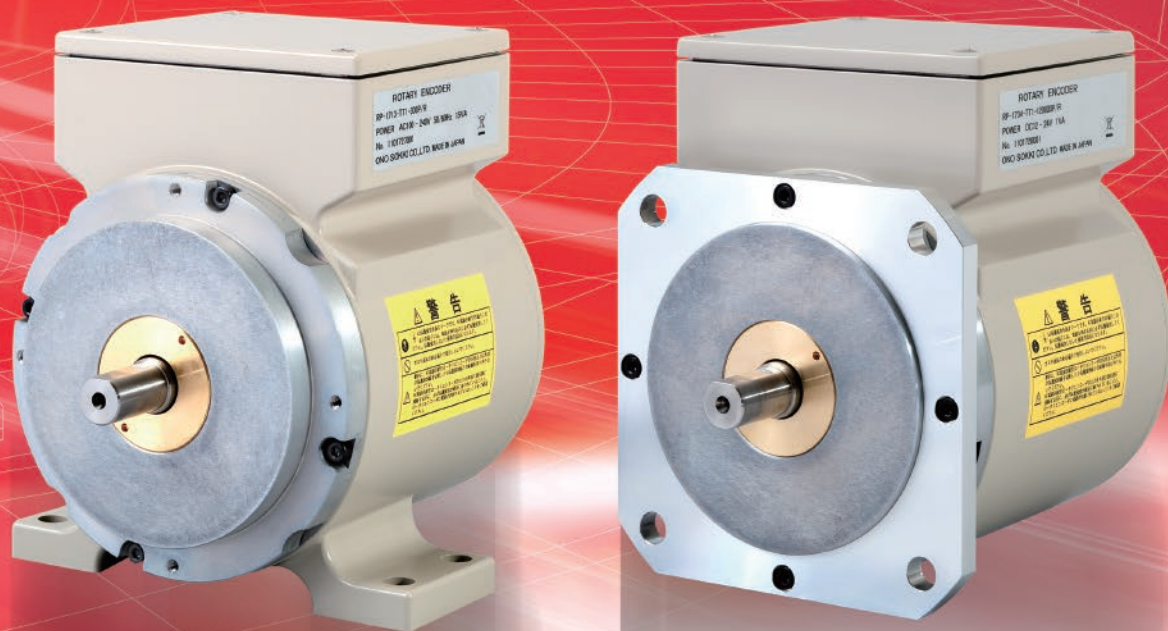


Rotary Encoder Roller Encoder

RP/SP series



ONOSOKKI

Model code

The model code of the RP series rotary encoder consists of abbreviations of functions and structures. However, there are exceptions, such as simplifying abbreviations for some models.

[RP-1700 series]

RP-17□□-□□□-Output pulse number P/R

Installation method and shaft shape		Power and output phase		Signal output	Connection method and electricity business act		Oil sealing			
No.	Installation method	Shaft shape	No.	Power	Output phase	No.	Connection method	Electricity business act	No.	Oil seal
1	Bottom-mount	D cut	1	AC	A, B phase	T	Terminal strip	PSE	0	N/A
2		Key groove	2	DC		O	Connector	PSE	1	Applicable
3	Flange-mount	D cut	3	AC	A, B, Z phase	C	Terminal strip	Conformed to TUV		
4		Key groove	4	DC		L	Line driver	Conformed to TUV	3	Terminal strip
						4	Connector	Conformed to UL		

*Notes: Only AC power conforms to TUV/UL.

[RP-432Z series]

RP-432Z - Output pulse number P/R

[SP-405ZA series]

SP-405ZA - Output pulse number P/R

*Note: Collector output : standard
Open collector output : option (Please specify when ordering.)

Ingress Protection code (IP)

The RP series conforms to JIS C 0920 (compliant with IEC 529), protection class for electro-mechanical equipment waterproofing and dustproofing. Grade is classified as follows, and the test method is stipulated.

[Example] IP65 ... Dustproof, jet-proof water form
 ↑↑ The second characteristic number: protection from water intrusion
 ↑ The first characteristic number: protection from external solid material

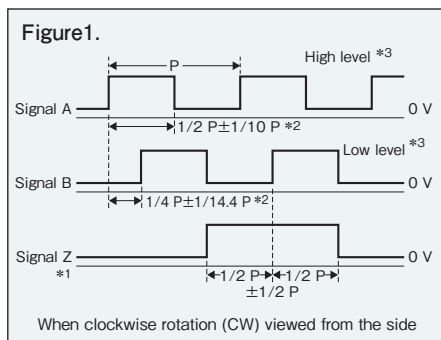
Protection against external solid material		
The 1st number	Structure	Test conditions
0	Not protected	—
1	Protection for hand etc.	Solid material of $\phi 50$ mm or more does not intrude.
2	Protection for finger etc.	Solid material of $\phi 12.5$ mm or more does not intrude.
3	Protection for tools etc.	Solid material of $\phi 2.5$ mm or more does not intrude.
4	Protection for wire etc.	Solid material of $\phi 1$ mm or more does not intrude.
5	Dust proof type	Dust among which prevents operation does not intrude.
6	Dust resistance type	Dust does not intrude.
X	Not stipulated.	—

Protection against water intrusion		
The 2nd number	Structure	Test conditions
0	Not protected	—
1	Protection against water dripping vertically	Dripping water droplets of 1 mm/min from a height of 200 mm for 10 minutes
2	Protection against water dripping vertically $\pm 15^\circ$	Dripping water droplets of 3 mm/min from a height of 200 mm, at $\pm 15^\circ$ tilted for 10 minutes
3	Protection against sprinkling water	Spray water of 10 ℓ /min. from a distance of 300 mm at $\pm 60^\circ$ C. for 5 minutes
4	Protection against water splashes in all directions	Spray water of 10 ℓ /min. from a distance of 300 mm at $\pm 180^\circ$ C. for 5 minutes
5	Protection against jet flow water	Jet flow of 12.5 ℓ /min. from a distance of 2.5 m in all directions for 3 minutes
6	Protection against excessive jet flow water	Jet flow of 100 ℓ /min. from a distance of 2.5 m in all directions for 3 minutes
7	Protection against flooded condition	30 minutes at a depth of 1 m
8	Protection against diving condition	Consultation between the user and the manufacturer
X	Not stipulated.	—

Signal output

① Output waveform

Ono Sokki rotary encoder incorporates an amplifier circuit, DUTY (High-Low-level time ratio) is 1: 1, the pulse height (voltage) is shaped to a constant square wave signal regardless of the change in the rotation speed. The output signal converted into a high voltage and low impedance is hardly affected by external noise, and it enables on-site installation and long distance transmission.



*1: only with zero-mark
 *2: only RP-1700 series. For other products, please refer to each individual page.
 *3: For detail specifications, please refer to each individual page.

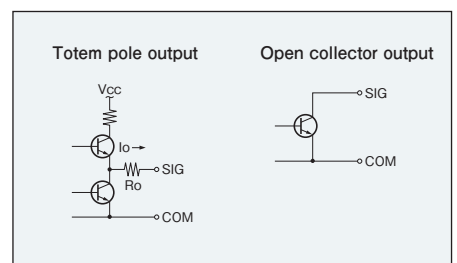
② Output signal phase number

● Two-phase output type
 Outputs two-phase signals that have 90° phase of <signal A> and <signal B> in Fig.1. Since it is possible to distinguish the rotation direction, it can be used for detection of precise angle, moving amount, and control of automatic positioning, etc. by combining with reversible counter with direction detecting circuit.

● Single-phase output type
 Only the signal of <signal A> in Fig.1 is output. Since it does not distinguish the direction of rotation, it outputs the same single phase signal regardless of whether it rotates to the right or the left.
 So it can be used for rotation detection, and also length or feeding amount measurement by moving in a fixed direction with measuring roll.





By using only <signal-A> or <signal B>, you can use it as single phase output type.
 ● Output type with zero-mark
 In accordance with the output of the <signal A> or <signal B> in Fig. 1, outputs a <signal Z> which is one pulse per revolution. The position of <signal Z> for <signal A> <signal B> is not specified. (The timing is not specified.)

③ Example of output circuit



* In the output resistance R_o , 22Ω is a thermistor with PTH positive temperature coefficient. It is an element for over current protection of the output circuit and shows approx. 22Ω resistance value at 25°C . (If the output is mistakenly short-circuited, the resistance value will increase and it will decrease. Normal output can not be obtained. The normal output will be restored by appropriate load connection.)

Rotary Encoder Specifications

		General-purpose industrial type		Low torque miniature type	
		Bottom-mount type	Flange-mount type	Ultra miniature type	General-purpose miniature type
					
Model name		RP-1710/20 series	RP-1730/40 series	SP-405ZA series	RP-432Z series
The number of output pulses		60, 100, 120, 180, 200, 240, 250, 256, 300, 360, 400, 480, 500, 512, 600, 720, 750, 800, 900, 960, 1000, 1024, 1200, 1250, 1280, 1440, 1500, 1600, 1800, 2000, 2048, 2400, 2500, 2560, 2880, 3000, 3600, 3750, 4000, 4096, 4500, 4800, 5000, 5120, 6000, 7500, 9000, 12000, 15000, 18000, 22500, 24000, 30000, 36000, 45000, 48000, 60000, 72000, 90000, 96000, 120000 P/R		60, 100, 200, 300, 360, 500, 600 P/R (option 40, 50, 250, 400, 800, 900 P/R)	120, 360, 600, 1000, 1024 P/R
Mechanical specifications	Max. rotation speed	5000 r/min		6000 r/min	5000 r/min
	Max. allowable shaft load	Radial	80 N	25 N	20 N
		Thrust	50 N	15 N	10 N
	Shaft diameter	φ15 mm		φ4 mm	φ6 mm
	Starting torque	15 mN·m*1		2 mN·m	1.5 mN·m
	Moment of inertia	161 g·cm ²		6 g·cm ²	24 g·cm ²
Weight	Approx. 3.7 kg		Approx. 0.1 kg	Approx. 0.25 kg	
General specification	Operation temperature range	-5 to 55 °C		-10 to 70 °C	0 to 50 °C
	Humidity	95 %*2		90 %	85 %
	Protection class	IP65*3		IP40	—
	Vibration resistance	98 m/s ² *4		98 m/s ² *14	49 m/s ² *14
	Shock resistance	980 m/s ² *5		980 m/s ²	490 m/s ²
Electrical specification	Output waveform	2-phase square waveform*6		2-phase square waveform + zero-mark	2-phase square waveform + zero-mark
	Output voltage	Hi: 10 V or more, Lo: 0.5 V or less*7		Hi: supply voltage -20 % or more, Lo: 0.5 V or less	Hi: 4 V or more, Lo: 0.2 V or less*17
	Duty	50 %±10 %		50 %±25 %	50 %±12.5 %
	Phase difference	90 °±25 °		90 °±45 °	90 °±45 °
	Response frequency	100 kHz / 500 kHz (line driver output only)		100 kHz	50 kHz
	Signal accuracy (adjacent error)	See P.4		±1/15 Pitch	±1/20 Pitch
	Output type	Totem pole*8		Collector*15	Totem pole*18
	Connection method	Terminal strip or connector		Directly attached cable*16	Connector*19
	Power requirement	AC 100 V (50 mA) to 240 V (63mA)/ DC 12 V (83 mA) to 24 V (42 mA)		DC 5 to 12 V (50 mA)	DC 5 V or DC 12 V (100 mA)
	Applicable model	TM-3100 series, TM-5100, RV-3150, FV-1500, FV-1100			

- *1 When the rotating shaft with an oil seal.
- *2 When at 40 °C/8 h, the rotating shaft with an oil seal, with no condensation.
- *3 Applicable by affixing an oil seal to the rotating shaft and selecting terminal strip for connection method.
- *4 Axial direction for 4 h, up/down left/right for 2 h each
- *5 Three times each in X, Y and Z directions, 98 m/s² in the axial direction
- *6 Zero-mark is available as an option
- *7 Totem pole output, open collector output, collector output. Line driver output has 90-degree phase differential square waveform. RS422A compliant line driver output (equivalent to 26C31).
- *8 Totem pole output : standard (470 Ω or more of load resistance)
Open collector output : option (DC40 V, 50 mA or less)
Collector output : option (load resistance 10 kΩ or more)
Line driver output : option
- *9 When the rotating shaft with an oil seal.
- *10 Applicable by affixing an oil seal to the rotating shaft.
- *11 Axial direction for 4 h, up/down left/right for 2 h each.

- *12 Totem pole output : standard (470 Ω or more of load resistance)
Open collector output : option (DC40 V, 50 mA or less)
- *13 Crimped terminal: RBC 1.25-4 (JIS C 2805)
- *14 Three directions for 2 h each
- *15 Totem pole output : standard (470 Ω or more of load resistance)
Open collector output : option (DC30 V, 35 mA or less)
- *16 5-core shielded wire 500 mm (terminal: open).
- *17 Value at DC5 V. At DC 12 V, Hi: 10 V or more, Lo: 0.3 V or less.
- *18 1 kΩ or more of load resistance
- *19 7-core connector (cable side: TRC116-12A10-7F).

Notes: It varies according to the number of output signal phases, power supply type, number of output pulses, etc.

Bottom-mount type/
flange-mount type

RP-1700 series

Model name

RP-1711·RP-1712·RP-1713·RP-1714·RP-1721·RP-1722·
RP-1723·RP-1724·RP-1731·RP-1732·RP-1733·RP-1734·
RP-1741·RP-1742·RP-1743·RP-1744

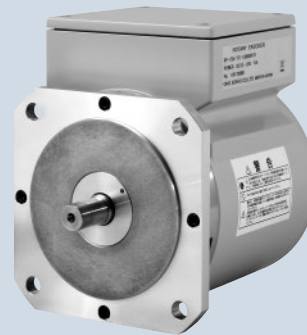
Standard output
pulse number (P/R)

60 100 120 180 200 240 250 256 300 360 400 480 500 512 600 720 750 800 900 960 1000 1024 1200 1250 1280
1440 1500 1600 1800 2000 2048 2400 2500 2560 2880 3000 3600 3750 4000 4096 4500 4800 5000 5120 6000 7500
9000 12000 15000 18000 22500 24000 30000 36000 45000 48000 60000 72000 90000 96000 120000

General-purpose industrial type with high reliability and wide range of application



RP-1710/20 series



RP-1730/40 series

[Features]

- Excellent resistance to shock and shaft loading
- High resolution, wide range of output pulse types (Selectable from 61 types, max. 120000 P/R)
- Line driver output can be selected to enable long distance transmission
- Compatible to worldwide AC and DC power supply
- Selectable connection from either terminal strip or connector
- Complied with IP65 by affixing an oil seal to the rotating shaft and selecting terminal strip as an option

[Electrical specification]

Output waveform : 2-phase square waveform
*Zero-mark is available as an option. (arbitrary timing)

Output voltage : Hi: 10 V or more, Lo: 0.5 V or less

Output method : Totem pole (standard) ; load resistance 470 Ω or more
Collector output (option) ; load resistance 10 kΩ or more
Open collector output (option); within 40 VDC, 50 mA
Line driver output (option)

Adjacent Error	Number of Pulses (P/R)
Within 1/200 P	60, 100, 180, 250, 256, 300, 750, 4500, 6000
Within 1/8.3 P	120, 200, 240, 360, 400, 500, 512, 600, 720, 900, 1000, 1024, 1200, 1250, 1280, 1500, 3000, 3750, 9000, 12000, 18000, 22500, 24000, 30000
Within 1/4.6 P	480, 800, 1440, 1800, 2000, 2048, 2400, 2500, 2560, 7500, 36000, 45000, 48000, 60000
Within 1/3.3 P	960, 1600, 2880, 4000, 4096, 4800, 72000, 96000
Within 1/2.5 P	3600, 5000, 5120, 15000, 90000, 120000

* When measuring the rotation fluctuation from the pulse interval, please use a pulse with adjacent error 1/200P.

Power requirement : AC 100 to 240 V or DC 12 to 24 V
Response frequency : 100 kHz/500 kHz (line driver output only)
Connection method : terminal strip or connector

[Mechanical specification]

Max. rotation speed : 5000 r/min
Max. allowable shaft load : radial: 80 N, thrust: 50 N
Starting torque : 15 mN·m * However, the oil seal non-rotating shaft is specified separately.
Moment of inertia : 161 g·cm²
Weight : approx. 3.7 kg

[General specification]

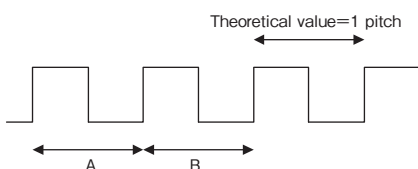
Operating temperature range : -5 to 55 °C
Storage temperature range : -20 to 70 °C
Humidity : 95 % (When at 40 °C / 8 h, the rotating shaft with an oil seal), with no condensation.
Protection class : IP 65 dust-proof and jet-proof type (applicable by affixing oil seal to the rotating shaft as an option, and selecting the terminal strip for the connection output method.)
Vibration resistance : 98 m/s² each direction of X/Y (120 min. each), Z direction (for 240 min) 10 to 150 Hz sweep
Shock resistance : 980 m/s² each direction of X/Y for both ±directions (4 directions each three times, total 12 times), shock activation time: 6 ms
: 98 m/s² Z for both ±directions (2 directions each 3 times, total 6 times) shock activation time: 11 ms

■ Error

[Adjacent error]

Adjacent error is the absolute value of the pitch difference between two adjacent pulses.

$$\text{Adjacent error} = |A - B|$$



■ Safety precautions

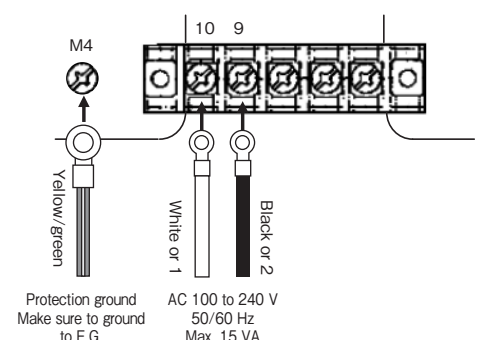
[Connector type]

COM and F.G. are common in the RP-1700 series. Make sure to ground the power connector F. G. as it may cause malfunction or breakdown.

[Terminal strip type]

Be sure to use M4 with a coating on the crimp part of the crimp terminal for connection to the protection earth terminal. COM and F.G. are common in the RP-1700 series. Make sure to ground the F. G. or it may cause malfunction or breakdown.

[AC power supply grounding]



RP-1700 series connection method

[Connector type]

●AC type AC100 to 240 V

Since only the cable side connector is provided, please perform cable wiring. (Refer to cable list on P.12 for AC power supply and signal cables for signal output.)

[For power supply]

Type	AC Power Supply Input Type
Signal	NJC-2010-RM (compatible connector: NJC-2010-PF)
Power supply	NJC-203-RM (compatible connector: NJC-203-PF)

Pin No.	Contents
1	AC
2	AC
3	F.G

[For Signal Output]

Pin No.	Contents		Pin No.	Contents	
	Totem pole, Collector, Open collector	Line driver		Totem pole, Collector, Open collector	Line driver
1	A	A	6	COM	COM
2	B	B	7	COM	(Z)
3	(Z)	(Z)	8	N.C	N.C
4	COM	A	9	N.C	N.C
5	COM	B	10	COM	COM

() is mounted on RP-1713, 23, 33, and 43.

●DC power supply DC12 to 24 V

It is used for DC power supply and signal output, and only the cable side connector is provided. Please perform cable wiring. (Refer to the cable list on P.12 for DC power supply and signal cable for signal output.)

Type	DC Power Supply Input Type
Signal	NJC-2010-RM (compatible connector: NJC-2010-PF)
Power supply	

DC Power Supply Type Common for Power Supply/Signal

Pin No.	Contents		Pin No.	Contents	
	Totem pole, Collector, Open collector	Line driver		Totem pole, Collector, Open collector	Line driver
1	A	A	6	COM	COM
2	B	B	7	COM	(Z)
3	(Z)	(Z)	8	DC+	DC+
4	COM	A	9	DC-	DC-
5	COM	B	10	COM	COM

() is mounted on RP-1714, 24, 34, and 44.

[Terminal strip type]

●AC type AC100 to 240 V

[AC Power Supply Type]

Pin No.	Contents		Pin No.	Contents	
	Totem pole, Collector, Open collector	Line driver		Totem pole, Collector, Open collector	Line driver
1	A	A	6	(Z)	(Z)
2	COM	A	7	COM	(Z)
3	B	B	8	COM	COM
4	COM	B	9	AC	AC
5	COM	COM	10	AC	AC

() is mounted on RP-1713, 23, 33, and 43.

●DC power supply DC12 to 24 V

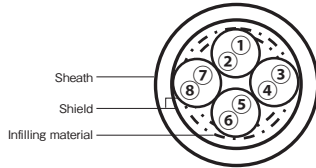
[DC Power Supply Type Common for Power Supply/Signal]

Pin No.	Contents		Pin No.	Contents	
	Totem pole, Collector, Open collector	Line driver		Totem pole, Collector, Open collector	Line driver
1	A	A	6	(Z)	(Z)
2	COM	A	7	COM	(Z)
3	B	B	8	COM	COM
4	COM	B	9	DC+	DC+
5	COM	COM	10	DC-	DC-

() is mounted on RP-1714, 24, 34, and 44.

[Cables for RP-1700 Series]

Cable diameter: approx. $\phi 10.2$



No.	Color	Contents	
		AC Type	DC Type
1	Blue	Sig A(A)*1	Sig A(A)*1
2	Green	Sig COM(A)*1	Sig COM(A)*1
3	White	Sig B(B)*1	Sig B(B)*1
4	Gray	Sig COM(B)*1	Sig COM(B)*1
5	Orange	Sig Z(Z)*1,*2	Sig Z(Z)*1,*2
6	Yellow	Sig COM(Z)*1,*2	Sig COM(Z)*1,*2
7	Red	Sig COM	Power supply+
8	Brown	Sig COM	Power supply-

*1 Within (): when a line driver output is selected.
*2 Sig Z : used when option is added.

●Replacement from RP-110, 130 series to RP-1700 series

- Cables used for the connector type RP-110 and RP-130 series can also be used for the RP-1700 series by using an optional conversion cable. However, please note that it does not comply with EMC requirements. In addition, AC type requires AC power supply separately.
- The output resistance values differ between the Y specification (collector output type/output resistance 330 Ω) of the RP-100 series and the C specification (collector output type /output resistance 470 Ω) of the RP-1700 series. Therefore, when replacing with RP-1700 series, please use it by making the external load resistance (load resistance of existing equipment side) 10 k Ω or more.

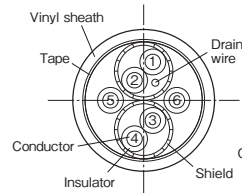
- Cables used for the RP-110 and RP-130 series of terminal strip type can also be used with the RP-1700 series. However, please note that it does not comply with EMC requirements. Also, be sure to connect the F.G. securely. Since RP-1700 series cable grand conforming diameter is 8 mm or more, it can not be diverted when using R6 cable.

Old model name	Compatible cable	Replacement recommended cable
RP-112A-T	R6	RP-0144,0145,0151,0152,0153
RP-132A-T	R6	RP-0144,0145,0151,0152,0153
RP-112D-T	R6	RP-0146,7
RP-132D-T	R6	RP-0146,7
RP-112AZ-T	R8	RP-0144,5 (R8)/RP-0151,2,3
RP-132AZ-T	R8	RP-0144,5 (R8)/RP-0151,2,3
RP-112DZ-T	R8	RP-0146,7(R8)
RP-132DZ-T	R8	RP-0146,7(R8)

* Please refer to P.12 for more details of the cables.

■R6 cable

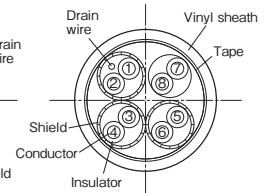
Cable diameter: approx. $\phi 6.8$



No.	1	2	3	4	5	6
Color	Blue	Green/gray	White	Green/brown	Red	Black

■R8 cable

Cable diameter: approx. $\phi 8.2$

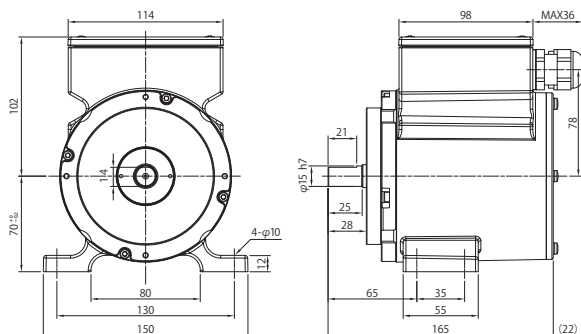


No.	1	2	3	4	5	6	7	8
Color	Blue	Green/gray	White	Green/brown	Orange	Green	Red	Black

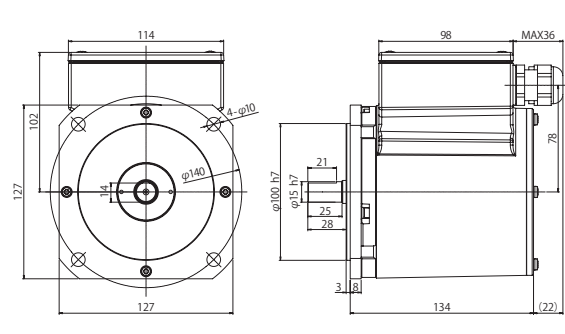
* In the table, green/gray indicates that the circumference of the green PVC is marked with gray.

[Outer dimensions] (unit: mm)

■RP-1710 series (terminal strip type/ D cut shaft)



■RP-1730 series (terminal strip type/ D cut shaft)



Ultra-compact type

SP-405ZA series

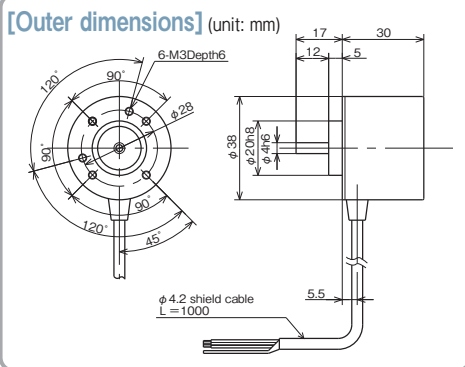
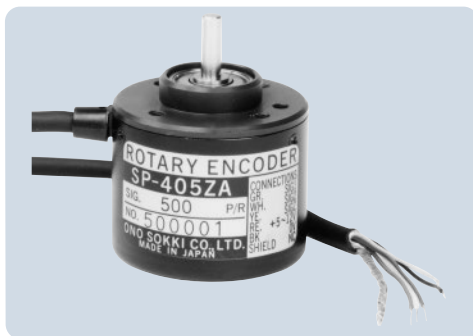
Standard output pulses (P/R)

60 100 200 300
360 500 600

Optional output pulses (P/R)

40 50 250 400 800 900

Ultra-compact shaft type appropriate to the built-in assembly



[Features]

- Economical type to meet the needs of OEM
- Outer diameter $\phi 38$, the mass approx. 100 g ultra-compact and lightweight
- 2-phase square wave + zero-mark signal output
- Selectable the number of pulses from 13 kinds

[Electrical specification]

(*: an optional specification)

Output Waveform	: 2-phase square wave + zero-mark (timing optional)
Output Voltage	: Hi: supply voltage - 20 % or more, Lo: 0.5 V or less
Output type	: collector load resistance 10 k Ω or more *open collector: within DC30 V, 35 mA
Adjacent error	: $\pm 1/15$ P
Power supply	: DC5 to 12 V ± 10 %, 50 mA * Only open collector by an option, 24 VDC is possible.
Response frequency	: 100 kHz
Connection method	: direct cable 1 m (terminal: open)

[Mechanical specification]

The maximum rotation speed	: 6000 r / min
Allowable shaft load	: radial: 25 N thrust: 15 N
Starting torque	: 2 mN · m
Moment of inertia	: 6 g · cm ²
Weight	: approx. 0.1 Kg

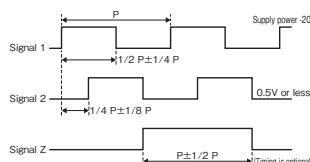
[General specification]

Operating temperature range	: -10 to 70 °C
Storage temperature range	: -20 to 80 °C
Humidity	: 90 %, with no condensation
Protection degree	: IP40
Vibration resistance	: 98 m/s ² (3 directions each 2 h)
Shock resistance	: 980 m/s ² (3 directions 3 times each, for axis : 98 m/s ²)

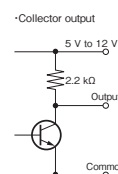
[Signal connection]

Green	White	Yellow	Shield	Red	Black
Signal 1	Signal 2	Signal Z	Case	5 to 12 V	0 V

[Output waveform]



[Output circuit]



When turning clockwise (C/W), viewed from the axial direction (Inverted output diagram is omitted.)

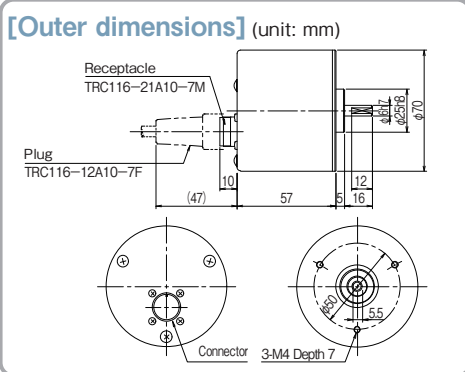
General-purpose compact type

RP-432Z series

Standard output pulses (P/R)

120 360 600 1000 1024

General-purpose type that can be used for a wide range of applications



[Features]

- General-purpose type that can be used for a wide range of applications
- A low price by miniaturization and standardization.
- Suitable for OEM
- Both DC5 V/DC12 V available for power supply
- Easy-to-use connector system for signal output connection
- Outputs 2-phase square wave + zero-mark signal.

[Electrical specification]

Output waveform	: 2-phase square wave + zero-mark (timing is optional)
Output voltage	: when using 5 V power supply ... Hi: 4 V or more, Lo: 0.2 V or less when using 12 V power supply ... Hi: 10 V or more, Lo: 0.3 V or less
Output method	: totem pole, load resistance: 1 k Ω or more
Adjacent error	: $\pm 1/20$ P
Power supply	: DC5 V ± 5 %, 100 mA or DC12 V ± 5 %, 100 mA
Response frequency	: 50 kHz
Connection method	: 7-core connector (cable side: TRC116-12A 10-7F)

[Mechanical specification]

Max. rotation speed	: 5000 r/min
Max. allowable shaft load	: radial: 20 N, thrust: 10 N
Starting torque	: 1.5 mN · m
Moment of inertia	: 24 g · cm ²
Weight	: approx. 0.25 kg

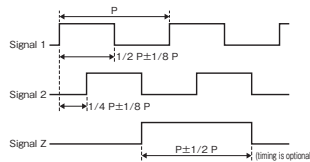
[General specification]

Operating temperature range	: 0 to 50 °C
Storage temperature range	: -20 to 80 °C
Humidity	: 85 % (40 °C, 8 h), with no condensation
Vibration resistance	: 49 m/s ² (3 directions 2 h each)
Shock resistance	: 490 m/s ² (3 directions 3 times each, for axis : 98 m/s ²)

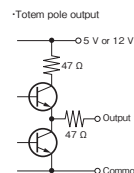
[Signal connection]

A	B	C	D	E	F	G
Signal 1	Signal 2	Signal Z	Common	5 V or 12 V	Common	Case

[Output waveform]



[Output circuit]

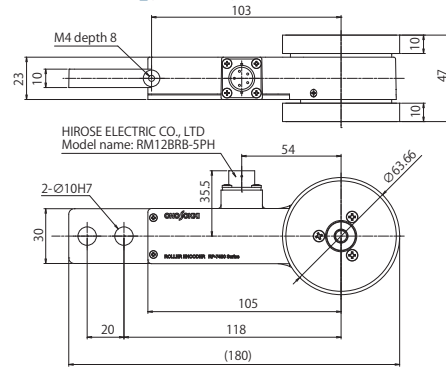


When rotating in right direction (CW) viewed from the axial direction

Easy measurement of line speed and length of traveling body



[Outer dimensions](unit: mm)



- [Features]**
- The number of pulses selectable from 120, 200, 1200 P/R.
 - 4 output methods (Standard: totem pole/ Option: collector, emitter, and open collector)

[Electrical specification]

Number of output pulses	: For speed: 120, 1200 For length: 200
Output waveform	: 2-phase square wave
Duty ratio	: 50 ± 25 %
Phase difference	: 90 ± 45 °C
Output voltage (at DC12 V supply)	Hi: 10 V or more Lo: 0.5 V or less
Output method	: totem pole output (load resistance 470 Ω or more) * option RP-0701 : emitter output RP-0702 : collector output RP-0703 : open collector output
Power supply	: DC 12 V ± 5 %, 100 mA or less

[General specification]

Operating temperature range	: 0 to 50 °C (without freezing or condensation)
Storage temperature range	: -10 to 65 °C (without freezing or condensation)
Humidity	: 35 to 93 % RH or less (without freezing or condensation)
Protection class	: IP40 (when using a cable RP-0181/0182)
Weight	: approx. 400 g
Accessory	: instruction manual:1 connector 1 (RM12BPE-5S, made by Hirose electric Co.,LTD.)
Cable (option)	: RP-0181: connection cable for RP-7400 series (5 m), one side end : crimp terminal (M3), RP-0182: connection cable for RP-7400 series (5 m), one side end: open

[Mechanical specification]

Speed range	: 0 to 600 m/min *Speed range will vary depending on the conditions of the object to be measured.
Measurement unit	: 120 P/R : 0.1 m/min 1200 P/R : 0.01 m/min 200 P/R : 1 mm
Roller material	: metal core; aluminum rubber ; polyurethane rubber baked on the roller surface (degree of hardness: A90)
Roller outer circumference	: 200 mm
Max. allowable shaft load	: radial 20 N
Starting torque	: 1 mN·m
Moment of inertia	: 0.6 kg·cm ²
Vibration resistance	: 19.6 m/s ² X/Y/Z directions (150 min. each), 10 to 150 Hz sweep, 20 cycles
Shock resistance	: 196 m/s ² X/Y/Z directions in each ± direction (6 directions) for 3 times each (total 18 times), half-sine, operation time: 11 ms
Mounting hole (position)	: φ10 mm × 2 intervals 20 mm
Options	: RP-0701/0702/0703, RP-0181 (5 m), RP-0182 (5 m) * Cable extension of RP-0181/RP-0182: made to order (up to 10 m) * For details of the cable, refer to P.12.

* Cumulative error will occur in the measured value due to installation situation of the roller encoder, roller slip, roller wear and so on. Compensation function of the RV-3150 reversible counter can correct such circumferential errors.

Applications

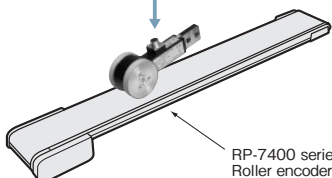
● Measurement of line speed

Measures the line speed of belt conveyor etc. in units of m/min.



TM-3100 series

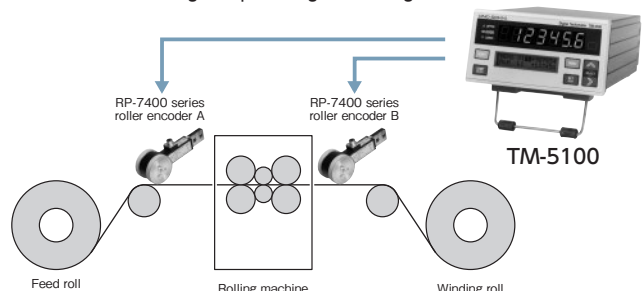
* Refer to the TM-3100 series brochures for more details.



RP-7400 series Roller encoder

● Measurement of the difference/ratio in rotation speed

Measures the elongation percentage and rolling reduction of the steel sheet.





- Wide measurement range from low to high speed (0.2 Hz to 320 kHz)
- High-speed conversion per signal period
- Rapid deceleration follow-up function
- Automatic center frequency follow-up function (option) can close up transient fluctuation component.

[Electrical specification]

Response : within one cycle time of input frequency + 3.5 μ s

Input voltage : AC input signal voltage range: 0.3 to 30 V p-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
In full scale mode output:
Arbitrarily set in 1 Hz unit at 1 to 320,000 Hz.
Arbitrarily set in units of 1 r/min at 1 to 320,000 r/min.
Arbitrarily set at 1 m/min at 1 to 320,000 m/min.
In deviation output mode;
Any measurement frequency up to 320 Hz
 $\pm 1\%$, $\pm 5\%$, $\pm 10\%$, $\pm 20\%$, $\pm 50\%$, $\pm 100\%$ or
 ± 1 to 180,000 (set in units of 1 Hz, 1 r/min, 1 m/min)

Input terminal : C02 type (BNC) and terminal strip selectable

Input format : single-phase, AC/DC/non-voltage (+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 connector signal : voltage output: 0 to 10 V (F.S. mode, direction recognition function OFF)
 ± 5 V (F.S. mode, direction recognition function ON, deviation output mode, automatic center frequency follow-up mode)
load resistance: 100 k Ω 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: $\pm 0.1\%$ (to 180 kHz),
 $\pm 0.2\%$ (to 320 kHz),
AC: $\pm 0.2\%$ (to 180 kHz),
 $\pm 0.4\%$ (to 320 kHz)
current output: DC: $\pm 0.7\%$ (to 180 kHz),
 $\pm 1.4\%$ (to 320 kHz),
AC: $\pm 1.4\%$ (to 180 kHz),
 $\pm 2.8\%$ (to 320 kHz)

Analog output low pass filter : selectable from OFF/3 Hz/10 Hz/1 kHz

Analog output connector : C02 type (BNC) (voltage output) or terminal strip (phoenix contact:MC1.5/6-STF-3, 81) (current output) selectable

Display : fluorescent display tube (display range 69.85 mm \times 11.45 mm)

Display unit : Hz, r/min, m/min, USER

Sensor power : 12 VDC $\pm 10\%$ 150 mA, 5 VDC $\pm 10\%$ 150 mA
selectable by SENSOR/POWER switch on the rear panel.

Power requirement : 16 VDC exclusive AC adapter (100 to 240 VAC) is provided

[General specification]

Operating temperature range : 0 to 40 °C

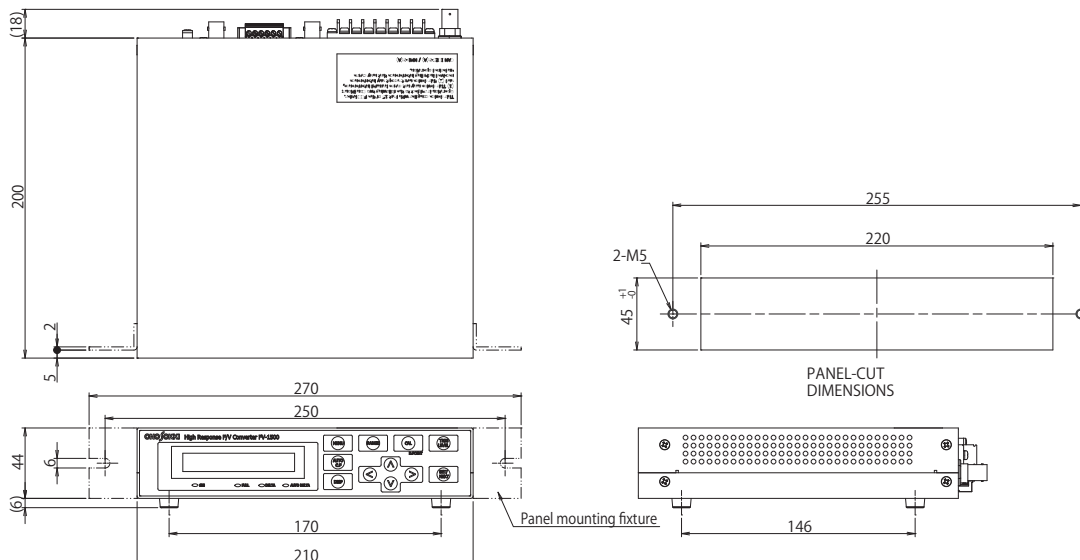
Operating humidity range : 5 to 80 % (with no condensation)

Weight : approx. 1 kg

Accessory : exclusive AC adaptor (AC adapter PS-P20023A, cable assembly VM1072-VM1700 2 m) X 1, instruction manual X 1, connector (MC1.5/6-STF-3.81) X 1 (already installed in the unit)

Option : Automatic center frequency follow-up function (FV-0151)
Comparator output function (FV-0152)
Deviation scale change function (FV-0153)
Open collector output function (FV-0154)
Panel mounting fixture (FV-0014)

[Outer dimensions] (unit: mm)





- Rotation measurement over a wide range from low to high speed (input frequency: 0.6 mHz to 100 kHz) is available.
- Computing and displaying signals from two rotating bodies
- Independent coefficient correction function of each channel can convert it to an arbitrary physical quantity proportional to rotation speed.
- 2ch calculation function can display rotation speed difference/ rotation speed ratio / rolling reduction/draw/ rotation change rate/direction of rotation.

[Electrical specification]

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 channels : 2 channels

Input amplification type : AC/DC (switching type)

Measurement method : period calculation method, gate calculation method (switching type)

Measurement time : 0.2 s + 1 period time (by period calculation method)

Coefficient setting range : 0.0001 to 99.9999

2 ch calculation function : difference <B-A>, ratio <(B / A) × 100> change rate <(B-A / A) × 100>

Rotation direction : When 2-phase rotary encoder is used, the direction of rotation is indicated by polarity display

Main display section : green 7 segment LED (character height: 14 mm) display range: 0 to ± 999999 (0.00 to 9999.99 %)

Sub display section (parameter setting display section) : LCD module display number of 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 Vp-p signal frequency range: 1 Hz to 100 kHz

DC amplification section : signal waveform : a rectangular wave with a pulse width of 4 μs 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 : setting number of stages : 2 steps setting range : 0 to ± 999999 output item : UPPER / GOOD / LOWER output type : semiconductor relay make-up contact (DC 30 V, 0.1 A)

Analog output : switching system : 12 bit D/A system voltage range : 0 to ± 10 V/F.S.(= Full Scale) can be set arbitrarily

Power supply for sensor : DC 5 V ± 0.25 V(max 150 mA) the total value of A ch and B ch DC12 V ± 0.6 V (max 150 mA) for each channel of A and B

Power supply : AC 100 V to 240 V (50/60 Hz)

Power consumption : 45 VA or less

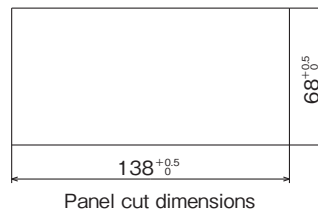
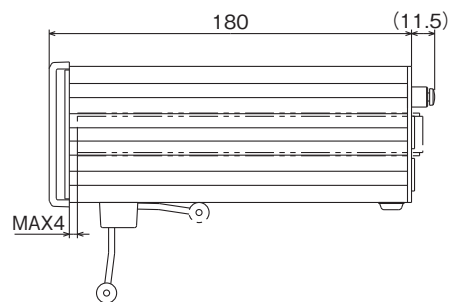
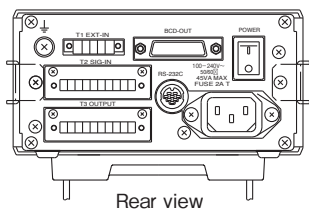
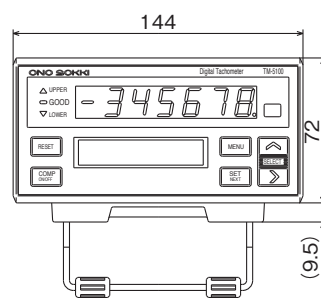
[General specification]

Operating temperature range : 0 to 40 °C

Humidity resistance : max 95 % (with no condensation)

Weight : approx. 1.5 Kg

[Outer dimensions] (unit: mm)





- Reversible counter that measures linear position, displacement, dimension, etc.
- Adopted large-sized LED (14 mm) for easy viewing.
- Extensive external output function (comparator, analog, BCD, RS-232C communication)
- 4 types of comparator setting values are available, can be saved as a condition.

[Electrical specification]

Applicable sensor : RP series (rotary encoder),
RP-7400 series (roller encoder)

Display section : main display section: red LED (14 mm), 6 digits,
polarity (0 to ± 999999)
sub display section : LCD, 16 characters × 2 lines,
with backlight (yellow green)
decimal point : 0, 0.0, 0.00, 0.000 (selectable)
status display section: comparator output display
UPPER (red) /
GOOD (green) /
LOWER (red)

Sensor input signal : single phase or square wave voltage signal with 90 ° phase
difference
(Hi: 4 to 30 V, Lo: 0 to 1 V)
Line receiver (RS-422A compliant)
: Input frequency: DC to 100 kHz

Supply power for sensor : select one from
DC 5 ± 0.25 V (max 150 mA) or
DC 12 ± 0.6 V (max 120 mA)

External control signal : input signal type: voltage input (Hi: 4 to 5.25 V, Lo: 0 to 1
V), no-voltage contact input
input signal type: reset, gate, offset, key protection

Mode/function : multiplier : 1/2/4
ratio correction 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
number of setting steps: 2 steps
output item : LOWER (LOWER setting value ≥
coefficient value) /
GOOD (LOWER setting value <
coefficient value <
UPPER setting value) /
UPPER (UPPER setting value ≤
coefficient value)
output format : semiconductor relay
(one make contact each)
max. contact capacity : DC 30 V, 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

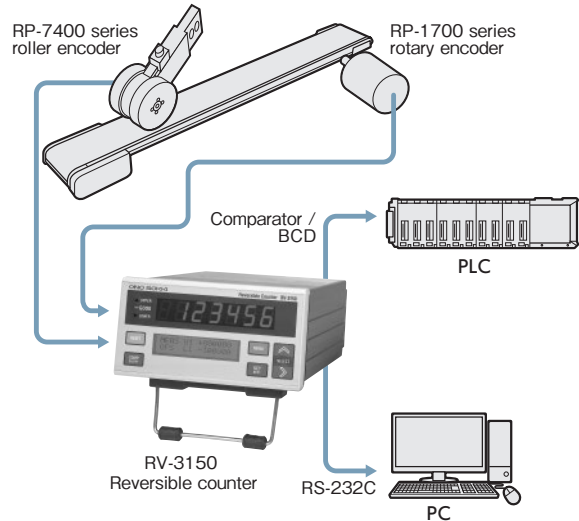
RS-232 communication : function; read measurement data, set/read parameters
Baud rate: 2400/4800/9600 bps

Power supply : AC 100 to 240 V (50 / 60 Hz)
Power consumption : 30 VA or less

[General specification]

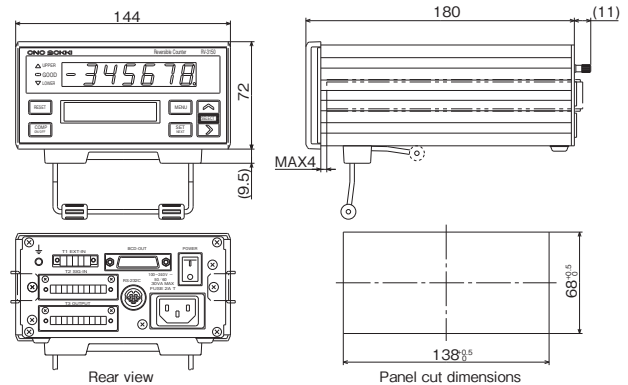
Operating temperature range : 0 to 40 °C
Humidity resistance : Max 95 % (with no condensation)
Weight : approx. 1.3 kg

[Example of System Configuration]



[Outer dimensions]

(unit: mm)





- Receives square wave output from rotary encoder, can be used as insulated amplifiers.
- Changes to the signal with low impedance suitable for transmission by waveform shaping.
- Supplies 12 DCV to RP series of DC power type.
- Case is an airtight structure that can be installed at the site near the detector.
- Due to isolation of input/output circuit, it is resistant to noise.

[General specifications]

Operating temperature range : -5 to 40 °C
 Storage temperature range : -10 to 70 °C
 Weight : approx. 4 kg
 Terminal strip : JIS C 2805, 1.25 to 3 crimp terminal compatible
 Accessory : crimp terminal

[Option]

Remodeling Item	Remodeling Specification	Standard
Open collector output	Max. rating DC40 V 50 mA	Collector output
Change of power supply voltage	AC110 V / 200 V / 220 V	AC 100 V
Change of input resistance	1.5 kΩ / 47 kΩ*	470 Ω
Change of output resistance	220 Ω (Output Z cannot be used.)	330 Ω (3-phase)

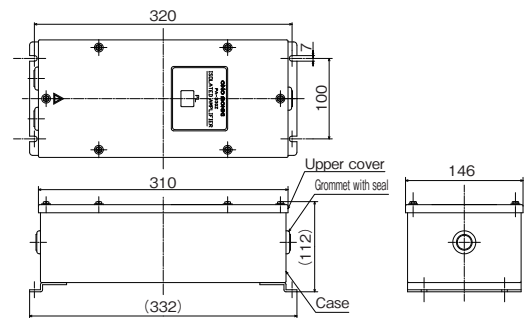
*When using the C specification of RP-1700 series (collector output type/pull-up resistor 470 Ω), it is necessary to remodel the input resistance to 47 kΩ.

[Electrical specification]

Input phase number : 3 phases
 Input resistance : 470 Ω
 Input waveform : square wave, duty approx. 50 %
 Input voltage : Hi: 8 to 12.5 V,
 Lo: 0 to 4 V
 Input 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
 Power requirement : AC 100 V, approx. 12 VA
 Power supply : DC12 V, 0.15 A

[Outer dimensions]

(unit: mm)



Encoder / indicator / amplifier correspondence table

There are 4 types of connection methods for our encoder. Devices connectable are decided depending on the connection method. First of all, check "List of Encoder Output System." Then, check the available indicator/amplifier with "Indicator/Amplifier Compatibility Table by Output System."

"List of Encoder Output System"

Encoder	Output System of Detector	Compatible Load Resistance
RP-1700 series	Totem pole	470 Ω or more
	Collector	10 kΩ or more
	Open collector	—
	Line driver	—
SP-405ZA series	Collector	10 kΩ or more
	Open collector	—
RP-432Z series	Totem pole	1 kΩ or more
	Totem pole	470 Ω or more
RP-7400 series	Collector	10 kΩ or more
	Open collector	—
	Line driver	—

Indicator / Amplifier Compatibility Table by Output System

Output System	Indicator / amplifier	Connection Availability ○:Available △:Conditionally available ×:Unavailable
Totem pole	FV-1500	○
	TM-3000 series	○
	TM-5100	○
	RV-3150	○
	PA-330Z*1	△
Collector	FV-1500	○
	TM-3000 series	○
	TM-5100	○
	RV-3150	○
	PA-330Z*2	△
Open collector	FV-1500*3	△
	TM-3000 series*4	△
	TM-5100	×
	RV-3150	×
Line driver	PA-330Z	×
	FV-1500	×
	TM-3000 series	×
	TM-5100	×
	RV-3150	○
	PA-330Z	×

* 1 For connecting RP-432Z, it is necessary to remodel the input resistance of PA-330Z to 1.5 kΩ.
 * 2 It is necessary to remodel the input resistance of PA-330Z to 47 kΩ.
 * 3 It is necessary to change input setting of FV-1500 to PULL UP.
 * 4 It is necessary to change input setting of TM-3000 series to PULL UP.

Cable list

[Cable List for RP-1700 Series]

Application	Power	Type	Model	Terminal Processing (Cable Length)	Example of Connectable Device
Signal output	AC	△t	RP-0140	NJC-2010-PF ⇔ M3×7 (5 m)	RP-17□1-□C, RP-17□3-□C →TM-3100 series
	AC	○t	RP-0141	NJC-2010-PF ⇔ Open (5 m)	RP-17□1-□C, RP-17□3-□C →TM-5100, RV-3150
	DC	△t	RP-0142	NJC-2010-PF ⇔ M3×8 (5 m)	RP-17□2-□C, RP-17□4-□C →TM-3100 series
	DC	○t	RP-0143	NJC-2010-PF ⇔ Open (5 m)	RP-17□2-□C, RP-17□4-□C →TM-5100, RV-3150
	AC	△t	RP-0144	M3×7 ⇔ M3×7 (5 m)	RP-17□1-□T, RP-17□3-□T →TM-3100 series
	AC	○t	RP-0145	M3×7 ⇔ Open (5 m)	RP-17□1-□T, RP-17□3-□T →TM-5100, RV-3150
	DC	△t	RP-0146	M3×8 ⇔ M3×8 (5 m)	RP-17□2-□T, RP-17□4-□T →TM-3100 series
Power supply	AC	○t	RP-0148	NJC-203-PF ⇔ 3P AC plug (2.4 m)	For RP-1700 series-□C
	AC	△t	RP-0149	NJC-203-PF ⇔ M3×2, M4×1 (5 m)	For RP-1700 series-□C
	AC	△t	RP-0150	NJC-203-PF ⇔ open (5m)	For RP-1700 series-□C
	AC	○t	RP-0151	M3×2, M4×1 ⇔ 3P AC plug (2.4m)	For RP-1700 series-□T
	AC	△t	RP-0152	M3×2, M4×1 ⇔ M3×2, M4×1 (5m)	For RP-1700 series-□T
	AC	△t	RP-0153	M3×2, M4×1 ⇔ open (5m)	For RP-1700 series-□T
Conversion cable	AC, DC	○t	RP-0154	NJC-2010-PF ⇔ RM12BJB-5P (0.5 m)	Old RP-100 series connector type (without Z-phase) →RP-1700 series
	AC, DC	○t	RP-0155	NJC-2010-PF ⇔ TRC116-32A10-7M (0.5 m)	Old RP-100 series connector type (with Z-phase) →RP-1700 series

* Option cables above are for domestic use. Please contact your nearest distributor or Ono Sokki sales office nearby when export.

*For China : not provided

[Cable List for RP Series (Except RP-1700 Series)]

Application	Power	Type	Model	Terminal Processing (Cable Type/ Length)	Example of Connectable Device
Single-phase signal output	AC	△t	RP-0156	RM12BPE-5S ⇔ M3 × 3 (R6,5 m)	RP-100A-C0 → TM-3100 series
	AC	△t	RP-0157	M3×3 ⇔ M3×3 (R6,5 m)	RP-100A-T0 → TM-3100 series
	DC	○t	RP-0158	RM12BPE-5S ⇔ M3×5 (R6,5 m)	RP-100D-C0 → TM-3100 series RP-721 → TM-3100 series
Two-phase signal output	DC	△t	RP-0159	M3×5 ⇔ M3×5 (R6,5 m)	RP-100D-T0 → TM-3100 series
	AC,DC	△t	RP-0160	RM12BPE-5S ⇔ M3×7 (R6,5 m)	RP-100D-C0 → PA-330Z
	AC,DC	○t	RP-0161	RM12BPE-5S ⇔ open (R6,5 m)	RP-100A-C0, RP-732
	AC	△t	RP-0162	M3×5 ⇔ open (R6,5 m)	RP-100A-T0
	DC	△t	RP-0163	M3×7 ⇔ open (R6,5 m)	RP-100D-T0 → RV-3150
	AC	t	RP-0164	M3×5 ⇔ M3×5 (R6,5 m)	RP-100A-T0 → PA-330Z
	DC	t	RP-0165	M3×7 ⇔ M3×7 (R6,5 m)	RP-100D-T0 → PA-330Z
	DC	△t	RP-0166	SNW2010-PCF ⇔ M3×7 (R6,5 m)	RP-5322D → PA-330Z
	DC	△t	RP-0167	SNW2010-PCF ⇔ open (R6,5 m)	RP-5322D → PA-330Z
	DC line driver	△t	RP-0168	SNW2010-PCF ⇔ open (R6,5 m)	RP-5322D-L
Two-phase + zero-mark signal output	AC,DC	○t	RP-0169	TRC116-12A10-7F ⇔ open (R8,5 m)	RP-432Z
	AC	△t	RP-0170	M3×7 ⇔ open (R8,5 m)	RP-100AZ-T0
	DC	△t	RP-0171	M3×9 ⇔ open (R8,5 m)	RP-100DZ-T0 → RV3150
	AC	t	RP-0172	M3×7 ⇔ M3×7 (R8,5 m)	RP-100AZ-T0 → PA330Z
	DC	t	RP-0173	M3×9 ⇔ M3×9 (R8,5 m)	RP-100DZ-T0 → PA330Z
	DC	△t	RP-0174	SNW2010-PCF ⇔ M3×9 (R8,5 m)	RP-5324D → PA-330Z
	DC	△t	RP-0175	SNW2010-PCF ⇔ open (R8,5 m)	RP-5324D
Power supply	AC	△t	RP-0177	AC plug ⇔ RM12BPE-2S (0.75×2C, 2.4 m)	For RP-100A-C0
	AC	△t	RP-0178	AC plug ⇔ M3×2 (0.75×2C, 2.4 m)	For RP-100A-T0
Two-phase signal output	DC	○t	RP-0181	RM12BPE-5S ⇔ M3×5 (D5UL, 5 m)	RP-7400 series → TM-3100 series
	DC	○t	RP-0182	RM12BPE-5S ⇔ open (D5UL, 5 m)	RP-7400 series → RV-3150 series

Cable Specification

0.75×2	t	VCTF 0.75×2	2-core cabtyre cable for AC power 0.75 mm	R8	t	4 pairs twist, 3 pairs shield cable of that, for 2-phase + zero-mark signal output
R6	t	3 pairs twist, 2 pairs shield cable of that, for single-phase and 2-phase signal output		RT7	t	PVC 0.3×7 cores for RP-5610D series

* Normally the cable length is 5 m for signal output and 2.4 m for power supply. A cable of non-standard length is estimated separately in units of 5 meters.

○ mark: The standard item that is always stocked.

△ mark: Made-to-order product. The delivery time is about 1 to 4 months.

Note: Refer to page 5 for details on cable R6 and R8.

○ mark: The standard item that may be out of stock. If it is out of stock, the delivery time is 1 to 2 months.

t mark: The shipping fee will be charged separately.

* Notes on export to China

We only provide encoders of terminal block type for China. Cables for exporting to China are not provided.



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

URL : <https://www.onosokki.co.jp/English/english.htm>

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