

# Koyo®

## Incremental Encoder Series TRD-J Operation Manual

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

### KOYO ELECTRONICS (WUXI) CO.,LTD.

Addr: No.118 Lixi Road Wuxi, Jiangsu, P.R. China  
Pc: 214072 Tel: (0510)85167888  
Fax: (0510)85161393

KEW-M8164A-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	TRD-J□-S□	TRD-J□-RZ□	TRD-J□-RZV□		
Power supply	Operating voltage	4.75V~30V DC	4.75V~30V DC	4.75V~5.25V DC	
	Allowable ripple	3%rms Max.	3%rms Max.	3%rms Max.	
	Current consumption (no load)	40mA Max.	60mA Max.	130mA Max.	
Output waveform	Output signal type	One-phase	Two-phase+home position	Two-phase+home position	
	Max. response frequency	50kHz	50kHz	50kHz	
	Operating speed	(Maximum response frequency/Pulse)×60	(Maximum response frequency/Pulse)×60	(Maximum response frequency/Pulse)×60	
	Symmetry	50±25%(square wave)	50±25%(square wave)	50±25%(square wave)	
Signal width at home position	—	50~150%	50~150%		
Output	Rising/falling time <sup>2</sup>	3μs (Max. Cable 50 cm)max.	3μs (Max. Cable 50 cm)max.	2μs (Max. Cable 50 cm)max.	
	Output Type	Totem-pole	Totem-pole	Line driver <sup>2</sup>	
	Output current	Outflow "H"	10mA Max.	10mA Max.	—
		Inflow "L"	30mA Max.	30mA Max.	—
	Output voltage	"H"	[(Load power voltage)-2.5V] min.	[(Load power voltage)-2.5V] min.	2.5V Min.
		"L"	0.4V Max.	0.4V Max.	0.5V Max.
		TTL 5V	10TTL	10TTL	—
Load power supply voltage	30VDC Max.	30VDC Max.	—		

\*Equivalent to 26LS31

(Output signal is compatible to TTL)

## Mechanical specifications

Starting torque	Max. 0.003N·m (+20°C) (Dust and splash proofed: Min. 0.02N·m)
Shaft moment of inertia	2×10 <sup>-6</sup> kg·m <sup>2</sup>
Max. allowable shaft load	Radial: 50N
	Thrust: 30N
Max. allowable speed <sup>1</sup>	5000rpm (Dust and splash proofed: 3000rpm)
Service life of bearing	5×10 <sup>8</sup> revolution (calculated value at the maximum load)
Cable	External diameter Φ5mm (W type: Φ6mm) 5-wire oil-proof shielded vinyl chloride cable Nominal section area of core: 0.3mm <sup>2</sup> (Line driver output: 8 cores, 0.14mm <sup>2</sup> )
	Weight

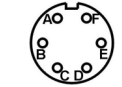
Note1: Highest speed that can support mechanical integrity of the encoder.

## Connection

### One-phase: TRD-J□-S□

Green: OUT A  
White: Not connected  
Yellow: Not connected  
Red: Power source  
Black: 0V  
Shield: Ground

Pin out of connector



Rear view

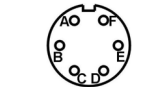
Pin code

A: OUT A  
B: Not connected  
C: Not connected  
D: Power source  
E: 0V  
F: Not connected

### Two-phase with home position: TRD-J□-RZ□

Green: OUT A  
White: OUT B  
Yellow: OUT Z  
Red: Power source  
Black: 0V  
Shield: Ground

Pin out of connector



Rear view

Pin code

A: OUT A  
B: OUT B  
C: OUT Z  
D: Power source  
E: 0V  
F: Not connected

### Two-phase with home position: TRD-J□-RZV□

Blue: OUT A  
Blue/Black: OUT Ā  
White: OUT B  
White/Black: OUT B̄  
Yellow: OUT Z  
Yellow/Black: OUT Z̄  
Red: Power source  
Black: 0V  
Shield: Ground

Pin out of connector



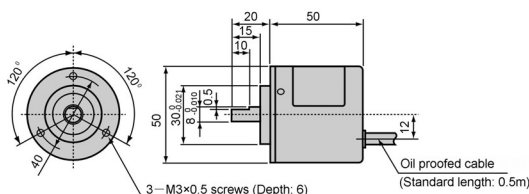
Rear view

Pin code

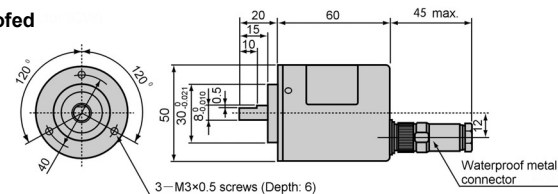
A: OUT A  
B: OUT Ā  
C: OUT B  
D: OUT B̄  
E: OUT Z  
F: OUT Z̄  
G: Power source  
H: 0V

## External dimensions

### With side cable

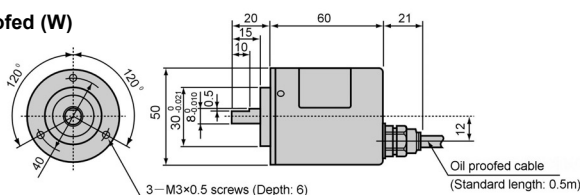


### Dust and splash proofed with connector (CW)

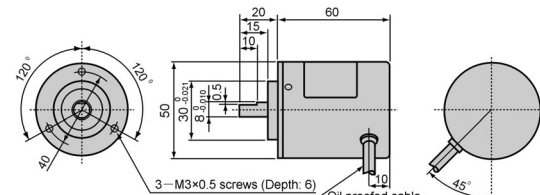


Model numbers of connectors  
• Totem-pole (S□/RZ□)  
Body: R04-R6F  
Cable: R04-P6M (Attached)  
• Line driver (RZV□)  
Body: R04-R8F  
Cable: R04-P8M (Attached)  
\* Section area: Max. 0.3mm<sup>2</sup>  
Diameter of cable duct: Φ6.2

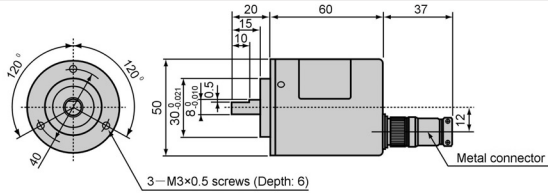
### Dust and splash proofed (W)



### With side cable (S)

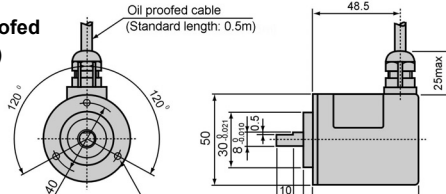


### With connector (C)



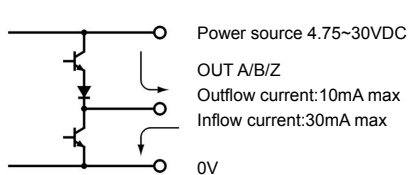
Model numbers of connectors  
• Totem-pole (S□/RZ□)  
Body: R03-R6F  
Cable: R03-PB6M (Attached)  
• Line driver (RZV□)  
Body: R03-R8F  
Cable: R03-PB8M (Attached)  
\* Section area: Max. 0.3mm<sup>2</sup>  
Diameter of cable duct: Φ6.2

### Dust and splash proofed With side cable (WS)



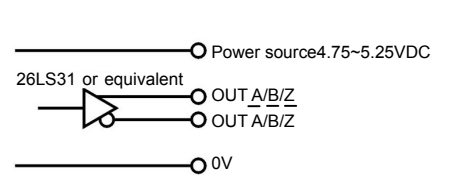
## Output circuit

### Totem-pole output



The above circuit can be applied to voltage output or open collector output. Please see Rotary Encoders catalog.

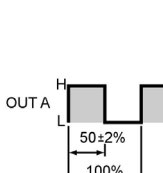
### Line driver Output



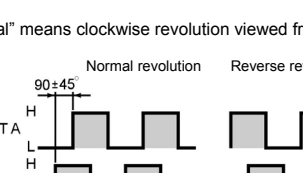
For the line driver output wiring, see the Rotary Encoders catalog.

## Output signal timing chart

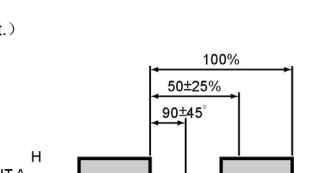
### One-phase: TRD-J□-S□



### Two-phase with home position: TRD-J□-RZ□

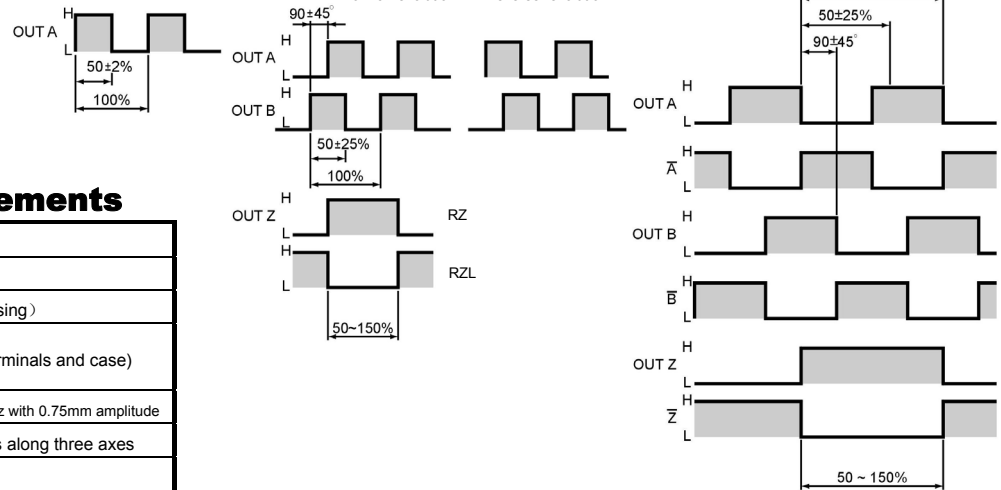


### Two-phase with home position: TRD-J□-RZV□



(\*Normal" means clockwise revolution viewed from the shaft.)

Normal revolution Reverse revolution



## 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.

