

Incremental Encoder Series

# TRDA-20

## OPERATION MANUAL

Thank you for purchasing this Series TRDA-20 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		TRDA-20R1Nxxx-RZD	TRDA-20R1NxxxVD	
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		
	Max response frequency	100kHz	200kHz	
	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 logic	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	Max 0.003 N·m [20°C]	
Shaft Moment of Inertia	2.0x10 <sup>-6</sup> kg·m <sup>2</sup>	
Max allowable shaft load	Radial	50N
	Axial	30N
Max allowable speed *	5000 rpm	
Cable	Material	Oil-resistant PVC **
	Nominal core cross section	0.2 mm <sup>2</sup>
	External diameter	6.4 mm
Weight	approx 270g [0.6 lb] ***	

\* HIGHEST SPEED THAT CAN SUPPORT MECHANICAL INTEGRITY OF THE ENCODER.  
\*\* RZD: 5-CORE SHIELDED CABLE (24 AWG).  
VD: 8-CORE SHIELDED CABLE (24 AWG).  
\*\*\* WITH 2M CABLE.

### ■ 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 disassemble the product.
- Use care when handling and mounting the rotary encoder. (It is made of precision components that can be damaged by physical shocks.)

### ■ Environmental Specifications

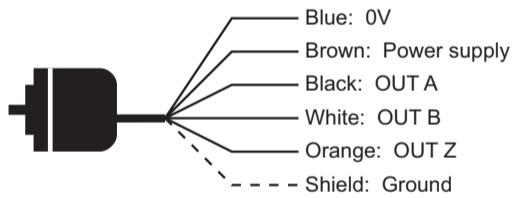
Environmental Conditions		
Ambient Temperature	Operation	-10 to 70 °C [14 to 158 °F]
	Store	-25 to 85 °C [-13 to 185 °F]
Ambient Humidity	35 to 85 %RH (non-condensing)	
Withstand Voltage	RZD	500 VAC @ 50/60 Hz for 1 minute
	VD	grounded through capacitor *
Insulation Resistance	50 MΩ min	withstand voltage is good for power supply, signals, and case; not good for shield wire
Vibration Resistance	10 to 55 Hz with 0.75 mm half amplitude **	
Shock Resistance	~ 500 P/R metal slit 981 m/s <sup>2</sup> 11 ms ***	
	600 P/R ~ glass slit 490 m/s <sup>2</sup> 11 ms ***	
Protective Construction	IP50 (IEC529)	
Mounting Orientation	can be mounted in any orientation	
Agency Approvals	cULus (E189395)	

\* A CAPACITOR OF 630V IS CONNECTED BETWEEN 0V, POWER SUPPLY, AND FG (FRAME GROUND) LINES.  
\*\* DURABLE FOR ONE (1) HOUR ALONG 3 AXES. (NOT GUARANTEED FOR CONTINUOUS USE.)  
\*\*\* APPLIED 3 TIMES 3 AXES. (NOT GUARANTEED FOR CONTINUOUS USE.)

### ■ Connections

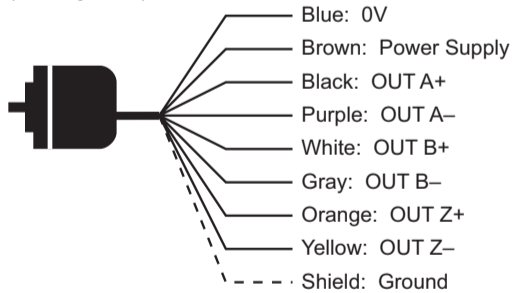
#### Totem Pole Connections

Cable shield is connected to the encoder body (frame ground)

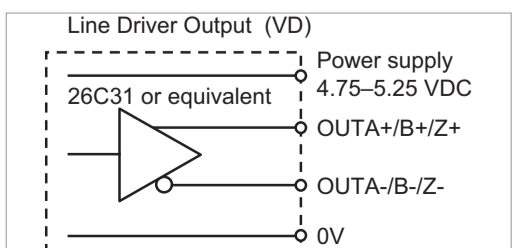
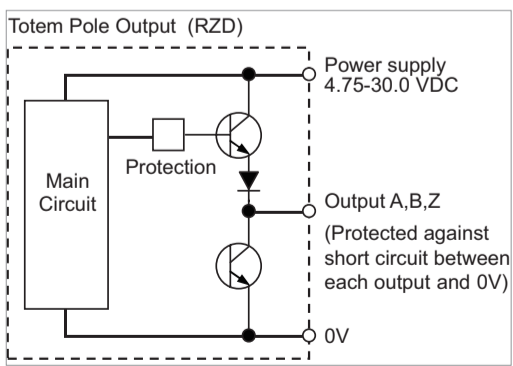


#### Line Driver Connections

Cable shield is connected to the encoder body (frame ground)



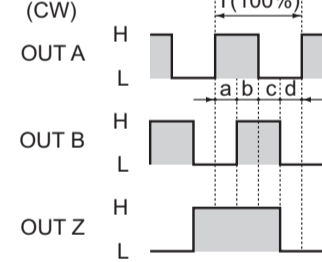
### ■ Output Circuits



### ■ Channel Timing Charts

#### Totem Pole Models (RZD)

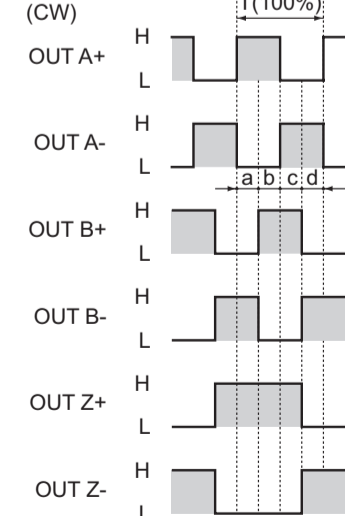
Normal revolution (CW)



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

#### Line Driver Models (VD)

Normal revolution (CW)

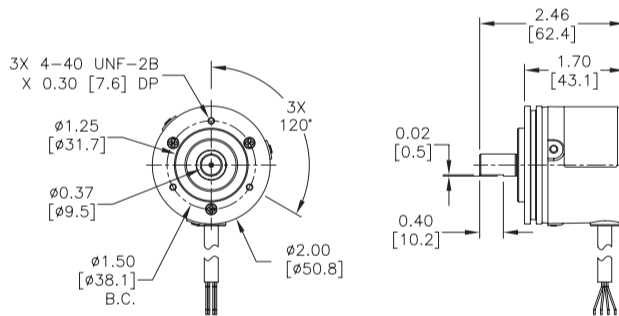


a, b, c, d = 1/4T±1/8T  
"Normal" means clockwise revolution viewed from the shaft

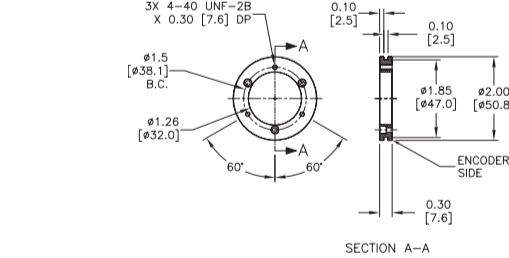
### ■ Dimensions - ( dimensions = in [mm] )

VISIT [WWW.AUTOMATIONDIRECT.COM](http://WWW.AUTOMATIONDIRECT.COM) FOR DRAWINGS OF EACH PART NUMBER.

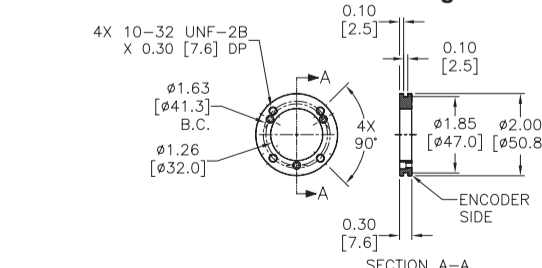
#### ■ Dimensions - TRDA-20R1N Encoder



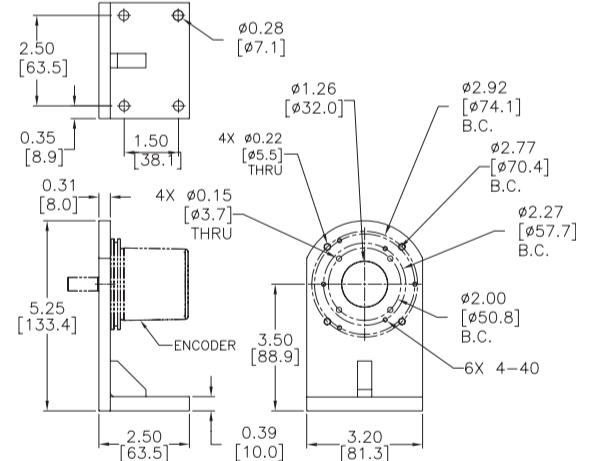
#### ■ Dimensions - TRDA-20R1D Flange



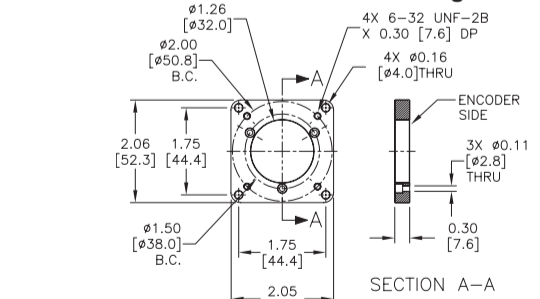
#### ■ Dimensions - TRDA-20R2D Flange



#### ■ Dimensions - LM-001D Bracket (requires TRDA-20SND flange)



#### ■ Dimensions - TRDA-20SND Flange



### ■ Mounting Screw Information

Mounting Screw Information				
Part #	Quantity	Fastener Type	Size	Tightening Torque
LM-001D	4	socket head screw	M6 x 1.00 x 20 mm	26.6 lb-in [3.0 N·m]
TRDA-20R1D	3	Phillips screw	M2.6 x 0.45 x 8 mm	4.0 lb-in [0.45 N·m]
TRDA-20R2D	3	Phillips screw		
TRDA-20SND	3	Phillips screw		

### ■ Index Position

