Koyo®

Incremental Encoder

Series TRD-NH

Operation Manual

Thank you for purchasing this series TRD-NH Incremental Encoder. Please read this Operation Manual carefully before applying this product.

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KEW-M8167D-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.

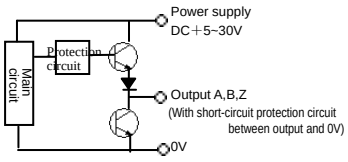
[**Installation and wiring**]

⚠Warning

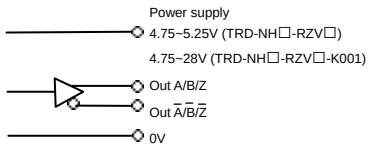
❗	Use only with the power supply voltage listed in the specifications. Otherwise fire, electric shock, or accidents may be caused.
❗	Use only with the wiring and layout specified in the specifications. Otherwise fire, electric shock, or accidents may be caused.
❗	Do not apply any kind of stress to the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

■ Output circuit

Totem-pole output



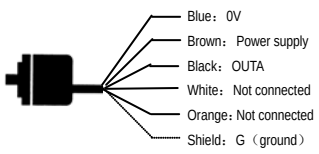
Line driver Output



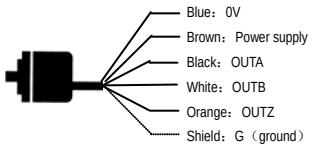
■ Connection

More than 2501P/R, two-phase output type and Line driver output type, a shield wire (GND) is connected to an encoder body FG.
As for other products, a shield wire (GND) does not connect with an encoder body.

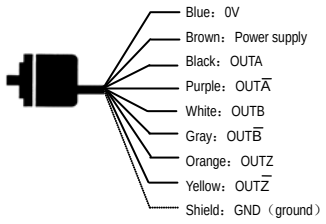
- Single-phase output type: TRD-NH□-S□



- Two-phase output type: TRD-NH□-RZ□/ RZ□L



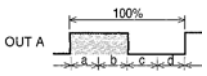
- Line driver output type: TRD-NH□-RZV□/ RZV□-K001



■ Output signal timing chart

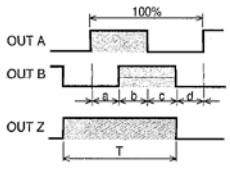
（CW rotation viewed from input-shaft of encoder)

- Single-phase output type: TRD-NH□-S□



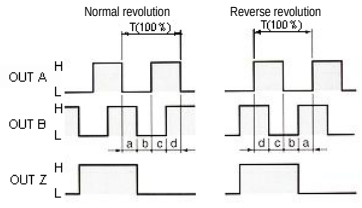
12.5%≦a,b,c,d≦37.5%
50%≦T≦150%

- Two-phase output type: TRD-NH□-RZ□



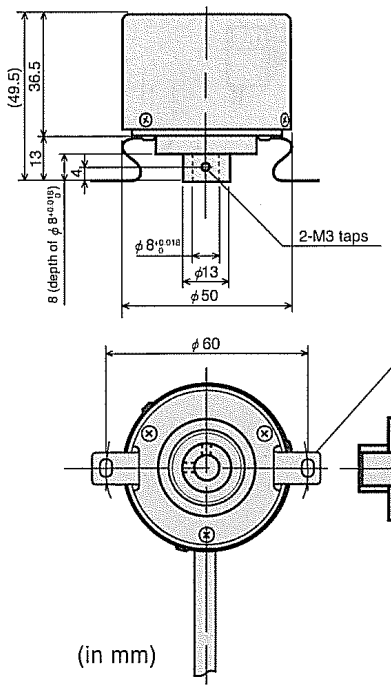
OUT Z phase is reversed on the RZL and RZWL models

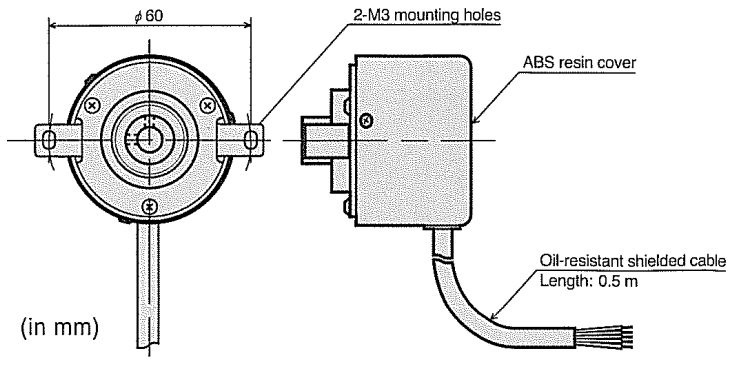
- Line driver output type: TRD-NH□-RZV□/ RZV□-K001



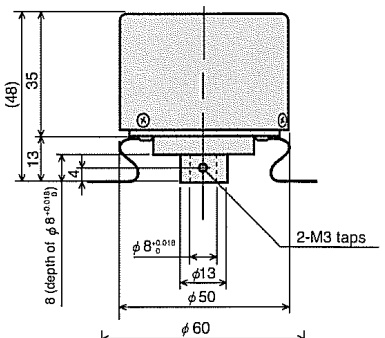
■ External dimensions

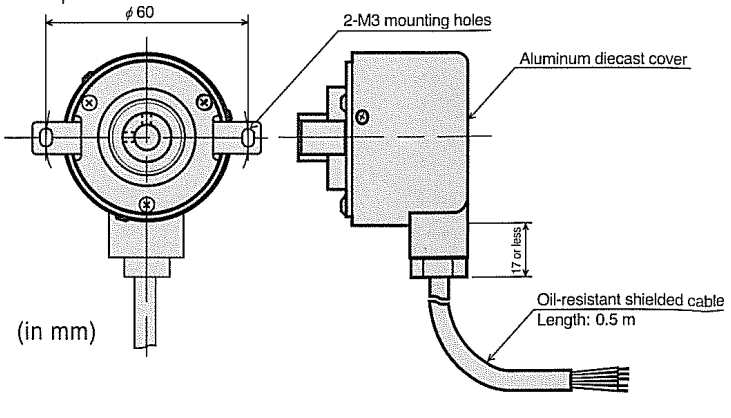
- Dust-proof type: TRD-NH□-S/ RZ/ RZL/ RZV/ RZV-K001





- Dust-resistant, jet-proof type: TRD-NH□-SW / RZW / RZWL / RZVW / RZVW-K001



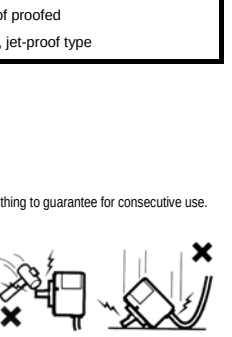


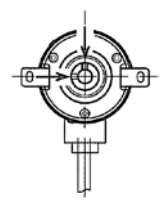
■ Electrical specifications

	Type No.	TRD−NH□−S□	TRD−NH□−RZ□/ RZ□L	TRD−NH□−RZV□	TRD−NH□−RZV□−K001※1
Power supply	Operating voltage	DC4.75V～30V	DC4.75V～30V	DC4.75V～5.25V	DC4.75V～28V
	Allowable ripple	≤3%rms	≤3%rms	≤3%rms	≤3%rms
	Current consumption (no load)	≤40mA	≤60mA	≤60mA	≤40mA
Output waveform	Signal format	Single-phase output	Two-phase output with origin	Two-phase output with origin	Two-phase output with origin
	Max. response frequency	100kHz	100kHz	100kHz(200kHz:about 4096P/R)	100kHz
	Max. response rotating speed	(Maximum response frequency/Pulse)×60	(Maximum response frequency/Pulse)×60	(Maximum response frequency/Pulse)×60	(Maximum response frequency/Pulse)×60
	Duty rate	50±25%	50±25%	50±25%	50±25%
	Origin signal width	—	100±50%	100±50%	100±50%
Output	Rising/falling time※2	≤3μs	≤3μs	≤2μs	≤2μs
	Output configuration	Totem-pole output	Totem-pole output	Line driver output (26C31 or equivalent)	Line driver output (OL7272 or equivalent)
	Output logic	Positive logic (active high)	Positive logic (active high)	Positive logic (active high)	Positive logic (active high)
	Output current Inflow	≤30mA	≤30mA	—	—
	Output current Outflow	≤10mA	≤10mA	—	—
	Output voltage "H"	≥[(Power supply voltage) −2.5V]	≥[(Power supply voltage)−2.5V]	≥2.5V	≥[(Power supply voltage)−4V] (non-loaded)
	Output voltage "L"	≤0.4V	≤0.4V	≤0.5V	≤2V (non-loaded)
	Load power supply voltage	≤DC35V	≤DC35V	—	—
	Short-circuit protection	(With short-circuit protection circuit between output and 0V)		—	—

※1 Only supported by products less than 2500P/R ※2 With a cable of 0.5m

- **Bearing life**





- **Origin position**

Origin output when the set screws are in the positions shown in the figure.

■ Mechanical specifications

Starting torque		Max. 0.003N・m（＋20℃） (0.05N·m for the dust-resistant, jet-proof type.)
Shaft moment of inertia		2×10^{-6} kg・m^2
Max. allowable shaft load		Radial : 50N Thrust : 30N
Max. allowable speed		5000rpm (for the dust-resistant, jet-proof type: 3000rpm continuously and 5000rpm momentarily.)
Cable	Material	Oil-resistant shielded cable※1
	Nominal core cross section	0.3mm^2(Line driver: 0.14mm^2)
	External diameter	Φ6.0mm
Weight（With 0.5m cable.）		Approx. 150g (Approx.200g for the dust-resistant, jet-proof type.)

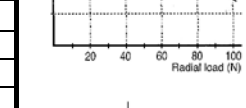
※1: TRD-NH□-S□/ RZ□： 5-core oil-resistant shielded cable
TRD-NH□- RZV□/ RZV□-K001： 8-core oil-resistant shielded cable

※2: Durable for 1h along 3 axes
※3: Applied 3 times 3 axes
} It is an examination condition, and it is not a thing to guarantee for consecutive use.

■ Environmental requirements

Ambient temperature	Operation: −10～＋70℃	
	Store: −25～＋85℃	
Ambient humidity	35～85%RH（non-condensing）	
Withstand voltage	AC500V（50/60Hz）for 1 min	A power supply, signal Line and a case
Insulation resistance	50MΩ min.	Interval. Shield Line does not include it.
Vibration resistance	10～55Hz with 0.75mm amplitude※2	
Shock resistance	~500P/R(metal slit),980m/s^2, 11ms※3 600P/R~(glass slit),490m/s^2, 11ms※3	
Protection construction	IP50: Dust-proof proofed IP65: Dust-resistant, jet-proof type	

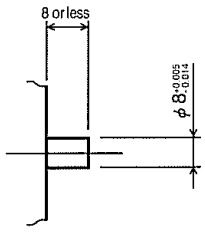
■ Cautions for use

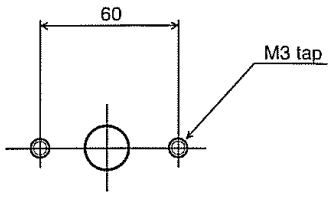


- Do not wire the cable in parallel with other power lines and do not share a duct with other cables.
- Use capacitors or surge absorption elements to remove the sparks caused by relays and switches in the control panel as far as possible.
- Be sure to connect all wires properly, as wrong wiring can 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. 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.

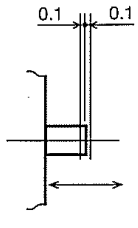
■ Mounting

Shape of the mounting part

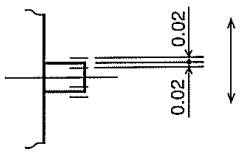




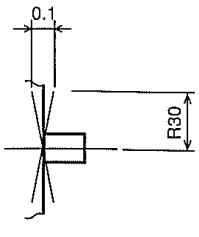
Fluctuation in shaft direction



Fluctuation at a right angle to the shaft



Rectangularity of the mounting surface in regard to the shaft



(in mm)