Incremental Encoder Series

TRD-N(H)

Operation Manual

Thank you for purchasing this Series TRD-N(H) Incremental Encoder. Please read this Operation Manual carefully before applying this product.

KEEP THIS MANUAL IN A SAFE PLACE.

Sales: 800-633-0405
Tech Support: 770-844-4200

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■ Safety Considerations

When you see the "exclamation mark" icon in the left-hand margin, the paragraph to its immediate right will be a WARNING. This information could prevent injury, loss of property, or even death (in extreme cases).

When you see the "notepad" icon in the left-hand margin, the paragraph to its immediate right will be a special note which presents information that may make your work quicker or more efficient.

WARNINGS: Operating environment and conditions

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.

CAUTIONS: Operating environment and conditions

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.

Read this Operation Manual, and understand this product before using it.

WARNINGS: Installation and Wiring

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 fire or electric shock may be caused.

■ Electrical Specifications

Electrical Specifications			TRD-N(H)xxx-RZWD	TRD-N(H)xxx-RZVWD
Power Supply	Operating voltage *		4.75–30.0 VDC	4.75–5.25 VDC
	Allowable ripple		3% rms max	
	Current consumption (no load)		60mA max	
Output Waveform	Signal waveform		Quadrature output + home position	
	Max response frequency		100kHz	100kHz for ≤ 3000 ppr 200kHz for > 3000 ppr
	Operating speed		(maximum response frequency / resolution) x 60	
	Duty ratio (Symmetry)		50% ±25%	
	Index signal width		100% ±50%	
Output	Rising/falling time **		3µs max	100ns max
	Output configuration		Totem Pole (Push Pull)	Line driver (26C31 or equivalent)
	Output current	Inflow	negative: 30 mA max	positive: 20 mA max
		Outflow	positive: 10 mA max	
	Output voltage	"H"	[power supply V - 2.5V] min	2.5V min
		"L"	0.4V max	0.5V max
	Load power supply voltage		35 VDC max	–
	Short-circuit protection		between each output and 0V	–

** To be supplied by a class II source.*
*** With a cable of 2m or less. Maximum load.*

■ Mechanical Specifications

Mechanical Specifications		
Starting torque	Solid shaft (TRD-N)	Max 0.02 N•m [20°C]
	Hollow shaft (TRD-NH)	Max 0.05 N•m [20°C]
Shaft Moment of Inertia		2.0×10^{-6} kg•m²
Max allowable shaft load	Radial	50N
	Axial	30N
Max allowable speed *		3000 rpm (continuous) 5000 rpm (max)
Cable	Material	Oil-resistant PVC **
	Nominal conductor cross section	0.2 mm²
	External diameter	6.4 mm
Weight		approx 270g [0.6 lb] ***

** Highest speed that can support mechanical integrity of the encoder.*
*** RZWD: 5-conductor shielded cable (24 AWG).*
RZVWD: 8-conductor shielded cable (24 AWG).
**** With 2m cable.*

■ Environmental Specifications

Environmental Conditions			
Ambient Temperature	Operation	-10 to 70 °C [14 to 158 °F]	
	Store	-25 to 85 °C [-13 to 185 °F]	
Ambient Humidity		35 to 85 %RH (non-condensing)	
Withstand Voltage	RZWD *	500 VAC @ 50/60 Hz for 1 minute	withstand voltage is good for power supply, signals, and case; not good for shield wire
	RZVWD *	grounded through capacitor	
Insulation Resistance		50 MΩ min	
Vibration Resistance **		10 to 55 Hz with 0.75 mm half amplitude	
Shock Resistance ***		≤ 500 ppr metal slit 981 m/s² 11 ms	
		≥ 600 ppr glass slit 490 m/s² 11 ms	
Mounting Orientation		can be mounted in any orientation	
Protective Construction		IP65	
Agency Approvals		CE, RoHS, cULus (E189395)	

** RZWD ≥3000 ppr & all RZVWD: A capacitor of 630V is connected between 0V, power supply, and FG (frame ground) lines.*
RZWD <3000 ppr: No connection.
*** Durable for one (1) hour along 3 axes. (Not guaranteed for continuous use.)*
**** Applied 3 times 3 axes. (Not guaranteed for continuous use.)*

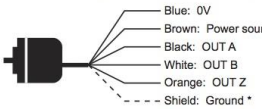
■ WARNINGS for Use

- **Do not wire the cable in parallel with other power lines, and do not share a wiring duct with other cables.**
- **Use capacitors or surge absorption elements to remove the sparks caused by relays and switches in the control panel.**
- **Connect all wires properly. (Incorrect wiring can damage the internal circuitry.)**
- **Erroneous pulses may be caused at the time of power ON and power OFF. After power ON, wait at least a 0.5 second before use.**
- **Do not dissassemble the product.**
- **Use care when handling and mounting the rotary encoder. (It is made of precision components that can be damaged by physical shocks.)**

■ Connections

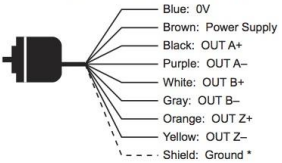
Totem Pole Connections (RZWD)

* ≤ 2500 p/r: Cable shield is NOT connected to the encoder body (frame ground)
* ≥ 3000 p/r: Cable shield is connected to the encoder body (frame ground)



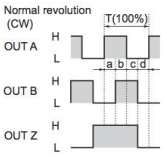
Line Driver Connections (RZVWD)

* ≤ 2500 p/r: Cable shield is NOT connected to the encoder body (frame ground)
* ≥ 3000 p/r: Cable shield is connected to the encoder body (frame ground)



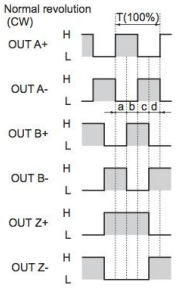
■ Channel Timing Charts

Totem Pole Models (RZWD)



a, b, c, d = 1/4T±1/8T
"Normal" means clockwise revolution viewed from the shaft

Line Driver Models (RZVWD)

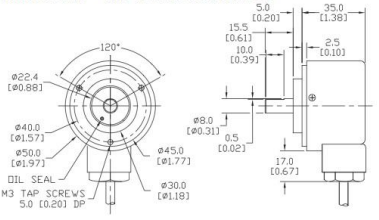


a, b, c, d = 1/4T±1/8T
"Normal" means clockwise revolution viewed from the shaft end

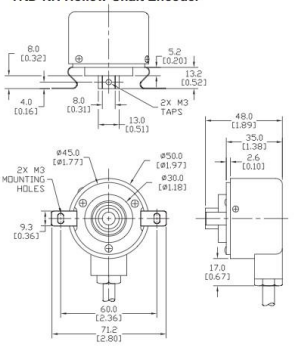
■ Dimensions – (dimensions = mm [in])

Visit www.AutomationDirect.com for drawings of each part number.

■ Dimensions – TRD-N Solid-Shaft Encoder

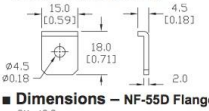


■ Dimensions – TRD-NH Hollow-Shaft Encoder

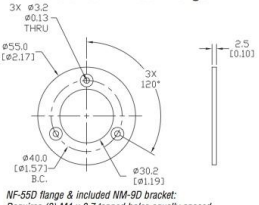


■ Dimensions

NM-9D Mounting Clamp *



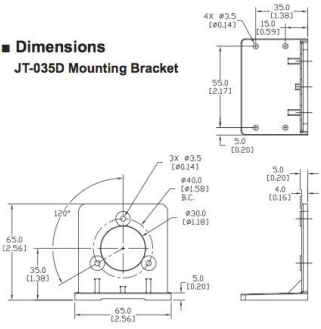
■ Dimensions – NF-55D Flange



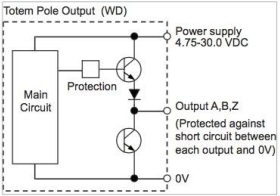
NF-55D flange & included NM-9D bracket: Requires (3) M4 x 0.7 tapped holes equally spaced on a 64 mm bolt circle in the mounting surface.

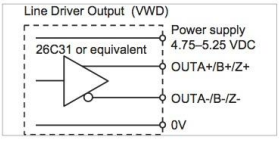
■ Dimensions

JT-035D Mounting Bracket



■ Output Circuits





■ Mounting Screw Information

Mounting Screw Information				
Part #	Quantity	Fastener Type	Size	Tightening Torque
TRD-N	3	socket-head screw	M3 x 0.5 x 9 mm	4.4 lb·in [0.5 N·m]
TRD-NH	0	n/a	n/a	n/a
JT-035D	4	socket-head screw	M3 x 0.5 x 9 mm	*
NF-55D	3	countersink Phillips screw	M3 x 0.5 x 6 mm	4.4 lb·in [0.5 N·m]
	3	socket-head screw	M4 x 0.7 x 12 mm	*
NM-9D	3	countersink Phillips screw	M3 x 0.5 x 6 mm	4.4 lb·in [0.5 N·m]
	3	socket-head screw	M4 x 0.7 x 12 mm	*

** These screws are for mounting the bracket to the customer-provided mounting surface; tightening torque depends upon the mounting surface material.*

■ Index Position