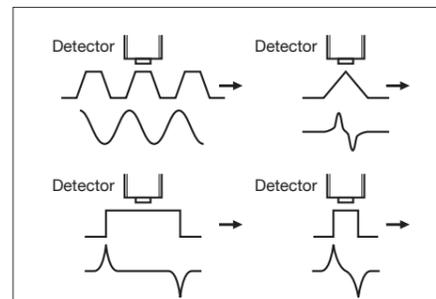
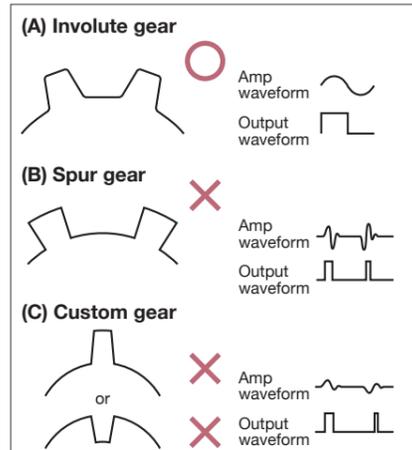


Fig. 1 Various teeth shapes and output waveforms

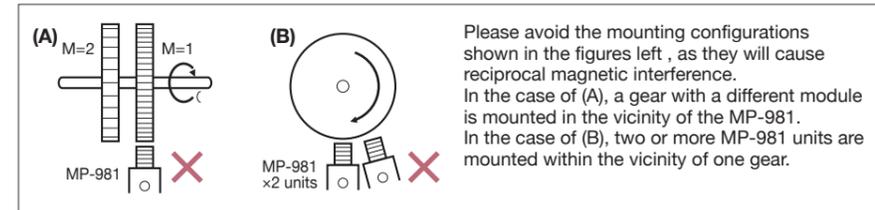
•Shape of the gear for the MP-981 and the mounting method

(1) Output signals according to the shape of the gear

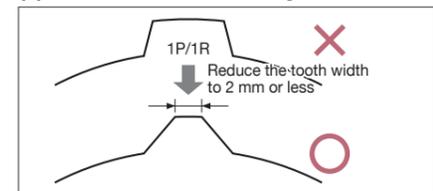


Since two pulses may be output for one tooth in the case of (B) and (C) in the figure above, (B) and (C) are not suitable for use as a detection gear.

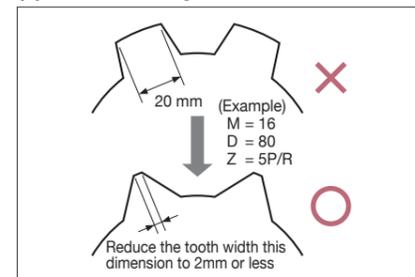
(2) Mounting method



(3) How to use a custom gear



(5) How to use a gear when M = 3 or more



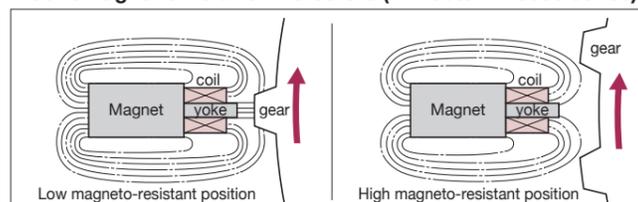
(4) How to calculate Module M

This calculation is for involute gears only

$$\text{Module } M = \frac{\text{Reference pitch circle diameter}}{\text{Number of teeth}}$$

Electromagnetic Rotation Detectors and Magneto-electric Rotation Detectors

Electromagnetic Rotation Detectors (MP-900/MP-9000 series)



Electromagnetic Rotation Detector generates frequency signal of proportional to the rotation speed by bringing it close to the tooth tip of the detection gear attached to the rotating shaft. It consists of a permanent magnet, a detection coil, and a yoke.

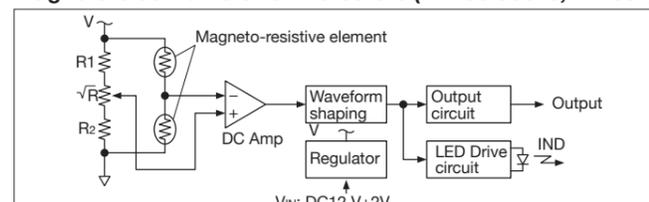
When a magnetic material approaches in the vicinity of the yoke, the magnetic flux passing through the detection coil changes, and an induced voltage of frequency proportional to the change is generated in the detection coil. Magnetic flux pulsates "frequency f = rotation speed x gear". Therefore, this will be output as the rotation signal of the detector.

Features are as follows.

- Easy structure
- No power supply required
- Compact
- No need for maintenance

It provides reliable rotation measurement and is widely used in many ways.

Magneto-electric Rotation Detectors (MP-981/9820, AP-981)



Magneto-electric rotation detector is made by applying a magneto-resistive element whose resistance value varies depending on the intensity of the magnetic field.

Normally, a constant magnetic field is applied by a magnet, and the change in the magnetic field when the detection gear approaches the element is detected as a change in the resistance value.

Changes in resistance value (= differential output) is detected and its signal is amplified by a DC amplifier. The output of the DC amplifier goes through a waveform shaping circuit and is made into a rectangular wave.

Magneto-resistive element is arranged at the tip of the detector. For correct detection, it is necessary that the detection surface and the gear surface face each other with the proper direction and position. As a guide, the detector is marked with an alignment mark. (power supply: DC 12 ± 2 V)

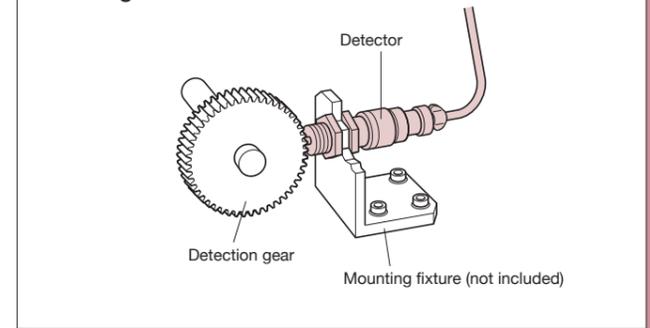


Electromagnetic Type Rotation Detector MP-900/9000 series

By bringing the MP-900/9000 series close to the tooth tip, it detects the frequency signal proportional to the rotation speed (sine wave output). You can select according to the purpose from wide selection, such as general purpose type, special type including oil proof / heat resistant type. Extension cable, signal cable, connector are sold separately (See P.34, 35).



Mounting method



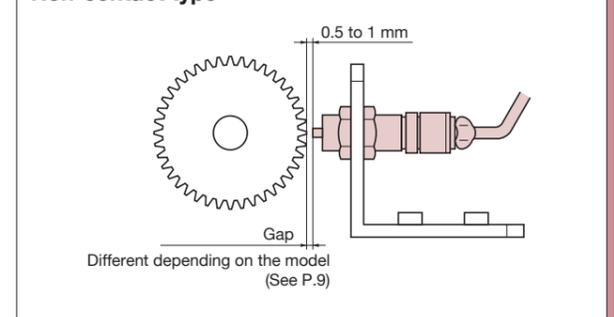
•Features

- General-purpose type MP-9100**
 - Low cost and popular type
- Direct attached cable type MP-911**
 - Cable 5m direct attached type of MP-9100 (cable: 3D-2V)
- Low impedance (high-speed rotation type) MP-9120**
 - Noise-resistant due to low impedance
 - Adapted for detection in high speed range
 - Same size as MP-9100
- Oil-proof type MP-930**
 - Conforms to Japan Electrical Manufacturers Association (JEM) standard (old), JEM-1030-1983*1 oil proof type
 - Direct attached cable 0.5 m
- Oil proof and heat-resistant type MP-935**
 - Conforms to Japan Electrical Manufacturers Association (JEM) standard (old), JEM-1030-1983*1, oil proof type
 - Heat resistant cable up to 150 °C
 - 1 m directly attached type
- Heat resistant type MP-936**
 - Heat resistant up to 220 °C
 - Heat resistant cable 1 m directly attached type
- Long body type MP-940A**
 - Long body type of 105 mm mounting section, suitable for the rotation detection of the rotating object deeply installed.
- Long body type MP-954**
 - Long body type of 81 mm mounting section, suitable for the rotation detection of the rotating object deeply installed.
 - Mounting screw size is same as MP-950
 - Directly attached cable 0.5 m

*1 Protective type F: Not affected harmful by oil droplets/oil spill from any direction.

- Compact type MP-950**
 - Compact (M12), directly attached cable 0.5 m
 - Compact type MP-962**
 - Compact (M8), directly attached cable 0.5 m
 - Ultra-compact type MP-992**
 - Ultra-compact (M5), directly attached cable 0.5 m
 - Compact module type MP-9200**
 - For module 0.5 to 1
 - Medium module type MP-963**
 - For module 3 to 10
- Standard detection gear**
- MP-001 (σ = 62)
 - Module 1, 60 teeth

Non-contact type



* When the electromagnetic type rotation detector MP series is used especially in the place where great importance is placed on reliability, the technical consultation is required. Please consult your nearest distributor or Ono Sokki sales office nearby.

●MP-900/9000 series specifications

Items	Detectors		Low impedance (High-speed rotation type)	Oil-proof (With cable attached)	Oil-proof/Heat- resistant (150 °C) (With cable attached)	Heat-resistant (220 °C) (With cable attached)
	General-purpose	General-purpose (With cable attached)				
	MP-9100	MP-911	MP-9120	MP-930	MP-935	MP-936
DC resistance value (Ω)*1	850 to 950		85 to 105	850 to 950	600 to 700	800 to 900
Inductance (mH) [1kHz, T.Y.P.]	300		30	300	270	370
Impedance (Ω) [1kHz, T.Y.P.]	2 k		240	2 k	1.8 k	2.5 k
Output voltage (Vp-p) [1kHz, T.Y.P.]*2	2.0 or more					
Detectable frequency range (Hz) *3, *4	200 to 35,000		200 to 80,000	200 to 35,000	300 to 35,000	
Detecting gear module	1 to 3					
Operating temperature range	-10 to 90 °C			-10 to 150 °C	-10 to 220 °C	
Vibration resistance (m/s ²)*5	196					
Shock resistance (m/s ²)*6	1,960					
Weight (g)	Approx. 90	Approx. 300 (Including cable)	Approx. 90	Approx. 100 (Including cable)		
Surrounding magnetic field (T)	0.03 or less			0.02 or less		

Items	Detectors		Compact type (With cable attached)	Compact type (With cable attached)	Ultra-compact type (With cable attached)	For small modules	For medium modules
	Long body	Long body (With cable attached)					
	MP-940A	MP-954	MP-950	MP-962	MP-992	MP-9200	MP-963
DC resistance (Ω)*1	500 to 600	2.1 to 2.3 k		1.25 to 1.45 k	160 to 190	850 to 950	3.7 to 4 k
Inductance (mH) [1kHz, T.Y.P.]	270	400		210	25	300	1800
Impedance (Ω) [1kHz, T.Y.P.]	1.8 k	3.5 k		2.1 k	250	2 k	16 k
Output voltage (Vp-p) [1kHz, T.Y.P.]*2	2.0 or more			1.5 or more	0.5 or more	0.6 or more (M=0.75)	2.5 or more
Detectable frequency range (Hz)*3, *4	300 to 35,000			400 to 35,000	400 to 100,000	300 to 35,000	45 to 15,000
Detecting gear module	1 to 3					0.5 to 1	3 to 10
Operating temperature range	-10 to 90 °C				-10 to 120 °C	-10 to 90 °C	
Vibration resistance (m/s ²)*5	196						147
Shock resistance (m/s ²)*6	1,960						
Weight (g)	Approx. 150	Approx. 90 (Including cable)	Approx. 70 (Including cable)	Approx. 50 (Including cable)	Approx. 3 (Including cable)	Approx. 90	Approx. 200
Surrounding magnetic field (T)	Up to 0.01			Up to 0.005	Up to 0.001	Up to 0.005	Up to 0.03

*1: The temperature coefficient for the DC resistance value: 0.4% / °C

*2: Load resistance: 10 kΩ, M=1, gap=0.5 mm (As for MP-963; load resistance 10 kΩ, M=3, gap=1.5 mm)

*3: When using the 60 P/R detection gear, the value for frequency [Hz] and value for rotation speed [r/min] are the same.

*4: When using the Ono Sokki standard MP-001 detection gear (when using a gear with M=3 for MP-963, M=0.75 for MP-9200)

*5: JIS E 4031, five types, 40 Hz, two hours in each of the X and Y directions; four hours in the Z direction

*6: Three times each in the X, Y and Z directions

● Notes on the Detection Gear

a) Gap between the detector and the detection gear

The smaller the gap, the lower rotation speed can be detected. The gap should normally be set between 0.5 to 1 mm.

b) Detection gear tooth shape

An involute gear is recommended.

c) Gear size

The module unit (M) is used. This value is used to determine the size of the teeth. Modules with the same number of teeth can be meshed.

$$\text{Module} = \frac{\text{Pitch circle diameter}}{\text{Number of teeth}}$$

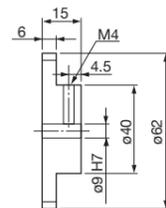
We recommend a module of greater than 1 and the width of teeth 4 mm.

d) Detection gear material

Material with a property of being strongly attracted to a magnet, (ferromagnet) is good to use. If you have a choice, we recommend materials such as S45C, SS400, SUS430, etc.

● Ono Sokki's Standard Detection Gear MP-001

The detection gear Ono Sokki provides is a module 1 involute gear with 60 teeth.
Number of teeth: 60
Module : 1
Material : SS400 (Chrome plated)



●The relationship between the gap and detection range

- (1) The relationship between the gap from the detector to the detection gear and the detection range (lowest measurable value) is given in the tables below.
- (2) The rotation speed range where an output voltage of 0.5 Vp-p or more can be maintained. (load resistance = 10Ω)
- (3) The measurable rotation speed varies according to the type of display unit used.

● MP-900/9000 series measurable rotation speed (r/min)

* When using a detection gear with 60 teeth

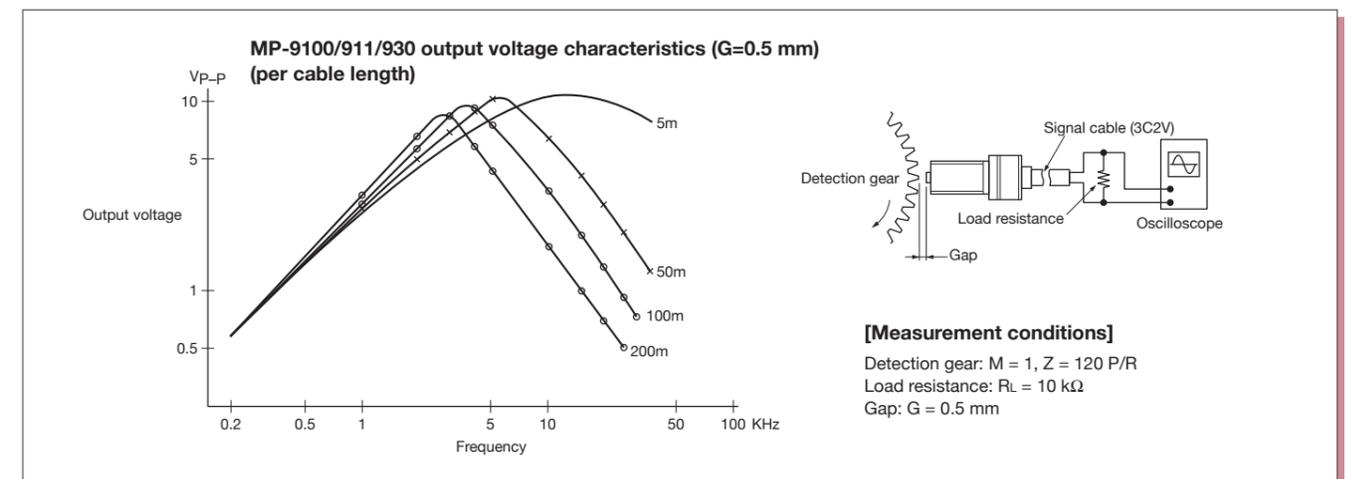
Model	Module	Lower limit of rotation speed						Upper limit of rotation speed
		M=1		M=1.5		M=2		
	Gap	0.5	1	0.5	1	0.5	1	
MP-9100		200	500	50	300	30	100	35,000
911		200	500	50	300	30	100	35,000
9120		200	500	50	300	30	100	80,000
930		200	500	50	300	30	100	35,000
935		300	1200	75	300	40	100	35,000
936		300	1000	75	300	40	100	35,000
940A		300	1200	80	300	50	130	35,000
950		300	1000	100	300	60	150	35,000
954		300	1200	100	300	60	150	35,000
962		400	1500	140	420	80	200	35,000

Model	Module	M=1		M=1.5		M=2		Upper limit of rotation speed
		0.2	0.5	0.2	0.5	0.2	0.5	
MP-992		400	1000	230	600	140	330	100,000

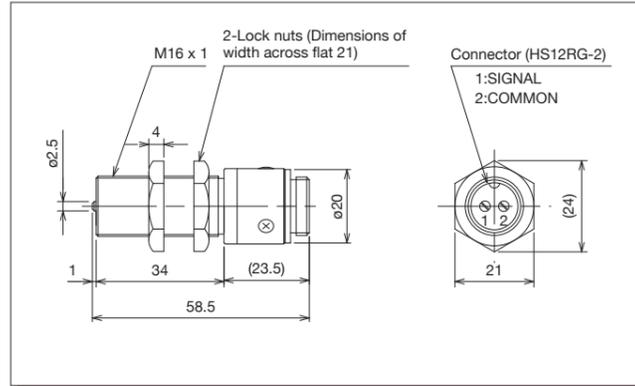
Model	Module	M=0.5		M=0.75		Upper limit of rotation speed
		0.2	0.2	0.2	0.5	
MP-9200		2,000	300	1,000	35,000	

Model	Module	M=3		M=5		M=7.5		Upper limit of rotation speed
		1	2	1	2	1	2	
MP-963		45	90	25	50	20	45	15,000

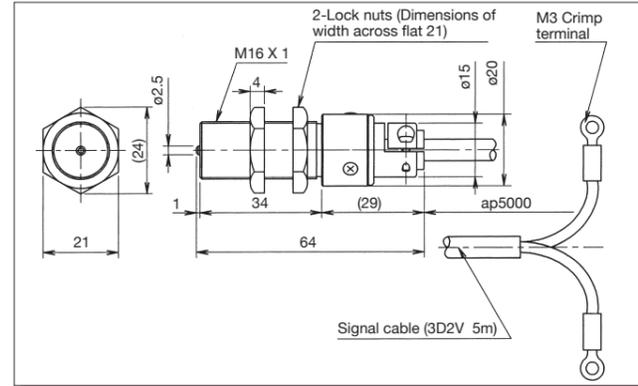
*The data is standard value and do not warrant the operation. When using our rotation detectors.



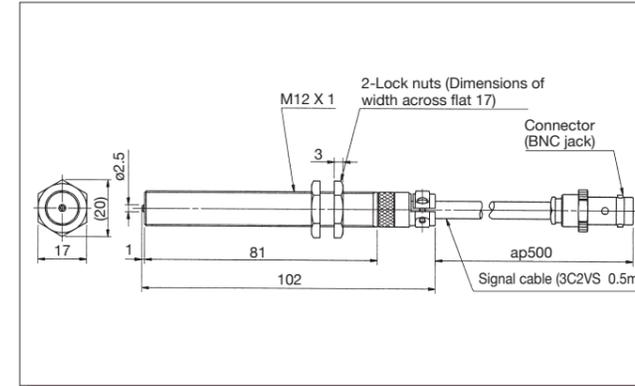
● MP-9100



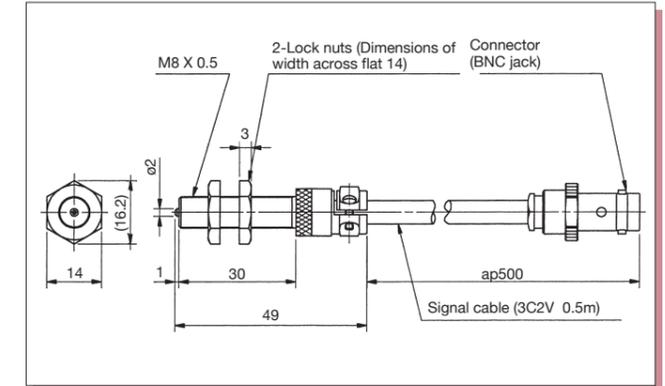
● MP-911



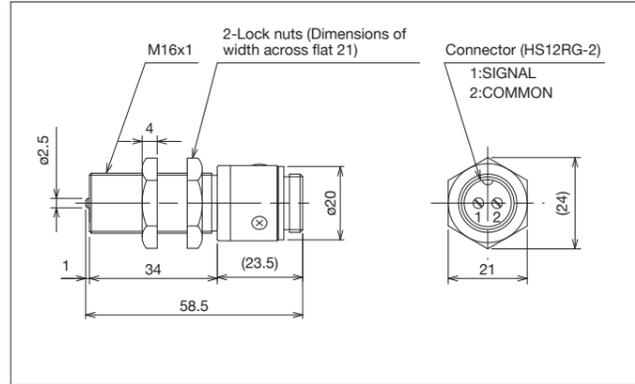
● MP-954



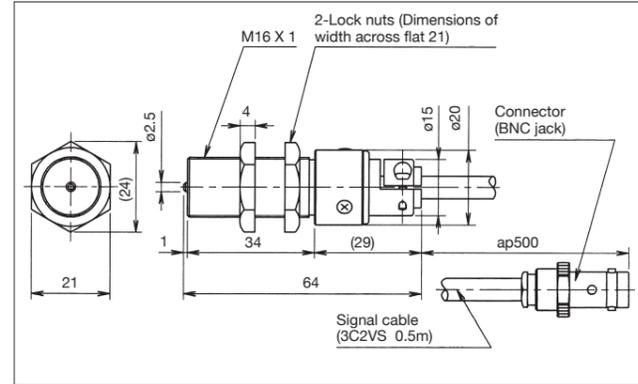
● MP-962



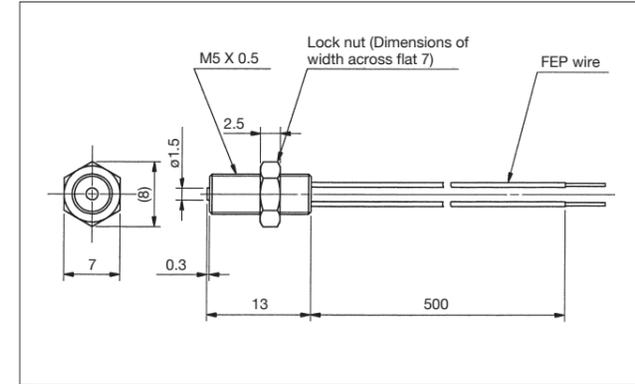
● MP-9120



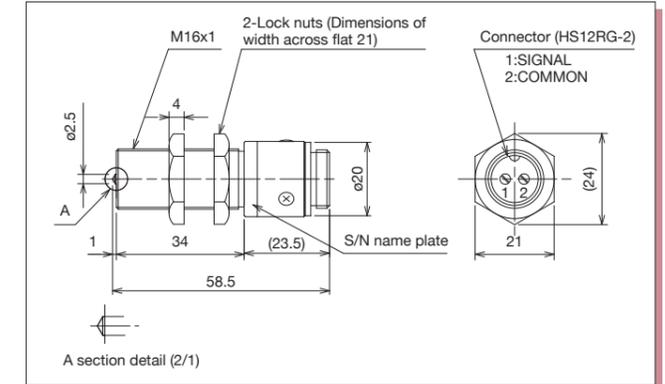
● MP-930



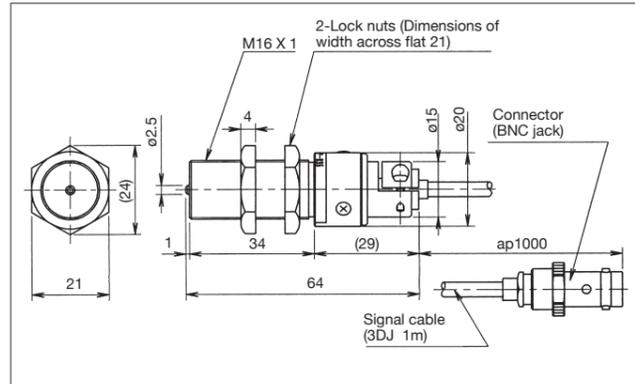
● MP-992



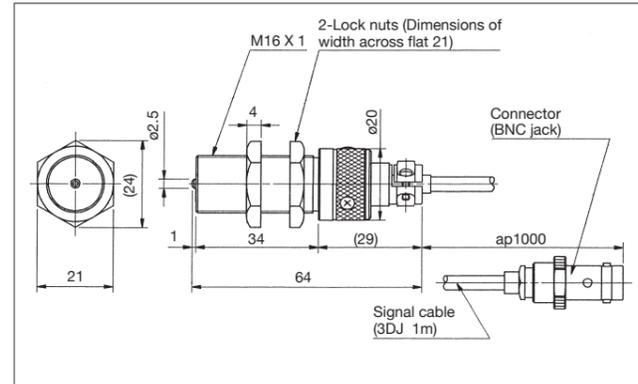
● MP-9200



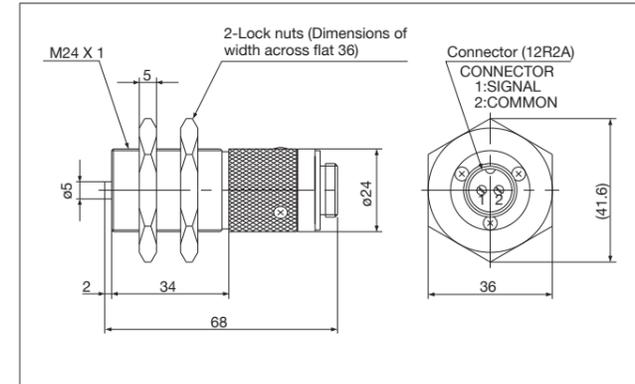
● MP-935



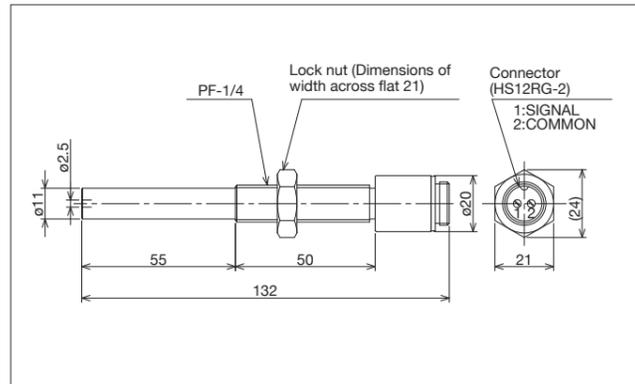
● MP-936



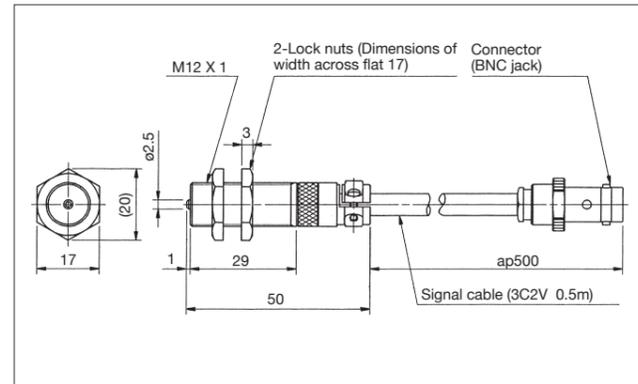
● MP-963



● MP-940A



● MP-950



Magneto-electric Rotation Detector MP-981/9820

General-purpose/ high speed detection type

This is a magnetic flux response type detector (the resistance value changes according to the magnetic flux) which internally has magnetic resistance elements, permanent magnets, a direct current amplifier, and a voltage regulator. It can detect over a wide range of rotation speed from ultra low speed to high, and outputs the results as a square waveform.

Three models are provided; General-purpose type (MP-981), high speed detection type (MP-9820), and acid-resistance and waterproof type (AP-981).



MP-981
MP-9820

• Features

- Detection from nearly 0 r/min
- Output as a square wave from ultra-low to high speed (1 to 100,000 r/min [60-teeth gear]) (MP-9820)
- Compact, light weight, easy-to-mount

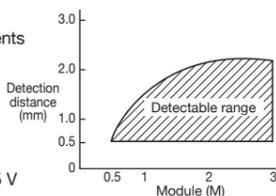
• Specifications

Detection method : detection using magnetic resistance elements
 Detection range : MP-981... 1 Hz to 20 kHz
 MP-9820... 1 Hz to 100 kHz
 Detection gear : ferromagnet (tooth width: at least 3 mm, module: 0.5 to 3)
 Detection distance : see the graph at the right
 Power requirement : 12 ±2 VDC
 Power consumption : approx. 40 mA (at 12 V, 25 °C)
 Output waveform : square wave, Lo; 0.5 V or less, Hi; 5 ±0.5 V
 Output impedance : approx. 330 Ω
 Protective circuit : power source polarity, output short-circuit protection

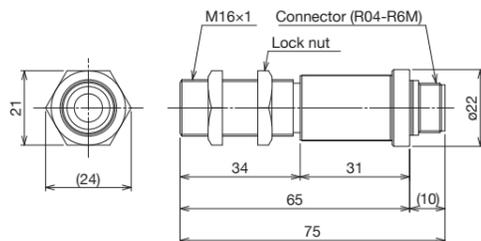
Operating temperature : -10 to +70 °C
 Storage temperature : -20 to +80 °C
 Withstand voltage : 250 VDC
 Vibration resistance (conduction) :
 MP-981; 49 m/s² in each direction of X, Y, Z (for 1 hour)
 MP-9820; 49 m/s² (10 to 150 Hz)
 *in 10 to 46 Hz, 1.5 mm (constant amplitude)
 in 46 to 150 Hz, 49 m/s² in each direction of X, Y, Z (for 150 mins each)

Shock resistance (non-conduction) :
 MP-981; 490 m/s² in each direction of X and Y (three times each)
 MP-9820; 490 m/s² in each direction of X, Y and Z (three times each)
 Connection method : see P.36-37
 Weight : approx. 80g (including the two nuts used for fastening)
 Accessory : nut for fastening x 2, instruction manual x1

Module and detection distance



- MP-981
- Rotation speed: 1 to 20,000 r/min (60 P/R)
 - Temperature: 25 °C
- MP-9820
- Rotation speed: 1 to 100,000 r/min (60 P/R)
 - Temperature: 25 °C



Magneto-electric Rotation Detector AP-981

Acid-resistant, waterproof type

The AP-981 is a waterproof model that complies with the JIS C 0920 Protective Class 7 (marking symbol: IPX7) requirements for the waterproof testing of electrical equipment and wiring materials.



• Features

- Can be used for measurement in locations where nitric acid mist is in the atmosphere, or in environments where the detector may be submerged.
- Performs by non-contact detection
- Output as a square wave with the same amplitude from ultra-low to high speed (1 to 20,000 r/min [60-teeth gear])
- Comes with a 1.9 m length acid-resistance directly attached cable

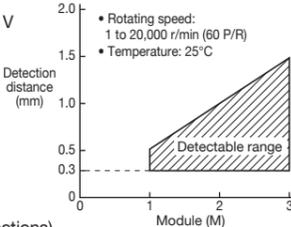
• Specifications

Detection method : detection using magnetic resistance elements and magnetic gears
 Detection range : 1 Hz to 20 kHz
 Detection gear : ferromagnet (tooth width: at least 3 mm, module: 1 to 3)
 Detection distance : see the graph at the right
 Power requirement : 12 ±2 VDC
 Power consumption : approx. 30 mA (at 12 V, 25 °C)
 Output waveform : square wave, Lo; 0.5 V or less, Hi; 5 ±0.5 V
 Output impedance : approx. 330 Ω
 Protective circuit : power source polarity, output short-circuit protection

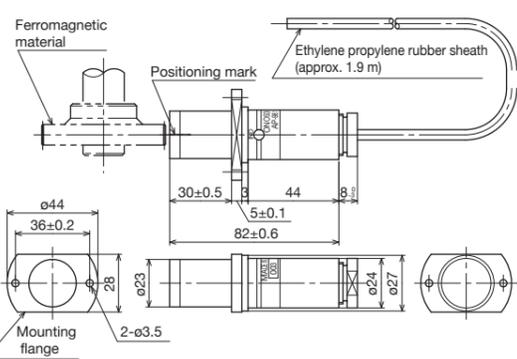
Operating temperature : -10 to 70 °C
 -10 to 50 °C (with a nitric acid fume concentration of 10%)
 Storage temperature : -20 to 80 °C
 Withstand voltage : 250 VDC
 Vibration resistance (conduction) :
 1.2 mm compound amplitude, 30 Hz (for 1 hour in each of the X, Y, and Z directions)

Shock resistance (non-conduction) :
 490 m/s² (three times each in the X and Y directions)
 Outer surface material : polycarbonate
 Connection method : 1.9 m length directly attached cable (other end: open)
 Weight : approx. 130 g (including a signal cable)
 Accessory : instruction manual x1
 *The cable length can be specified as 5, 10, 15 and 20 m.

Module and detection distance



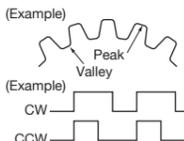
- Rotating speed: 1 to 20,000 r/min (60 P/R)
- Temperature: 25 °C



Caution

MP-981 and AP-981 have been designed for the purpose of detecting rotation speed. Please observe the following points when using these detectors.

- (1) A square wave with the same amplitude is output as the result of rotation measurement from low speed to high speed (1 to 20,000 r/min: 60 gear teeth per a gear). However, it does not necessarily mean that the high level is appeared at the peak of the gear, the low level at the valley. The starting points may not be the same when using several detectors for synchronous operation.
- (2) The output pulse width may be different depending on the rotating direction of a detection gear (CW direction / CCW direction).



Electromagnetic Type Rotation Detector MP-800 series

Low-to-medium speed

There are three models in the series, each with a different outer appearance: MP-810, MP-820 and MP-830.



• Features

- There are three models in the series, differentiated by their outer appearances.

MP-810: base mount type

MP-820: dual-shaft type

MP-830: flange type

- Number of output pulses

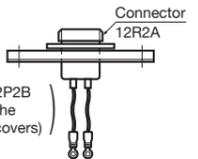
Model	Number of Pulses (P/R)
MP-810F, 820F	300
MP-810G, 820G, 830G	60, 120, 360
MP-810B, 820B, 830B	600

* Models other than MP-810B are made-to-order products.

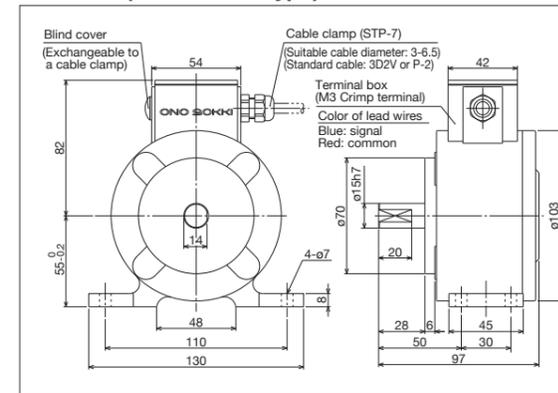
• Specifications

Rotating speed range : 5 to 5,000 r/min
 Output waveform : approximate sine wave
 Output voltage : 0.5 Vp-p or more
 DC resistance value : 770 ±30 Ω
 Inductance : 2 H typ. (at 1 kHz)
 Starting torque : 245 mN·m or less
 Moment of inertia : approx. 1.5 kg·cm²
 Allowable shaft load : radial 147N, thrust 98N
 Vibration resistance : 98 m/s² in each direction of X, Y, Z (for 2 hour)
 Shock resistance : 980 m/s² in each direction of X, Y and Z (three times each)

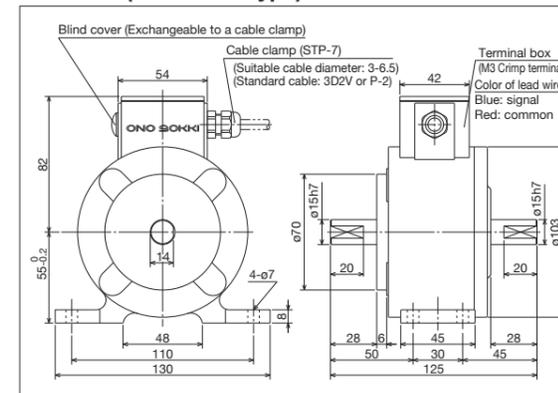
Operating temperature : -10 to 80 °C
 Weight : approx. 2 kg
 Connection method : M3 crimp terminal (JIS C 2805 1.25-3) (When using MP-081) See P.36 and P.37
 Cable outlet : cable clamp (complies with IP-68)
 Surrounding magnetic field : up to 0.01 T
 Option : connector output (MP-081)



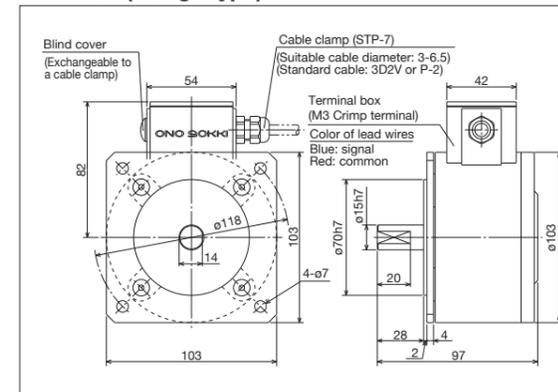
• MP-810 (Base mount type)



• MP-820 (Dual-shaft type)



• MP-830 (Flange type)



<Related product: MP-837 (low impedance type)>

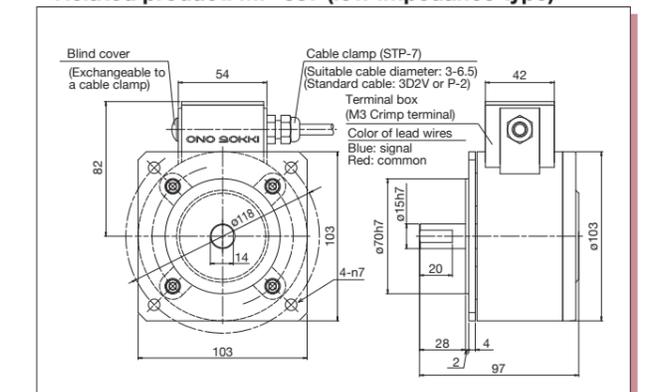
- Number of output pulses

Model	Number of Pulses (P/R)
MP-837J	180
MP-837K	240
MP-837L	300
MP-837M	360
MP-837N	420

• Specifications

Rotation speed : 50 to 2500 r/min
 Output voltage : 1.5 Vp-p or more
 Direct current resistance value : 50 ± 5 Ω
 Inductance : 0.12 H typ. (at 1 kHz)
 * The other than the above are same as MP-810/820/830.

• Related product: MP-837 (low impedance type)



Digital Tachometer

Digital Tachometer TM-3100 series

DIN standard size (96x48 mm) / for general-purpose

TM-3110 Display only



Features

- Basic model for measurement and display
- Wide measurement range from low to high speed (0.1 Hz to 100 kHz)
- The fluorescent display tube greatly improves the visibility and the operability.
- Compatible with our various detectors.

TM-3120 BCD output



BCD mode setting screen

Features

- With BCD output of 6-digit display
- Open collector output for direct connection with a PLC
- Output mode is selectable from normal or request.
- Output can be optionally changed to voltage output.

Specifications

- Mode**
- Normal mode : continuously outputs the print command every approx. 100 ms.
 - Request mode : Data is output for each request pulse.

Outputs data and print command within a minimum of 50 ms after receiving the request pulse.

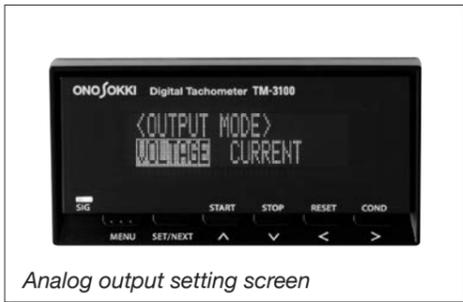
Output signal

BCD output
 Output form : 6-digit parallel output
 Output format : open collector
 Sync current : max. 32 mA
 Output withstand voltage : max. 24 V
 Output logic : positive logic
 Data refresh time : 100 ms or less

Input signal

Request signal
 Input logic : negative logic (pulse width: 10 μs or more)
 Operating edge : falling edge
 Input voltage : TTL
 Gate function : start, stop, reset

TM-3130 Analog output



Analog output setting screen

Features

- Output pulse can be switched between voltage and current.
- Update time (10 ms) improved by using D/A conversion method.

Specifications

- Output signal (voltage or current selectable)
 Output method: 12bit D/A conversion
*Resolution decreases depending on the set value.
- Output voltage range : selected from 0 to 10 V, 0 to 5 V, 1 to 5 V

Output current range : selectable from 4 to 20 mA, 0 to 16 mA

Load resistance

Voltage output : 100 kΩ or more
 Output current : 500 Ω or less
 Linearity : ± 0.3 %/F.S.

Analog output adjustment

Voltage output : ± 5 %/F.S. or more
 Current output : ± 3 %/F.S. or more
 Zero drift : ± 0.05%/F.S./°C
 Span drift : ± 0.05 %/F.S./°C
 Output refresh time : selectable from followings; 10, 20, 50, 100, 200, 500 ms, 1 s

TM-3140 Comparator output



Features

- Up to 3 types of judgment levels for upper and lower range
- High speed response with output update time of approx. 10 ms
- Various output functions

Specifications

- UPPER setup : 6-digit numeric input (The relay is ON when UPPER ≤ displayed value)
- LOWER setup : 6-digit numeric input (The relay is ON when LOWER > displayed value.)
- OK setup : The relay is ON when UPPER or LOWER is OFF.
- ERROR setup : The relay is ON when any ERROR other than RS communication error occurs.
- Output format : 1-make contact output
 Three outputs : COMP1, COMP2, and COMP3
 Either of UPPER, LOWER, OK, or ERROR can be set to.
- Measurement mode
 Automatic recovery mode : Automatically recovers when the rotation speed returns to within the set range

Comparator hysteresis :

Sets hysteresis in judgment value at comparator return.
 Holding mode : Even if the rotation speed returns to within the setting range, it holds the state.

Shot output function :

Holds comparator output time for a certain time. OFF (shipping time), 10 to 2000 ms, set in increments of 10 ms.

COMP delay function :

When the set value exceeds the setting time continuously for the set time or more, the comparator operates.
 0 to 1000 ms, set in increments of 50 ms.

Reset function : Resets in comparator holding mode.

Maximum contact capacity : 30 VDC V/1A, 250 VAC/1 A

Output format : terminal block
 Output refresh time : approx. 10 ms

Depending on the application, you can choose the suitable model from four types: display only type, BCD output type, analog output type, or comparator output type.

Various functions (common to all models)

- Display in various units is available by coefficient setting.
- Condition memory function
- Sudden deceleration follow-up function enables to follow up and display even at the time of a sudden stop.
- Calculation of the maximum value, minimum value, average value for each section
- Moving average function
- With auto zero function
- Pulse output
- World wide power supply (100 to 240 VAC)

Common specifications

Input

Input terminal : M3, free terminal screw
 Input impedance : 10 kΩ or more
 Input format : voltage or non-voltage
 Input amplification: AC or DC
 Compatible detectors:

electromagnetic type/magneto-electric type/photoelectric type/rotary encoder/proximity switch

[Input amplification format specification]

•AC amplifier
 Signal waveform : sine or square wave
 Signal voltage : sine wave; 0.2 to 45 Vrms
 square wave; 0.6 V to 63 Vp-p

Signal frequency : 1 Hz to 100 k Hz

•DC amplifier
 Signal waveform : rectangular waveform having a pulse width at 5 μs or more
 Signal voltage : Hi level; +4 to +30 V, Lo level; -1 to +1 V
 Signal frequency : 0.1 Hz to 100 kHz
 Low pass filter : OFF/20 kHz switchable

Output

<Pulse output>
 Output voltage : Hi level; 4.5 V or more
 Lo level; 0.5 V or less
 Output logic : negative
 Load resistance : 100 kΩ or more
 Output terminal : M3 free terminal screw

Display

Display unit : fluorescent display tube (selectable from three-stage brightness, 6-digit display)
 Display refresh time : selectable from 0.2 s (factory setting), 0.4s, 0.5s, 0.6s, 0.8s, 1.0 to 10s (every 1.0s).
 Display unit : select from the table below

Calculation	Unit
Rotation speed	r/s, r/min, r/h
Circumferential speed	mm/s, m/s, mm/min, m/min
Moving speed	mm/s, m/s, mm/min, m/min, km/min, mm/h, m/h, km/h
Period	s, min
No. of times (1/s)	1/s, 1/min, 1/h
Frequency	Hz, kHz
Flow rate	ml/s, ml/min, ml/h, l/s, l/min, l/h
Transit time	s, min
Option	EU/s, EU/min, EU/h

Character height : 10 mm

Number of decimal points : Select from OFF (none), 1st, 2nd, 3rd
 SIG indicator : flashes synchronously with the input pulse
 Error display : backup memory error, board error, input frequency error, display digit number error, memory full error, setting value error

Calculation

Calculation display : rotation speed, circumferential speed, moving speed, period, number of times (1/s), frequency, flow rate, transit time
 Measurement method : period calculation method
 Measurement time : 10 ms + 1 period time
 Measurement accuracy : Displayed value × (± 0. 01%) within ± 1 count
* The displayed value here indicates the count value excluding the decimal point.
 Auto zero function : This function sets the displayed value to 0 if there is no pulse input during the set time.
 Select from OFF (11 s), 0.5 s, 1.0 s, 2.0 s, 3.0 s, 4.0 s, 5.0 s, 6.0 s, 7.0 s, 8.0 s, 9.0 s, 10.0 s.

Sudden deceleration follow-up function :
 When the input pulse suddenly decreases and not being input after approx. 1 s or more, the display value automatically decreases and becomes 0 after approx. 11 seconds.

Moving average function :
 Selectable from OFF (shipping time), 2, 4, 8, 16, 32, 64, 128
* Analog output of TM-3130/0330 performs moving average of the calculation value every 10 ms and outputs it.
 Peak hold function : This function holds the peak values (maximum value, minimum value, average value) from measurement start to stop.

Memory

Panel condition memory :
 Memorizes 4 kinds of measurement conditions (The setup conditions can be stored and recalled.)

Power supply for detector

Output voltage : 12 VDC ± 10%
 Maximum output current : 100 mA

General specifications

Rated power : 100 to 240 VAC (50 Hz/ 60Hz) 30 VA max.
 TM-3100 ; 11 to 19 VA
 TM-3120 ; 13 to 21 VA
 TM-3130 ; 16 to 25 VA
 TM-3140 ; 12 to 21 VA
* When all the cards (analog output, BCD output, comparator output) are installed: 20 to 30 VA

Withstand voltage : 1500 VAC (1 min)
 Insulation resistance : 10 MΩ or more (at 500 VDC mega)
 Operating temperature : 0 to 50 °C
 Storage temperature : -10 to 60 °C
 Operating humidity : 30 to 80% RH (with no condensation)
 Storage humidity : 30 to 85% RH (with no condensation)
 Outer dimensions : 96 (W)×48 (H)×148 (D) mm
 Weight : approx. 310 g

Conforming standards

CE marking : Low voltage Directive EN61010-1:2001 (2nd)
 Overvoltage category II / pollution degree 2
 EMC Directive EN61326-1:2006 Embedded board type

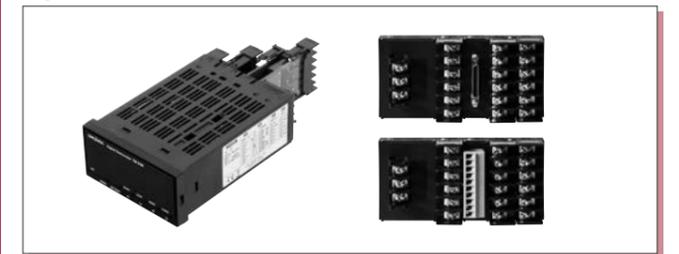
Accessory

Instruction manual × 2 set (spec edition, basic operation manual),
 panel mounting fixture × 1 set
 condenser × 1

Option

power cable for 100 V 3m (AX-2050N)

Optional card



Features

- The functions can be added by the optional cards.
- By addition of TM-0350, further advanced measurement such as rotation fluctuation rate, section data can be performed besides RS-232C communication.

Optional card list

TM-0301: DC power supply card
 TM-0321: BCD output card, voltage output
 TM-0322: BCD output card, open collector output
 TM-0330: Analog output card
 TM-0340: Comparator output card
 TM-0350: RS-232C card

* The additional fee for installation of optional cards after ordering a main body is required. Please contact your nearest distributor or Ono Sokki sales office nearby.

Digital Tachometer TM-5100

Multifunction Digital Tachometer



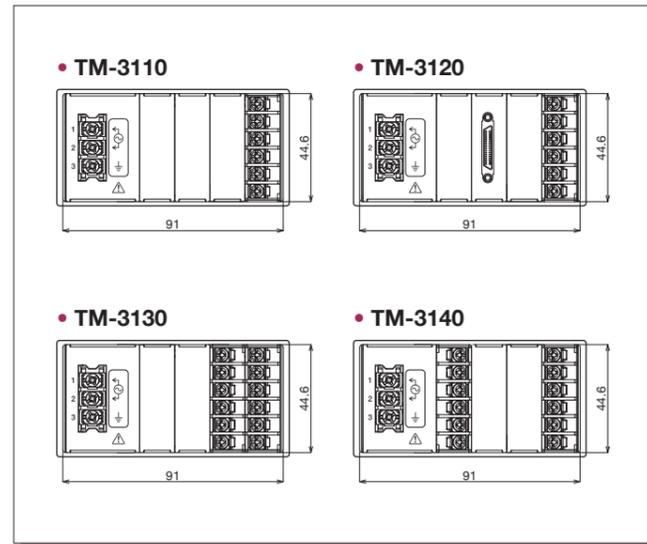
Features

- Rotation measurement over a wide range from low to high speed (input frequency: 0.6 mHz to 100 kHz)
- Two sensors are used to display the rotation direction with phase difference pulse input
- Converts to arbitrary physical amount that is proportional to rotation speed by each channel independent coefficient correction function
- Built-in comparator function of upper and lower range in two stages
- 2ch calculation function displays rotation speed difference/rotation speed ratio/rolling reduction/draw/rotation change rate/direction of rotation.
- BCD, analog comparator, RS-232C are provided as standard for output function.
- Easy-to-install DIN standard size (144 × 72 mm)
- Two Displays: a main display section that indicates coefficient value and a sub display (2 steps) that indicates set items (comparator setting value/coefficient value/ 2ch measurement values).

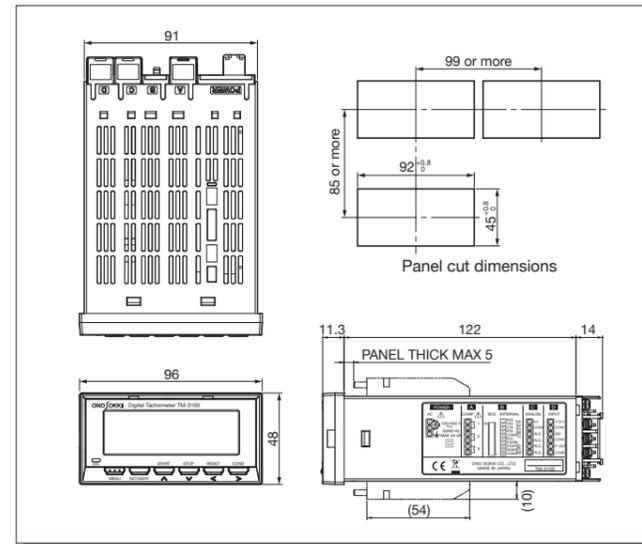
Specifications

Applicable detector	: MP series electromagnetic type / magneto electric type rotation detector, LG series photoelectric type rotation detector, RP series rotary encoder, roller encoder etc.
Number of input ch	: 2
Input amplifier type	: AC/DC (switching type)
Measurement method	: periodic calculation method, gate calculation method (switching type)
Measurement time	: 0.2 s + 1 period time (by periodic calculation method)
Coefficient setting range	: 0.0001 to 99.9999
2ch calculation function	: difference <B-A>, ratio <(B/A) × 100> change rate <(B-A/A) × 100>
Rotation direction measurement function	: The direction of rotation is indicated by polarity display when 2-phase rotary encoder is used.
Main display section	: green 7-segment LED (character height: 14 mm) display range... 0 ± 999999 (0.00 to 9999.99 %)
Sub display section (parameter setting display section)	: LCD module number of display characters... 16 characters × 2 steps
Signal input section	: input impedance... 10 kΩ or more (at 100 kHz)
AC amplification section	: signal waveform... sine wave or square wave signal voltage range... sine wave; 0.2 to + 45 Vrms square wave; 0.6 to 63 V _{P-P} signal frequency range... 1 Hz to 100 kHz
DC amplification section	: signal waveform... rectangular wave with pulse width 4μs or more signal voltage range... Hi; 4 to 30 V, Lo; -1 to 1 V signal frequency range... 0.0006 Hz to 100 kHz
Comparator function	: number of setting stages... 2 setting range... 0 ± 999999 output item... UPPER /GOOD/ LOWER output format... semiconductor relay makeup contact (30 VDC, 0.1 A)
Analog output	: conversion method... 12 bit, D / A method voltage range... 0 to ± 10 V / F.S. (F.S. = Full Scale; can be set arbitrarily.)
BCD output	: positive/negative logic (switchable), 6-digit parallel output format... open collector
RS-232 communication	: baud rate... 2400, 4800, 9600 bps
Supply power for sensor	: 5 VDC ± 0.25 V (max 150 mA) with the total value of A ch and B ch 12 VDC ± 0.6 V (max 150 mA) for each channel of A ch and B ch
Power supply voltage	: 100 to 240 VAC (50/60 Hz)
Power consumption	: 45 VA or less
Operating temperature	: 0 to 40 °C
Storage temperature	: -10 to 55 °C
Operating (storage) humidity	: max. 95 % (with no condensation)
Weight	: approx. 1.5 kg
Withstand voltage	: 1500 VAC (between power supply and GND, 1 min)
Insulation resistance	: 10 MΩ or more (500 VDC mega)
Accessory	: power cable × 1, panel mounting fixture × 1, foot stand × 1, rubber foot × 1, terminal socket (5 pins) × 1, (10 pins) × 2, unit seal × 1, instruction manual × 1
Option	: BCD cable 3 m (AA-8107) RS-232C cable 2m (AX-5022B)

Rear side panel connector terminal screw: M3

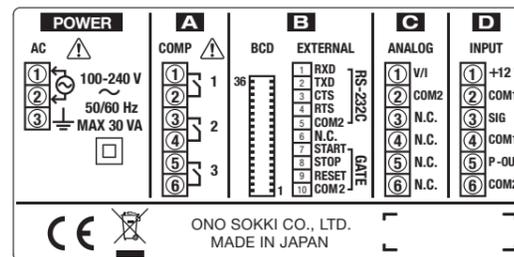


Outer dimensions TM-3100 series



TM-3100 series output enlarged view

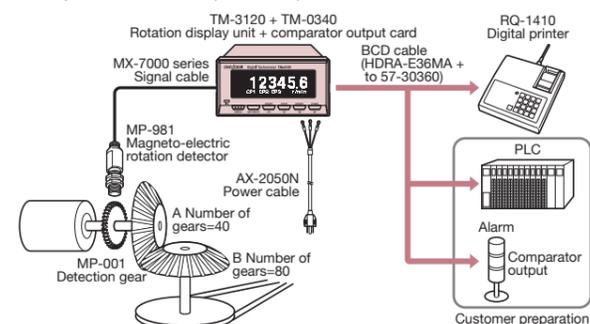
- TM-3110 (display only) : POWER + D (INPUT)
 - TM-3120 (BCD output) : POWER + D (INPUT) + B (O.C.)
 - TM-3130 (analog output) : POWER + D (INPUT) + C (ANALOG)
 - TM-3140 (comparator output) : POWER + D (INPUT) + A (COMP)
- *The function can be added by addition of board.



Application

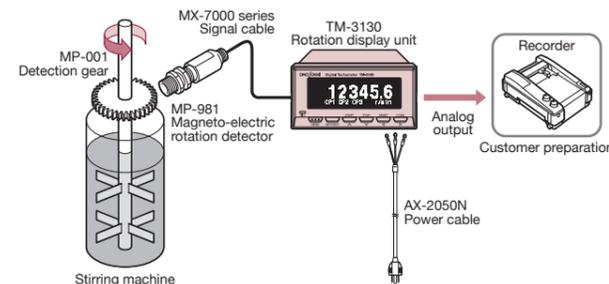
Measure and display the rotation speed of the shaft and output the result to the printer, the PLC and the comparator.

In the following application, motor rotation is measured using MP-981 magneto-electric rotation detector, TM-3210 digital tachometer, and its optional functions. The rotation speed of a motor shaft is amplified by gears, and the rotation speed (r/min) and speed (m/min) of the rotator are calculated. The rotation speed of the shaft is measured by MP-981 magneto-electric rotation detector, the calculation is made by TM-3120 digital tachometer. Adding an option expands the range of output devices to. BCD output function (TM-0321, TM-0322): Printing, loading to the PLC. Comparator function (TM-0340): Alarm can also be set.



Measure, display, and record the shaft rotation speed and its fluctuation

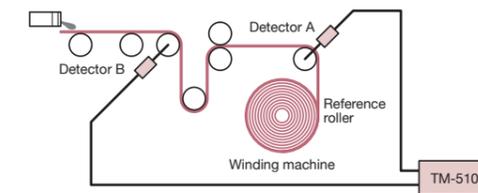
A rotation detector is attached to a gear on a rotating main shaft such as a stirrer, a mixer, a centrifugal separator, and the rotation speed of the shaft is measured and displayed. By using the analog output, you can record it on a recorder and check the rotation change.



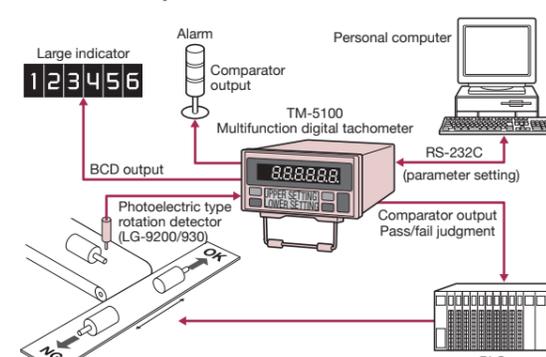
Application example

Measurement of drawing on paper and glass manufacturing lines

Attach rotation detectors to the rotating sections of the line and input signals to TM-5100. The speed change rate of the reference roller and other rollers is displayed in TM-5100. Therefore, adjusting the speed of the line each section accordingly enables to make products stable quality.



Product inspection of motors



FFT Tachometer FT-2500

Advanced Tachometer

The FT-2500 is a tachometer that performs frequency analysis by FFT calculation processing and measures rotation speed. Even when the rotating shaft is not accessible, it can measure from sound, vibration, etc. and supports various types of rotating objects such as steady rotation of a motor, acceleration / deceleration rotation of an engine.



Features

- No need for reflective mark and special machining to install a detector
- Enables rotation measurement using sound and vibration easily. Machining of the rotating shaft is not required.
- Supports rotation speed change and acceleration/deceleration. (when selecting rotation acceleration/deceleration measurement mode)
- Rotation direction judgment function (FT-0501)
- Easy-to-read indication by fluorescent display tube
- With analog output, pulse output

Specifications

- Input section**
- Applicable sensor : FT-0501, IP-292/296/3000A/3100, VP-202/1220, OM-1500/1200, Constant Current Line Drive sensors (microphones, accelerometers) and so on.
- Measurement section**
- Measurement mode: Steady rotation measurement mode
 - Arithmetic operation : 1024 points, FFT processing
 - Frequency range : 500 Hz, 2 kHz, 10 kHz
 - Rotation speed searching : Measurement frequency range (Hz) x 60 / range (Pulse count [P/R])
 - Measurement frequency range
 - When 500 Hz range selected; 3.75 Hz to 500 Hz
 - When 2 kHz range selected; 15 Hz to 2 kHz
 - When 10 kHz range selected; 75 Hz to 10 kHz
 - Update time : within 500 ms
 - Measurement accuracy : ±2 x rotating speed resolution[r/min] ±1 count
 - Rotation speed resolution : Frequency range [Hz] ÷ 12800 × 60 ÷ set pulse count [P/R] *12800 = 400 line x 32
 - Measurement mode: Rotation acceleration/deceleration measurement mode
 - Arithmetic operation : 512 & 256 points, FFT processing
 - Frequency range : 250 Hz, 500 Hz, 2 kHz
 - Rotation speed measurement : Measurement frequency range (Hz) x 60 / (Pulse count [P/R]) range
 - Measurement frequency range
 - When 250 Hz range selected; 3.75 Hz to 250 Hz
 - When 500 Hz range selected; 7.5 Hz to 500 Hz
 - When 2 kHz range selected; 30 Hz to 2 kHz
 - Update time : within 250 ms
 - Measurement accuracy : ±2 x rotating speed resolution[r/min] ±1 count
 - Rotation speed resolution : Frequency range [Hz] ÷ 6400 × 60 ÷ set pulse count [P/R] *6400 = 200 line x 32
- Display section**
- Main display unit
 - Display unit : fluorescent display tube (Blue - Green)
 - Display update time : 0.5 ±0.2 second
 - Display resolution : 1 r/min, 1 Hz
 - Measurement display range : 0 to 999,999 r/min(0 to 10,000 Hz)
 - Level monitor LED
 - Display method : 2-color LED
 - Unlit : Sensor signal amplitude is small and stable measurement is disabled.
 - Red : Sensor signal amplitude exceeds the set voltage range.
 - Green : Sensor signal amplitude is appropriate (common to Upper, Lower, Rotation)
 - Comparator monitor LED
 - Display method : 2-color LED
 - Unlit : Comparator is disabled.
 - Red : Comparator is active and measurement values do not meet operating conditions.
 - Green : Comparator is active and measurement values meet operating conditions.
- Rotation pulse count setting**
- Set range : 0.5 to 199.5
 Minimum number of steps : 0.5 [P/R]
- Averaging processing**
- Averaging type : Moving average
 Allowable count : OFF, 2, 4, 8, 16
- Filter function**
- Processing type : Specifying the desired measurement rotating speed (frequency) range within the selected frequency range
- Setting : Specifying upper and lower rotation speeds (frequencies)

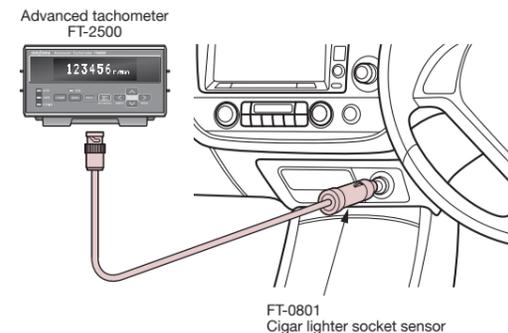
- Rotating direction judgment**
- Applicable sensor : FT-0501
 Judgment : CW/CCW
 Judgment output : semiconductor relay, status display
- Key protection function**
- Setting/Canceling : It can be switched by pressing and holding SET/NEXT key approximately 2 seconds in measurement mode.
- Protection range : All keys except < (SAMPLE) key when returning to measurement ready state in rotation acceleration/ deceleration mode.
- Analog voltage output**
- REVO output
 - Output contents : displayed value
 - Output voltage : 0 to F.S./ 0 to 10 V
 - Conversion type : D/A conversion
 - Linearity : ±0.3 % of F.S.
 - Output update time : steady rotation measurement mode (CONSTANT); 500 ms or less
 - rotation acceleration/deceleration mode (ACTIVE); 250 ms or less
 - Temperature stability
 - Set error : ±0.05 % F.S./°C (common to ZERO and SPAN)
 - Load resistance : ±0.5 % of F.S. (default error, common to ZERO and SPAN)
 - Output connector : 100 kΩ or more
 - Calibration function : R03RB3F
 - Outputting ZERO/FULL calibration signal
 - SIG output
 - Output contents : analog output for monitoring obtained by wave-shaping of sensor signal
 - Load resistance : 100 kΩ or more
 - Output connector : switching to/from REVO output connector
- Comparator output**
- Items : LOWER, UPPER, ROTATION, OK
- LOWER : closed when LOWER threshold value > displayed value
 UPPER : closed when UPPER threshold value = displayed value
 ROTATION : closed when comparator ROTATION operating direction setting = measurement value (CW/CCW)
 OK : closed when three comparators above are all open
- Output type : semiconductor relay (Photo-MOS)
 Output connector : D-SUB (15-pin connector)
 Maximum contact capacity : 30 VDC, 0.1A
 Contact ON resistance : 50 Ω or more
- Pulse output**
- Signal contents : Pulse of power spectrum frequency extracted by FFT operation
- Output voltage : LO; 1 V or less, HI; 4.5 V or more (no load)
 Output update time : steady rotation measurement mode (CONSTANT); 500 ms or less
- rotation acceleration/deceleration mode (ACTIVE); 250 ms or less
- Load resistance : 100 kΩ or more
 Output type : D-SUB (15-pin connector)
- Remote input signal**
- Remote input signal : Terminal open; measurement start, displayed value update, comparator activated
 Terminal close; measurement stop, display value hold, comparator output hold, analog/pulse output hold
- Input logic switching : enabled by RS-232C communications in setup mode
 Input connector : D-SUB (15-pin connector)
 Input signal type : no voltage contact input, open voltage; +5 V ±0.25V, short-circuit current; 1 mA or less, contact resistance; 50 Ω or less
- Condition memory function**
- Function contents : saving parameter settings to nonvolatile memory
 Number of conditions : 3 kinds (selectable in setup mode)
 Target item : set parameters
- Communications function**
- RS-232C
 - I/F : reading function measurement data, setting parameters, reading parameters
 - Connector : HR12-10R-8SDL
 - Character code : ASCII
 - Baud rate : 2400/4800/9600/19200 bps
 - Data length : 8 bit
 - Stop bit : 1bit
 - Parity check : none
 - X parameter control : none
 - Hardware control : RTS/CTS
 - Terminator : CR + LF
- General specifications**
- Power requirement : 100 to 240 VAC±10% (50/60 Hz)
 Conforming standard : CE marking
 Outer dimensions : 144(W) x 72(H) x 180(D) mm
 Weight : 2 kg or less
 Power consumption : 22 to 32 VA
 Operating temperature range : 0 to +40 °C
 Storage temperature range : -10 to +55 °C
 Operating (storage) humidity : 20 to 80 %RH (without condensation)
 Withstand voltage : 1500 VAC (between power supply and FG, 1 min)
 Insulation resistance : 5 MΩ or more (between power supply and FG, 500 VDC)
 Accessories : power cable, panel mounting bracket, stand foot, rubber foot, connector, instruction manual
- Options : analog output cable 1.5m (FT-0100) [R03PB3M-BNC245], pulse output cable 1.5 (FT-0110) [D-SUB15PIN-BNC245], RS-232C cable 2m (AX-5022B)

They may be some cases that FT-2500 cannot measure depending on the type of engines and motors, or the measurement range may change. Please confirm with the demonstration machine before order. Please contact the nearest distributors or our sales office for demonstration machines.

Application

Example of engine rotation speed measurement using cigar lighter socket sensor

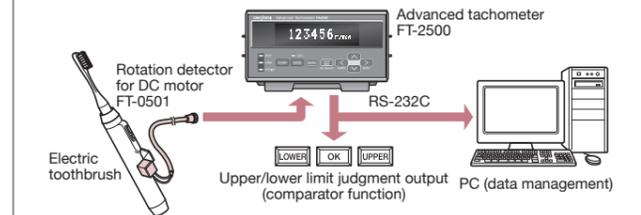
Connect to power outlet installed in an automobile or a construction machine. The ignition noise of the voltage output from the power outlet is detected and the rotation speed of engine can be measured by the FT-2500. Compatible with battery 12 and 24 VDC.



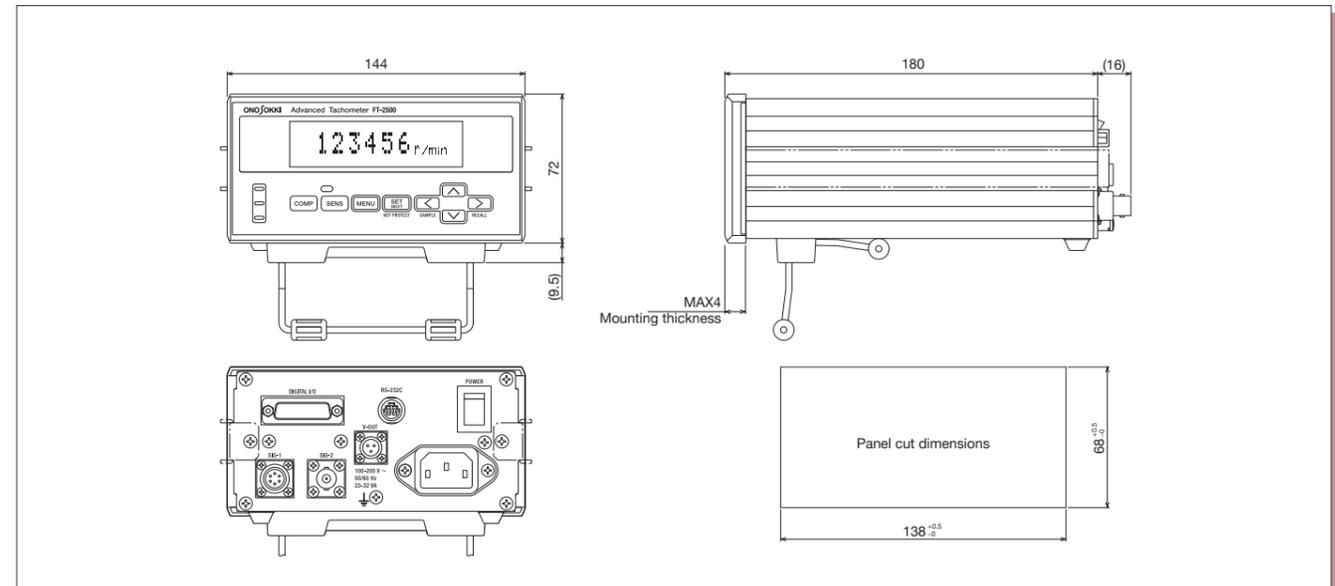
Measurement example of rotation speed of DC motor incorporated in home electric appliances

In this application, we measure the rotation of the electric toothbrush, which DC motor rotation is converted into brush vibration inside. The FT-2500 measures the rotation speed by detecting the magnetic flux leakage from the DC motor incorporated in the toothbrush.

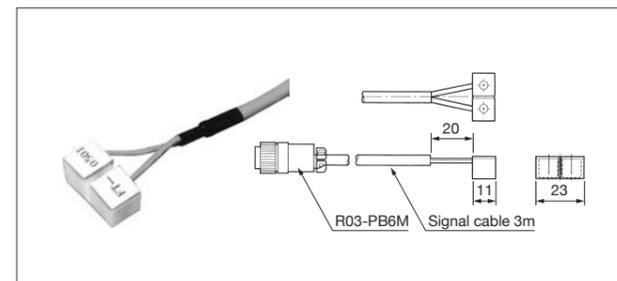
- Detects pulsation of magnetic flux leakage proportional to the number of poles of the DC motor from the completed product.
- With upper / lower limit comparator output for OK, LOWER, UPPER judgment on production line.
- Data management with RS-232C
- System can be upgraded at low price.



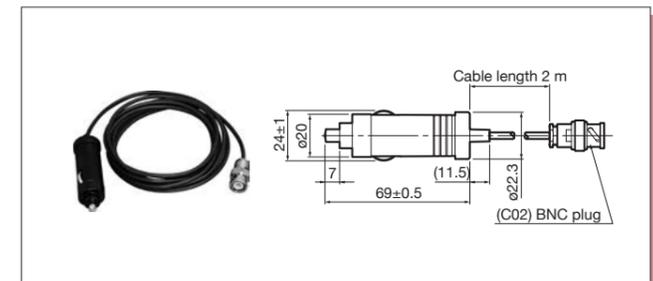
FT-2500 advanced tachometer



FT-0501 Rotation detector for DC motor



FT-0801 Cigar lighter socket sensor



Sensor specification	FT-0501	FT-0801
Measurement target	DC motor etc. (commutator type)	Automobile, construction machine
Detection method	Leakage magnetic flux detection	Voltage noise
Major specifications	Direct attached signal cable 3m With tip connector (R03-PB6M) *It is necessary to set the number of poles of the motor.	Plug in cigarette lighter socket. Cable length 2m With tip connector (C02) (BNC)
Operating temperature range	-10 to 60 °C	0 to 40 °C

* Please contact us for more detail brochure of the FT-2500.

Handheld Tachometer

Handheld Tachometer FT-7200

Advanced Handheld Tachometer

FT-7200 FFT calculation method

The FT-7200 is a handy type tachometer that performs frequency analysis by FFT calculation processing and measures rotation speed. Can measure a wide range from steady motor rotation to acceleration/deceleration of engine rotation.



●Features

- Enables rotation measurement easily using sound and vibration. Machining of the rotating shaft is not required.
- Supports rotation speed change and acceleration/deceleration.
- Efficient for measuring engine rotation speed of completed vehicles etc.
- Various sensors can be used.
- Both analog and pulse outputs provided as standard. Used for recording rotation speed and as rotation synchronization signals.
- Large LCD with backlight.
- With averaging processing function.

●Specifications

Measurement section	
Measurement object	: DC motor, compressor, engine or general rotating body
Calculation method	: FFT calculation method
Measurement time	: within 250 ms
Input frequency range	: 3.75 Hz to 2 kHz (3 ranges switching)
Measurement unit	: r/min (rotation speed)
Measurement accuracy (r/min)	: $\pm 2 \times$ rotation speed resolution (r/min) ± 1 count *Measurement accuracy depends on the frequency range.
Rotation speed resolution (r/min)	: frequency range (Hz) \div 6400 \times 60 \div number of set pulses frequency range; 250, 500, 2000 (Hz) number of set pulses; 0.5, 1, 1.5, etc. (P/R) 6400 = 200 lines \times 32 *It becomes coarse when the rotation speed is accelerating or decelerating.
Filter function	: Specifies the frequency range (rotation speed range) to be measured within the selected frequency range.
Averaging processing	: moving average processing number of averaging processing... OFF, 2, 4, 8, 16
Sensor amplifier sensitivity adjustment volume	: Sensor amplifier sensitivity can be adjusted with the rotary type volume knob on the right side of the main unit.
Detection section	
Compatible sensors	: dedicated for engine rotation measurement OM-1200/1500, VP-1220/202, IP-292/296, IP-3000A/3100, FT-0801 FT-0501+FT-0150, NP-3000 series (with built-in preamplifier), MI series (microphone + preamplifier)
Input voltage level	: 3-range available; 5 V (max \pm 5 V), 0.5 V (max \pm 0.5 V), 0.05 V (max \pm 0.05 V)
Input coupling	: AC coupling
Power supply for NP series accelerometer	: constant current power supply (2.4 \pm 0.5 mA) *Note on measurement: depending on the type of engine and measuring object, it may not detect properly.

Display section	
LCD display	: 5 digits, LCD 7 segments, with backlight (character height 10.2 mm)
Display update time	: 0.5 \pm 0.2 s
Display resolution	: 1 r/min
Measurement mode	
CNS (Constant)	: Used when the fluctuation of the rotation speed of the object to be measured is small (when measuring the rated rotation speed, etc.)
ACT (Active)	: Used when the rotation speed of the object to be measured accelerates or decelerates. (However, when it changes suddenly, it may not measure correctly.)

Output section	
[ANALOG] analog output (switch to analog output for monitor)	
Output content	: Output for the display value of rotation speed.
Voltage range	: 0 to 1 V / 0 to F.S. (F.S. is arbitrarily set.)
Conversion method	: 10 bit D/A conversion method
Linearity	: $\pm 1\%$ of F.S.
Output update time	: within 250 ms
Temperature stability	: $\pm 0.05\%$ of F.S. / °C (ZERO & SPAN)
Setting error	: $\pm 0.5\%$ of F.S. (factory setting adjustment error, ZERO & SPAN)
Load resistance	: 100 k Ω or more
Output connector	: mini jack (ϕ 2.5)
[ANALOG] analog output for monitor (switch to analog output)	
Output content	: analog output for monitoring after waveform shaping of sensor pulse
Load resistance	: 100 k Ω or more
Output connector	: mini jack (ϕ 2.5/commonly used with ANALOG output)

[PULSE] output	
Signal content	: Outputs frequency pulse of the power spectrum extracted by FFT processing.
Output voltage	: Lo... 0.5 V or less, Hi... 4.5 V or more (no load)
Output frequency range	: 3.75 Hz to 2 kHz, equivalent to display rotation speed \times number of set pulses per rotation (P/R)
Output update time	: steady rotation mode (Constant); within 500 ms rotation acceleration/deceleration mode (Active); within 250 ms
Load resistance	: 100 k Ω or more
Output connector	: mini jack (ϕ 2.5/commonly used with ANALOG output)

General specification	
Power supply	: AAA battery \times 4 or dedicated AC adapter (PB-7090, sold separately)
Battery life	: approx. 6 hours (When the backlight is off.) approx. 5 hours (When the backlight is on.) (When alkaline battery is used, at 20 °C, excluding when using the NP-3000 series accelerometer*1) *1: When using NP-3000 series accelerometer, consumption current increases due to driving constant current power. We recommend using the dedicated AC adapter.
Low battery display	: The LOW mark is displayed, when the battery voltage drops 4.2 V or less.
Operating temperature	: 0 to 40 °C
Storage temperature	: -10 to 50 °C
Operating (storage) humidity	: 35 to 85% RH (with no condensation)
Outer dimensions	: 66.0 (W) \times 189.5 (H) \times 47.5 (D) mm
Conforming standard	: CE marking
Weight	: approx. 230g (not including battery)
Accessory	: AAA battery \times 4, instruction manual (basic operation, function guide, measurement procedure) \times 1 each, carrying case \times 1
Option	: relay cable for FT-0501, 0.5 m (FT-0150) output signal cable, 2m (AX-501) dedicated AC adapter (PB-7090) magnet stand (HT-0522) stand jig (HT-0521A) measurement tripod (LA-0203 D) (Airy L 100 manufactured by SLIK)

Handheld Tachometer HT-5500

Handheld Digital Tachometer

HT-5500 Contact/non-contact type · multifunction type

Extensive measurement from 6.0 r/min (low speed rotation) to 99999 r/min (high speed rotation).



●Features

- Memory function: up to 20 data of memory can be recorded.
- Both contact and non-contact measurement, line speed measurement is available with non-contact method.
- Both analog and pulse outputs provided as standard. Used for recording rotation speed and as rotation synchronization signals.
- Peak hold function installed: maximum value and minimum value during measurement can be displayed.
- Large LCD with backlight.
- Tripod, stand jig (option) mounting: can be fixed to a tripod etc. for continuous measurement.

●Specifications

Detection method	: red visible light photoelectric reflection method, contact method (attaching contact adapter)	
Detection distance	: 20 to 300 mm	
Display section	: LCD, 5 digits, with backlight (character height: 10.2 mm)	
Measurement time	: Within 1 s + time for one cycle (however, when the rotation is less than 60 r/min, twice the time for one cycle).	
Display update time	: approx. 1 s	
Measurement unit	: r/min, r/s (rotation speed), m/min (circumferential speed), ms (period), COUNT (integration count)	
Measurement range	:	

	Non-contact type	Contact type
r/min (Hi level)	6 to 99999	6 to 20000
r/min (Lo level)	6.0 to 600.0	6.0 to 600.0
r/s	0.10 to 999.99	0.10 to 400.00
m/min	0.6 to 9999.9	0.6 to 400.0
COUNT	0 to 99999	0 to 99999
ms	0.6 to 9999.9	2.5 to 9999.9

Measurement accuracy	: display value* \times ($\pm 0.02\%$) ± 1 count *Display value is the count value excluding the decimal point. (Note)
Measurement function	
Peak hold function	: maximum value (MAX), minimum value (MIN)
Memory function	: up to 20 data
Over range function	: over range (ERROR mark) is displayed when the measured value exceeds the measurement range.

Rotation upper limit warning function	: When the rotation speed exceeds a preset upper limit value, upper limit warning (↑ mark) is displayed.
Circumferential speed calculation function	: [non-contact type] circumferential speed is calculated with the preset diameter (mm) and the measured rotation speed. [contact type] circumferential ring KS-100/200 is used.
Integration count function	: Performs integration pulse counting of input signal *Note: The display is updated every display update time.
Period measurement function	: Measures the period of input pulse (however, average value of input pulse if it is 1 second or more)
Rotation speed	: non-contact type (with reflective mark), contact type (using KS-300)
Output section [analog output]	
Output voltage	: 0 to 1 V / 0 to F.S. (Full scale is arbitrarily set.)
Conversion method	: 10 bit D/A conversion method
Linearity	: $\pm 1\%$ F.S.
Output update time	: 50 ms + input pulse within 1 period time
Temperature stability	: $\pm 0.05\%$ / F.S. / °C (span & zero)
Full scale setting error	: $\pm 0.5\%$ / F.S.
Load resistance	: 100 k Ω or more
Output section [pulse output]	
Output voltage	: Hi level... 4.5 V or more (when detecting with reflective mark) Lo level... 0.5 V or less
Output logic	: positive logic
Load resistance	: 100 k Ω or more

General specifications	
Power	: AAA battery \times 4 or dedicated AC adapter (PB-7090: sold separately)
Battery life	: approx. 32 hours (when the backlight is OFF) approx. 8 hours (when the backlight is ON) (When alkaline dry battery used, at 20 °C)
Low battery display	: The LOW mark is displayed, when the battery voltage drops 4.5 V or less.
Operating temperature	: 0 to 40 °C
Storage temperature	: -10 to 50 °C
Operating (storage) humidity	: 35 to 85% RH (with no condensation)
Outer dimensions	: 66 (w) \times 180.5 (H) \times 47.5 (D) mm (only main unit) 66 (W) \times 237.2 (H) \times 57.5 (D) mm (contact adapter + rotation contact tip)
Conforming standard	: CE marking
Weight (excluding batteries)	: approx. 220g (only main unit) approx. 282g (contact adapter+ rotation contact)
Accessory	: contact adapter (HT-0502) \times 1, rotation contact tip (KS-300) \times 1, circumferential ring (KS-200 for m/min) \times 1, reflective mark (12mm square, 25 sheets) \times 1, AAA battery \times 4, carrying case \times 1, instruction manual (function guide: Japanese/English, basic operation: Japanese/English) \times 1
Option	: pulse output cable; 2 m (AX-501) dedicated AC adapter (PB-7090) reflective mark; 12 mm square 25 sheet, 10 sheet 1 set (HT-011) circumferential ring for m/s (KS-100) circumferential ring for m/min (KS-200) rotation contact tip (KS-300) contact adapter (HT-0502) extension relay shaft for KS-300 (KS-700) stand jig (HT-0521B) magnet stand (HT-0522) measurement tripod (LA-0203D) (Airy L 100 manufactured by SLIK)

Handheld Tachometer HT-3200/4200/5510, HR-6800

Handheld Digital Tachometer

HT-3200 Contact type / general purpose liquid crystal display

With a low range setting that can measure from 0.5 r/min. A circumferential ring/rotation contact can be stored in a pocket of the main body.



Features

- Measurable from a low speed of 0.5 r/min to 10,000 r/min (circumferential speed: 0.05 to 1,000.0 m/min).
- Large liquid crystal display on a compact, lightweight body (character height 10.5 mm).
- With memory function useful for checking measurement results.
- By replacing the contact tip with the attached circumferential ring, it can also measure circumferential speed.
- With a pocket to store the circumferential ring.
- Continuously displays the latest measurement value for approx. 30 seconds after power-off.
- Displays the timing of battery replacement.

Specifications

Method : contact method
 Display section : liquid crystal display, 5 digits (character height 10.5 mm)
 Measurement unit : Lo range... 0.1 r/min, Hi range... 1 r/min
 Display update time: 1 second automatic repeat
 For Lo range (0.5 to 10 r/min); every 2 seconds
 For Hi range (5 to 10 r/min); every 2 seconds
 Measurement range and accuracy of rotation speed :
 Lo range...0.5 to 1249.9 r/min; within ± 0.1 r/min
 1250.0 to 2000.0 r/min; within ± 0.2 r/min
 Hi range...5 to 10,000 r/min; within ± 1 r/min
 Circumferential speed measurement range:

	KS-200 (provided)	KS-100 (option)
Lo range	0.05 to 200.00 m/min	0.5 to 2000.0 mm/s
Hi range	0.5 to 1000.0 m/min	5 to 10,000 mm/s

- The accuracy is calibrated with the rotation speed.
- The unit of measurement can not be changed. When using KS-200, setting the measurement value to 1/10 will result in the value in m/min.
- Memory function : number of memories; 10
- Data hold function : automatic power off 30 seconds after the end of measurement
- Low battery display : "LOW" mark is displayed when the battery voltage drops 3.3 V or less.

Over range display : "ERROR" is displayed.
 Power requirement : AAA batteryx3
 Battery life : approx. 20 hours (using alkaline dry batteries, at 20 °C)
 Operating temperature : 0 to 40 °C
 Storage temperature : -10 to 55 °C
 Operating (storage) humidity range : 35 to 85% RH (with no condensation)

Outer dimensions : 63 (W) x 172 (H) x 38.5 (D) mm
 Conforming standard: CE marking
 Weight : approx. 160 g (without batteries)

Accessory : contact tip for rotation measurement (KS-300) x2 (One of them is stored in the main body), circumferential ring (KS-200 for m/min)x1 (stored in the main body) AAA batteryx3, instruction manual (English, Japanese) x1 each

Option : circumferential ring for mm/s (KS-100), circumferential ring for m/min (KS-200), rotation contact tip (KS-300), extension shaft for KS-300 (KS-700), a carrying case (HT-0300)

HT-4200 Non-contact type/general-purpose liquid crystal display

Affix a reflective mark to the rotating body of the measurement target object, and then aim the red visible light at the mark. By attaching multiple reflective marks, it is possible to measure from a lower speed.



Features

- The 5-digit display enables wide-range measurement from 4 to 50,000 r/min (when several reflective marks are used).
- A large-size display (character height 10.5 mm) is adopted to the compact, lightweight body.
- Memory function for easy confirmation of the measurement results
- Even it is shiny shaft its rotation can be measured by using the reflective marks provided as standard.
- Measurement can be performed over a wide range from 30 to 50,000 r/min, in 1 r/min unit (When one reflective mark is used.).
- Safe measurement available for being detectable from a position away from the measurement target (20 to 300 mm).
- Continuously displays the latest measurement value for approx. 30 seconds after power off.
- Displays the timing of battery replacement.

Specifications

Detection method : red visible light photoelectric reflection method
 Detection distance : 20 to 300 mm
 Display : LCD, 5 digits (character height; 10.5 mm), fixed measurement unit (r/min)
 Display update time : 1 second automatic repeat (however, 2 seconds when the circumferential speed is lower than 60/reflective marks r/min)
 Measurement range: measurement unit ;1r/min
 Affixing of multiple reflective marks enables measurement of lower rotation speeds.

Measurement range	Number of reflective marks
30 to 50,000 r/min	1
15 to 25,000 r/min	2
10 to 16,667 r/min	3
8 to 12,500 r/min	4
5 to 8,333 r/min	6
4 to 6,250 r/min	8

Measurement accuracy (when one reflective mark is used) :
 30 to 12,499 r/min; within ± 1 r/min
 12,500 to 24,999 r/min; within ± 2 r/min
 25,000 to 50,000 r/min; within ± 4 r/min
 Pulse number setting function :
 The number of reflective marks used can be specified in order to perform measurement from lower rotation speeds. setting values; 1, 2, 3, 4, 6, 8 P/R

Memory function : 10 data can be memorized.
 Data hold function : The power automatically turns off 30 seconds after the end of measurement.
 Low battery display : "LOW" mark is displayed when the battery voltage drops 3.3 V or less.
 Over range display : "ERROR" mark is displayed.
 Power source : AAA batteryx3
 Battery life : approx. 20 hours (when using alkaline batteries at 20 °C)

Operating temperature : 0 to 40 °C
 Storage temperature : -10 to +55 °C
 Operating (storage) humidity : 35 to 85 %RH (with no condensation)

Outer dimensions : 62 (W)x129(H)x26.4 (D) mm
 Conforming standard: CE marking
 Weight : approx. 90 g (not including batteries)

Accessory : reflective marks 1 sheet (12 mm squarex25 marks), AAA batteryx3, instruction manual (English, Japanese)x1 each
 Option : reflective mark 12mm squarex25; 10 sheets 1set (HT-011) carrying case (HT-0400), soft case (HT-0003)

Handheld Tachometer HT-5510, HR-6800

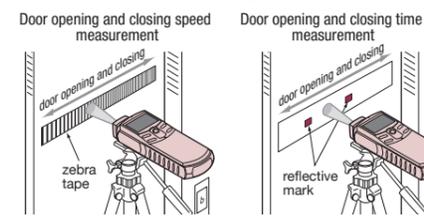
Handheld Digital Tachometer

HT-5510 Digital handheld speedometer



Features

- The HT-5510 is the model added two functions (opening and closing speed measurement and door opening and closing time measurement functions) to the HT-5500 handheld digital tachometer.



Specifications

Measurement section
 Measurement method : visible light reflection method
 Calculation method : period calculation method
 Measurement time : 50 ms + input signal within one period time

Measurement unit : r/min, r/s (rotation speed), m/min (circumferential speed, moving speed), ms (period, moving time, COUNT (integration count))
 Measurement range: door opening and closing speed measurement ; 0.6 to 45 m/min (1 pulse interval 4 mm) door opening closing time measurement ; 0.6 to 9999.9 ms rotation measurement mode; same as HT-5500 (P.25)
 Measurement accuracy : display value x ($\pm 1\%$) ± 1 count (Displayed value is a count value excluding decimal point.)

Detection section

Detection method : visible light photoelectric reflection method
 Detection distance : 30 to 70 mm
 Light source : red light emitting diode
 Light receiving element : phototransistor
 Detection mark : 1 reflective mark/ 1 rotation, high precision reflection zebra tape

Measurement function

Peak hold function : maximum value (MAX), minimum value (MIN)
 Memory function : up to 20 data
 Over range function : Over range (ERROR mark) is displayed when a measured value exceeds the measurement range.

Rotation upper limit warning function :
 When the rotation speed exceeds the preset upper limit value, displays upper limit warning (\uparrow mark).
 Circumferential speed calculation function : [non-contact type] Calculates the circumferential speed from the preset diameter value (mm) and

the measured rotation speed. [contact type] Uses circumferential ring KS-100/200
 Integration count function : Measures the period of the input pulse.
 Period measurement function : Measures the period of input pulse. However, if it is less than 1 second, average value of input pulse
 Rotation speed : non-contact type (with reflective mark), contact type (using KS-300)

Output section [analog output]
 Output voltage : 0 to 1 V/0 to F.S. (Full scale is arbitrarily set.)
 Conversion method : 10 bit D/A conversion method
 Linearity : $\pm 1\%$ /F.S.
 Output update time : 50 ms + input pulse within 1 period time
 Temperature stability : $\pm 0.05\%$ / F.S./ °C (span & zero)
 Full scale setting error : $\pm 0.5\%$ F.S.
 Load resistance : 100 k Ω

Output section [pulse output]
 Output voltage : Hi level...4.5 V or more (when detecting with reflective mark), Lo level...0.5 V or less
 Output logic : positive logic
 Load resistance : 100 k Ω or more

General specification : P.25 same as HT-5500
 Accessory : high precision reflective zebra tape (1 m) x 2 rolls 1 set Other accessories are same as P.25 HT-5500.
 Option : high precision reflective zebra tape (1 m) x 2 rolls 1 set Other optional items are same as P.25 HT-5500.

HR-6800 High speed rotation type



Features

- High-speed rotation measurement from 100 to 999,990 r/min
- Built-in memory function, up to a maximum of 20 data can be saved to memory.
- Both analog and pulse outputs provided as standard. Used for recording rotation speeds, confirming detected waveforms and as rotation synchronization signals
- Built-in peak hold function: The maximum and minimum values can be displayed during measurement.
- Large LCD with backlight

Specifications

Measurement section
 Measurement target: rotating objects used in dentistry, texturizing machine, high-speed machine tools
 Note: target measurement objects must be magnetized.
 Display section : LCD with backlight, 5-digit (character height: 10.2 mm)

Measurement time : 50 ms + input signal within 10 periods
 Display update time: approx. 1 s/approx. 0.5 s selectable
 Measurement unit : 10 r/min (rotation speed)
 Rotation speed measurement range : 100 to 999,990 r/min (range selectable)
 Measurement accuracy : display value x $\pm (0.02\%) \pm 1$ count

Peak hold function : maximum value (MAX), minimum value (MIN)
 Memory function : up to 20 data
 Over range display : When the measured value exceeds the measurement range, over range (ERROR mark) is displayed.

Rotation upper limit warning function :
 When the rotation speed exceeds the preset upper limit value, upper limit warning (\uparrow mark) is displayed.

Analog output section : output voltage; 0 to 1 V/0 to F.S. (F.S.: arbitrarily set.)* output update time; 50 ms + input pulse within 10 period time

Monitor output : for monitor analog output after waveform shaping of sensor pulse (before pulse waveform conversion)

Pulse output : 1 pulse output per pulse detection
 output voltage; Hi level...4.5 V or more, Lo level...0.5 V or less

Power supply : AAA battery x4 or a dedicated AC adapter (PB-7090, sold separately)
 Battery life : approx. 13 hours (when the backlight is OFF), approx. 8 hours (when the backlight is ON) (using alkaline batteries, at 20 °C)

Low battery display : "LOW" mark is displayed when the battery voltage drops 4.5 V or less.
 Operating temperature : 0 to 40 °C
 Storage temperature : -10 to 50 °C
 Operating (storage) humidity : 35 to 85% RH (with no condensation)

Outer dimensions : 66 (W) x 189.5 (H) x 47.5 (D) mm
 Conforming standard: CE marking
 Weight : approx. 230 g (main unit only, not including batteries)

Accessory : AAA batteryx4, adapter for tripod mounting (MI-0301)x1, carrying casex1, instruction manual (basic operation, function explanation) x 1 each
 Option : output signal cable 2m (AX-501) dedicated AC adapter (PB-7090) Stand jig (HT-0521B) Magnet stand (HT-0522) Measurement tripod (LA-0203D) (Airy L 100 made by SLIK) Tripod mounting adapter (MI-0301)

Detection section (sold separately)
 Dedicated detector : MP-5350
 Detection method : electromagnetic induction method
 DC resistance value: 25 to 40 Ω (20 °C)
 Connection cable : 1 m (both ends BNC (included) connector included)
 Operating temperature : 0 to 40 °C
 Storage temperature : -10 to 50 °C
 Vibration and shock resistance : 19.6 m/s² - 490 m/s²

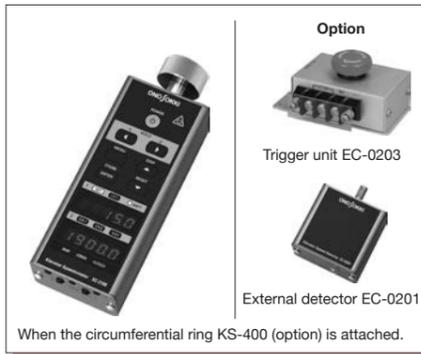
Outer dimensions : 107 x ϕ 14 mm
 Conforming standard: CE marking
 Weight : approx. 50 g (detection section only)

*Please refer to HT-5500 for electrical specification of analog output.

Related Products

Elevator Speedometer EC-2100

Handheld Type Speedometer



When the circumferential ring KS-400 (option) is attached.

Features

- Analog output function
- Maximum value hold function
- Memory function
- Function of remaining battery level
- Auto power off function
- Averaging function
- Distance measurement function (option)

Specifications

Measurement method : contact type
 Measurement range : speed; 0.1 to 2,000.0 (m/min)
 rotation speed; 1 to 20,000 (r/min)
 distance (option); 0 to ±999 (mm)
 *Distance measurement up to ±5000 mm is available.
 However, measurement values more than ±999 mm is not guaranteed.
 Measurement accuracy : ±1 count (not including the error due to camera shake and slippage of contact part.)
 Measurement time : 10 ms
 Display : 5-digit, 7 segment, red LED in two-step display
 Display update time : 100 ms

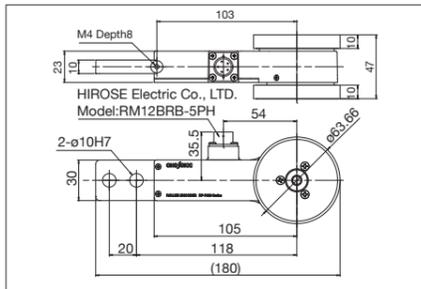
Resolution : 0.1 (m/min/average number 10 or more), 1 (r/min, average number 10 or more), 1 (mm)
 Measurement unit : m/min, r/min, mm (option)
 Auto power off function : The power automatically turns off 180 seconds after the last operation.
 Data hold function : data hold of each channel (CH 1, CH 2, Max value, each independent)
 Averaging function : 1 to 200 times (optionally setup)
 Memory function : Up to 10 measurement results can be stored in the main unit.
Output section
 Analog output : output content; instantaneous value (output after averaging processing) voltage range; 0 to 1 V/0 to F.S. conversion method; 10-bit D/A conversion linearity; ±1% F.S. output update time; 10 ms output connector; ø 2.5 mm pin-jack
 Pulse output : output method; transistor output (open collector) withstand voltage; 14 V current; 20 mA or less number of pulses; 600 pulses / rotation logic; negative logic pulse width; approx. 0.5 to 1.2 µs output connector; ø 2.5 mm pin-jack
Detection section
 Number of generated pulses : 150 pulses/ rotation, slit reflection method
 Light source : infrared-emitting diode
 Light receiving element : photodiode
 Allowable shaft load: radial; 5 kg, thrust; 5 kg
 Bearing life : 2×10⁷ r/min-h (maximum load within the specification)
General specification
 Power supply : AA battery x 3 pieces
 Battery life : 15 hours or more (continuous using at room temperature)

Current consumption : 100 mA max. (power voltage 4.5 V)
 Operating temperature : 0 to 45 °C
 Storage temperature : -10 to 60 °C
 Operating (storage) humidity : 35 to 85 % (RH) (with no condensation)
 Outer dimensions: 60 (W) × 162 (L) × 38 (D) mm
 Conforming standard : CE marking
 Weight : approx. 423 g (including batteries, not including the circumferential ring)
 Accessory : EC-0922 external hold signal cable (1.4m) x 1 set (2 pieces)
 Option : EC-0925 carrying case x 1 piece hexagonal wrench (opposite side:1.5mm) x 1 piece AA battery x 3 pieces Instruction manual x 1 piece EC-0202 Distance measurement function
 *If ordering after delivering the main unit, installation fee is required separately.
 KS-400 circumferential ring (wide type); 15 mm circumferential ring (narrow type); 2 mm circumferential ring (rubber coating wide type); 15 mm rotating contact tip
 EC-0924 relay shaft for rotating contact tip
 EC-001A external hold detection switch
 EC-0921 signal cable (5 m)
 EC-0923 pulse output cable (2 m)
 EC-0926 trigger unit cable (1.5 m)
 AX-501 analog output cable (2 m)
 EC-922 external hold signal cable (1.4 m) x 1 set (2 pieces)
 EC-0925 carrying case x 1 piece

* Please visit our website for more details on EC-2100.

Line Speedometer (Roller Encoder) RP-7400 series

Low to medium speed applications



Features

- Number of pulses selectable from 120, 200, or 1200 P/R
- Wide variety of output signal Totem pole (standard), Collector (option) Emitter (option), Open collector (option)

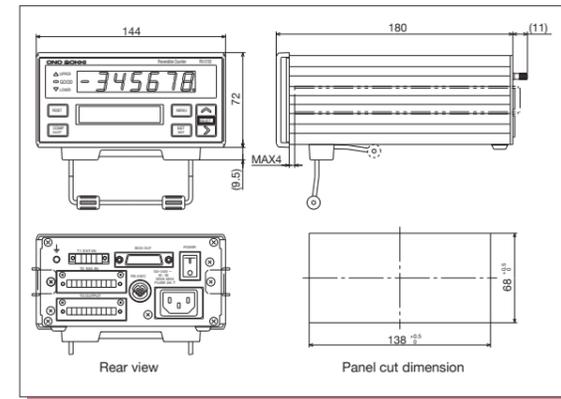
Specifications

Electrical specification
 Number of output: speed; 120, 1200 P/R pulses length; 200 P/R
 Output waveform : 2-phase rectangular wave
 Duty ratio : 50 ±25 %
 Phase difference : 90 ±45°
 Output voltage (when 12 VDC is supplied.) : Hi; 10 V or more, Lo; 0.5 V or less
 Output method : Totem pole output (load resistance 470 Ω or more)
 Options; RP-0701 Emitter output RP-0702 Collector output RP-0703 Open collector output
General specification
 Power supply : 12 VDC±5 % (100 mA or less)
 Operating temperature : 0 to +50 °C (with no freezing, no condensation)
 Storage temperature : -10 to +65 °C (with no freezing, no condensation)
 Operating humidity : 35 to 93 % RH or less (with no freezing, no condensation)
 Protection class : IP 40 (when RP-0181/0182 cable used)
 Conforming standard : CE marking

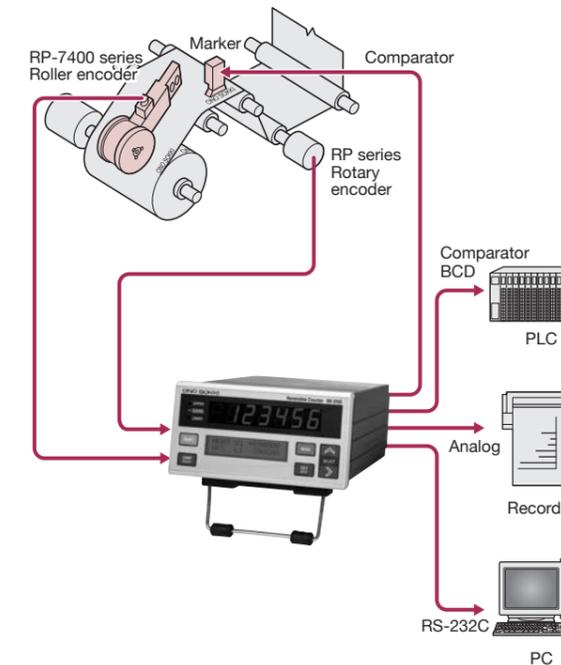
Weight : approx. 400 g
 Accessory : instruction manual x 1 connector (RM12BPE-5S) x 1; HIROSE Electric Co., LTD.
Mechanical specification
 Speed range : 0 to 600 m/min
 *Speed measurement range depends on condition of measurement object.
 Measurement unit : 120 P/R 0.1 m/min 1200 P/R 0.01 m/min 200 P/R 1 mm
 Roller material : mandrel; aluminum rubber; polyurethane rubber baked on the roller surface (rigidity A90)
 Roller outer circumference : 200 mm
 Maximum allowable load : radial 20 N
 Starting torque : 1 mN·m
 Moment of inertia : 0.6 kg·cm²
 Vibration resistance : 19.6 m/s² X/Y/Z each direction (150 minutes each)
 10 to 150 Hz sweep, 20 cycles
 Shock resistance : 196 m/s² ±X/Y/Z (3 times for each, total 18 times)
 Mounting hole (position) : ø10 mm x 2, 20 mm of interval
 Option : RP-0701 Emitter output RP-0702 Collector output RP-0703 Open collector output RP-0181 cable (5 m) P.36-37 RP-0182 cable (5 m) P.36-37

Length Meter RV-3150

Reversible Counter



System Configuration Example



Features

- Reversible counter designed to measure linear position, displacement, dimensions and so forth
- Easy-to-read large size LED (14 mm)
- Wide range of external output functions (comparator, analog, BCD, and RS-232C communication)
 Four comparator setting values can be saved as conditions.

Specifications

Applicable sensor : RP series (Rotary encoder) RP-7400 series (Roller encoder) GS series (Linear gauge sensor) *Conversion cable required
 Display section : main display; red LED (14mm), 6-digit and polarity (0 to ±999999) sub display; LCD, 16 characters x 2 lines, with backlight (yellow green) decimal point; 0, 0.0, 0.00, 0.000 (selectable) condition display; comparator condition; UPPER (red) / GOOD (green) / LOWER (red)
 Sensor input signal : single phase or 90° phase difference square wave voltage pulse (Hi...4 to 30 V, Lo...0 to 1 V) line receiver (conforms to RS-422A) input frequency range...DC to 100 kHz
 Power supply for sensor : selectable from 5 ± 0.25 VDC (max 150 mA) 12 ± 0.6 VDC (max 120 mA)
 External control signal : format of input signal; voltage input (Hi; 4 to 5.25 V, Lo; 0 to 1 V), Non-voltage contact input types of input signal; reset, gate, offset, key protect
 Mode/function : multiplication; 1/2/4 ratio compensation range; 0.000001 to 0.999999 exponent value; 1/1, 1/10, 1/100, 1/1000 offset setting range; 0 to ±999999
 Comparator function : setting range; 0 to ±999999 setting step; 2 steps output parameter; LOWER (Lower setting value ≥ calculated value) GOOD (Lower setting value < calculated value < upper setting value) UPPER (Upper setting value ≤ calculated value) output format; semiconductor relay (single make contact each) Max. contact capacity; 30 VDC, 0.1 A update time; within 15 ms
 BCD Input/Output : output signal (BCD, polarity, judgment, error, print command) open collector (withstand voltage: max. 30 V) control signal (reset, hold) input format (voltage input); Hi; 4 to 5.25 V, Lo; 0 to 1 V
 Analog output : output voltage range; 0 to ±10 V/F.S. (F.S. can be set arbitrarily.) load resistance; 10 kΩ or more linearity error; ± 0.3 % of F.S. calibration function; ZERO / FULL, 12 bit D/A method update time; within 15 ms
 RS-232C communication : function; readout of data and parameter, setting of parameter baud rate; 2400/4800/9600 bps
 Power requirement : 100 to 240 VAC (50/60 Hz)
 Power consumption : 30 VA or less
 Operating temperature : 0 to +40 °C
 Storage temperature : -10 to +55 °C
 Operating/storage humidity : max. 95 % (with no condensation)
 Weight : approx. 1.3 kg
 Withstand voltage : 1500 VAC (between power supply-GND, 1 min)
 Insulation resistance : 10 MΩ or more (at 500 VDC mega)
 Accessory : power cable x 1, panel mounting fixture x 1 set, stand foot x1 set, rubber foot x 1 set, terminal socket (5 pins) x 1/ (10 pins) x 2, instruction manual x 1
 Option : BCD cable 3 m (AA-8107) RS-232C cable 2 m (AX-5022B)

Liner motion speedometer ST-1210

Liner motion speedometer

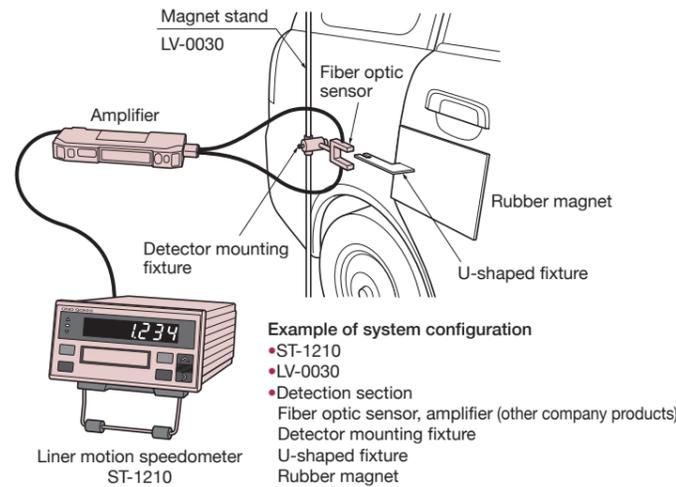


Made-to order product

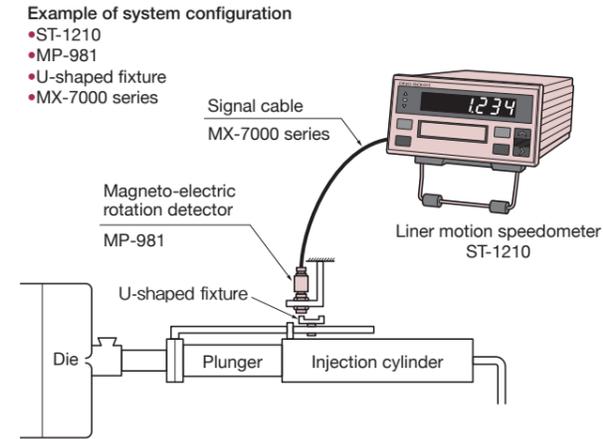
● Feature

- It enables to measure the passing speed such as a plunger speed of an injection cylinder, passing speed of open/close sections (doors) of a vehicle with high accuracy.
- The distance between two points can be set arbitrarily.
- Passing time can be measured in minimum resolution (by 1 μs)

• Measurement of automobile door opening /closing speed



• Speed measurement of die-cast machine



● Specifications

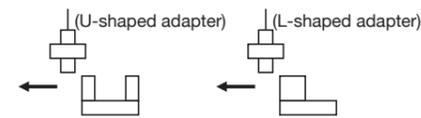
- Input section**
 [Signal input section]
 Input signal type : Hi level ; +4 to +30 V
 Input voltage level : Lo level ; 0 to +1 V
- Number of input channels : 2 (Ch.A and Ch.B)
 [External control signal input]
 Input signal type : Input voltage level Hi level ; +4 to +5.25 V
 Lo level ; 0 to +1 V
 non-voltage contact input (open voltage 5.25 V or less, short-circuit current 1 mA or less)
- Signal type
 Reset : Reset the count value to zero and recover error status.
 Start : Start measurement and enable input pulse.
 Key protection : Disable the key switch setting on the front panel. Disable setting changes.

- Display section**
 [MAIN data display unit]
 Display : red LED with 7-segment
 Display range : 0 to 999999
 Display (measurement) update time : approx. 0.5 seconds
 [SUB parameter setting display section]
 Display : LCD module
 Display item : The selected data or set value is displayed in two rows.

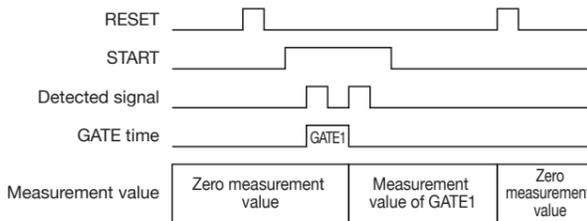
- Measurement mode**
 [ST-901 mode]
 Measurement range : 0.050 to 99.999 m/s
 Measurement distance : 32 mm (fixed)
 Detection adapter : U-shaped type (fixed)
 Number of sensor channels : 1 ch (A ch input fixed)
 Measurement operation : After turning ON the start signal, it starts measurement with the first pulse signal and stops measurement with the second pulse signal.

[ST-902 mode] The mode in which a comparator function is added to the functions of the ST-901 mode.

- [USER mode]
 Measurement range : 0.050 to 99.999 m/s
 Measurement time : 3.2 to 999.9 ms (approx. 1 seconds)
 Distance between two points : arbitrarily setting available, setting range; 16 to 9999 mm (= 9.999 m)
 Detection adapter : U-shaped type or L-shaped type
 Number of sensor channel : 2 ch (A ch & B ch)
 Measurement operation :
 SINGLE operation : equivalent to ST-901



Timing chart (when using U-shaped adapter)



- DUAL operation**
 : A ch side input=measurement start
 B ch side input=measurement stop

- Measurement unit : m/s or km/h
 Decimal point : none, 0.0, 0.00, 0.000

- [Passing time measurement mode]
 Max. measurement time : max. 999.999 ms (approx. 1 seconds)*
 *It can be modified up to 10 seconds.
 Measurement accuracy : display value × 0.1%±1 count
 Measurement operation : same as the USER mode
 Decimal point : none, 0.0, 0.00, 0.000

- Output section**
 [Comparator function (excluding ST-901 mode)]
 Operation : comparison with the main display value
 Setting range : 0 to 999999
 Number of setting stages : 2 stages
 Output item : LOWER / GOOD / UPPER
 Output type : semiconductor relay (each with one make contact)
 Contact capacity : max. DC 30 V, 0.1 A
 Output update time : 20 ms or less after completion of measurement
 LOWER; ON when setting value ≥ measurement value
 UPPER; ON when setting value ≤ measurement value
 GOOD; ON when all the conditions other than above

- [BCD input/output section (excluding ST-901 and ST-902 mode)]
 Operation : output for the main display value
 Signal item : BCD output/judgment output/error output/print command output/reset input/start input
 Output update time : 20 ms or less after completion of measurement
 Output method : open collector output
 Input type : Hi level; 4 to 5.25 V, LO level; 0 to +1 V

- [Analog output (excluding ST-901 and ST-902 mode)]
 Operation : conversion and output for the main display value
 Conversion method : 12 bit D/A conversion
 Output voltage range : 0 to 10 V/F.S (F.S: setting arbitrarily)
 Output update time : 20 ms or less after completion of measurement
 Load resistance : 10 kΩ or more
 [RS-232C communication (excluding ST-901 and ST-902 mode)]
 Function : reading of measurement data, setting and reading of parameters
 Baud rate (selectable) : 2400/4800/9600 bps

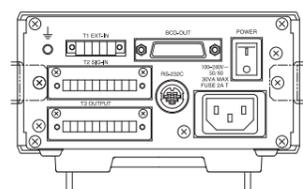
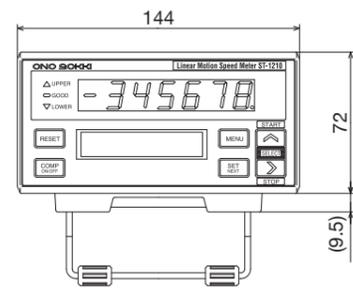
- Power supply for sensor**
 Select either voltage : DC 5 V (max 120 mA, total of A ch and B ch) or DC 12 V (max 120 mA, total of A ch and B ch)

- General specification**
 Power requirement : AC 100 to 240 V, (50/60 Hz)
 Power consumption : 30 VA or less
 Operating temperature range : 0 to 40 °C
 Storage temperature : -10 to 55 °C
 Operating (storage) humidity : 95% max. (without condensation)
 Weight : approx. 1.3 kg
 Withstand voltage : 1500 VAC (between power supply and GND for one minute)

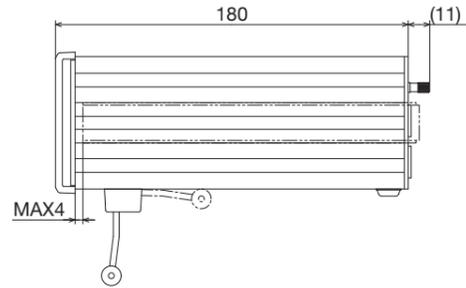
- Insulation resistance : more than 10 MΩ (with a 500 VDC megger)

- Accessory : power cable (for AC100 V) × 1, panel mounting fixture × 1, foot stand × 1, rubber foot × 1, terminal board socket (10 pin×2, 5 pin×1), instruction manual × 1

- Option : BCD cable 3 m (AA-8107)
 RS-232C cable 2 m (AX-5022B)
 Detection adapter (made-to-order) (32 mm); U-shaped type, L-shaped type
 Magneto-electric rotation detector (MP-981)
 Photoelectric rotation detector (LG-9200)
 Signal cable (MX-7000 series)



Rear view



Panel cutout dimensions

F/V Converter FV-1100

Frequency-to-Voltage/Frequency-to-Current Converter

General-purpose type



Specifications

Conversion method	: constant width pulse integration method
Response	: 30 ms (Varies according to the frequency optionally specified.)
Input frequency range	: 10 kHz as standard (optionally specified from 100 Hz to 100 kHz)
Input terminal	: BNC (C02), terminal block (3.5 M)
Input voltage	: AC input; sine wave ; 0.2 to 50 Vrms square wave ; 0.6 to 70 Vp-p DC input; rectangular wave; Hi +4 to +30 V Lo -1 to +1 V pulse width ; 3 μs or more
Input impedance	: 80 kΩ or more (20 kHz), 30 kΩ (100 kHz)
Output terminal	: terminal block (3.5 M)
Output voltage	: 0 to 10 V, load resistance 1 kΩ or more (0 to 5 V/ 0 to 1 V/ 0 to 0.1 V: available as an option)
Output current	: 4 to 20 mA, load resistance 500 Ω or less (setting also available in the range from 0 to 16 mA)
Linearity	: within ±0.2 % of the maximum rated value
Ripple	: 0.1 % of the maximum rated value or 10 mV or less (Input frequency level during 5% of full-scale frequency input)
Detector power supply	: 12 VDC ±10 % 100 mA
Power requirement	: within AC 85 to AC 110 V, 46 to 63 Hz (110/120/200/220/240 VAC on request)
Operating temperature range	: 0 to +40 °C
Weight	: approx. 2 kg
Accessory	: power cable for 100 VAC (AX-2050N, 3m) x 1 flat-bladed screwdriver x 1 panel mounting fixture x 1 instruction manual x 1

Features

- Withstand voltage: 2000 VAC 1 minute (chassis, primary power supply)
- Equipped power supply for detector as standard (12 VDC, 100mA).
- AC/DC input signal selectable.
- Frequency range can be optionally specified from 100 Hz to 100 kHz. (standard: 10 kHz) (Once the frequency is fixed, the setting cannot be changed.)
- Data output as current and voltage signals can be recorded to a pen recorder, and displayed to other indicators, etc.
- Compact monofunction type. Simple to use for smoothing the input frequency and indicating the average behavior or variation.

F/V Converter FV-1500

Frequency-to-Voltage/Frequency-to-Current Converter

High response type



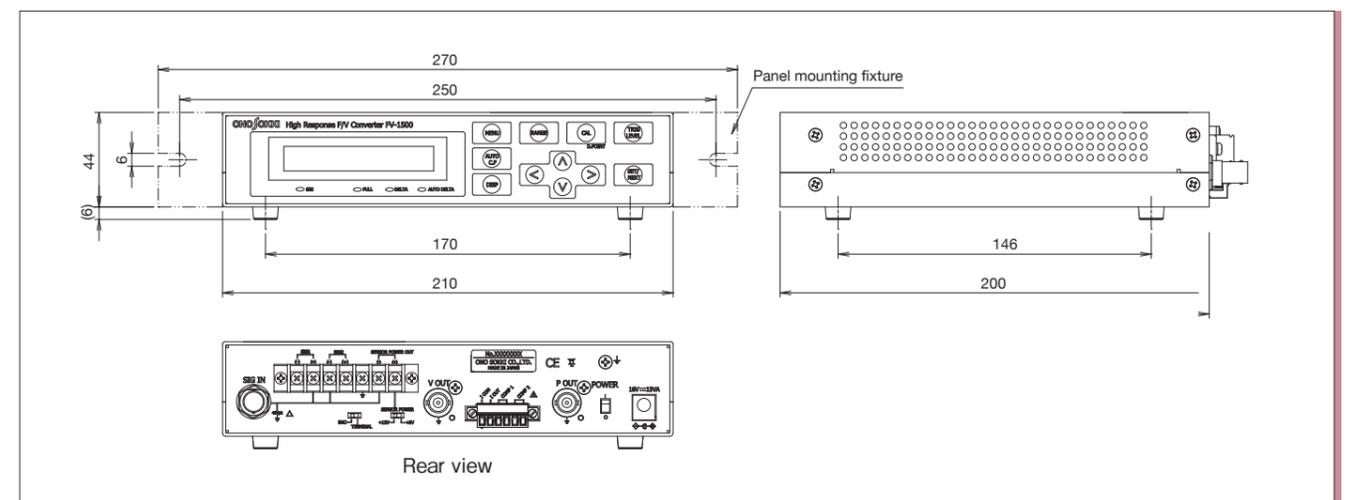
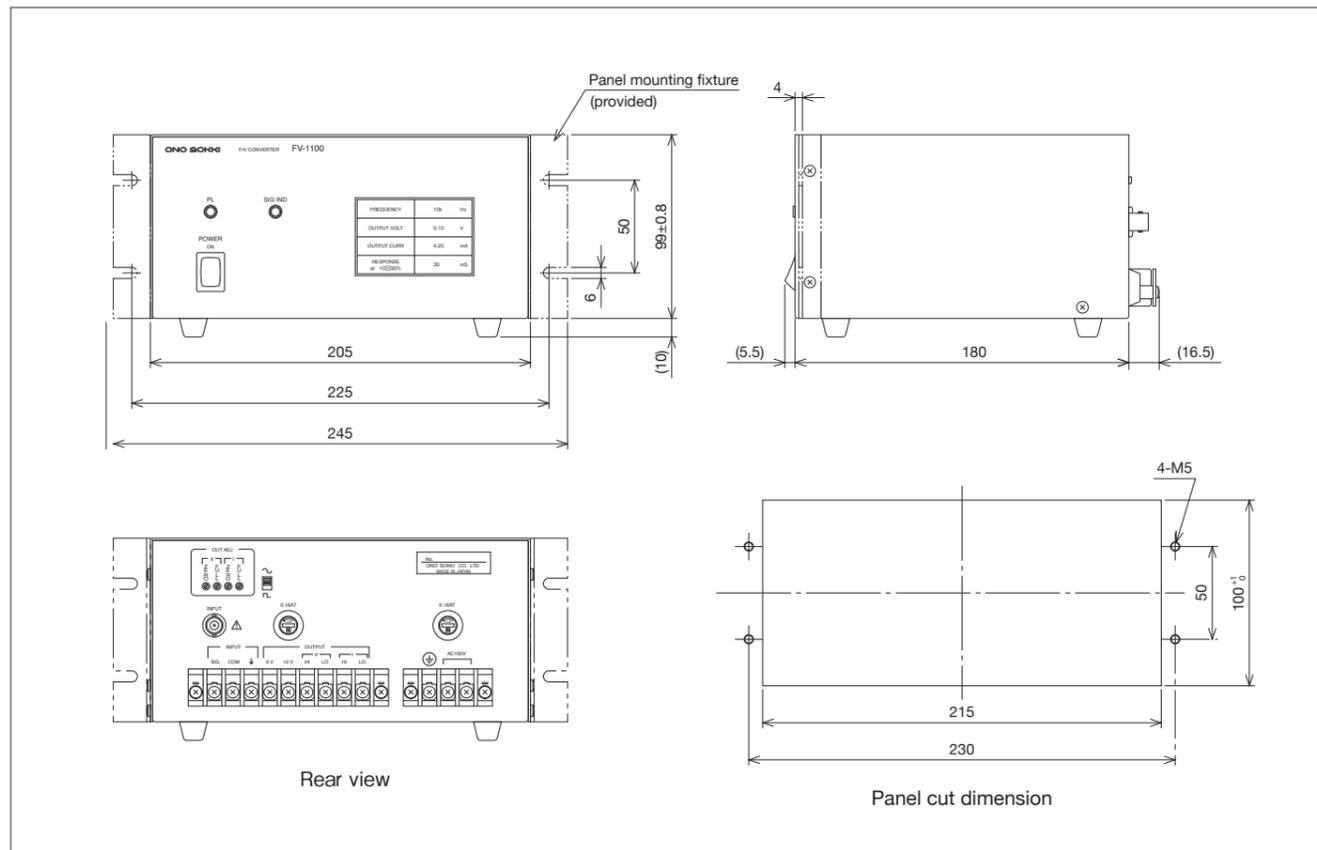
Features

- Wide frequency range: 0.2 Hz to 320 kHz
- High-speed response of every signal period
- Rotation direction judgment using two-phase signal input
- Rapid deceleration follow-up function
- Automatic center frequency follow-up function can analyze transient fluctuation component (option)

Specifications

Response	: within 1 period time of input frequency + 3.5 μs
Input voltage	: AC input signal voltage range; 0.3 to 30 Vp-p DC input signal voltage range; Hi +4 to +30 V, Lo 1 V or less
Input frequency range	: 0.2 Hz to 320 kHz For full scale mode output; • Can be set between 1 and 320000 Hz every 1 Hz • Can be set between 1 and 320000 r/min every 1 r/min • Can be set between 1 and 320000 m/min every 1 m/min For deviation mode; Selectable from the measurement frequency range up to 320 kHz ±1 %, ±5 %, ±10 %, ±20 %, ±50 %, ±100 % or ±1 to 180,000 (can be set every 1 Hz, 1r/min, or 1m/min.)
Input terminal	: BNC (C02) or terminal block selectable
Input format	: single-phase, AC/DC/non-voltage selectable (+12 V pull-up for open collector devices) Two-phase signal with 90° phase difference (DC input only)

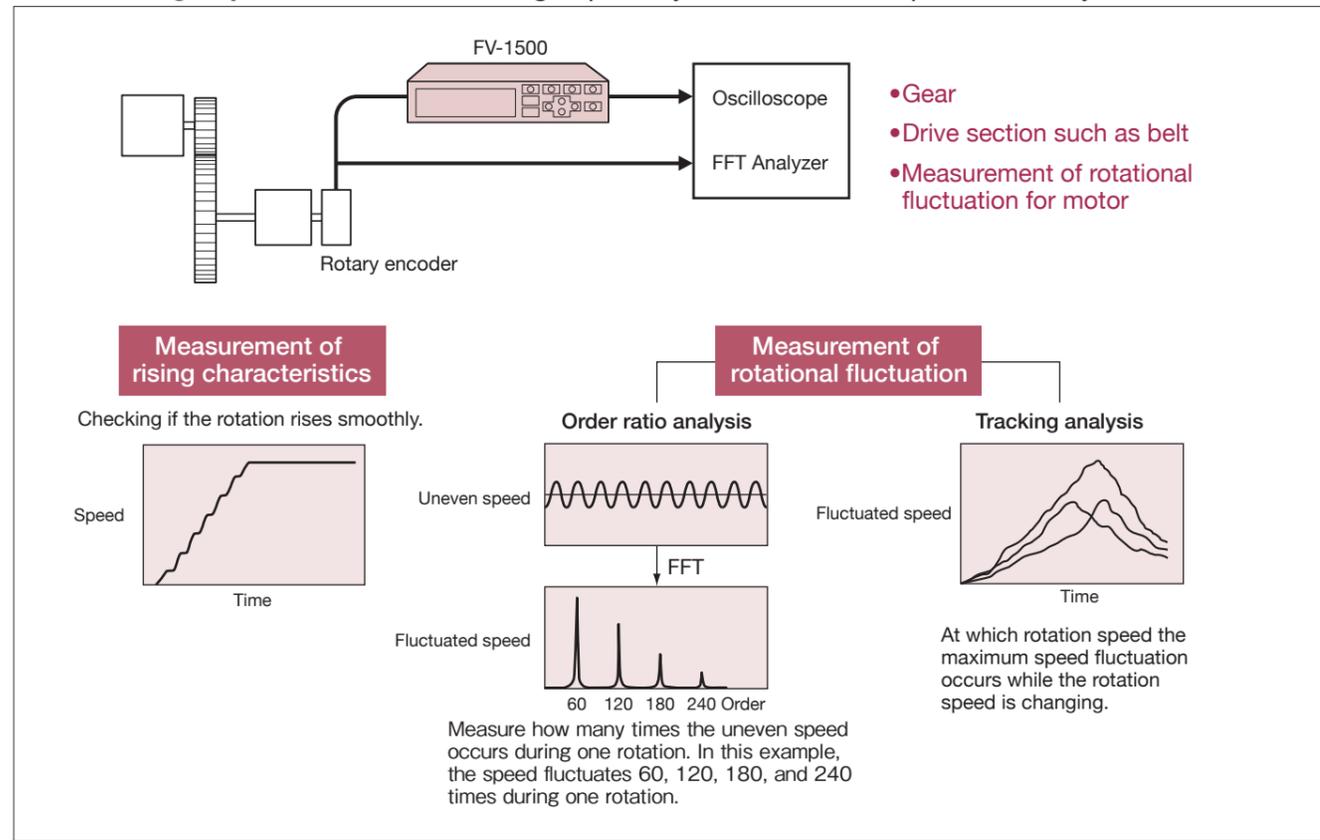
Filter	: OFF / 20 kHz / 120 kHz low-pass filter
Analog output terminal signal	: voltage output; 0 to 10 V (Full scale mode signal output, direction recognition function OFF) ± 5 V (Full scale output mode, direction recognition function ON, deviation mode, automatic center frequency follow-up mode) Load resistance 100 kΩ or more
current output	: 0 to 16 mA (at the time of shipment)/4 to 20 mA Load resistance 500 Ω or less
Linearity	: voltage output; DC: ±0.1 % (to 180 kHz), ±0.2 % (to 320 kHz) AC: ±0.2 % (to 180 kHz), ±0.4 % (to 320 kHz) current output; DC: ±0.7 % (to 180 kHz), ±1.4 % (to 320 kHz) AC: ±1.4 % (to 180 kHz), ±2.8 % (to 320 kHz)
Analog output low pass filter	: OFF/ 3 Hz/ 10 Hz/ 1 kHz selectable
Analog output terminal	: BNC/C02 type (voltage output) or terminal block (phoenix contact: MC1.5/6-STF-3,81) (voltage output) selectable
D/A resolution	: 16-bit
Display	: fluorescent display tube (display range 69.85 mm × 11.45 mm)
Display unit	: Hz, r/min, m/min, USER
Power requirement for sensor	: 12 VDC ±10 %, 150 mA / 5 VDC ±10 % 150 mA Selectable by switch on the real panel.
Operating power voltage range	: 16 VDC dedicated AC adapter (100 to 240 VAC) provided as standard
Operating temperature	: 0 to +40 °C
Storage temperature	: -10 to 50 °C
Operating humidity	: 5 to 80 % RH (with no condensation)
Storage humidity	: 5 to 85 % RH (with no condensation)
Weight	: approx. 1 kg
Accessory	: dedicated AC adapter (AC adapter: PS-P20023D cable: VM1391-VM1700 2m) x 1, instruction manual x 1, connector (MC1.5/6-STF-3.81) x 1 (equipped with the main body)
CE marking	: Low Voltage Directive; 2006/95/EC EN61010-1:2010 EMC Directive; 2004/108/EC EN61326-1:2006 Class A Table 2
Option	: FV-0151 (Automatic center frequency follow-up function) FV-0152 (Comparator output function) FV-0153 (Deviation scale change function) FV-0154 (Open collector output function) FV-0014 (Panel mounting fixture)



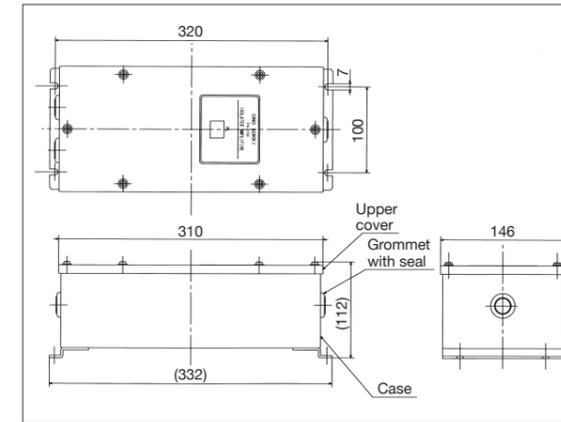
* Please visit our website for more details on FV-1500.

F/V converter application

- **FV-1500 High-speed F/V Converter** High-speed cycle conversion output for each cycle



Isolated Signal Amplifier PA-150 Signal Amplifier



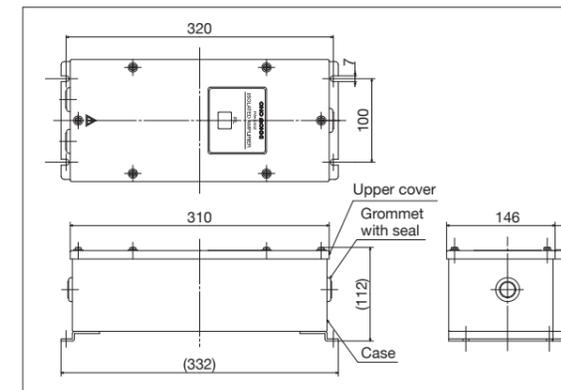
• Features

- Used as an amplifier for electromagnetic detectors under electrically bad environment.
- Converts the input signal into a high-voltage low-impedance signal to transmit the signal to remote locations accurately.
- 12 VDC power terminal for use with various sensors.
- Terminal block allowing easy wiring, sealed structure, a take-off vent for various plumbing and cabling methods.
- Isolated shielded type to allow installation on site. Noise-resistant.

• Specifications

Input amplification	: AC amplification
Input impedance	: differential input: approx. 70 kΩ (50 kHz) single-ended input: approx. 45 kΩ (50 kHz)
Input waveform	: sine wave or rectangular wave (with a duty of approx 1:1)
Input sensitivity	: sine wave input : 0.1 Vrms, rectangular wave input; 0.3 Vp-p (max. allowable bias voltage: ± 1 VDC)
Frequency range	: 1 Hz to 50 kHz
Operating voltage range	: sine wave input : 0.1 to 30 Vrms rectangular wave input; 0.3 to 30 Vp-p
Max. input apply voltage	: sine wave; 100 Vrms, rectangular wave; 100 VDC
Output waveform	: rectangular waveform
Voltage output	: max. peak voltage (Vp-p) ; 12 ± 1 V max. bias voltage (VBIAS); 0.5 V or less <small>*When OUT2 and OUT1 is short-circuited and no load between COM2 and OUT1/2.</small>
Open collector output	: output impedance; approx. 330 Ω collector maximum applied voltage; 40 VDC collector maximum input current; 50 mA <small>*Between OUT2 and OUT1: open *Between OUT1 and COM2; collector maximum applied voltage, and collector maximum input current</small>
Power source	: 12 VDC ± 5 %, 100 mA max.
Operating temperature	: -10 to 40 °C
Storage temperature	: -20 to 70 °C
Power requirement	: 100 VAC ± 10 %, 50/60 Hz
Power consumption	: approx. 8 VA
Weight	: approx. 4 kg
Accessory	: crimp terminal x 11, fuse for 200/220V x 1, instruction manual x 1
Terminal block	: applicable to JIS C 2805 2-4 crimp terminal

Isolated Signal Amplifier PA-330Z Signal Amplifier



• Features

- Can be used as an insulated amplifier by receiving square wave output from rotary encoder.
- Low impedance transmission for long distance available after wave-shaping.
- Supplies 12 VDC to DC power type RP series.
- The case is sealing structure which allows close mounting to the encoder.
- Isolated shielded type to allow installation on site. Noise-resistant.

• Specifications

Number of input phases	: three-phase
Input resistance	: 470 Ω
Input waveform	: rectangular waveform approx. 50 % duty
Input voltage	: Hi; 8 to 12.5 V, Lo; 0 to 4 V
Frequency range	: 0 to 50 kHz
Output voltage	: Hi; 10 V±2 V (5 kΩ load), Lo; 0.5 V or less (5 kΩ load)
Output resistance	: collector resistance 330 Ω
Delay time	: approx. 2 μs between input and output
Operating power supply	: 100 VAC, approx. 12 VA
Power source	: 12 VDC, 0.15 A
Operating temperature	: -5 to 40 °C
Storage temperature	: -10 to 70 °C
Weight	: approx. 4 kg
Accessory	: crimp terminal
Terminal strip	: applicable to JIS C 2805 1.25 to 3 crimp terminal

Optional modification

Item	Modified specification	Standard
Open collector output	Max. rating : 40 VDC, 50 mA	Collector output
	AC110 V	
Power voltage	AC200 V	100 VAC
	AC220 V	
Input resistance	1.5 kΩ	470 Ω
	47 kΩ*	
Output resistance	220 Ω (Output Z is not available)	330 Ω (three-phase)

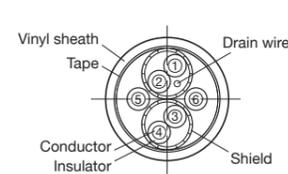
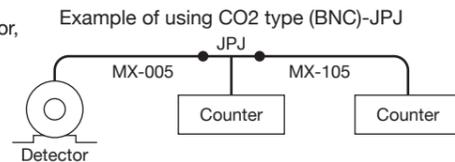
Please specify the item and specification to be modified when ordering.
*Modification of input resistance to 47 Ω is required when RP-1700 series with C specification (collector output type/ pull up resistance 470 Ω) is used.

Table of Signal Cable

Item	Compatible Detectors	Cable	Model Name	Specifications	Compatible Products	Non-compatible Products	Remarks																					
1	MP-9100/9120/9200/940A/963 MP-810/820/830 (MP-081+MX-005 series)	3C-2 V (High-frequency coaxial cable)	MX-005 5m 010 10m 015 *15m 020 *20m	HS12PA-2 CO2 type (BNC) plug 	FV-1100/1500	Counter without a BNC input connector * However, if the input connector is connected to the terminal block's display unit, connection is enabled by using a cable combination (MX-000 series+ MX-603.)	<table border="1"> <thead> <tr> <th>Connector Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>SIG</td> </tr> <tr> <td>2</td> <td>COM</td> </tr> </tbody> </table>	Connector Pin	Signal	1	SIG	2	COM															
Connector Pin	Signal																											
1	SIG																											
2	COM																											
2	MP-930/935/936/950/954/962 FG-1300	3C-2 V (High-frequency coaxial cable)	MX-101 1.5m 105 5m 110 *10m 115 *15m 120 *20m	CO2 type (BNC) plug CO2 type (BNC) plug 	FV-1100/1500 TM-3100 series TM-5100 	Counter without a BNC input connector * However, if the input connector is connected to the terminal block's display unit, connection is enabled by using a cable combination (MX-100 series+ MX-603.)	The following models have a directly attached cable. MP-930: 0.5 m MP-950: 0.5 m 935: 1 m 954: 0.5 m 936: 1 m 962: 0.5 m																					
3	MX-000 series cables, MX-100 series cables	P-2 (2-core outer shield cable)	MX-603 0.3m (Junction cable)	CO2 type (BNC) jack TM1.25-3.5S 	PA-150 TM-3100 series TM-5100 	* The TM-5100 has a terminal board socket for signal input/output. To connect to the TM-5100, it is required to process the cable end by removing a crimp terminal.	Use only for connecting the compatible detectors at item No.1 & 2 when the input connector is the terminal block's display unit. <table border="1"> <thead> <tr> <th>Connector</th> <th>Color of Code</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>The Center Contact</td> <td>White</td> <td>SIG</td> </tr> <tr> <td>Shell</td> <td>Green</td> <td>COM</td> </tr> <tr> <td>Shell</td> <td>Shield</td> <td>Case Ground</td> </tr> </tbody> </table>	Connector	Color of Code	Signal	The Center Contact	White	SIG	Shell	Green	COM	Shell	Shield	Case Ground									
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4	MP-9100/9120/9200/940A/963 MP-810/820/830 (MP-081+MX-500 series)	P-2 (2-core outer shield cable)	MX-505 5m 510 10m 520 20m	HS12PA-2 TM1.25-3.5S 	FV-1500, PA-150, TM-3100 series/5100 * The TM-5100 has a terminal board socket for signal input/output. To connect to the TM-5100, it is required to process the cable end by removing a crimp terminal.	Counters without an input terminal block	Connection to counter <table border="1"> <thead> <tr> <th>Connector</th> <th>Color of Code</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>Contact 1</td> <td>White</td> <td>SIG</td> </tr> <tr> <td>Contact 2</td> <td>Green</td> <td>COM</td> </tr> <tr> <td>Housing</td> <td>Shield</td> <td>Case Ground</td> </tr> </tbody> </table>	Connector	Color of Code	Signal	Contact 1	White	SIG	Contact 2	Green	COM	Housing	Shield	Case Ground									
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5	MP-981/9820 LG-9200	D5-UL (Composite 5-core vinyl sheath cable)	MX-7105 5m 7110 10m 7115 15m 7120 20m	R04-PB6F TM1.25-3.5S 	FV-1100/1500, PA-150, TM-3100 series/5100 * The TM-5100 has a terminal board socket for signal input/output. To connect to the TM-5100, it is required to process the cable end by removing a crimp terminal.		Connection to counter <table border="1"> <thead> <tr> <th>Connector Pin</th> <th>Color of Code</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Blue</td> <td>SIG</td> </tr> <tr> <td>B</td> <td>White</td> <td>Unused</td> </tr> <tr> <td>C</td> <td>Red</td> <td>+12 V</td> </tr> <tr> <td>D</td> <td>Shield</td> <td>Case Ground</td> </tr> <tr> <td>E</td> <td>Green</td> <td>COM</td> </tr> <tr> <td>F</td> <td>Black</td> <td>0 V</td> </tr> </tbody> </table>	Connector Pin	Color of Code	Signal	A	Blue	SIG	B	White	Unused	C	Red	+12 V	D	Shield	Case Ground	E	Green	COM	F	Black	0 V
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6	MP-981/9820 LG-9200	D5-UL (Composite 5-core vinyl sheath cable)	MX-8105 5m 8110 10m 8115 15m 8120 20m	R04-PB6F R03-PB6M 	TS-2800/3200A (LG-9200 cannot be used.)	Counters other than those listed in the column at the left	The connector pin arrangement is the same as MX-7105 to 7120.																					
7	RP-7400 series	D5-UL (Composite 5-core vinyl sheath cable)	RP-0181 5m *10m	RM12BPE-5S TM1.25-3.5S 	PA-150 TM-3100 series	Counters without an input terminal block	<table border="1"> <thead> <tr> <th>Connector Pin</th> <th>Color of Code</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Blue</td> <td>SIG1</td> </tr> <tr> <td>2</td> <td>White</td> <td>SIG2</td> </tr> <tr> <td>3</td> <td>Red</td> <td>+12 V</td> </tr> <tr> <td>4</td> <td>Shield</td> <td>Case Ground</td> </tr> <tr> <td></td> <td>Green</td> <td>COM</td> </tr> <tr> <td>5</td> <td>Black</td> <td>0 V</td> </tr> </tbody> </table>	Connector Pin	Color of Code	Signal	1	Blue	SIG1	2	White	SIG2	3	Red	+12 V	4	Shield	Case Ground		Green	COM	5	Black	0 V
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9	TM-3100 series	Power cable for general purpose	AX-2050N 3m Compliant with Electrical Appliance and Material Safety Act	Crimp terminal M3 AC plug 3P 																								

* Made to order

• When several counters are connected to one detector, it is convenient to use BNC-JPJ connector.



• R6 Cable

Identification of wire core

No.	1	2	3	4	5	6
Color	Blue	Green/Gray	White	Green/Brown	Red	Black

Related Products

Signal Cables

Coupling Selection Guide

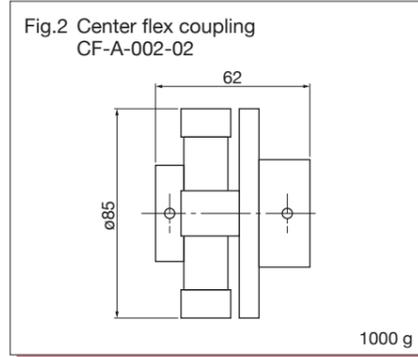
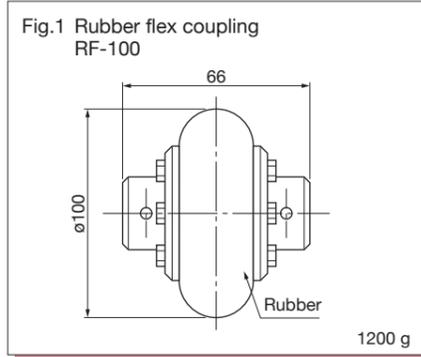
When connecting an electromagnetic rotation detector to a device, a rigid coupling will give accurate transmission of rotation and angle. However, if there is misalignment of the centering or allowance in the thrust direction, the bearing will be elastically deformed, which will impair accuracy or damage the detector.

For stable and long use with rigid coupling, the shaft misalignment should be within 6/1000 m.

When you cannot make shaft centering with that accuracy, it is necessary to use flexible coupling which can accept the differences in shaft center and the allowance in thrust direction.

There are various kinds of flexible couplings, such as one with high torsional rigidity, one suitable for general rotation speed measurement. It must be selected according to the application. Please perform the centering work as carefully as possible to prevent dynamic and static loads on the shaft beyond allowance.

• Recommended coupling shape/weight



Coupling name	Application	Features	Allowable eccentricity, deflection angle [Note 1]	Detaching method	Remarks	Manufacturer
Rub flex coupling RF-100 etc. Fig.1	MP-810B MP-200	<ul style="list-style-type: none"> Relaxation of rubber impact elasticity Vibration damping 	Rotation speed: 2000 r/min Deviation: 1.5 mm Deflection angle: 6 °	Attach the flange to the detector and the machine side. After setting to the dimensions specified in the centering rules, attach the rubber tire. Removable without moving system.	At high speed, expansion of the rubber due to centrifugal power causes a thrust power and it damages the detector. Drive side shaft diameter ϕ 10 to ϕ 22 [Note 2]	Nitta Chemical Industrial Products Co., Ltd.
Center flex coupling CF-A-002-02 Fig.2		<ul style="list-style-type: none"> Absorbs vibrations and shocks Does not occupy wide space in the axial direction 	Rotation speed: 5000 r/min Deviation: 0.5 mm Deflection angle: 1 °	Attach the flange hub and hub to the detector and the machine side, and attach the rubber body after centering.	Drive side shaft diameter ϕ 10 to ϕ 25	Miki Puli Co., Ltd.

[Note 1] Allowable eccentricity and deflection angle are the ranges that guarantee the performance as a coupling. However, please avoid installing in the way that the detector shaft exceeds the specified load even if it is within the allowable range.

[Note 2] Customers should prepare hole machining on the drive shaft side.

* For details of coupling, please contact each manufacturer.



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★ Outer appearance and specifications are subject to change without prior notice.
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