

ROTARY ENCODERS

TRD-GK Series Incremental Encoders



Features

- Strong shaft that supports (Radial: 100N, Thrust: 50N)
Tough bearing serviceable for 1.2×10^{10} revolutions
- Quick response and wide ranging operating temperature (-10°C to +70°C)
- Dust and splash proofed
- Totem-pole output allowing 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		TRD-GK□-R	Two-phase	10, 12, 15, 50, 60
		TRD-GK□-RZ	Two-phase with home position in normal operation □□	30, 10, 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		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
BlankRear cable
: 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) x 60
The encoder does not respond to revolution faster than the maximum speed.

Electrical Specifications

Model		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 (to 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 25% / At 500P or more: 1 ° ±30' * (1800P, 3600P, 5000P: 50 to 150%)	At 400P or less: 25 to 25% / At 500P or more: 1 ° ±30' (60P, 3600P: 100 to 300%, 1800P: 50 to 150%)
	Rise / Fall time	3 μs max. (Cable: 2 m or shorter) max.	3 μs max. (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] 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	0.1N·m (+20°C) max.
Moment of inertia	1 x 10 ⁻⁶ kg·m ²
Allowable load	Radial: 100N
	Thrust: 50N
Maximum allowable speed (Note 1)	5000 rpm
Service life of bearing	1.2 x 10 ¹⁰ revolutions (at the maximum load)
Cable	External diameter ø6 mm
	5-wire oil-proof shielded vinyl chloride 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

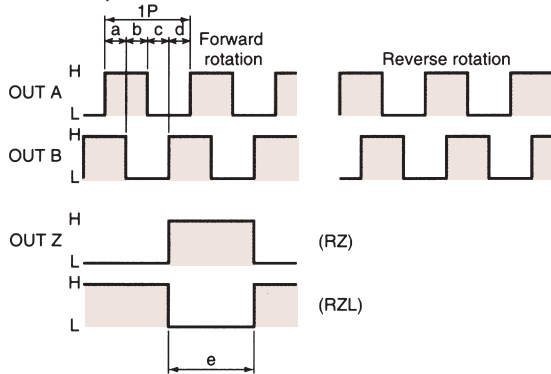
Ambient temperature	-10 to +70°C
Storage temperature	-25 to +85°C
Operating humidity	35 to 85% RH (with no dewing)
Withstand voltage	500VAC for 1 minute
Insulation resistance	50 MΩ min. (Excluding shield between power supply, signal cable, and case.)
Vibration resistance	At 500P or less: 0.75 mm } Durable for 1 hour along X, Y, and Z axes at 10 to 55 Hz At 500P or less: 0.35 mm }
Shock resistance	At 500P or less: 11 ms with 980 m/s ² } Applied 3 times along X, Y, and Z axes At 500P or less: 11 ms with 294 m/s ² }
Protection	IP65: Dust and splash proofed

ROTARY ENCODERS

TRD-GK Series

Output Signal Timing Chart

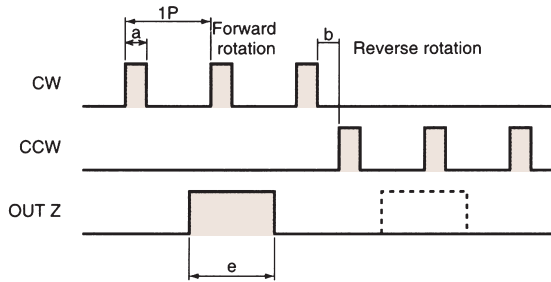
2-phase output: TRD-GK□-R/-RZ□



a, b, c, d = $(1/4 \pm 1/8) P$
 e: 400 P or less: 25 to 150%
 500 P or more: $1^\circ \pm 30'$
 (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□

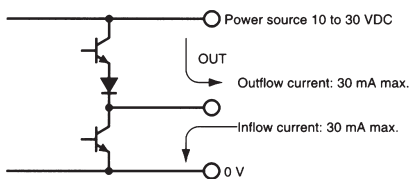


a = $(1/4 \pm 1/8) P$ b $\geq 1/4 P$
 e: 400 P or less: 25 to 150%
 500 P or more: $1^\circ \pm 30'$
 (At 60, 3,600 P: 100 to 300%, 1,800 P: 50 to 150%)

* OUT Z generates home position in both directions.
 * OUT Z is not included in the R model.

Output Circuit

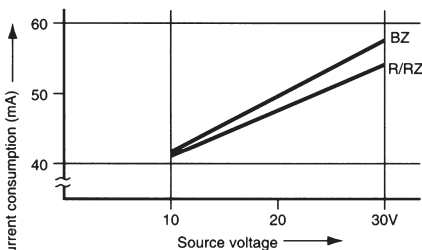
Totem-pole output:



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

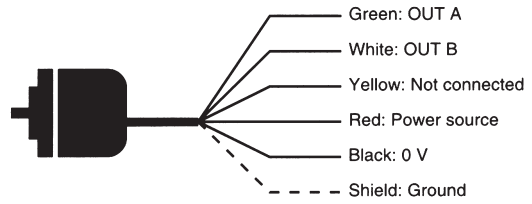
For connection examples, refer to page 15, TRD-J Series.

Electrical Characteristics (Typical)

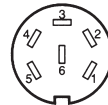


Terminal Assignment

TRD-GK□-R□



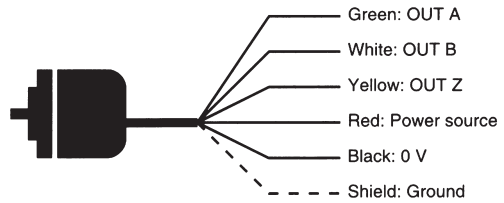
Pin out of connector



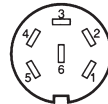
Rear view

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

TRD-GK□-RZ□



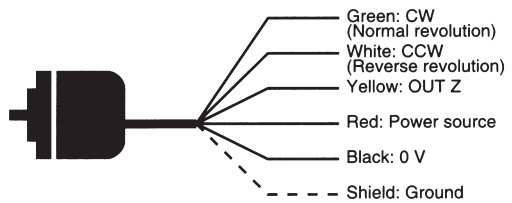
Pin out of connector



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



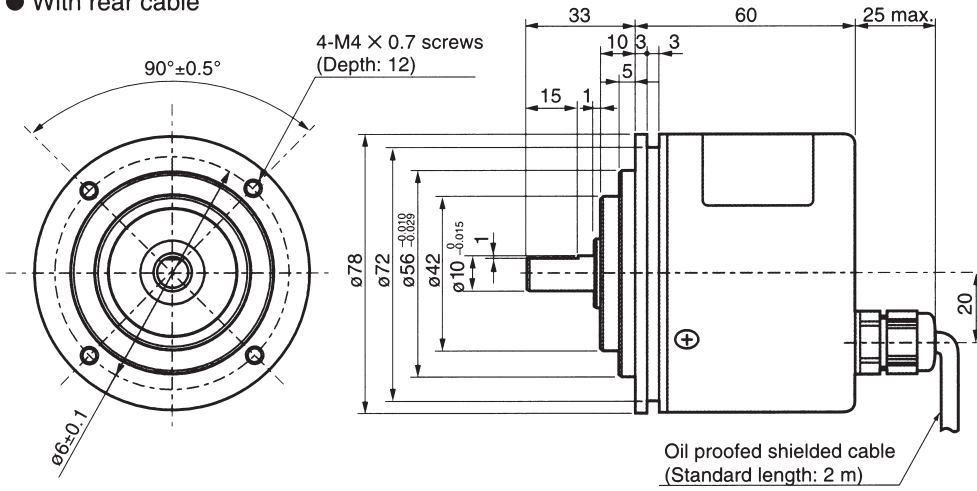
Rear view

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

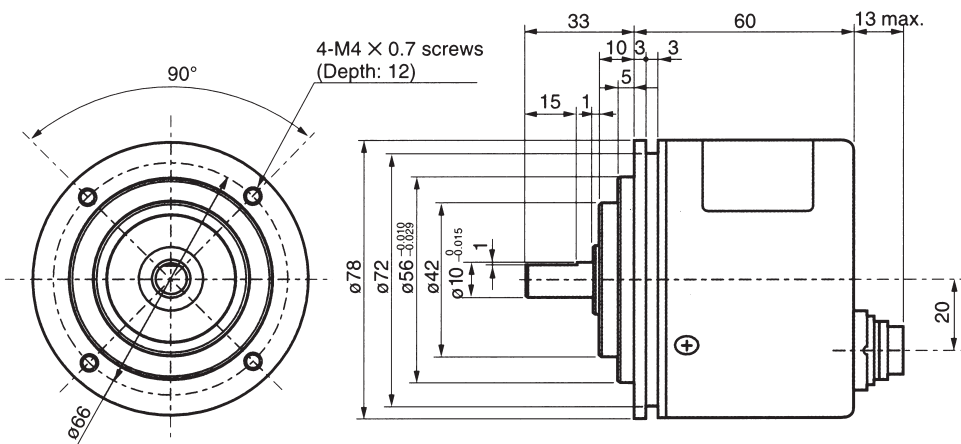
TRD-GK Series External Dimensions

(in mm)

● With rear cable



● With connector (C2)



Model numbers of connectors (option)

- Straight: BMCC-6
- Angular: BAFC-6

* Refer to page 32 for detailed descriptions of the options.

● Servo mount metal fixture

