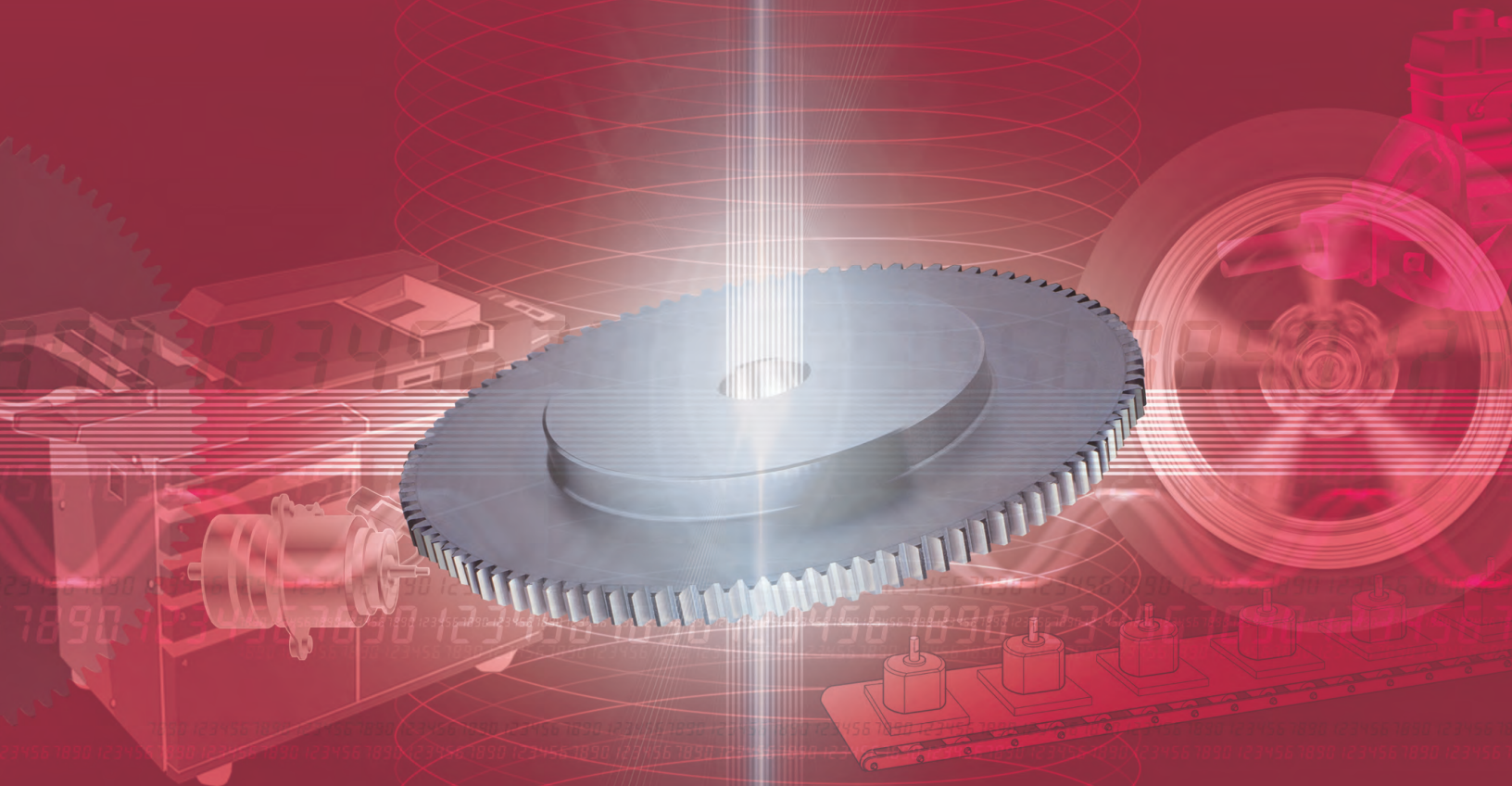


Digital Tachometers / Sensors and Peripherals



ONO SOKKI

Select the rotation detector/rotation display unit that is optimal for your needs from the wide range of products that Ono Sokki is proud to offer.

Rotation Detectors Selection Guide



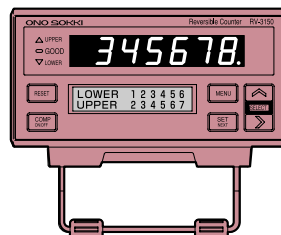
Cable (P. 26)

- When using a rotary encoder with a 12 VDC drive
TM-2100 Series (P. 4)
TM-5100 (P. 17)



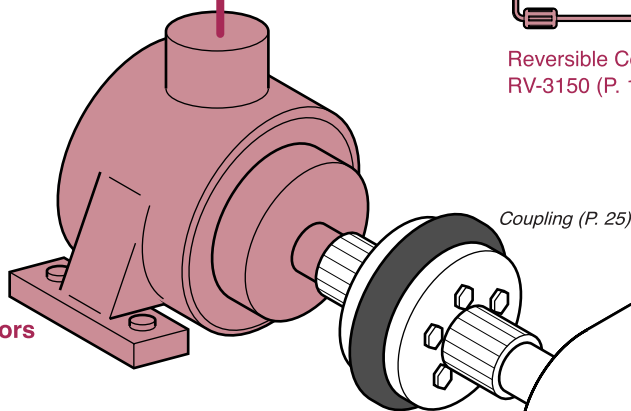
TM Series

Cable (P. 26)

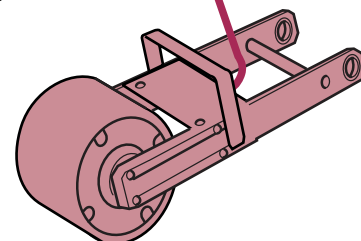


Reversible Counter
RV-3150 (P. 19)

Cable (P. 26)



Coupling (P. 25)



Length Detector
RP-732 (P. 18)

Electromagnetic Rotation Detectors (Internal Gear Type)

MP-610 (P. 14)

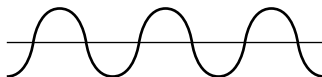
MP-800 Series (P. 13)

• Electromagnetic Rotation Detectors (Internal Gear Type) – Features

- Direct connection to the rotating shaft is all that is required. A flexible coupling is recommended for the direct connection method.
- Non-contact detection provided inside the detector.
- Superb rigidity and environmental resistance; high durability
- No power supply required
- Provides stable measurement, particularly at the lower limit of the measurement range, when compared to the external gear type

• Electromagnetic Rotation Detectors

The principle used is the same as that for a generator where the magnet and coil are unified. If the detector is brought near the vicinity of a rotating object such as a ferromagnetic gear with protuberances, the detector's magnetic force is affected, and an alternating current with peaks corresponding to the number of teeth is generated. If the number of gear teeth is 60, the detector becomes a 60 P/R rotation detector.



Correct electromagnetic detector waveform

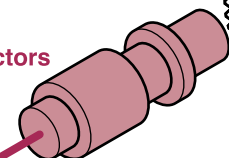
• Electromagnetic Rotation Detectors (External Gear Type) – Features

- Non-contact detection enables measurement even of high-speed rotations
- Superb rigidity and environmental resistance; high durability
- No power supply required (excluding MP-981, AP-981)
- P/R selectable (the number of detector gear teeth becomes the P/R value)
- The mounting position is enabled simply by attaching the gear to the target measurement object.

Electromagnetic Rotation Detectors (External Gear Type)

MP-900/MP-9000 Series (P. 7)

(excluding MP-981 and AP-981)



Cable (P. 26)

TM Series



• Rotary Encoders – Features

- a) Small rotation torque
- b) Capable of measuring large P/R values; wide selection range
- c) Can perform detection of low-speed rotations (close to zero)
- d) Choice of two types of power supply depending on the model, AC or DC.
- e) Wide selection of models for different applications

Rotary Encoders

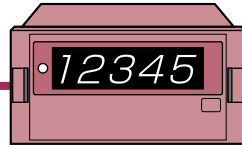
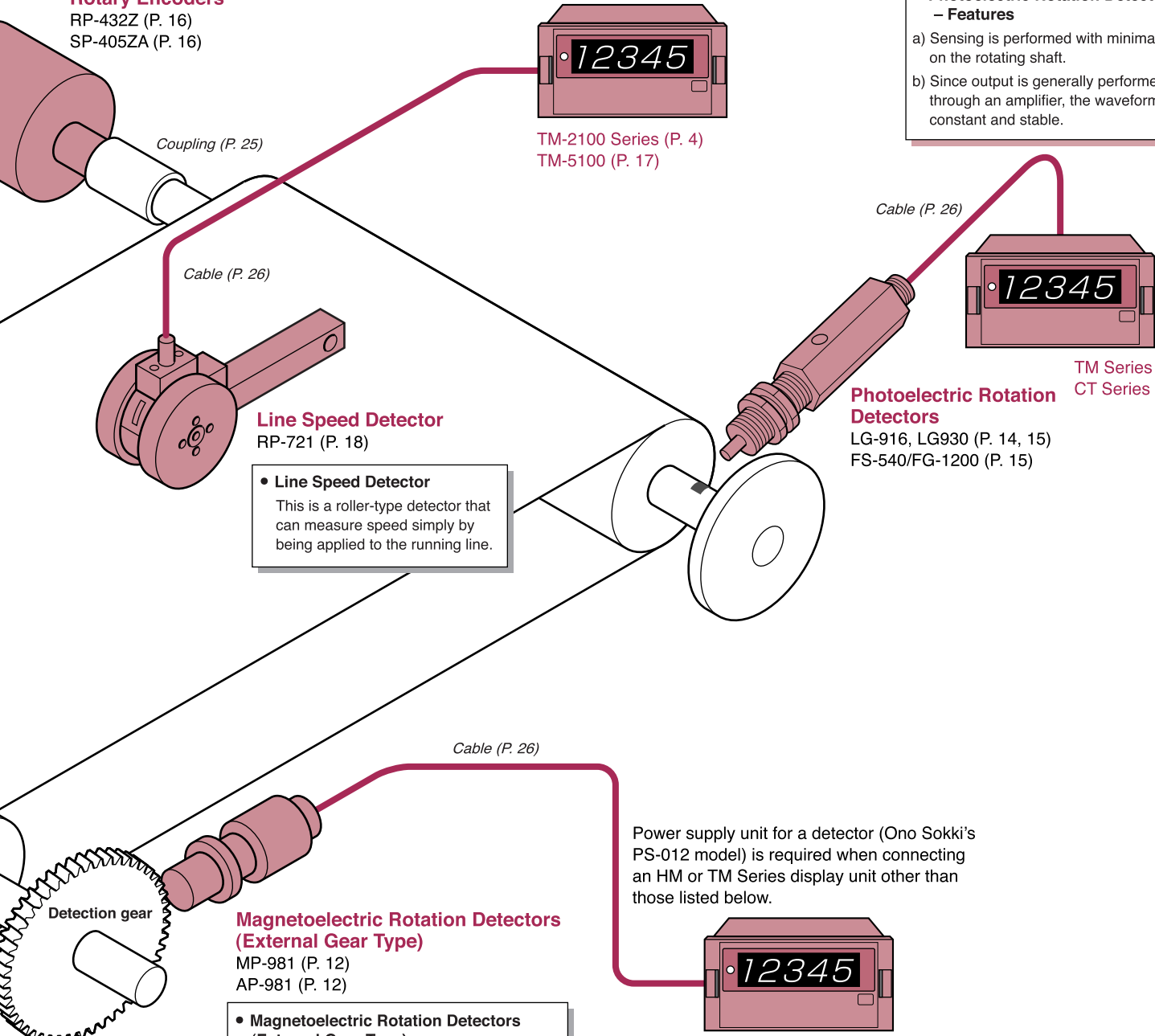
RP-432Z (P. 16)
SP-405ZA (P. 16)

• Photoelectric rotation detector

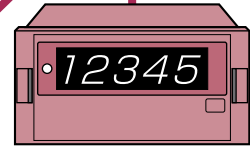
This device measures the rotation speed either by utilizing the light reflected from reflective tape, or from the contrast in the light received that is caused by the color of the shaft or by a difference in level.

• Photoelectric Rotation Detectors – Features

- a) Sensing is performed with minimal load on the rotating shaft.
- b) Since output is generally performed through an amplifier, the waveform is constant and stable.



TM-2100 Series (P. 4)
TM-5100 (P. 17)



TM Series
CT Series

Photoelectric Rotation Detectors
LG-916, LG930 (P. 14, 15)
FS-540/FG-1200 (P. 15)

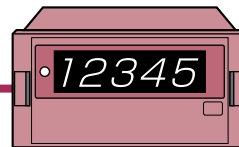
Line Speed Detector
RP-721 (P. 18)

• Line Speed Detector
This is a roller-type detector that can measure speed simply by being applied to the running line.

Magnetolectric Rotation Detectors (External Gear Type)
MP-981 (P. 12)
AP-981 (P. 12)




• Magnetolectric Rotation Detectors (External Gear Type)
These detectors utilize magnetic flux response (the resistance value changes according to the magnetic flux). The internal mechanism comprises magnetic resistance elements, permanent magnets, a direct current amplifier, and a voltage regulator. Detection can be performed as square wave output of the same amplitude over a wide range from ultra-low speeds to high speeds (1 to 20,000 r/min [60 P/R]).

Power supply unit for a detector (Ono Sokki's PS-012 model) is required when connecting an HM or TM Series display unit other than those listed below.



TM-2100 Series (P. 4)
TM-5100 (P. 17)

Rotation Display Units Selection Guide

		Model No.	Output, Specifications, etc.	Power requirement (Power supply for the detector)	Compatible Detectors	Page No.
For General-Purpose Use		TM-2110	Display only	100 to 240 VAC (12 VDC/100 mA)	MP Series SP-405ZA LG Series RP Series	—
		TM-2120	BCD output			
		TM-2130	Analog output			
		TM-2140	Contact output			
Compatible with Low Pulse Sensors		CT-6520	BCD output Analog output Pulse output Alarm contact output	100 to 240 VAC 11 to 15 VDC (12 VDC/100 mA)	IP Series VP-202, 1220 OM-1200 LG Series MP Series	—
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. 17

Note 1: Please see "Table of Signal Cable" on Pages 26 and 27 to select the suitable model of signal cable.

Note 2: Please contact nearest Ono Sokki representative for the separated catalogue of TM-2100 series and CT-6520.

CONTENTS

Rotation Detectors Selection Guide	2,3
Rotation Units Selection Guide	4

Rotation Detectors

Notes on Detection Gears	6
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Electromagnetic Type (External Gear Type) [Modules 1 to 3]

General-purpose type	MP-9100	7 to 10
With a directly attached cable	MP-911	7 to 10
Measurable for high speed rotation	MP-9120	7 to 10
Oil-proof type	MP-930	7 to 10
Oil-proof/Heat-resistant type (up to 150°C)	MP-935	7 to 10
Heat-resistant type (up to 220°C)	MP-936	7 to 10
Long body type	MP-940A	7 to 10
Compact type	MP-950	7 to 10
Long body type	MP-954	7 to 9, 11
Compact type	MP-962	7 to 9, 11
Ultra-compact type	MP-992	7 to 9, 11
[Up to Module 1]		
For modules 0.5 to 1	MP-9200	7 to 9, 11
[Modules 3 to 10]		
For modules 3 to 10	MP-963	7 to 9, 11

Magnetolectric Type (External Gear Type)

For low-to-medium speeds	MP-981	12
Acid-proof/waterproof	AP-981	12

Electromagnetic Type (Internal Gear Type)

For low-to-medium speeds	MP-810B/820B/830B	13
Wide range	MP-610	14

Photoelectric Type

Compact type	LG-916	14
Long distance detection	LG-930	15
Glass Fiber	FS-540/FG-1200	15

Rotary Encoders

General-purpose compact type	RP-432Z	16
Ultra-compact type	SP-405ZA	16

Rotation Display Units

Multifunction type

With 2-channel calculation function	TM-5100	17
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Related Products

Line Speed Detector (Roller Encoder)

For medium-to-low speeds	RP-721	18
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Length Meter

Length detector	RP-732	18
Reversible Counter	RV-3150	19

Peripheral Devices

Ratio Multiplier	TA-103	20
Signal Amplifier	PA-150	20

Frequency-Voltage converters

General-purpose type	FV-1100	21
High-speed response type	FV-1300	22, 24
Multi-channel type	FV-5300	23, 24

Coupling Selection Guide

25

Table of Signal Cable

26, 27

Rotation Detectors

Notes on Detection Gears

● Detection Gear

In theory, a detector is a magnetic body. Since it has a large magnetic permeability, soft metals (such as S20C, SS41) are generally used.

When performing normal rotating speed measurements, if the gate time is specified at 1 second, using a 60 P/R gear enables direct readout of the rotating speed by the counter.

● Shape of a Detection Gear

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

If the gear is a spur gear, an involute gear is the most suitable type, as it produces waveforms with high frequency spikes from squared-off, triangular or rounded teeth. Care is required because spikes appear in waveforms even when the gear teeth are chipped in places.

Furthermore, if the gear teeth are magnetized, please be aware that reciprocal interference between the teeth and the permanent magnets inside the detector will result in a reduction of the output voltage, and abnormal waveform signals.

Fig. 2 shows the relational dimensions of the gear and detector that are required in order to obtain the optimal output voltage and output waveform.

"a" shall be the same dimension as or larger than "d"

"b" shall be the same dimension as or larger than "c"

"c" shall be three times the dimension of "d"

"e" shall be less than half the dimension of "b", and as small as possible

The tooth width shall be at least 4 mm

- a: Gear tip thickness b: Tooth height c: The spacing between teeth
d: Yoke diameter e: Gap between the gear and the detector

Abbreviations used

M = Module Z = Number of teeth D = Outer diameter of gear

$$M = \frac{D}{Z+2}$$

$$\frac{N \text{ (r/min)} \times Z \text{ (number of teeth)}}{60 \text{ (s)}} = C \text{ (Hz)}$$

If Z = 60, then N = C

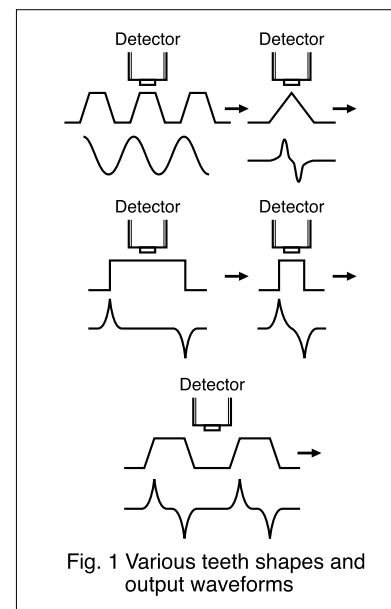


Fig. 1 Various teeth shapes and output waveforms

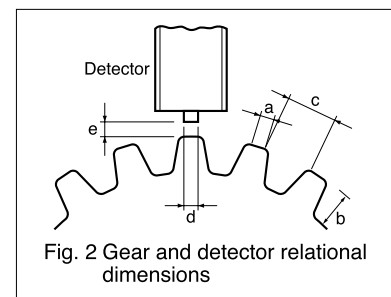
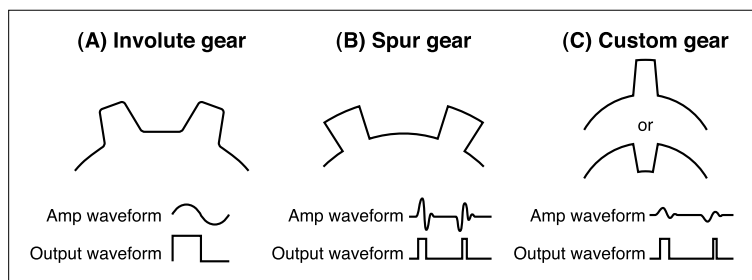


Fig. 2 Gear and detector relational dimensions

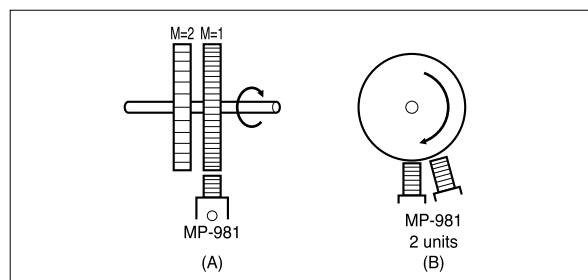
● Shape of the gear for the MP-981 and the mounting method

(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 above figure, (B) and (C) are not suitable for use as a detection gear.

(2) Mounting method

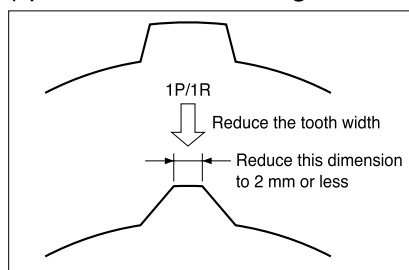


Please avoid the mounting configurations shown in the above figure, as they will cause reciprocal magnetic interference.

In the case of (A), a gear with a different module is mounted in the vicinity of the MP-981.

In the case of (B), two or more MP-981 units are mounted within the vicinity of one gear

(3) How to use a custom gear

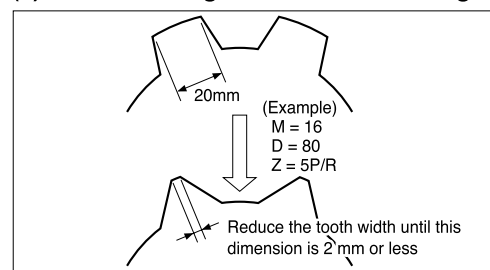


(4) How to calculate Module M

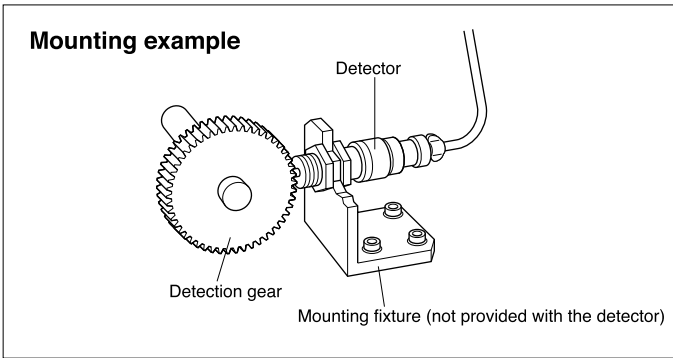
This calculation is for involute gears only

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

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



The MP-900/9000 Series detectors have been designed primarily to detect frequency signals in proportion to the rotating speed by bringing the detector in close proximity to the addendum of a detection gear fitted to a rotating shaft (sine wave output). Various types are available, from general-purpose, oil-proof and heat-resistant types through to user-customized types, enabling you to select the one that best suits your application. Extension cables, signal cables and connectors can also be purchased separately.



● Features

- **General-purpose type**
MP-9100
General-use type
- **General-purpose type with a directly attached cable**
MP-911
MP-910 with a 5-m directly attached (cable: 3D-2V type)
- **Low impedance type (for measuring high-speed rotations)**
MP-9120
Low impedance enables better noise resistance
Ideal for the detection of high-speed rotations
Same outer dimensions as those of the MP-9100 model
- **Oil-proof type**
MP-930
Complies with the JEM (Japan Electrical Manufacturers Association) 1030-1983 standard for oil-proof models
- **Oil-proof/Heat-resistant type**
MP-935
Complies with the JEM (Japan Electrical Manufacturers Association) 1030-1983 standard for oil-proof models
Heat-resistant up to 150°C
Comes with a 1-m heat-resistant cable
- **Heat-resistant type**
MP-936
Heat-resistant up to 220°C
Comes with a 1-m heat-resistant cable
- **Long body type**
MP-940A
The 105-mm mounting section on this long body type makes it ideal for detecting rotations deep in the rotating object.
- **Compact type**
MP-950
Compact; comes with a 0.5-m cable

• Long body type

MP-954

The 81-mm mounting section on this long body type makes it ideal for detecting rotations deep in the rotating object. The mounting screw dimensions are the same as those of the MP-950 model.

• Compact type

MP-962

Compact; comes with a 0.5-m cable

• Ultra-compact type

MP-992

Ultra-compact; comes with a 0.5-m cable

• Small module type

MP-9200

For modules 0.5 to 1

• Medium module type

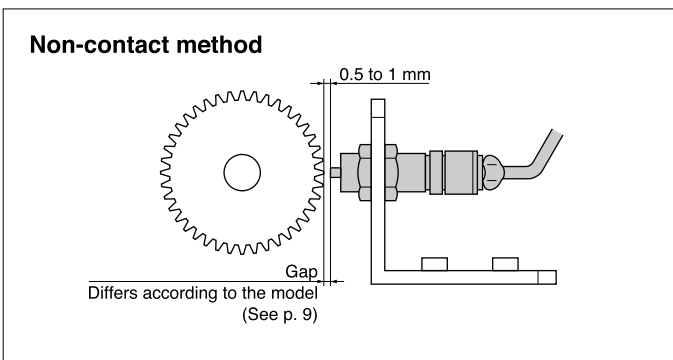
MP-963

For modules 3 to 10

● Standard Detection Gear

MP-001 ($\phi = 62$)

Module 1, 60 teeth



Note: When using the MP Series electromagnetic rotation detectors in locations where there are requirements for high reliability, please contact nearest Ono Sokki representative for separate technical solutions that meet your needs.

● MP-900/9000 Series Specifications

Item	Detector		General-purpose	With cable attached	Low impedance (Measurable for high speed rotation)	Oil-proof	Oil-proof/Heat-resistant (150°C)	Heat-resistant (220°C)
	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) [1 kHz, typ.]	300		30	300	270	370		
Impedance (Ω) [1 kHz, typ.]	2 k		240	2 k	1.8 k	2.5 k		
Output voltage (Vp-p) [1 kHz, typ.] ^{*2}	2.0 or greater							
Detectable frequency range (Hz) ^{*3, *4}	200 to 35,000		200 to 80,000	200 to 35,000	300 to 35,000			
Detection 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)	90	300 (including cable)	90	100 (including cable)	100			
Surrounding magnetic field (T)	Up to 0.03				Up to 0.02			

Item	Detector		Long body	Compact type (With cable attached)	Long body	Compact type (With cable attached)	Ultra-compact type	For small modules	For medium modules
	MP-940A	MP-950	MP-954	MP-962	MP-992	MP-9200	MP-963		
DC resistance value (Ω) ^{*1}	500 to 600	2.1 k to 2.3 k	2.1 k to 2.3 k	1.25 k to 1.45 k	160 to 190	850 to 950	3.7 k to 4 k		
Inductance (mH) [1 kHz, typ.]	270	400		210	25	300	1800		
Impedance (Ω) [1 kHz, typ.]	1.8 k	3.5 k		2.1 k	250	2 k	16 k		
Output voltage (Vp-p) [1 kHz, typ.] ^{*2}	2.0 or greater		1.5 or greater		0.5 or greater	0.6 or greater (M=0.75)	2.5 or greater		
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		
Detection 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)	150	70	90	50	3	90	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 is 0.4% / °C.

*2 Load resistance is 10 kΩ, M = 1, Gap = 0.5 mm

*3 The frequency value (Hz) indicated corresponds to the rotating speed (r/min) indicated when a 60 P/R detection gear is used.

*4 When using the Ono Sokki standard MP-001 detection gear

*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 the rotational speed that 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.

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

For a module that is greater than 1, we recommend a tooth width of 4 mm.

d) Detection gear material

Material with a property of being strongly attracted to a magnet, or in other words, a ferromagnet, is ideal. If you have a choice, we recommend materials such as S45C, SS400, SUS430, or FC400.

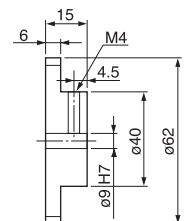
● Ono Sokki's standard detection gear MP-001

The detection gear available from Ono Sokki 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 Rotation Range

- (1) The relationship between the gap between the detector and the detection gear and the detection range (Lowest measurable value) is given in the tables below.
- (2) The rotating speed range is that for which an output voltage of 0.5 V_{p-p} or greater can be maintained (load resistance = 10 kΩ).
- (3) The rotating speed that can be measured varies according to the type of display unit used.

• MP-900/9000 Series: Rotating speed (r/min) that can be measured

Note: When a 60-tooth gear is used

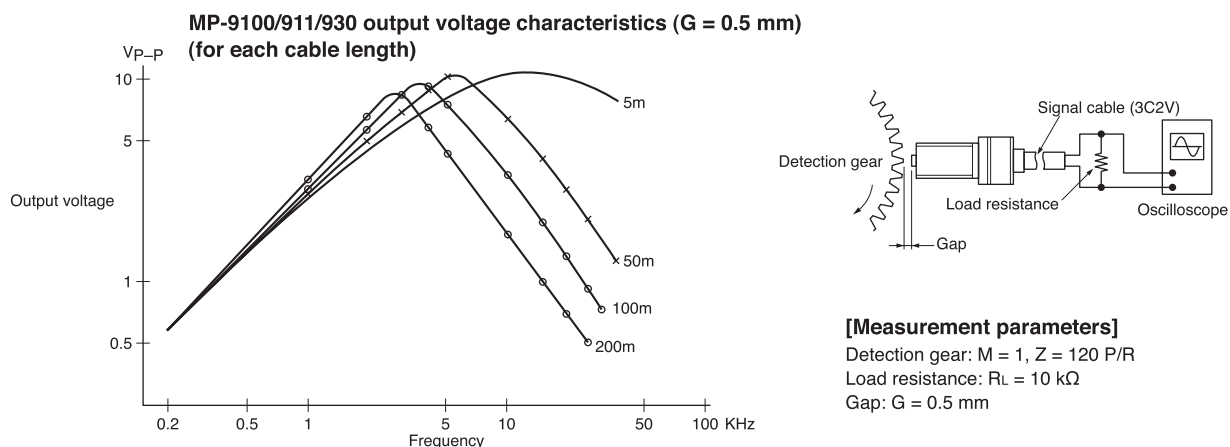
Model name	Module	Lowest measurable value						Highest measurable value
		M=1		M=1.5		M=2		
		0.5	1	0.5	1	0.5	1	
MP- 9100		200	500	50	300	30	100	35,000
911		200	500	50	300	30	100	35,000
9120		200	500	50	300	30	100	80,000
930		200	500	50	300	30	100	35,000
935		300	1200	75	300	40	100	35,000
936		300	1000	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 name	Module	M=1		M=1.5		M=2		Highest measurable value
		0.2	0.5	0.2	0.5	0.2	0.5	
MP- 992		400	1000	230	600	140	330	100,000

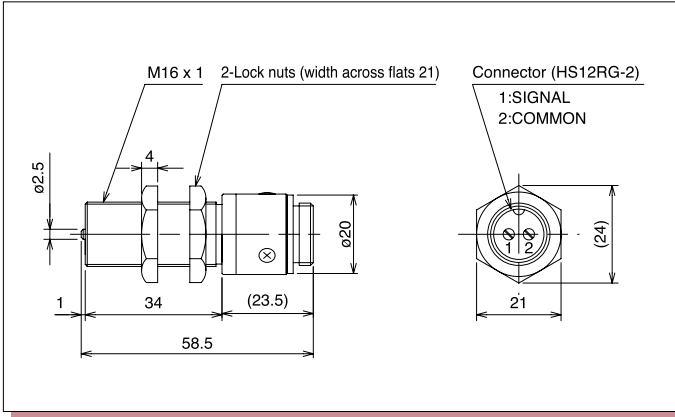
Model name	Module	M=0.75		Highest measurable value
		0.5		
MP- 9200		1000		35,000

Model name	Module	M=3		M=5		M=7.5		Highest measurable value
		1	2	1	2	1	2	
MP- 963		45	90	25	50	20	45	15,000

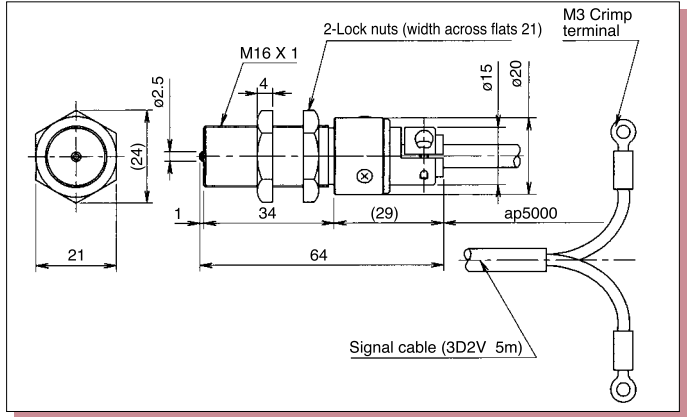
Note: The data in the above tables are standard values, and operation at these values is not guaranteed.
An Ono Sokki display unit was used to be available at the above figures.



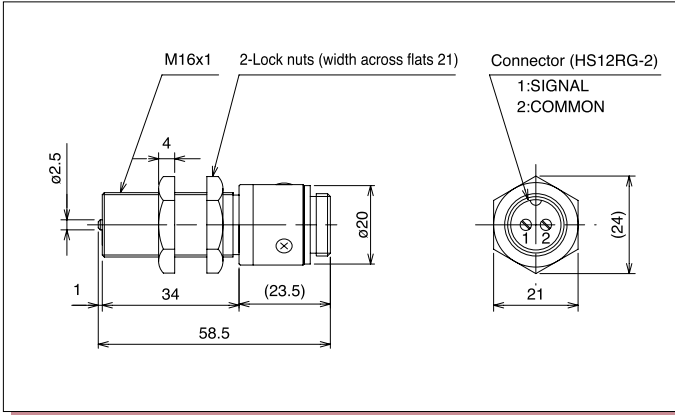
• MP-9100



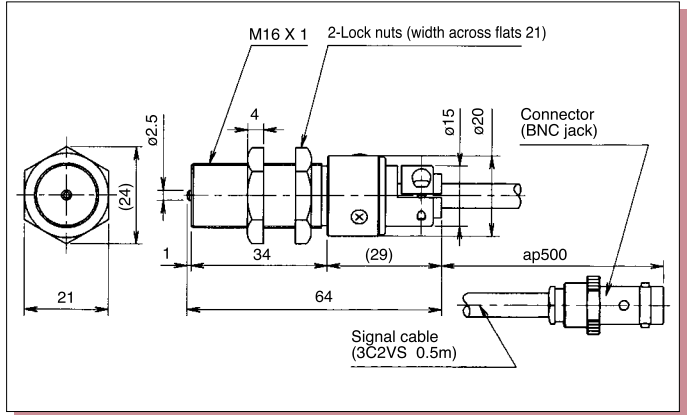
• MP-911



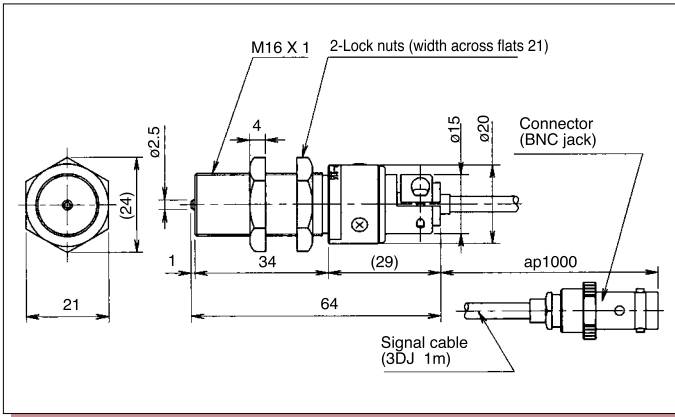
• MP-9120



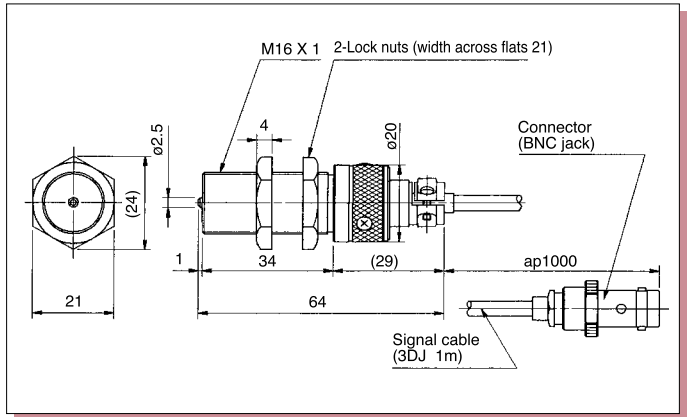
• MP-930



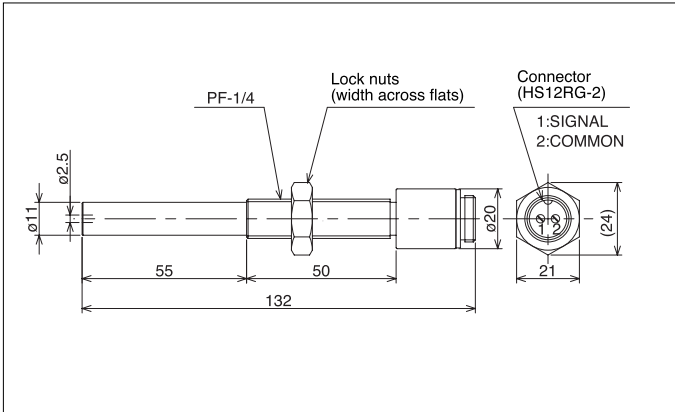
• MP-935



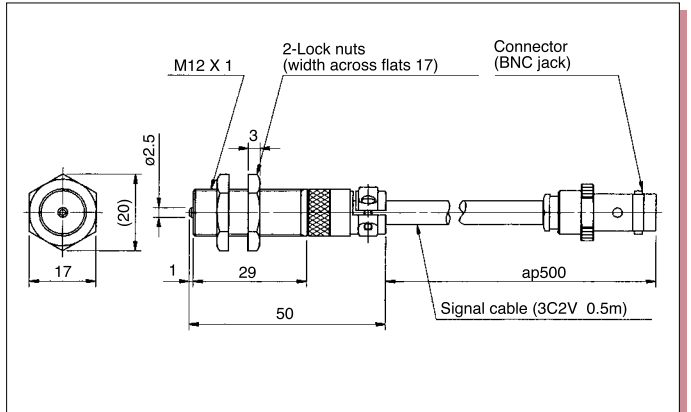
• MP-936



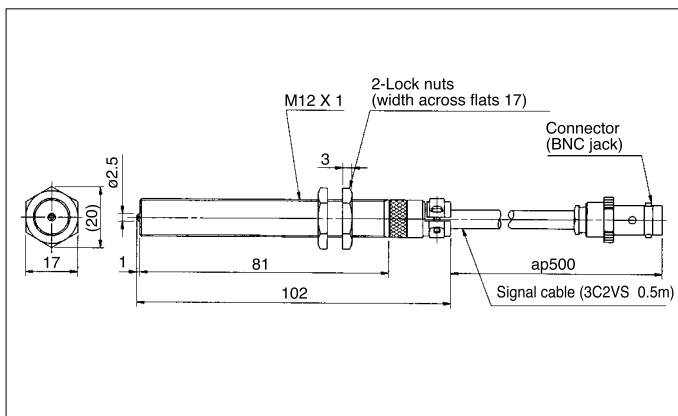
• MP-940A



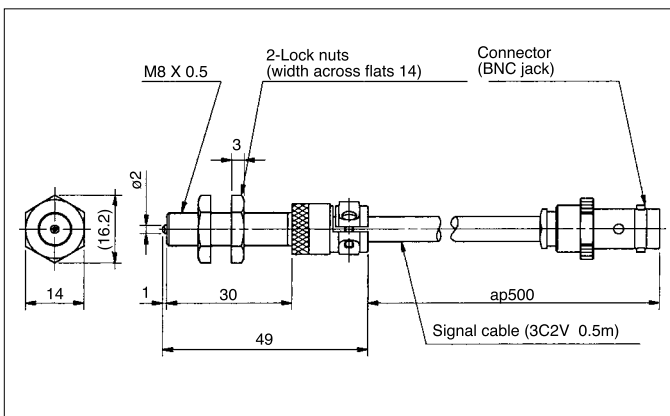
• MP-950



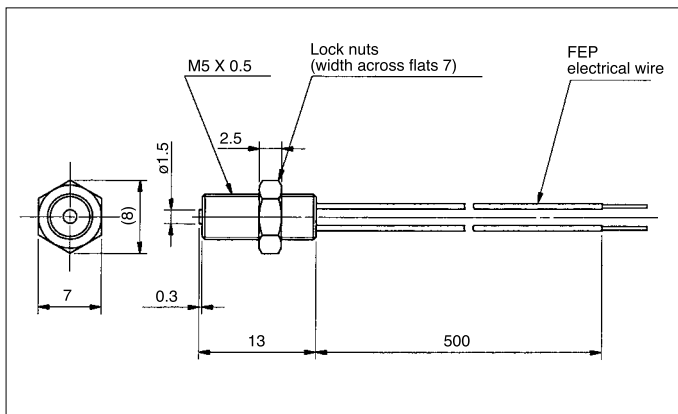
• MP-954



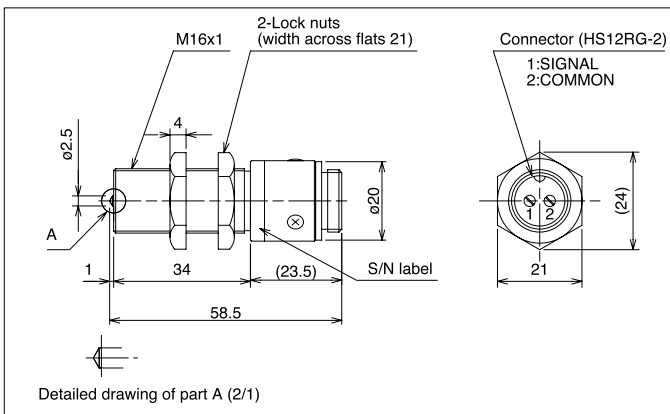
• MP-962



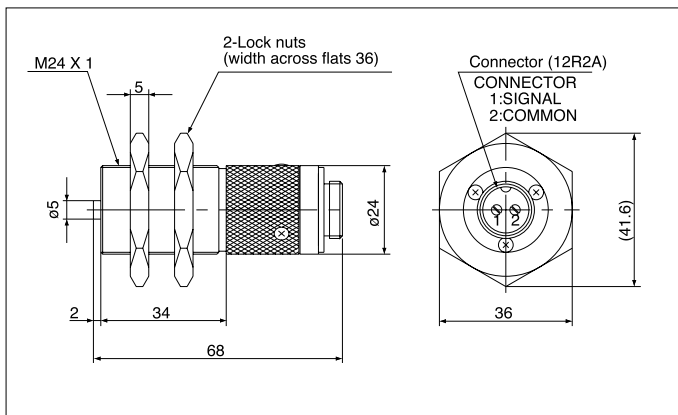
• MP-992



• MP-9200



• MP-963

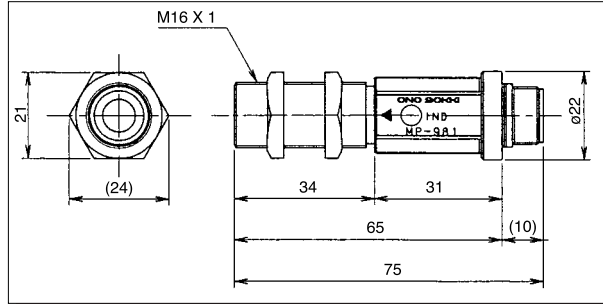


Magnetolectric Rotation Detector MP-981

For detection of low-to-medium speeds

These detectors utilize magnetic flux response (the resistance value changes according to the magnetic flux). The internal mechanism comprises magnetic resistance elements, permanent magnets, a direct current amplifier, and a voltage regulator. Detection can be performed as square wave output over a wide range from ultra-low speeds to high speeds (1 to 20,000 r/min [60 P/R]).

There are two models: the general-purpose MP-981 model and the waterproof AP-981 model.



● Features

- Detection from nearly 0 r/min
- Output from ultra-low to high speeds (1 to 20,000 r/min [in the case of a 60-tooth gear])
- Compact, lightweight, easy-to-mount

● Specifications

Detection method: Detection using magnetic resistance elements

Detection range: 1 Hz to 20 kHz

Detection gear: Ferromagnet (Tooth width: At least 3 mm, Module: 0.5 to 3)

Detection distance: See the figure at the right

Power requirement: 12 VDC ± 2 V

Power consumption: Approx. 40 mA (at 12 V)

Output waveform: Square wave Lo: Up to +0.5 V
Hi: +5 ± 0.5 V

Output impedance: Approx. 330 Ω

Protective circuit: Power source polarity, output short-circuit protection

Operating temperature range: -10 to +70°C

Withstand voltage: 250 VDC

Vibration resistance: (normal power supply):

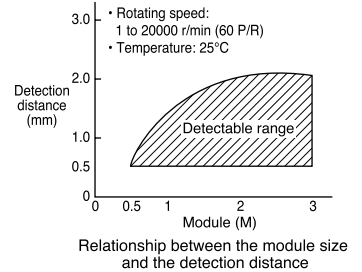
1.2 mm compound amplitude, 30Hz (for one hour in each of the X, Y, and Z directions)

Shock resistance (when not connected to a power supply):

490 m/s² (three times each in the X and Y directions)

Connection method: Connector (compatible plug, R04-PB6F) or MX-700, MX-800 Series signal cable

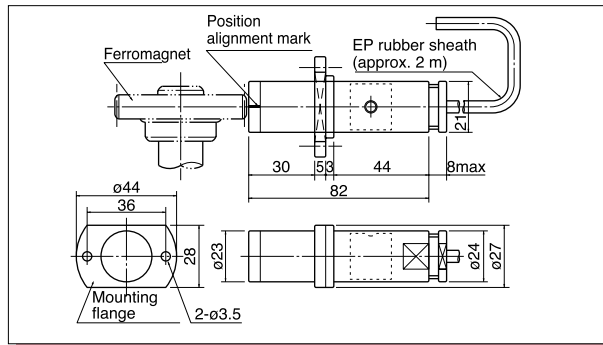
Weight: Approx. 80 g (including the two nuts used for fastening)



Magnetolectric 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 is nitric acid mist in the atmosphere, or in environments where the detector needs to be submerged.
- Performs detection by non-contact rotation
- Output from ultra-low to high speeds (1 to 20,000 r/min [in the case of a 60-tooth gear]) as square waves of the same amplitude
- Comes with a 2-m length acid-resistant cable attached

● Specifications

Detection method: Detection using magnetic resistance elements

Detection range: 1 Hz to 20 kHz

Detection gear: Ferromagnet (Tooth width: At least 3 mm, Module: 1 to 3)

Detection distance: See the figure at the right

Power requirement: 12 VDC ± 2 V

Power consumption: Approx. 40 mA

Output waveform: Square wave Lo: Up to +0.5 V

Hi: +5 ± 0.5 V

Output impedance: Approx. 330 Ω

Protective circuit: Power source polarity, output short-circuit protection

Operating temperature range:

-10 to +70°C (on the condition that it is within the atmosphere or IP-X7{JIS C0920})

Withstand voltage: 250 VDC

Vibration resistance (when connected to a power supply):

1.2 mm compound amplitude, 30Hz (for one hour in each of the X, Y, and Z directions)

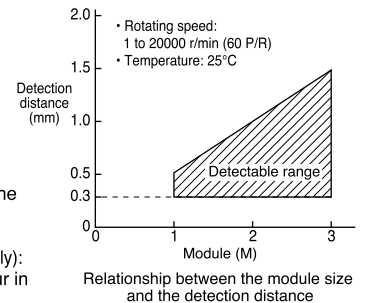
Shock resistance (when not connected to a power supply):

490 m/s² (three times each in the X and Y directions)

Outer surface material: Polycarbonate

Connection method: 2-m length directly attached cable (other end: open)

Weight: Approx. 130 g



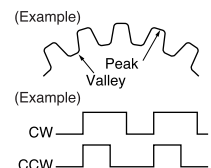
CAUTION

The MP-981 and AP-981 have been designed for the purpose of detecting rotational speed.

Please observe the following points when using these detectors.

(1) Output is performed from ultra-low to high speeds (1 to 20,000 r/min [in the case of a 60-tooth gear]) as rectangular waves with the same amplitude, but this does not necessarily mean that the High level will be at the peaks of the gear and the Low level at the valleys. Accordingly, when using several detectors to performed synchronized measurement, the starting positions may not be the same.

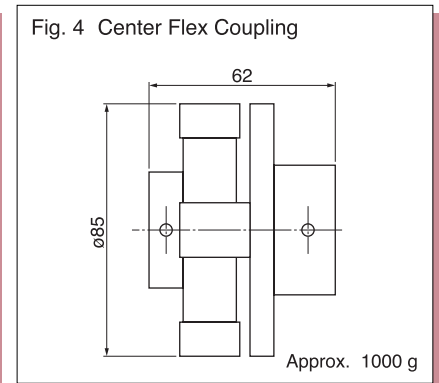
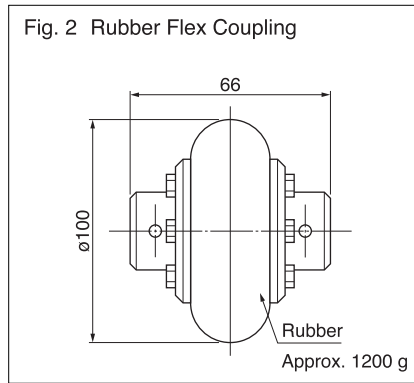
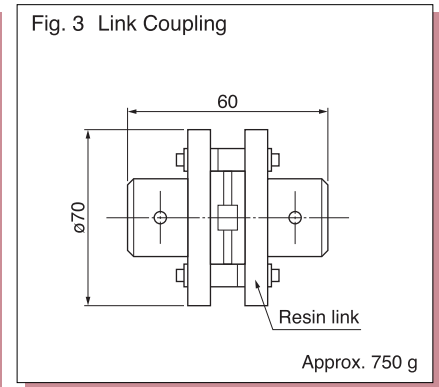
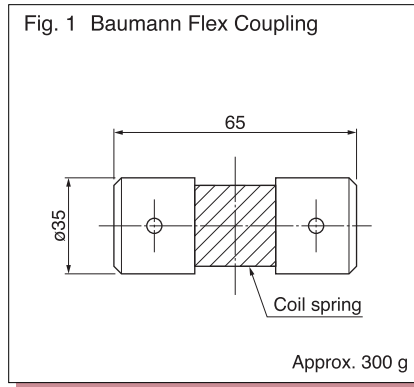
(2) The pulse width that is output when the gear is rotated in the clockwise direction may differ from the width that is output when the gear is rotated in the counter-clockwise direction.



Coupling Selection Guide

While a rigid coupling can ensure accurate rotation and angle measurements when an electromagnetic detector is connected to a device, mounting errors such as shaft misalignment and play in the thrust direction can result in deformation of the elasticity of the bearings and can cause loss of detector accuracy and even damage to the detector. To ensure stable operation when using a rigid coupling over a long period of time, the shaft misalignment should be kept within 6/1000 mm. If precise center alignment such as that stipulated above is a practical impossibility, a flexible coupling that can take up such center misalignment and play in the thrust direction must be used. A wide range of flexible couplings with high torsional rigidity as well as couplings that are suitable for general-purpose rotational measurements is available for an optimal selection to suit the application. Even with the use of a flexible coupling, however, there is always the possibility that the method used for mounting will subject the shaft to more than the allowable static or dynamic load. For this reason, centering of the shaft should be performed with extreme care.

● Example of couplings (Shape and weight)

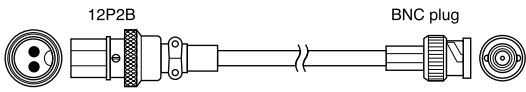
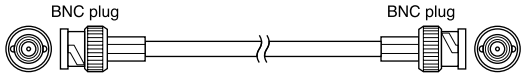
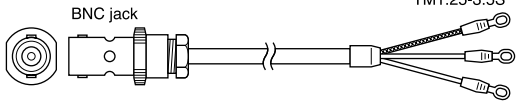
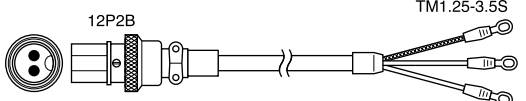
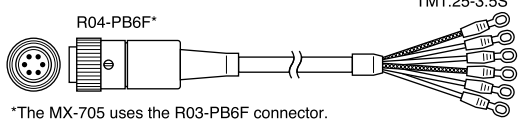
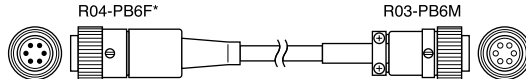
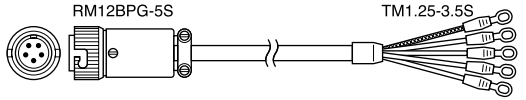
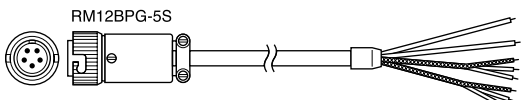
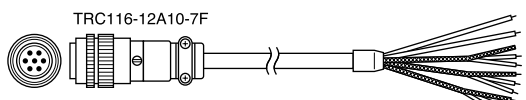


Coupling Name	Compatible Models	Features	Permissible eccentricity, angle of deviation [Note 1]	Mounting/removal methods	Remarks
Baumann Flex Coupling	MP-610	<ul style="list-style-type: none"> Utilizes a coil spring for elasticity Small outer diameter dimension 	Number of rotations: 2000 r/min Deviation: 0.9 mm Angle of deviation: 6°	Mount the coupling on the detector or on the device, and then insert them as one piece into the mating piece.	Since a coil spring is used, sudden forward/reverse rotations are not possible because of backlash, and play in the thrust direction is not absorbed. Drive shaft diameter ø10 to ø16 [See Note 2]
Rubber Flex Coupling	MP-810B	<ul style="list-style-type: none"> Utilizes rubber for elasticity; reduces shock Provides a vibration attenuation effect 	Number of rotations: 2000 r/min Deviation: 1.5 mm Angle of deviation: 6°	Mount the flange on the detector or device, and then after establishing the various centering dimensions required, attach the rubber ring. Mounting and removal can be performed without moving the device.	At high speeds, a thrust force caused by expansion of the rubber due to centrifugal force will damage the detector. Drive shaft diameter ø10 to ø22 [See Note 2]
Link Coupling		<ul style="list-style-type: none"> Utilizes a stainless steel spring for elasticity Available for higher revolution than rubber flex coupling as above. 	Number of rotations: 5000 r/min Deviation: 0.3 mm Angle of deviation: 1°	This is the same as the rubber flex coupling as above and similar models except that a stainless steel link is used instead of rubber ring.	Drive shaft diameter ø10 to ø20
Center Flex Coupling		<ul style="list-style-type: none"> Absorbs vibration and shock Does not take up space in the shaft direction 	Number of rotations: 5000 r/min Deviation: 0.5 mm Angle of deviation: 1°	Mount the flange and the flange hub on the detector or device, perform centering, and then attach the rubber body.	Drive shaft diameter ø10 to ø25

Note 1 The permissible eccentricity and angle of deviation are within the range that enables guaranteed performance of the coupling. Even though these values are within the permissible range, avoid mounting the coupling in a location where the load on the detector shaft will exceed the stipulated limits.

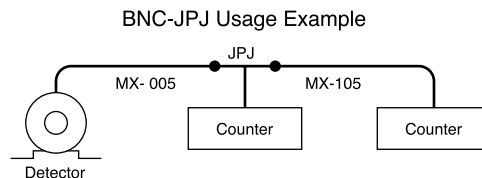
Note 2 Hole machining is the responsibility of the user.

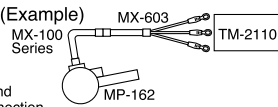
Table of Signal Cable

Item	Compatible Detectors	Cable	Model Name/Specifications
1	MP-610•610B•9100•9120•9200•940A•963 MP-810B•820B•830B (MP-081+MX-005 Series)	3C-2V (high-frequency coaxial cable)	MX-005 5 m 010 10 m 015 15 m 020 20 m 
2	MP-930•935•936•950•962 FG-1200	3C-2V (high-frequency coaxial cable)	MX-101 1.5 m 105 5 m 110 10 m 115 15 m 120 20 m 
3	MX-000 Series cable 100 Series cable	P-2 (2-core outer shielded cable)	MX-603 0.3 m 
4	MP-610•610B•9100•9120•9200•940A•963 MP-810B•820B•830B (MP-081+MX-500 Series)	P-2 (2-core outer shielded cable)	MX-505 5 m 510 10 m 520 20 m 
5	MP-981 LG-916	D-5 (Composite 5-core vinyl sheath cable)	MX-705 5 m 710 10 m 715 15 m 720 20 m MX-705: One end is open. MX-710 and longer: One end is fitted with crimp terminals.  *The MX-705 uses the R03-PB6F connector.
6	MP-981 LG-916	D-5 (Composite 5-core vinyl sheath cable)	MX-805A 5 m 810 10 m 815 15 m 820 20 m  *The MX-805A uses the R03-PB6F connector.
7	RP-721	R-6 (twisted-pair cable)	RP-004 5 m *10 m 
8	RP-721•732	R-6 (twisted-pair cable)	RP-006 5 m *10 m 
9	RP-432Z	R-8 (twisted-pair cable)	RP-008 5 m *10 m 

* Manufactured after receipt of order

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



	Compatible units	Non-compatible Products	Remarks
	CT-6520 TA-103 FV-1100•1300•5300	Counters 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).	
	CT-6520 TA-103 FV-1100•1300•5300	Counters 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).	The following models have a directly attached cable MP- 930 0.5m 935 1m 936 1m 950 0.5m 962 0.5m
	TM-5100 TM-2100 Series PA-150 * A terminal block socket is used for the TM-5100's input and output sections. To enable connection, the crimp terminals must be removed and the cable end left open.		Use only for connecting the compatible detectors at item No. 1 & 2 on page 26 and when the input connector is the terminal block's display unit. White – SIG Green – COM Shield – Case Ground
	TM-5100 TM-2100 Series TA-103, FV-1300, PA-150 * A terminal block socket is used for the TM-5100's input and output sections. To enable connection, the crimp terminals must be removed and the cable end left open.	Counters without an input terminal block	Connection to the counter White – SIG Green – COM Shield – Case Ground
	TM-5100, TA-103 TM-2100 Series, FV-1300, PS-012, PA-150 * A terminal block socket is used for the TM-5100's input and output sections. To enable connection, the crimp terminals must be removed and the cable end left open.	Connection is possible to another counter via the PS-012 power supply	Connection to the counter Blue – SIG White – Open Red – +12 V Shield – Case ground Green – COM Black – 0V
	CT-6520 FV-5300	Counters other than those listed in the column at the left	
	TM-2100 Series PA-150	Counters without an input terminal block	Blue – SIG Red – +12 V Gray/Brown – COM Shield – Case ground Black – 0V
	RV-3150 TM-5100		Blue – SIG1 White – SIG2 Red – +12 V Shield – Case ground Green/Gray, Green/Brown – COM Black – 0V
	TM-2100 Series RV-3150		Blue – SIG1 White – SIG2 Orange-SIGZ Green/Gray, Green/Brown – COM Red – +12 V Black – 0V Shield – Case ground

PS-012 Power Supply Unit
(DC12V power supply)



Input: 100 VAC
(110/120/220/240V on request)
Output DC: 12V/0.2A