ROTARY ENCODERS

TRD-N / NH Series Incremental Encoder

Features

- Small body with 50 mm diameter and 35 mm depth
- Protection options to meet environmental requirements
  Dust and splash proofed (IP65) aluminum diecast casing
- Resolution ranging from 1 to 2,500 P/R
- ø8 mm thick reinforced stainless steel shaft
- Operating voltage ranging from 4.75 to 30 VDC
- Servo mounting is available for easy installation

List of Model Numbers

Type	Appearance	Model Number	Output	Pulse / Revolution
Dust proofed ABS plastic cover		TRD-N□-S	One-phase	1, 3, 4, 5, 10, 20, 30, 60, 100, 120, 200, 300, 360, 500, 600, 1000
		TRD-N□-RZ	Two-phase with home position in normal operation	3, 4, 5, 10, 20, 30, 40, 50, 60, 100, 120, 200, 240, 250, 300, 360, 400, 480, 500, 600, 750, 1000, 1200, 2000, 2500
		TRD-N□RZL	Two-phase with home position in reverse operation	
Dust and splashproofed Aluminium die-cast cover		TRD-N□SW	One-phase	1, 3, 4, 5, 10, 20, 30, 60, 100, 120, 200, 300, 360, 500, 600, 1000
		TRD-N□RZW	Two-phase with home position in normal operation	3, 4, 5, 10, 20, 30, 40, 50, 60, 100, 120, 200, 240, 250, 300, 360, 400, 480, 500, 600, 750, 1000, 1200, 2000, 2500
		TRD-N□RZWL	Two-phase with home position in reverse operation	
Dust proof hollow shaft ABS plastic cover		TRD-NH□S	One-phase	1, 3, 4, 5, 10, 20, 30, 60, 100, 120, 200, 300, 360, 500, 600, 1000
		TRD-NH□RZ	Two-phase with home position in normal operation	3, 4, 5, 10, 20, 30, 40, 50, 60, 100, 120, 200, 240, 250, 300, 360, 400, 480, 500, 600, 750, 1000, 1200, 2000, 2500
		TRD-NH□RZL	Two-phase with home position in reverse operation	
Dust and splashproofed Hollow shaft Aluminium die-cast cover		TRD-NH□SW	One-phase	1, 3, 4, 5, 10, 20, 30, 60, 100, 120, 200, 300, 360, 500, 600, 1000
		TRD-NH□RZW	Two-phase with home position in normal operation	3, 4, 5, 10, 20, 30, 40, 50, 60, 100, 120, 200, 240, 250, 300, 360, 400, 480, 500, 600, 750, 1000, 1200, 2000, 2500
		TRD-NH□RZWL	Two-phase with home position in reverse operation	

Model Numbering System

TRD-N □ -RZ W L - □

- Series
  N : Shaft
  NH : Hollow shaft
- Pulse/revolution
- Output signal
  S : One-phase
  RZ : Two-phase with home position in normal operation
- Protection
  Blank : Dust proofed (IP50)
  W : Dust and splash proofed (IP65)
- Home position reverse operation symbol
  If output signal is RZ, model numbers with "L" are home position reverse operation type.
- (Available options)

TRD-N / NH Series

Pulse and Frequencies

Pulse / Revolution		1	3	4	5	10	30	40	50	60	100	120	200	240	250	300	360	400	480	500	600	750	1000	1200	2000	2500
Max. response frequency (kHz)*		0.08	0.25	0.33	0.41	0.8	2.5	3.3	4.1	4.9	8.3	9.9	16	19	20	24	29	33	39	41	49	62	83	100	100	100
Applicable models	TRD-N□-S□	●	●	●	●	●	●			●	●	●	●			●	●			●	●		●			
	TRD-NH□-S□																									
	TRD-N□-RZ□		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	TRD-NH□-RZ□																									
	TRD-N□-RZL		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	TRD-NH□-RZL																									
	TRD-N□-RZWL		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	TRD-NH□-RZWL																									

* Maximum response frequency is defined by the the following formula : Maximum revolution speed = (Maximum response frequency / Pulse) x 60
The encoder does not respond to revolution faster than the maximum speed.

Electrical Specifications

Model Number			TRD-N□-S□ TRD-NH□-S□	TRD-N□-RZ□/TRD-N□-RZ□L TRD-NH□-RZ□/TRD-NH□-RZ□L
Power source	Power source voltage		4.75 to 30 VDC	4.75 to 30 VDC
	Allowable ripple		3% rms max.	3% rms max.
	Current consumption (no load)		40 mA max.	60 mA max.
Output wave form	Output signal type		One phase	Two-phase + home position
	Duty ratio		50 ±25% (square wave)	50 ±25% (square wave)
	Signal width at home position		-	100 ±50%
	Rise / Fall time		3 μs max.	3 μs max.
Output	Output type		Totem-pole	Totem-pole
	Output current	Outflow "H"	10 mA max.	10 mA max.
		Inflow "L"	30 mA max.	30 mA max.
	Output voltage	"H"	[(Load power voltage)-2.5V] min.	[(Load power voltage)-2.5V] min.
		"L"	0.4 V max.	0.4 V max.
	Load power voltage		35 VDC max.	35 VDC max.

Mechanical Specifications

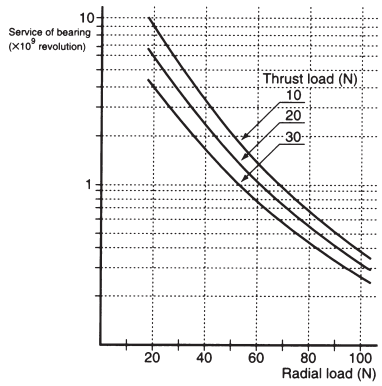
Initial torque	Dust proof: 0.003N•m max. (+20°C), Dust and splash proofed: 0.02N•m max. (+20°C), Hollow shaft: 0.05N•m max. (+20°C)
Moment of inertia	2 x 10^{-6}kg•m²
Allowable load	Radial: 50N
	Thrust: 30N
Maximum allowable speed (Note 1)	5000 rpm (Dust and splash proofed: Continuous: 3000 rpm, Instantaneous: 5000 rpm)
Cable	External diameter ø6 mm 5-wire oil-proof shielded cable Nominal section area of core: 0.3 mm²
Weight	Approx. 150g (Dust and splash proofed: Approx. 200g)

Note 1: Highest speed that can support mechanical integrity of the encoder

Environmental Requirements

Ambient temperature	-10 to +70°C
Storage temperature	-25 to +85°C
Operating humidity	35 to 85% RH (with no condensation)
Withstand voltage	500 VAC (50 Hz/60Hz) for one minute
Insulation resistance	50 MΩ min.
Vibration resistance	Durable for 1 hour along 3 axes at 10 to 55 Hz with 0.75mm amplitude
Shock resistance	Metal slit plate at 500 P/R or less: 11 ms with 981 m/s² Glass slit plate at 600 P/R or more: 11 ms with 490 m/s² Applied 3 times along 3 axes
Protection	IP50: Dust proofed IP65: Dust and splash proofed

Service Life of Bearing



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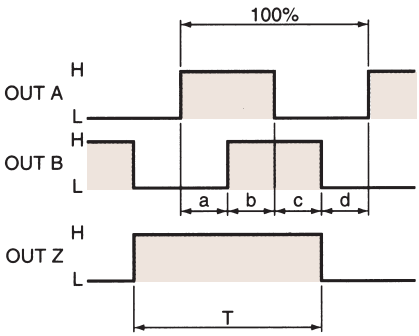
TRD-N / NH Series

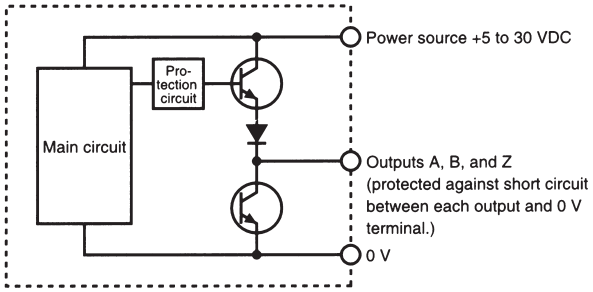
Output Signal Timing Chart



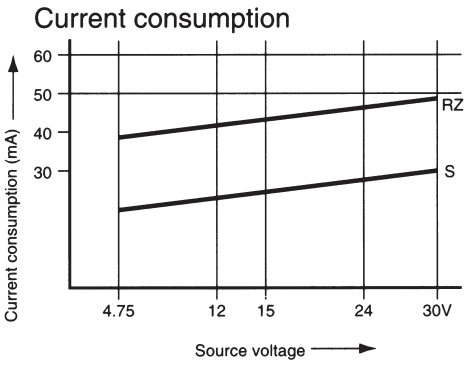
12.5% ≤ a, b, c, d ≤ 37.5%
50% ≤ T ≤ 150%

The above waveforms apply to normal (clockwise) revolution viewed from the shaft. OUT Z phase is reversed on the RZL and RZWL models.

Output Circuit



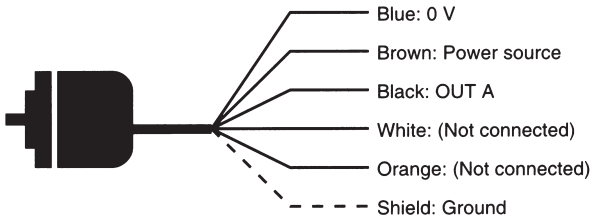
Electrical Characteristics (Typical)



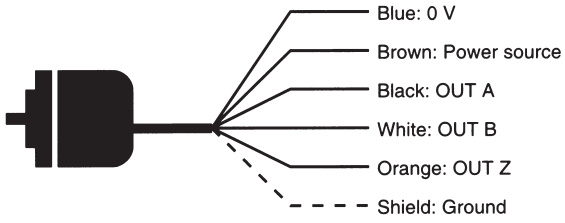
Terminal Assignment

Shielded cable is not connected to the encoder body.

One-phase: TRD-N□-S□
: TRD-NH□-S□



Two-phase with home position: TRD-N□-RZ□/RZ□L
: TRD-NH□N-RZ□/RZ□L

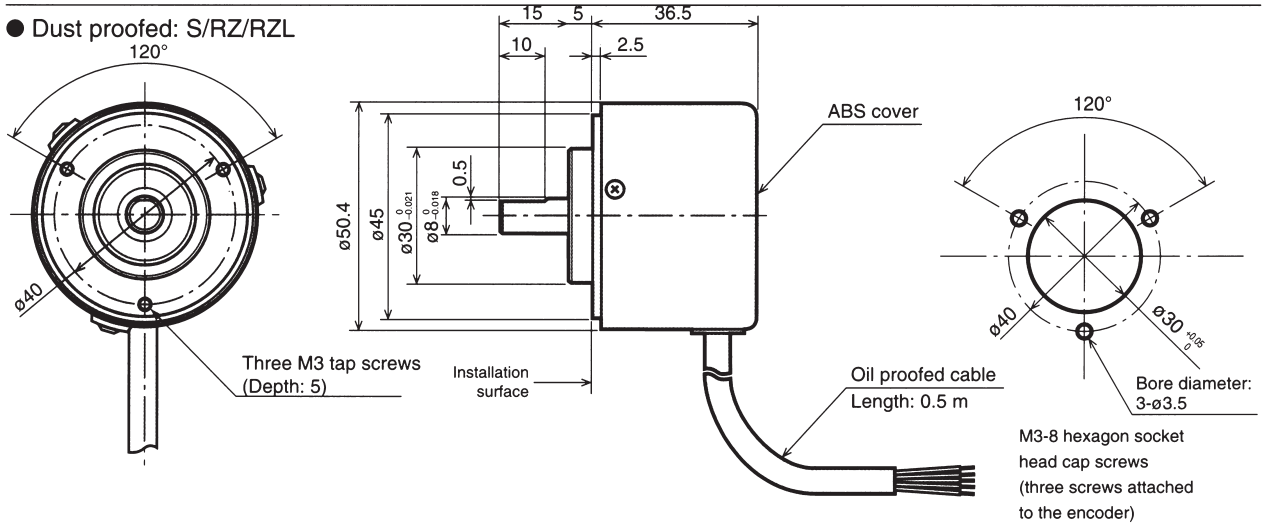


TRD-N / NH Series

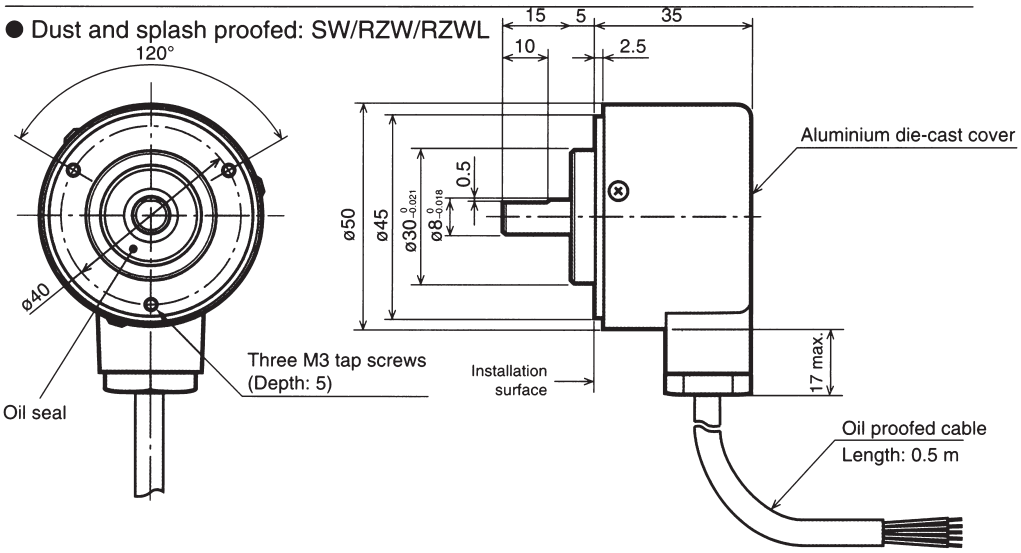
Dimensions TRD-N Series (Shaft Type)

(in mm)

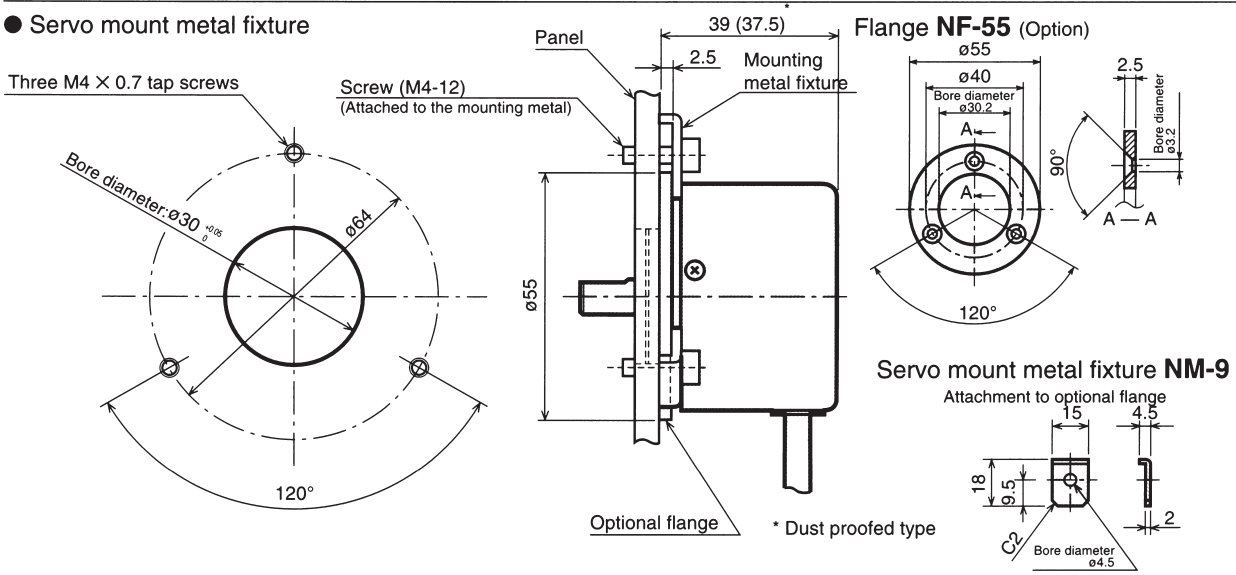
● Dust proofed: S/RZ/RZL



● Dust and splash proofed: SW/RZW/RZWL



● Servo mount metal fixture



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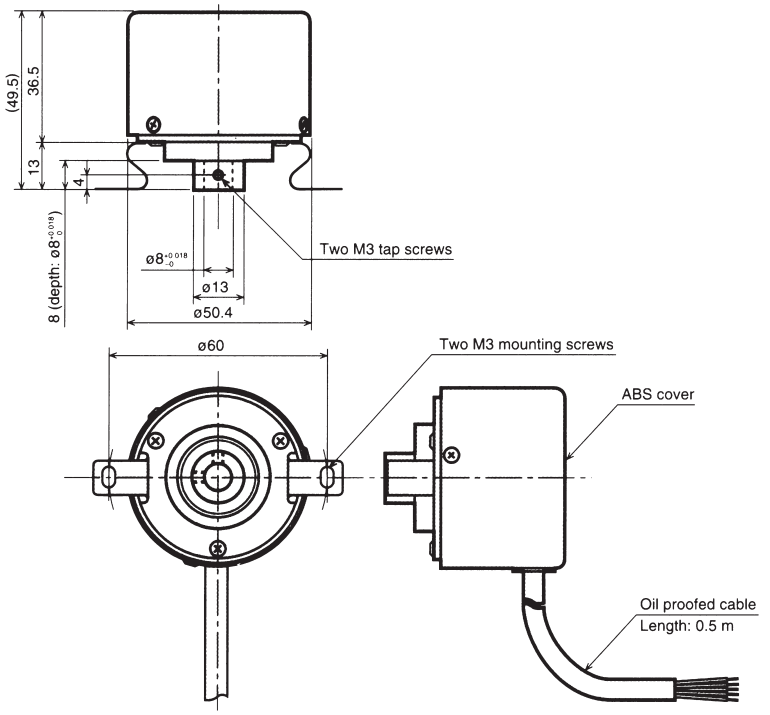
TRD-N / NH Series

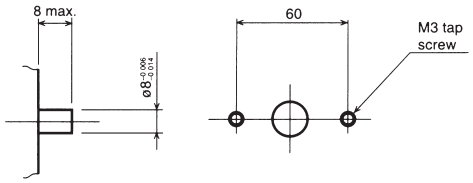
Dimensions TRD-NH Series (Hollow Shaft)

Unit: mm

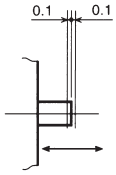
● Dust proofed : **S / RZ / RZL**



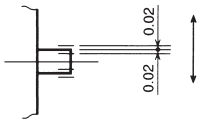
Mounting part



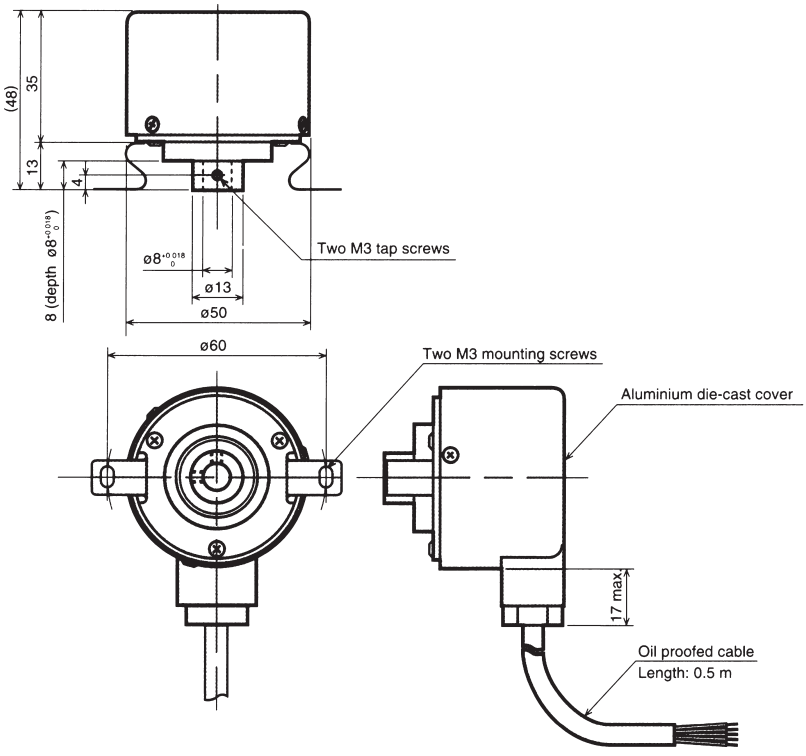
Shaft direction variation



Shaft angle direction variation



● Dust and splash proofed : **SW/RZW/RZWL**



Degree of mounting surface angle over shaft.