

TRD-GK Series Incremental Encoders

Rotary Encoders

■ Features

- Tough spindle withstand large load (radial 100N , thrust 50N) , durable bearing lasts for 1.2×10^{10} revolutions
- Quick response and wide range of operating temperature. (-10°C to +70°C)
- Protection degree IP65 (dust and splash proof)
- Totem-pole output allows longer cable extension
- Servo mounting is available for easy installation.



■ List of model numbers

Type	Appearance	Model number	Output	Pulse/revolution
Dust and splash proofed with rear cable type		TRD-GK□-R	Two-phase	10, 12, 15, 50, 60
		TRD-GK□-RZ	Two-phase with home position in normal operation	30, 100, 120, 200, 240, 250, 300, 360, 400, 500, 600, 800, 1000, 1200, 1500, 1800, 2000, 2500, 3600, 5000
		TRD-GK□-RZL	Two-phase with home position in reverse operation	
		TRD-GK□-BZ	Normal/Reverse detection and home position in normal operation	30, 60, 100, 120, 200, 240, 250, 300, 360, 400, 500, 600, 800, 1000, 1200, 1500, 1800, 2000, 2500, 3000, 3600, 4000, 5000
Dust and splash proofed with connector type		TRD-GK□-RC2	Two-phase	10, 12, 15, 50, 60
		TRD-GK□-RZC2	Two-phase with home position in normal operation	30, 100, 120, 200, 240, 250, 300, 360, 400, 500, 600, 800, 1000, 1200, 1500, 1800, 2000, 2500, 3600, 5000
		TRD-GK□-RZC2L	Two-phase with home position in reverse operation	
		TRD-GK□-BZC2	Normal/Reverse detection and home position in normal operation	30, 60, 100, 120, 200, 240, 250, 300, 360, 400, 500, 600, 800, 1000, 1200, 1500, 1800, 2000, 2500, 3000, 3600, 4000, 5000

■ Model numbering system

TRD-GK □ - RZ C2 L - □

- Series
- Pulse/revolution
- Output signal
R : Two-phase
RZ: Two-phase with home position in normal operation
BZ: With Normal/Reverse detection
- Connection
Blank: Rear cable
C2: Connector
- Home position reverse operation symbol
 If output signal is RZ, model numbers with "L" are home position reverse operation type.
- (Available options)

■ Pulse and frequencies

Pulse/revolution		10	12	15	30	50	60	100	120	200	240	250	300	360	400
Max. response frequency (kHz)*		0.83	1	1.25	2.5	4.17	5	8.33	10	16.7	20	20.8	25	30	33.3
Applicable models	TRD-GK□-R□	●	●	●		●	●								
	TRD-GK□-RZ□				●			●	●	●	●	●	●	●	●
	TRD-GK□-BZ□				●		●	●	●	●	●	●	●	●	●
Pulse/revolution		500	600	800	1000	1200	1500	1800	2000	2500	3000	3600	4000	5000	
Max. response frequency (kHz)*		41.7	50	66.7	83.3	100	100	100	100	100	100	100	100	100	
Applicable models	TRD-GK□-R□														
	TRD-GK□-RZ□	●	●	●	●	●	●	●	●	●		●		●	
	TRD-GK□-BZ□	●	●	●	●	●	●	●	●	●	●	●	●	●	

* Maximum response frequency is defined by the following formula:
 Maximum revolution speed = (Maximum response frequency / pulse) × 60
 The encoder does not respond to revolution faster than the maximum speed.

■ Electrical specifications

Model number		TRD-GK□-R□/RZ□	TRD-GK□-BZ□
Power source	Power source voltage	10 to 30 VDC	10 to 30 VDC
	Allowable ripple	3% rms max.	3% rms max.
	Current consumption (I _o load)	At less than 16 VDC: 50 mA max./At 16 VDC or more: 70 mA max.	At less than 16 VDC: 50 mA max./At 16 VDC or more: 70 mA max.
Output wave form	Output signal	R: Two-phase/RZ: Two-phase + home position	Normal/Reverse detection + home position
	Duty ratio	50 ± 25%	10 to 60% (2001P or more: 50 ± 25%)
	Signal width at home position	At 400P or less: 25 to 150%/At 500P or more: 1° ± 0.5° (1800P, 3600P, 5000P: 50 to 150%)	At 400P or less: 25 to 150%/At 500P or more: 1° ± 0.5° (60P, 3600P: 100 to 300%, 1800P: 50 to 150%)
	Rise/Fall time	3 μs (Cable: 2 m or shorter) max.	3 μs (Cable: 2 m or shorter) max.
Output	Output type	Totem-pole	Totem-pole
	Output current	Outflow "H"	30 mA max.
		Inflow "L"	30 mA max.
	Output voltage	"H"	[(Power source voltage) - 4 V] min.
		"L"	2 V max.
Load power voltage	35 VDC max.	35 VDC max.	

* Home position is not generated on the R model.

■ Mechanical specifications

Initial torque	0.1 N•m (+20°C) max.
Moment of inertia	1×10 ⁻⁵ kg•m ²
Allowable load	Radial: 100 N
	Thrust: 50 N
Maximum allowable speed (Note 1)	5000 rpm
Service life of bearing	1.2×10 ¹⁰ revolutions (at maximum allowable load)
Cable	External diameter: ø6 mm
	5-wire oil resistant PVC cable
	Nominal section area of core: 0.3 mm ²
Weight	Rear cable type: Approx. 600 g (with 2 m cable)
	Connector type: Approx. 500 g

Note 1: Highest speed that can support mechanical integrity of the encoder

■ Environmental requirements

Ambient temperature	-10 to +70°C
Storage temperature	-25 to +85°C
Operating humidity	35 to 85% RH (with no dewing)
Voltage withstand	500 VAC for one minute
Insulation resistance	50 MΩ min.
Vibration resistance	At 500P or less: 0.75 mm
	At 600P or more: 0.35 mm
Shock resistance	At 500P or less: 11 ms with 980 m/s ² At 600P or more: 11 ms with 294 m/s ²
Protection	IP65: Dust and splash proofed

(Excluding shield between power supply, signal cable, and case.)
 Durable for one hour along X, Y, and Z axes at 10 to 55 Hz
 Applied three times along X, Y, and Z axes

Rotary Encoders

Incremental Type

TRD-S/SH

TRD-2E

TRD-N/NH

TRD-J

TRD-GK

Absolute Type

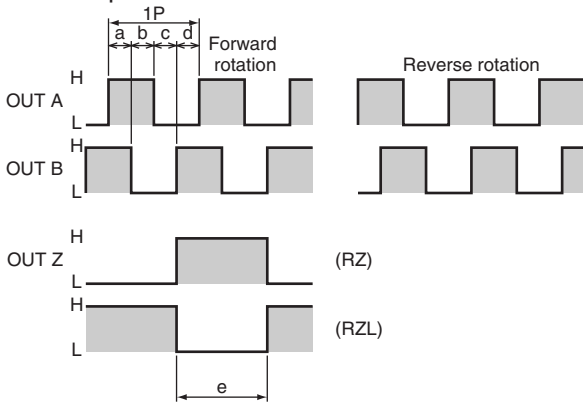
TRD-NA

TRD-K

TRD-KL

Channel timing chart

2-phase output: TRD-GK□-R/-RZ□



$a, b, c, d = (1/4 \pm 1/8) P$

$e: 400 P \text{ or less: } 25 \text{ to } 150\%$

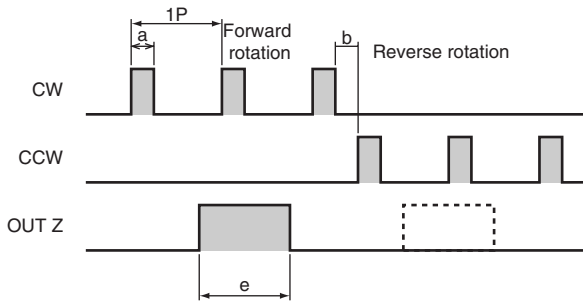
$500 P \text{ or more: } 1^\circ \pm 0.5^\circ$

(At 1,800, 3,600, 5000 pulses only: 50 to 150%)

* OUT Z generates home position in both directions.

* OUT Z is not included in the R model.

Normal/Reverse detection: TRD-GK□-BZ□



$a = (1/4 \pm 1/8) P$ $b \geq 1/4 P$

$e: 400 P \text{ or less: } 25 \text{ to } 150\%$

$500 P \text{ or more: } 1^\circ \pm 0.5^\circ$

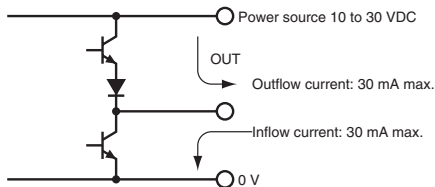
(At 60, 3,600 P: 100 to 300%, 1,800 P: 50 to 150%)

* OUT Z generates home position in both directions.

* OUT Z is not included in the R model.

Output circuit

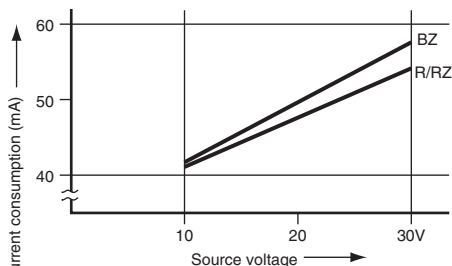
Totem-pole output:



Totem-pole output is compatible with both voltage output and open collector output.

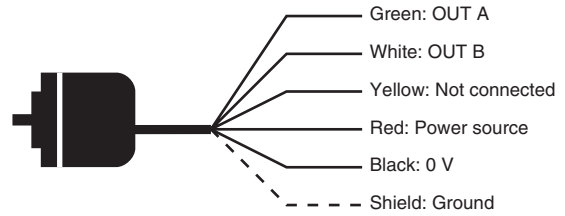
For connection examples, refer to page 21, TRD-J Series.

Electrical characteristics (typical)

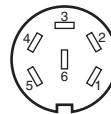


Terminal assignment

TRD-GK□-R□



Pin out of connector

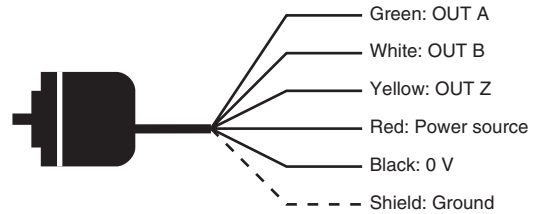


Rear view

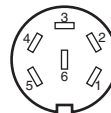
Pin number

- 1: OUT A
- 2: OUT B
- 3: Not connected
- 4: Power source
- 5: 0 V
- 6: Shield

TRD-GK□-RZ□



Pin out of connector

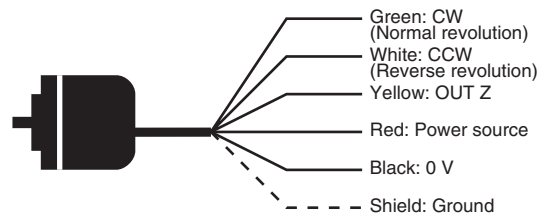


Rear view

Pin number

- 1: OUT A
- 2: OUT B
- 3: OUT Z
- 4: Power source
- 5: 0 V
- 6: Shield

TRD-GK□-BZ□



Pin out of connector



Rear view

Pin number

- 1: CW
- 2: CCW
- 3: OUT Z
- 4: Power source
- 5: 0 V
- 6: Shield

