

# Koyo®

## Incremental Encoder Series TRD-J Operation Manual

Thank you for purchasing this series TRD-MX Incremental Encoder. Please read this Operation Manual carefully before applying this product.  
**KEEP MANUAL IN A SAFE PLACE.**

KOYO ELECTRONICS (WUXI) CO.,LTD.  
Add: 21st Floor, Building 1, No.599, Jianzhuxi Road, Binhu District, Wuxi, Jiangsu, P.R. China  
Pc: 214072 Tel: (0510)85167888  
Fax: (0510)85161393  
KEW-M8164D-E

### Safety Consideration

**Warning** This indicates contents which can cause large accidents leading to loss of life or severe injury when the indication is disregarded and wrong handling is executed.

**Caution** This indicates contents which can cause injury or material damage when the indication is disregarded and wrong handling is executed.

Explanation of the pictograms

- This symbol indicates a general prohibition.
- This symbol indicates a compulsory item or an instruction.

### [Operating environment and conditions]

**Warning**

- Do not use in a combustible or explosive atmosphere. Otherwise personal injury or fire may be caused.
- Do not use this product for applications related to human safety. Use is assumed in an application where an accident or incorrect use will not immediately cause danger to humans.

### [Operating environment and conditions]

**Caution**

- Use and store the equipment within the scope of the environment (vibrations, impact, temperature, humidity, etc.) specified in the specifications. Otherwise fire or product damage may be caused.
- Understand the product first before use it.

### [Installation and wiring]

**Warning**

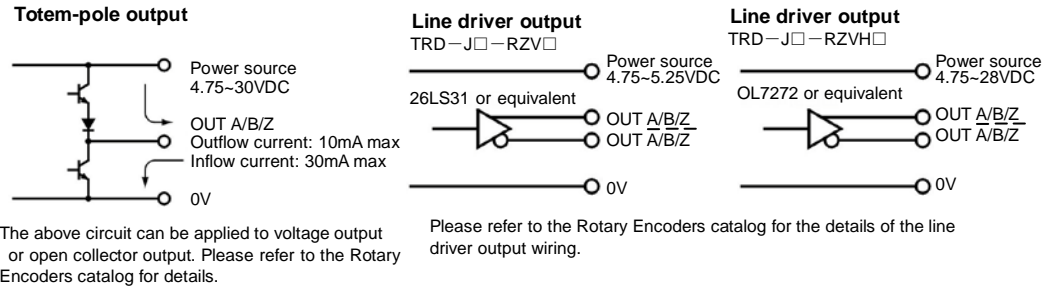
- Use only with the power supply voltage listed in the specifications. Otherwise fire, electric shock, or accidents may be caused.
- Use only with the wiring and layout specified in the specifications. Otherwise fire, electric shock, or accidents may be caused.
- Do not apply any kind of stress to the wires. Otherwise electric shock or fire may be caused.

### Electrical specifications

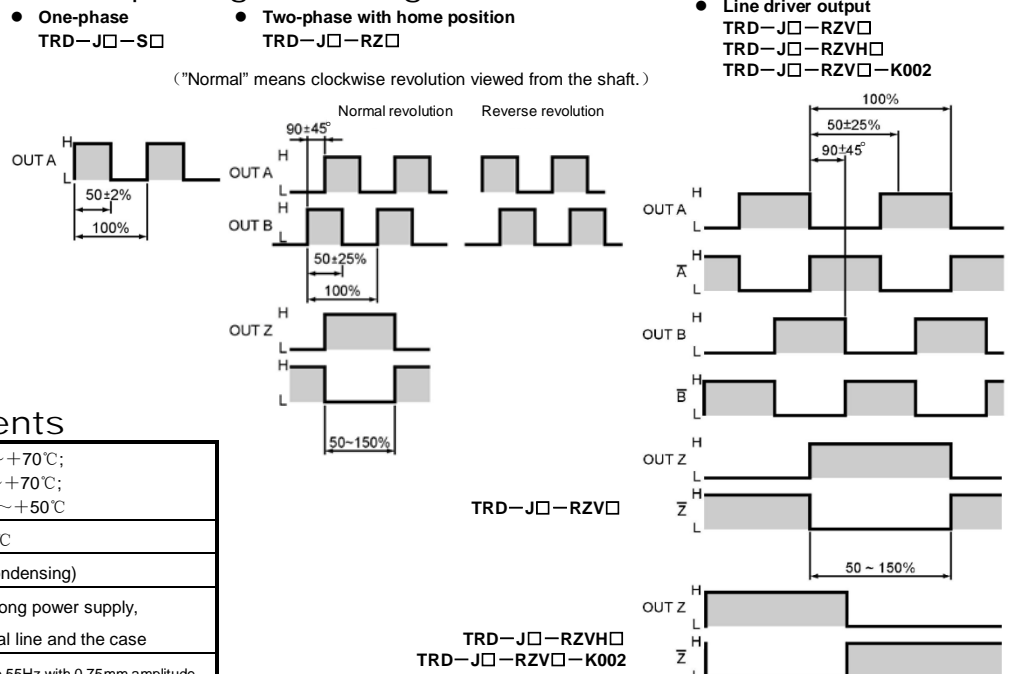
Model*1	TRD-J□-S□	TRD-J□-RZ□	TRD-J□-RZV□	TRD-J□-RZVH□		
Power supply	Operating voltage	DC 4.75V~30V	DC 4.75V~30V	DC 4.75V~5.25V	DC 10V~28V	
	Allowable ripple	3%rms Max.	3%rms Max.	3%rms Max.	3%rms Max.	
	Current consumption(no load)	40mA Max.	60mA Max.	130mA Max.	50mA Max.	
Output waveform	Output signal type	One-phase	Two-phase+ home position	Two-phase+ home position	Two-phase+ home position	
	Max. response frequency*2	50kHz	100kHz	50kHz	100kHz	
	Operating speed	(Maximum response frequency/Pulse)×60		(Maximum response frequency/Pulse)×60		
	Duty cycle	50±25%(square wave)		50±25%(square wave)		
	Signal width at home position	—	50~150%	50~150%	50~150%	
Output	Rising/falling time	3μs (Max. Cable 50 cm) max.		2μs (Max. Cable 50 cm) max.		
	Output Type	Totem-pole	Totem-pole	5V Line driver output*3	Wide Voltage Line driver output*4	
	Output current	Outflow "H"	10mA Max.	10mA Max.	20mA Max.	20mA Max.
		Inflow "L"	30mA Max.	30mA Max.	20mA Max.	20mA Max.
	Output voltage	"H"	[(Load power voltage)-2.5V] min.		2.5V Min.	2.5V Min.
		"L"	0.4V Max.	0.4V Max.	0.5V Max.	0.5V Max.
		TTL 5V	10TTL	10TTL	—	—
Load power supply voltage	30VDC Max.	30VDC Max.	—	28VDC Max.		

\*1 TRD-J□-RZV□-K002 is not described in this specification table. The specifications of TRD-J□-RZV□-K002 is the same as TRD-J□-RZV□ except: 1) operating voltage is DC10V~30V. 2) Line driver output is equivalent to 26C31. 3) Max response frequency is 100KHz.  
\*2 The maximum response frequency depends on the resolution of the encoder, please refer to the Rotary Encoders catalog for details.  
\*3 Equivalent to 26LS31 (Output signal is compatible to TTL). \*4 Equivalent to OL7272.

### Output circuit



### Output signal timing chart



### Mechanical specifications

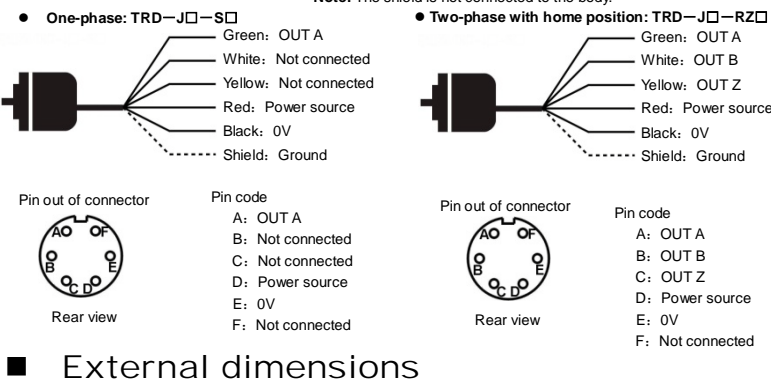
Starting torque	Max. 0.003N·m (+20°C) (Dust and splash proofed: Min. 0.02N·m)
Shaft moment of inertia	$2 \times 10^{-6} \text{ kg} \cdot \text{m}^2$
Max. allowable shaft load	Radial : 50N Thrust : 30N
Max. allowable speed*1	5000rpm(Dust and splash proofed: 3000rpm)
Service life of bearing	$5 \times 10^9$ revolution (calculated value at the maximum load)
Cable	External diameter $\Phi 5\text{mm}$ (W type: $\Phi 6\text{mm}$ ) 5-wire oil-proof shielded vinyl chloride cable Nominal section area of core: $0.3\text{mm}^2$ (Line driver output: 8 cores, $0.14\text{mm}^2$ )
Weight	220 g (with 0.5m cable) max.

\*1 The highest speed that can support mechanical integrity of the encoder.

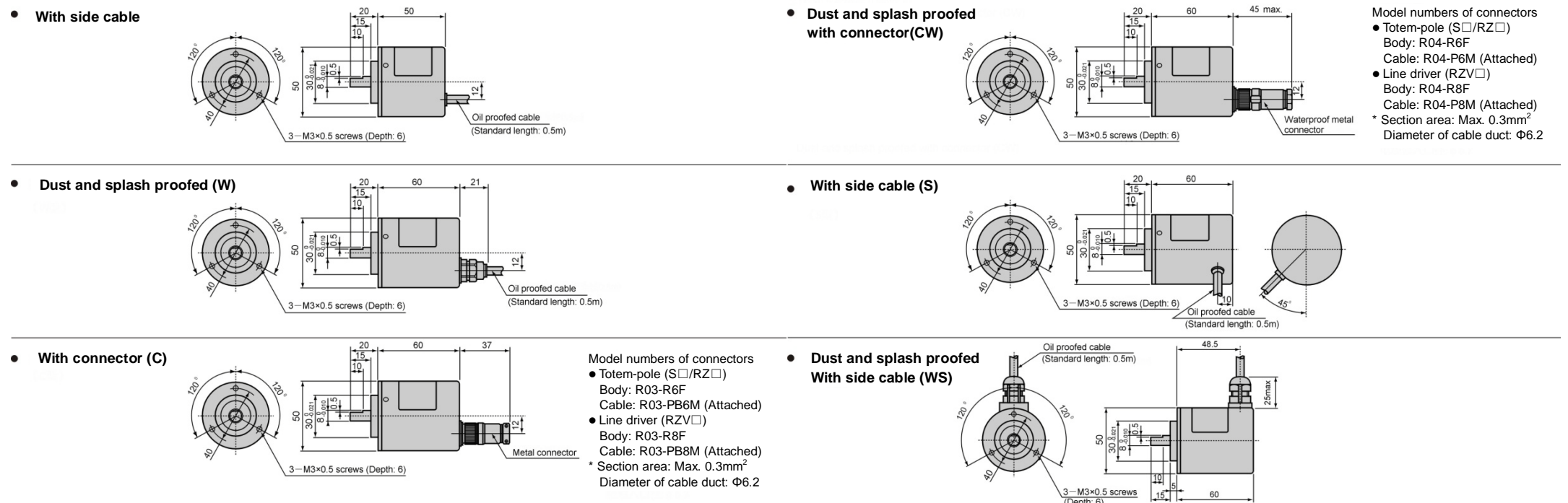
### Environmental requirements

Ambient temperature	RD-J□-RZV□-K002: -10~+70°C; RD-J□-RZVH□: -10~+70°C; others: -10~+50°C
Storage temperature	-25~+85°C
Ambient humidity	35~85%RH (non-condensing)
Withstand voltage	500VAC for one minute
Insulation resistance	50MΩ min.
Vibration resistance	Durable for one hour along three axes at 10 to 55Hz with 0.75mm amplitude
Shock resistance	11ms with $490\text{m/s}^2$ applied three times along three axes
Protection construction	Dust proofed: IP50; Dust and splash proofed: IP65

### Connection



### External dimensions



### Cautions for use

- Do not wire the cable in parallel with other power lines and do not share a duct with other cables.
- Use capacitors or surge absorption elements to remove the sparks caused by relays and switches in the control panel as far as possible.
- Be sure to connect all wires properly, as wrong wiring can damage the internal circuitry.
- Erroneous pulses may be caused at the time of power ON and power OFF. After power ON, wait for at least 0.5 sec before use.
- Do not disassemble the product.
- As the rotary encoder is composed of precision parts, its function will be impaired when it is subjected to shocks. Use sufficient care for handling and mounting.