

Koyo®

Servomotor Dedicated Encoder Series TRD-RV Operation Manual

Thank you for purchasing this series TRD-RV Servomotor Dedicated Encoders. Please read this Operation Manual carefully before applying this product.

PLEASE KEEP 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.

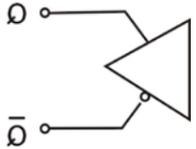
[Installation and wiring]

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

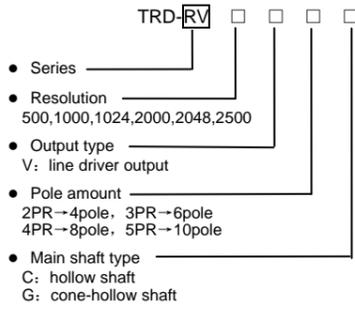


26C31 or equivalent

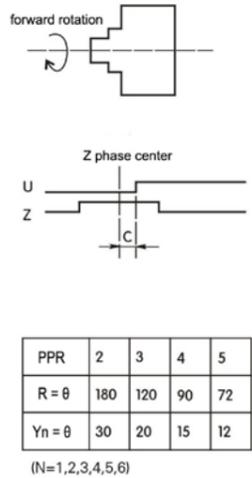
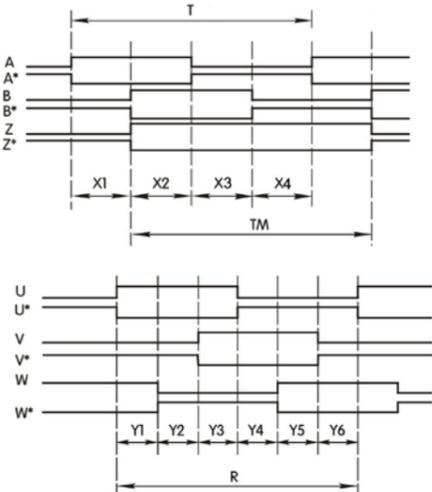
Connection

| Pin number | Signal | Color of cable |
|------------|--------|----------------|
| 1 | 0V | Blue/Red |
| 2 | 5V | Red/Blue |
| 3 | A* | Green |
| 4 | A | Brown |
| 5 | B* | Blue |
| 6 | B | Orange |
| 7 | Z | Black |
| 8 | Z* | Yellow |
| 9 | U* | White/Brown |
| 10 | U | Brown/White |
| 11 | W* | White/Gray |
| 12 | W | Gray/White |
| 13 | V* | Red/Orange |
| 14 | V | Orange/Red |
| 15 | N.C | |

Composition of model number



Output signal timing chart



Division Accuracy

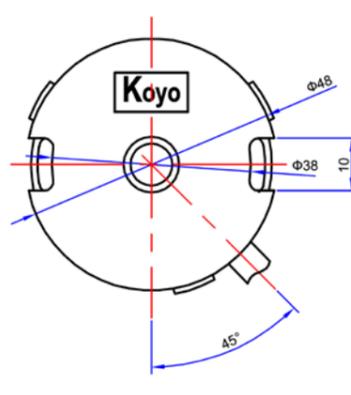
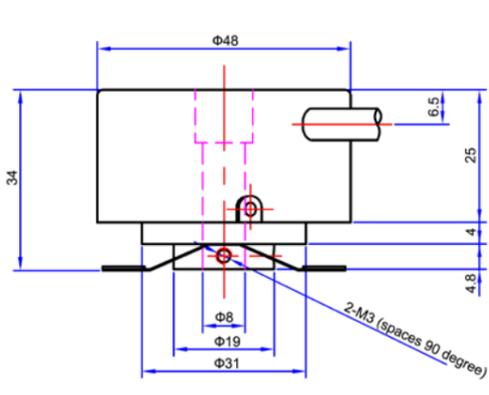
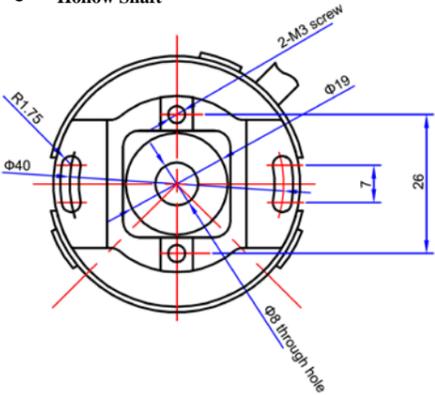
Symmetry(A, B)
 $X1+X2=0.5T \pm 0.1T$
 $X3+X4=0.5T \pm 0.1T$
 Phase shift(A, B)
 $Xn=0.25T \pm 0.1T$
 (n=1,2,3,4)
 Signal width of ch Z
 $TM=1.0T \pm 0.5T$
 Symmetry(U, V, W)
 $R = \theta \pm 1.0^\circ$ mechanical angle
 $Yn = \theta \pm 1.0^\circ$ mechanical angle
 $C = \pm 1.0^\circ$ mechanical angle
 $Y1+Y2+Y3=0.5R \pm 0.03R$
 $Y4+Y5+Y6=0.5R \pm 0.03R$
 $Yn=0.1666R \pm 0.03R$
 (n=1,2,3,4,5,6)

| PPR | 2 | 3 | 4 | 5 |
|---------------|-----|-----|----|----|
| R = θ | 180 | 120 | 90 | 72 |
| Yn = θ | 30 | 20 | 15 | 12 |

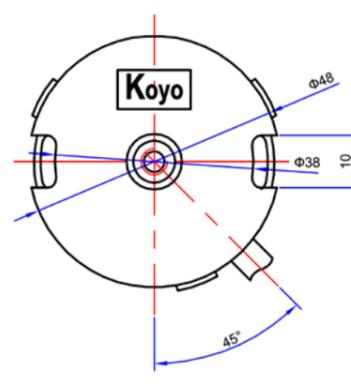
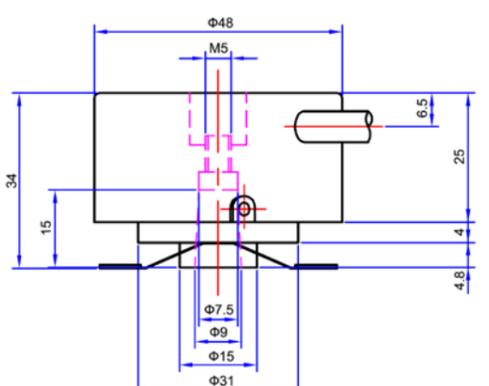
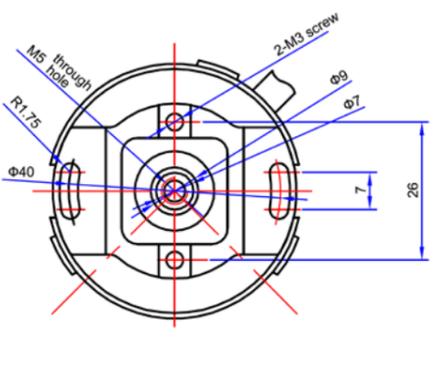
T=360° /N
 N= pulse /revolution

External dimensions (cable length:30cm)

Hollow Shaft



Cone-hollow Shaft



Mechanical specifications

| Starting torque | | Max. 0.01N · m (+20°C) |
|---------------------------|----------------------------|--|
| Shaft moment of inertia | | 30g · cm ² |
| Max. allowable shaft load | Radial | 10N |
| | Thrust | 10N |
| Max. allowable speed | | 7500rpm |
| Cable | Material | Oil-resistant PVC(with shielded cable) |
| | Nominal core cross section | 0.089 mm ² AWG#28 |
| | External diameter | Approx. 7.0 mm |
| Weight | | Approx.82g(cable length 0.3m) |

Environmental requirements

| Ambient temperature | Operation temperature: -20~+100°C Storage temperature: -25~+120°C |
|-------------------------|--|
| Ambient humidity | 35~90%RH (non-condensing) |
| Withstand voltage | AC500V 1minute |
| Insulation resistance | 50MΩ min. |
| Vibration resistance | Durable for 1h along 3 axes at 10 to 2000Hz with 98m/s ² amplitudes |
| Shock resistance | 10~15ms with 1960m/s ² applied 3 times 3 axes |
| Protection construction | IP40 (Prevent the solids larger than 1.0mm) |

Electrical specifications

| Type No. | | TRD-RV |
|-------------------------------|---|--|
| Power supply | Operating voltage | 5±0.5V DC |
| | Allowable ripple | ≤1%rms |
| | Current consumption | 180mA Max. (without load) |
| Signal format | | ABZ phase+UVW phase |
| Output signal | | A, A*, B, B*, Z, Z*, U, U*, V, V*, W, W* |
| 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.) |
| Pulse rising/falling time | | 0.5μs Max. |
| Output | Output waveform | |
| | Rectangle waveform | |
| Output voltage | High-level voltage | ≥2.3VDC |
| | Low-level voltage | ≤0.5VDC |
| Output type | | Line driver output (26C31 or equivalent) |
| ABZ output characteristic | Output code | Incremental |
| | Period wobble | ≤0.1T |
| | Duty ratio | 50%±10% |
| | Phase shift | 25%±10% |
| | Signal width at home position | 100%±50% |
| UVW output characteristic | magnetic pole amount | 2P, 3P, 4P, 5P |
| | Flutter | ≤0.03R |
| | Period (4P) | 90° ± 1.0° |
| | Phase Shift (4P) | 15° ± 1.0° |
| | Output position "C"(The rising edge of channel U is aligned to the center of index channel Z) | ± 1.0° (mechanical angle) |

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.
- 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.

