Absolute Encoder Series

TRD-NA

Operation Manual

Thank you for purchasing this Series TRD-NA Absolute 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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ES-M0220-5

■ 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-NAxxxxNWD
Power Supply	Operating voltage *	10.8–26.4 VDC
	Allowable ripple	3% rms max
	Current consumption	70mA max
Output Waveform	Output code **	Gray binary
	Max response frequency	20kHz
	Operating speed	(Maximum response frequency / resolution) x 60 or 3000 rpm, whichever is less
	Accuracy	(360 / (resolution x 2)) degrees
	Rotation direction***	Normal: clockwise (cw) Reversed: counterclockwise (ccw)
Output	Rising/falling time ****	2.0 µs max (@ 1kΩ load resistance)
	Output configuration	NPN open collector
	Output logic	Negative logic (active low)
	Sinking current	32mA max
	Residual voltage	0.4 V max @ ≤16mA 1.5 V max @ >16mA to 32mA
	Load power supply voltage	35VDC max
	Short-circuit protection	Not protected

**** To be supplied by a class II source.***
***** Resolution: 180 Excess Gray codes: 38***
Resolution: 360 Excess Gray codes: 76
Resolution: 720 Excess Gray codes: 152
****** As viewed looking from the shaft.***
******* With a cable of 2m or less.***

■ Mechanical Specifications

Mechanical Specifications		
Starting torque		0.03 N•m (20°C) max
Shaft Moment of Inertia		$2x10^{-6}$ kg•m^2
Max allowable shaft load	Radial	50N
	Axial	30N
Max allowable speed *		3000 rpm (continuous) 5000 rpm (momentary)
Cable conductor size		26 AWG
Weight **		approx 300g [10.6 oz]
M3 screws torque		0.45 N•m [4.0 lb•in]

**** Highest speed that can support mechanical integrity of the encoder.***
***** With 2m cable.***

■ Environmental Specifications

Environmental Conditions		
Ambient Temperature	Operation	-10 to 60 °C [14 to 140 °F]
	Store	-25 to 85 °C [-13 to 185 °F]
Ambient Humidity		25 to 85 %RH (non-condensing)
Insulation Resistance		10MΩ min
Vibration Resistance *		10 to 55 Hz with 0.75 mm half amplitude
Shock Resistance **		11ms with 980 m/s^2
Mounting Orientation		Can be mounted in any orientation
Protective Construction		IP65
Agency Approvals		$_{C}UL_{US}$ (E189395)

**** Durable for one (1) hour along 3 axes. (Not guaranteed for continuous use.)***
***** Applied 3 times 3 axes. (Not guaranteed for continuous use.)***

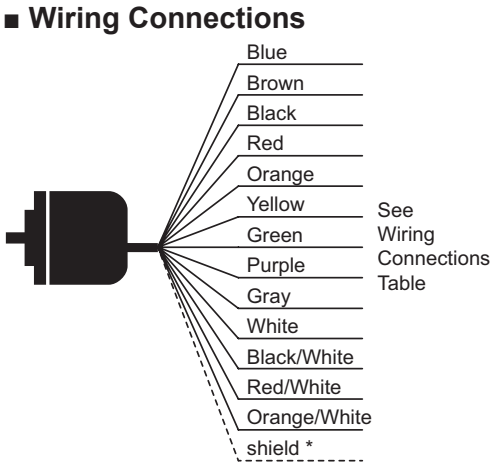
■ WARNINGS for Use

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

Wiring Connections								
Wire color	Pin #	Resolution						
		2048	1024 / 720	512 / 360	256 / 180	128	64	32
Blue	1	0V						
Brown	2	12/24V						
Black	3	bit 0 (2^0) *	bit 0 (2^0) *	no connection				
Red	4	bit 1 (2^1) *	bit 1 (2^1) *	bit 0 (2^0) *	no connection			
Orange	5	bit 2 (2^2) *	bit 2 (2^2) *	bit 1 (2^1) *	bit 0 (2^0) *	no connection		
Yellow	6	bit 3 (2^3) *	bit 3 (2^3) *	bit 2 (2^2) *	bit 1 (2^1) *	bit 0 (2^0) *	no connection	
Green	7	bit 4 (2^4) *	bit 4 (2^4) *	bit 3 (2^3) *	bit 2 (2^2) *	bit 1 (2^1) *	bit 0 (2^0) *	no connection
Purple	8	bit 5 (2^5) *	bit 5 (2^5) *	bit 4 (2^4) *	bit 3 (2^3) *	bit 2 (2^2) *	bit 1 (2^1) *	bit 0 (2^0) *
Gray	9	bit 6 (2^6) *	bit 6 (2^6) *	bit 5 (2^5) *	bit 4 (2^4) *	bit 3 (2^3) *	bit 2 (2^2) *	bit 1 (2^1) *
White	10	bit 7 (2^7) *	bit 7 (2^7) *	bit 6 (2^6) *	bit 5 (2^5) *	bit 4 (2^4) *	bit 3 (2^3) *	bit 2 (2^2) *
Black / White	11	bit 8 (2^8) *	bit 8 (2^8) *	bit 7 (2^7) *	bit 6 (2^6) *	bit 5 (2^5) *	bit 4 (2^4) *	bit 3 (2^3) *
Red / White	12	bit 9 (2^9) *	bit 9 (2^9) * (MSB)	bit 8 (2^8) * (MSB)	bit 7 (2^7) * (MSB)	bit 6 (2^6) * (MSB)	bit 5 (2^5) * (MSB)	bit 4 (2^4) * (MSB)
Orange / White	13	bit 10 (2^{10}) * (MSB)	no connection					
Shield	–	GND **						

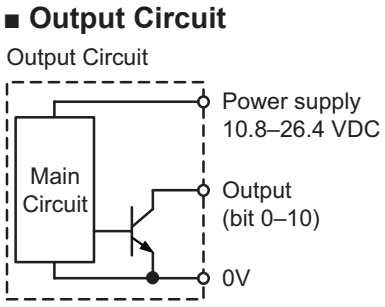
* Numbers in parentheses ( ) are the bits corresponding to binary code.
** GND (cable shield) is not connected to encoder body; the enclosure is grounded through the 0VDC line.

■ Wiring Connections



* Cable shield is not connected to the encoder body; enclosure is grounded through the 0V wire

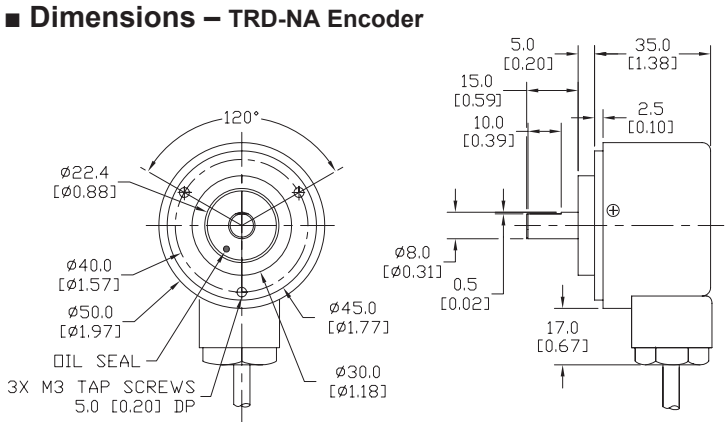
■ Output Circuit



■ Dimensions – (dimensions = mm [in])

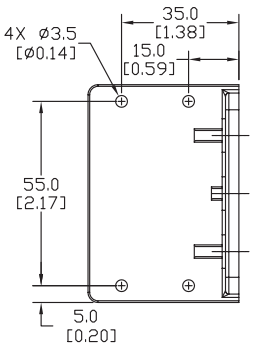
Visit www.AutomationDirect.com for drawings of each part number.

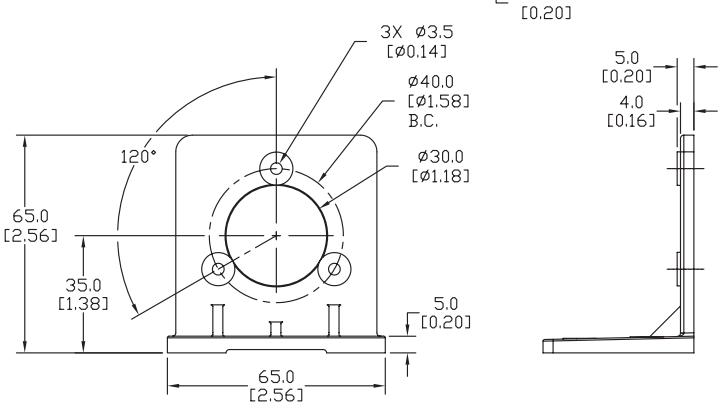
■ Dimensions – TRD-NA Encoder



■ Dimensions

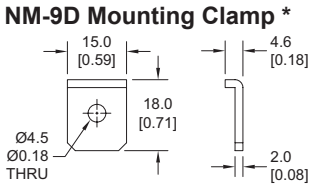
JT-035D Mounting Bracket



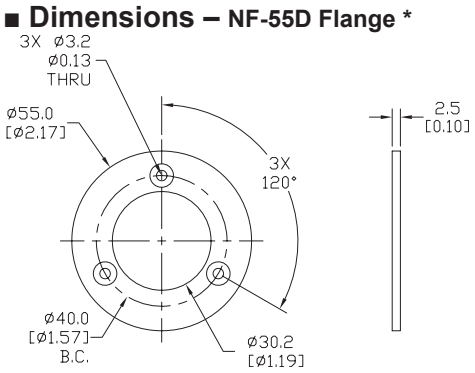


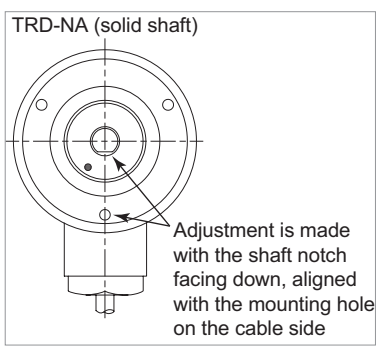
■ Dimensions

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 64mm bolt circle in the mounting surface.

■ Index Position