Koyo®

Incremental Encoder

Series TRD-2G

Operation Manual

Thank you for purchasing this series TRD-2G Incremental Encoders. Please read this Operation Manual carefully before applying this product.

PLEASE KEEP THIS MANUAL IN A SAFE PLACE!

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■ 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

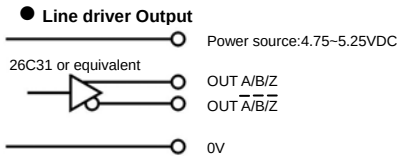
❗ Use only with the power supply voltage listed in the specifications.
Otherwise fire, electric shock, or accidents may be caused.

❗ Use only with the wiring and layout specified in the specifications.
Otherwise fire, electric shock, or accidents may be caused.

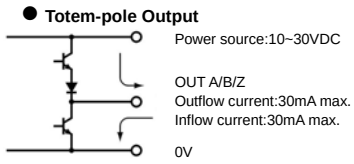
❗ Do not apply any kind of stress to the wires.
Otherwise electric shock or fire may be caused.

■ Output circuit

● **Line driver Output**

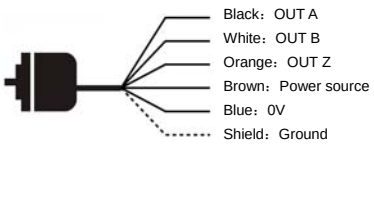


● **Totem-pole Output**

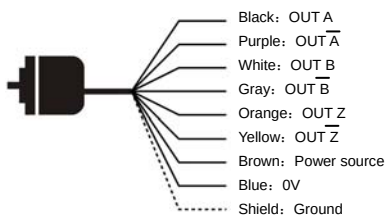


■ Connection

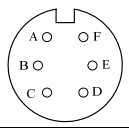
● **Totem-pole Output**



● **Line driver Output**



● **Ping of connecter type**

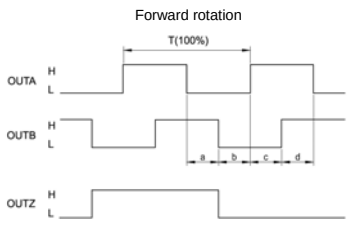


PIN NUM	SIGN define
A	A
B	B
C	Z
D	POWER+
E	0V
F	Not connect

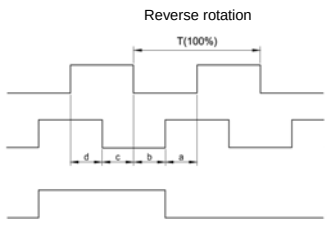
■ Output signal timing chart

● **Line driver Output**

Forward rotation



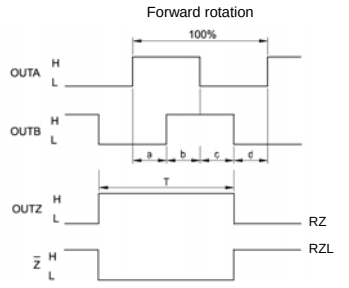
Reverse rotation



Forward rotation means clockwise revolution viewed from the shaft.
12.5%≤a,b,c,d≤37.5%, 50%≤T≤150%

● **Totem-pole Output**

Forward rotation



Forward rotation means clockwise revolution viewed from the shaft.
12.5%≤a,b,c,d≤37.5%, 50%≤T≤150%

■ Composition of model number

TRD – 2G 1000 – RZ V W L

- 2G: Series
- 1000: Resolution(Pulse) (600,1000,1024,1200,1500, 1800,2000,2048,2400,3000, 3600,4096,5000,8192,10000)
- RZ: Signal type — RZ：Two-phase with home position
- V: Output type — Blank：Totem-pole; V：Line driver
- W: Connection — Blank：Rear cable; W：Dust and splash proofed; C：Connector; CW：Dust and splash proofed with connector; S：Side cable
- L: Home position reverse operation symbol — Blank：home position normal operation type; L：home position reverse operation type

■ Mechanical specifications

Starting torque（＋20℃）		≤0.003N・m Dust and splash proofed：≤0.02N・m
Shaft moment of inertia		5.7×10^{-6} kg・m^2
Allowable shaft load	Radial	80N
	Axial	40N
Max. allowable rotation speed		5000rpm
Service life of bearing		1.2×10^9 revolutions (calculated value at the maximum load)
Cable	Material	Oil-proofed PVC(with shielded cable)
	Nominal section area of core	0.3 ㎜^{2}
	External diameter	Approx.6.0 ㎜
Weight		Approx.350g(without cable)

■ Environmental requirements

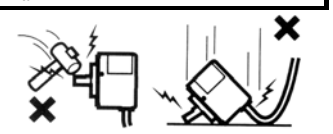
Ambient temperature	Operation temperature:－10～＋70℃ Storage temperature:－25～＋85℃
Ambient humidity	35～85%RH（without condensation）
Withstand voltage	AC500V 1minute *Note 1
Insulation resistance	50MΩ min. (Excluding shield between power supply, signal cable, and case.)
Vibration resistance	Durable for 1h along 3 axes at 10 to 55Hz with 0.75 ㎜ amplitude
Shock resistance	11ms with 490m/s^2 applied 3 times 3 axes, total 18 times
Protection construction	Dust proofed: IP50 Dust and splash proofed: IP65

Note1: Shield cable is connected to the encoder body. The enclosure is connected with 0V through a 630V 0.01μF capacitance.

■ Electrical specifications

Type No.			TRD－2G	
Power source	Power source voltage		5±0.5V DC(Line driver output)	10~30VDC(Totem-pole output)
	Allowable ripple		≤3%rms	
	Current consumption		100mA Max. (without load)	
Signal format			Two-phase A and B＋Phase Z	
Max. response frequency			200kHz	
Electric Max. allowable speed			(Maximum response frequency/Pulse)×60 (The encoder can not respond to revolution faster than the electric maximum allowable speed.)	
Duty ratio			50%±25%	
Phase Shift			25%±12.5%	
Index signal width			100%±50%	
Output	Rise and Fall time		2μs Max. (Cable: 2m, output current : 20mA (resistance load))	
	Output type		Line driver output (26C31 or equivalent)	Totem-pole output
	Output voltage (output current : 20mA (resistance load))	H-level voltage	≥2.5V	≥[(Power source voltage)－4V]
		L-level voltage	≤0.5VDC	≤2VDC
	Output current		30mA max.	

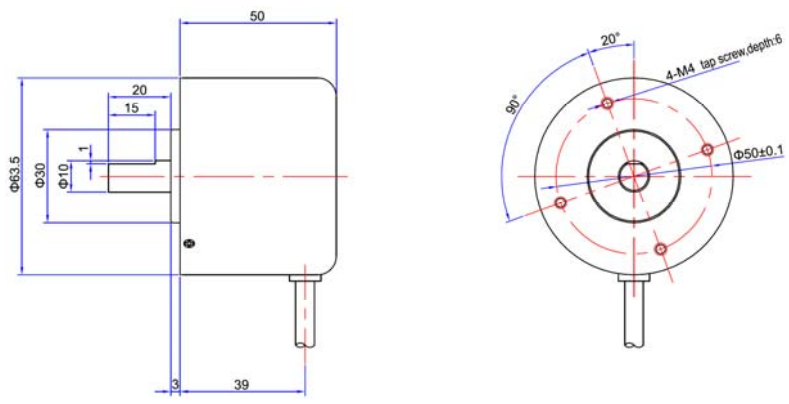
■ Cautions for use



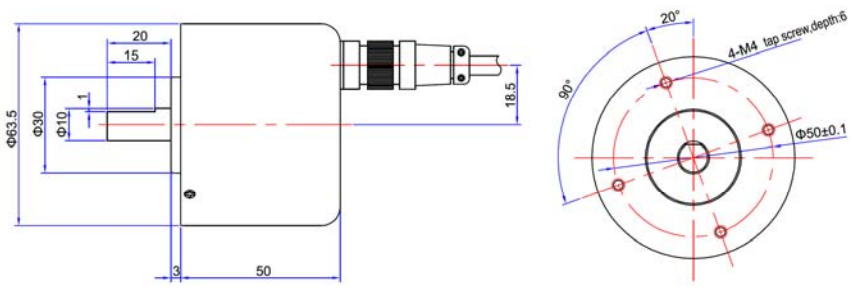
- Do not wire the cable in parallel with other power lines and do not share a duct with other cables.
- Use capacitors or surge absorption elements to remove the sparks caused by relays and switches in the control panel as far as possible.
- Be sure to connect all wires properly, as wrong wiring can 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.
- Use a specified coupling for connecting the encoder shaft and the shaft of a machine to be controlled. Do not squeeze the shaft into the coupling.
- The service life of the bearing is largely affected by the amount of load to the shaft. Try to reduce the load as much as possible.
- Do not disassemble the product. Do not expose the product for a long time to water, even if it is a dust-resistant, jet-proof type. Wipe off any water getting onto 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.

■ External dimensions(Cable length:2m)

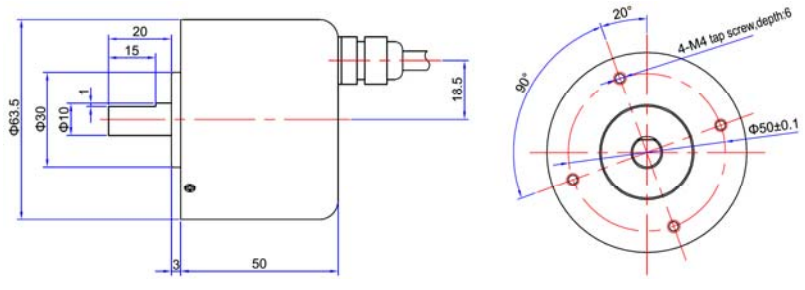
1. Dust proofed with side cable（S type）



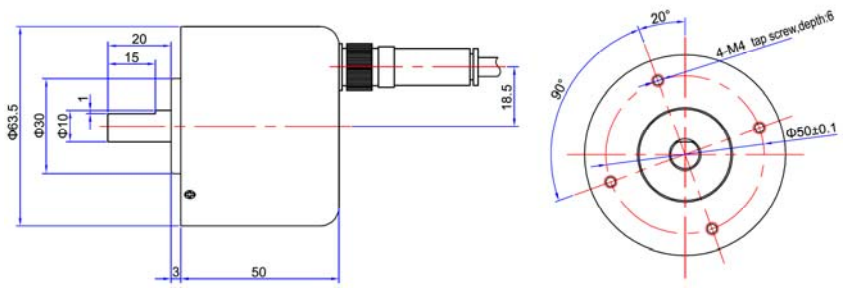
2. Dust and splash proofed with rear cable（W type）



3. Connector with rear cable（C type）

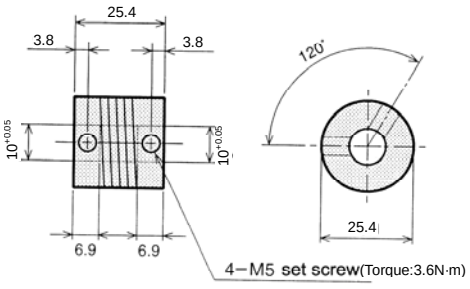


4. Connector /Dust and splash proofed with rear cable（CW type）

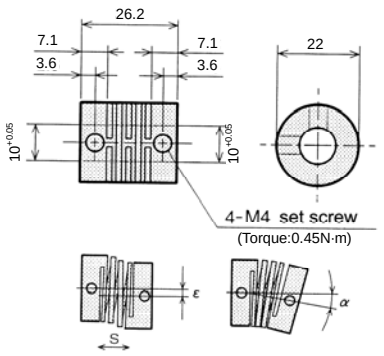


■ Options

RU－100



GJ－10



Type No.	Material	α	ε	s
RU－100	Aluminum alloy（7075）	5° MAX	0.25mmMAX	0.12mmMAX
GJ－10	Glass-fiber reinforced polyacetal resin	5° MAX	0.5mmMAX	0.12mmMAX