Medium-duty Absolute Encoders (Metric-dimension Encoders)
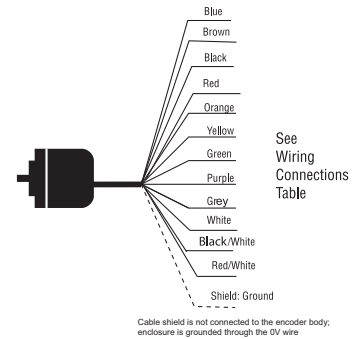
TRD-NA series

Features

Why use an absolute encoder? When power is cycled using an incremental encoder, any positioning information is lost until **home** position is triggered. An absolute encoder uses gray code to describe each position, so position data is not lost when power is cycled. Features include:

- Small body with 50 mm diameter and 35 mm depth
- Splash proof (IP65 rating)
- 8 mm solid shaft
- Absolute resolution available from 32 pulses per revolution to 1024 pulses per revolution
- Open collector output
- Up to 20 kHz response frequency

Standard shaft (TRD-NA) model

Blue
Brown
Black
Red
Orange
Yellow
Green
Purple
Grey
White
Black/White
Red/White
Shield: Ground

See Wiring Connections Table

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

Absolute Medium Duty Solid Shaft Encoders

Part Number	Price	Resolution	Input Voltage	Output	Body Dia.
TRD-NA32NWD	<--->	5 bit gray code, 32 pulses per revolution	10–26 VDC	NPN open collector	50 mm
TRD-NA64NWD	<--->	6 bit gray code, 64 pulses per revolution			
TRD-NA128NWD	<--->	7 bit gray code, 128 pulses per revolution			
TRD-NA180NWD	<--->	8 bit gray code, 180 pulses per revolution			
TRD-NA256NWD	<--->	8 bit gray code, 256 pulses per revolution			
TRD-NA360NWD	<--->	9 bit gray code, 360 pulses per revolution			
TRD-NA512NWD	<--->	9 bit gray code, 512 pulses per revolution			
TRD-NA720NWD	<--->	10 bit gray code, 720 pulses per revolution			
TRD-NA1024NWD	<--->	10 bit gray code, 1024 pulses per revolution			

Wiring Connections

Wire color	Connector Pin No.	1024/720 Resolution	512/360 Resolution	256/180 Resolution	128 Resolution	64 Resolution	32 Resolution
Blue	1	0V	0V	0V	0V	0V	0V
Brown	2	12/24V	12/24V	12/24V	12/24V	12/24V	12/24V
Black	3	bit 1 (2^0)	No connection	No connection	No connection	No connection	No connection
Red	4	bit 2 (2^1)	bit 1 (2^0)	No connection	No connection	No connection	No connection
Orange	5	bit 3 (2^2)	bit 2 (2^1)	bit 1 (2^0)	No connection	No connection	No connection
Yellow	6	bit 4 (2^3)	bit 3 (2^2)	bit 2 (2^1)	bit 1 (2^0)	No connection	No connection
Green	7	bit 5 (2^4)	bit 4 (2^3)	bit 3 (2^2)	bit 2 (2^1)	bit 1 (2^0)	No connection
Purple	8	bit 6 (2^5)	bit 5 (2^4)	bit 4 (2^3)	bit 3 (2^2)	bit 2 (2^1)	bit 1 (2^0)
Gray	9	bit 7 (2^6)	bit 6 (2^5)	bit 5 (2^4)	bit 4 (2^3)	bit 3 (2^2)	bit 2 (2^1)
White	10	bit 8 (2^7)	bit 7 (2^6)	bit 6 (2^5)	bit 5 (2^4)	bit 4 (2^3)	bit 3 (2^2)
Black/white	11	bit 9 (2^8)	bit 8 (2^7)	bit 7 (2^7)	bit 6 (2^5)	bit 5 (2^4)	bit 4 (2^3)
Red/white	12	bit 10 (2^9) (MSB)	bit 9 (2^8) (MSB)	bit 8 (2^7) (MSB)	bit 7 (2^6) (MSB)	bit 6 (2^5) (MSB)	bit 5 (2^4) (MSB)
-	13	Not connected	Not connected	Not connected	Not connected	Not connected	Not connected
Shield*	-	GND	GND	GND	GND	GND	GND

Note: Numbers in parentheses () are the bits corresponding to binary code.

* GND (shielded cable) is not connected to encoder body; the enclosure is grounded through the 0VDC line.

Note: Modules that support absolute encoder signals at high speed (220 Hz) are not currently offered.

Medium-duty Absolute Encoders (Metric-dimension Encoders)

Specifications – TRD-NA series

Electrical Specifications

Model		TRD-NAxxxx-NWD
Power Supply	*Operating Voltage* *	12–24 VDC (nominal) * Range: 10.8–26.4 VDC
	Allowable Ripple	3% rms max.
	Current Consumption	70 mA max.
Output Code		Gray binary (38 gray codes at 180 resolution, 76 at 360 resolution, and 152 at 720 resolution)
Max. Response Frequency		20 kHz (Maximum revolution speed = (max. response frequency / resolution) x 60. The encoder does not respond to revolution faster than the maximum speed.) 300 rpm mechanical maximum
Accuracy		$\dfrac{360}{\text{Resolution x 2}}$ = degree of accuracy
Direction of Rotation		Normal (CW) or reversed (CCW) (When viewed from the shaft, CW is clockwise direction, and CCW is counterclockwise direction)
Rise/Fall Time		2µs max. (at 1kW load resistance and when cable length is 2m or less)
Output	*Output Type*	NPN open collector
	Output Logic	Negative logic (active low)
	Sinking Current	32 mA max.
	Residual Voltage	16 mA or less: 0.4V max. 16 mA → 32 mA: 1.5V max.
	Load Power Voltage	35 VDC max.

* To be supplied by Class II source

Mechanical Specifications

Starting Torque	N (solid shaft): 0.03 N·m [0.27 lb·ft] ; NH (hollow shaft): 0.05 N·m [0.44 lb·ft] at 20 °C [68 °F]
Max. Allowable Shaft Load	Radial: 50N [11.24 lbs] ; Axial: 30N [6.74 lbs]
Max. Allowable Speed	Continuous: 3,000 rpm, instantaneous: 5,000 rpm; (highest speed that can support the mechanical integrity of encoder)
Wire Size	26 AWG
Weight	Approx. 300g (10.58 oz) with 2m cable

Environmental Specifications

Ambient Temperature	–10 to 60 °C [14 to 140 °F]
Storage Temperature	–25 to 85 °C [–13 to 185 °F]
Operating Humidity	25–85% RH (with no condensation)
Insulation Resistance	10MΩ min.
Vibration Resistance	Durable for one hour along three axes at 10 to 55 Hz with 0.75 mm amplitude
Shock Resistance	11 ms with 980 m/s^2 applied three times along three axes
Mounting Orientation	Can be mounted in any orientation
Protection	IP65
Agency Approvals	CE, RoHS, $_c$UL$_{US}$ (E189395)

Accessories

Couplings

For encoders with a solid shaft, please select a coupling that fits your encoder. All couplings are typically in stock, ready to ship.

See the "Encoder Couplings" section for more information.

Mounting Bracket & Clamps

Mounting Accessories

Part #	Price	Description
JT-035D	<--->	Mounting Bracket: Metal; for use with all TRD-N/NH/NA encoders
NM-9D *	<--->	Mounting Bracket: SPCC; for use with all TRD-N/NA encoders *
NF-55D *	<--->	Mounting Flange Kit: includes aluminum flange & NM-9D bracket; for use with all TRD-N/NA encoders *

* Order NF-55D (flange & bracket) for new installations.
Order NM-9D (bracket) for replacement parts only.

JT-035D   NM-9D

NF-55D

Automation Direct

Company Information

Systems Overview

Programmable Controllers

Field I/O

Software

C-more & other HMI

Drives

Soft Starters

Motors & Gearbox

Steppers/ Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Current Sensors

Pressure Sensors

Temperature Sensors

Pushbuttons/ Lights

Process

Relays/ Timers

Comm.

Terminal Blocks & Wiring

Power

Circuit Protection

Enclosures

Tools

Pneumatics

Safety

Appendix

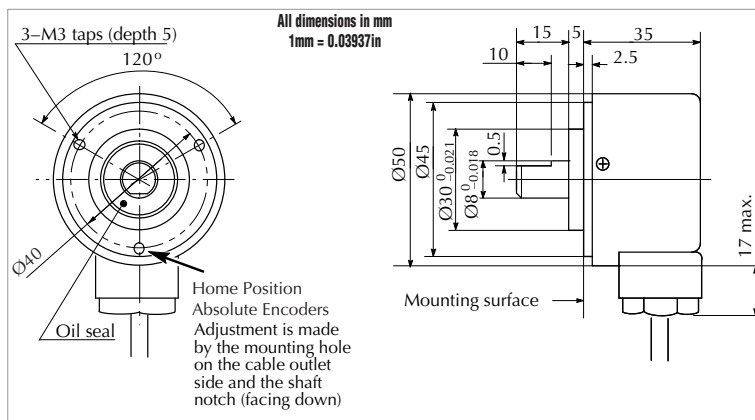Product Index

Part # Index

Medium-duty Absolute and Incremental Encoders (Metric-dimension Encoders)
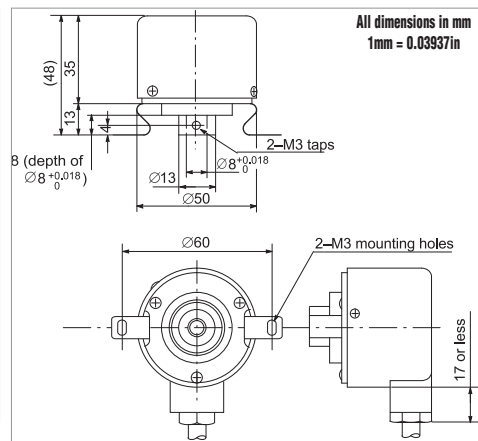
Dimensions – TRD-N(H) & TRD-NA series

The following are the external dimensions of both incremental and absolute medium duty encoders and optional mounting accessories.

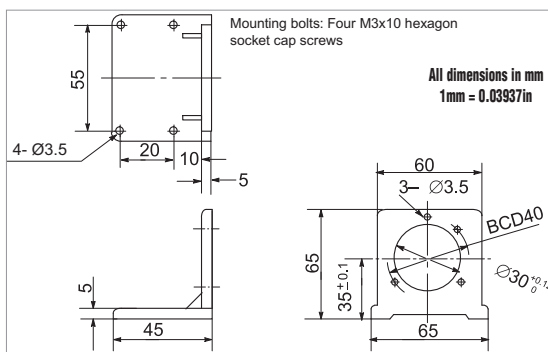### Solid-shaft Incremental and Absolute Encoders (TRD-N, TRD-NA)

All dimensions in mm
1mm = 0.03937in

3–M3 taps (depth 5)
120°

Ø40

Oil seal

Home Position
Absolute Encoders
Adjustment is made by the mounting hole on the cable outlet side and the shaft notch (facing down)

15 5 35
10 2.5

Ø50
Ø45
Ø30 $^{0}_{-0.021}$
Ø8 $^{0}_{-0.018}$
0.5

17 max.

Mounting surface

Hollow-shaft Incremental Encoders only (TRD-NH)

All dimensions in mm
1mm = 0.03937in

(48)
35
13
4

8 (depth of Ø8 $^{+0.018}_{0}$)
Ø13
Ø8 $^{0}_{0}$
Ø50

2–M3 taps

Ø60
2–M3 mounting holes

17 or less

Optional Mounting Flange and Brackets for Medium-duty Encoders

JT-035D (bracket)

Mounting bolts: Four M3x10 hexagon socket cap screws

All dimensions in mm
1mm = 0.03937in

55
4- Ø3.5
20 10
5

60
3– Ø3.5
BCD40
Ø30 $^{+0.12}_{0}$
65
35 $^{+0.1}_{0}$
65

45
5

NF-55D (flange)

3X Ø0.13
[Ø3.2]
THRU

dimensions = in [mm]

3X
120°

0.10
[2.5]

Ø2.17
[Ø55.0]

Ø1.57
[Ø40.0]
B.C.

Ø1.19
[Ø30.2]

NM-9D (clamp)(included with NF-55D)

dimensions = in [mm]

0.59
[15.0]

0.71
[18.0]

Ø0.18
[Ø4.5]
THRU

0.18
[4.5]

0.08
[2.0]
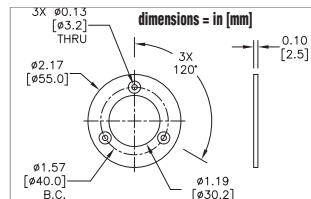
NF-55D flange & included NM-9D bracket: Requires (3) M4 x 0.7 tapped holes equally spaced on a 64 mm bolt circle in the mounting surface.