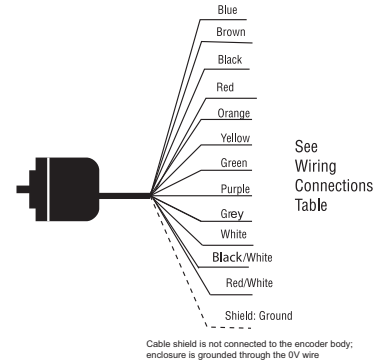# Medium Duty Absolute Encoders

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 standard shaft
- Absolute resolution available from 32 pulses per revolution to 1024 pulses per revolution
- Open collector output
- Up to 100 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

Note: Yellow shaded part numbers are non-stock. Availability may range from four to six weeks.

Absolute Medium Duty Standard Shaft Encoders

Part Number	Resolution	Input Voltage	Output	Body Dia.
TRD-NA32NWD	5 bit gray code, 32 pulses per revolution	10-26 VDC	NPN open collector	50mm
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.

Automation Direct

PLC Overview
DL05/06 PLC
DL105 PLC
DL205 PLC
DL305 PLC
DL405 PLC
Field I/O
Software
C-more HMIs
Other HMI
AC Drives
Motors
Steppers/ Servos
Motor Controls
Proximity Sensors
Photo Sensors
Limit Switches
Encoders
Current Sensors
Pushbuttons/ Lights
Process
Relays/ Timers
Comm.
TB's & Wiring
Power
Circuit Protection
Enclosures
Appendix
Part Index

Medium Duty Absolute Encoders

Electrical Specifications		
Model		TRD-NAxxxx-NWD
Power Supply	**Operating Voltage**	10.8 - 26.4VDC*
	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		20kHz (Maximum revolution speed = (max. response frequency / resolution) x 60. The encoder does not respond to revolution faster than the maximum speed.)
Accuracy		$\dfrac{360}{\text{Resolution} \times 2}$ = 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	16mA
	Residual Voltage	0.4V max.
	Load Power Voltage	30VDC max.

* To be supplied by Class II source

Mechanical Specifications	
Starting Torque	Max. 0.03 Nm (.0022 ft lbs) max. 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	AWG26
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
Protection	IP65: dust and splash proof

Accessories

Couplings

If you selected an encoder with a solid shaft, please select a coupling that fits your encoder. All couplings are in stock, ready to ship.
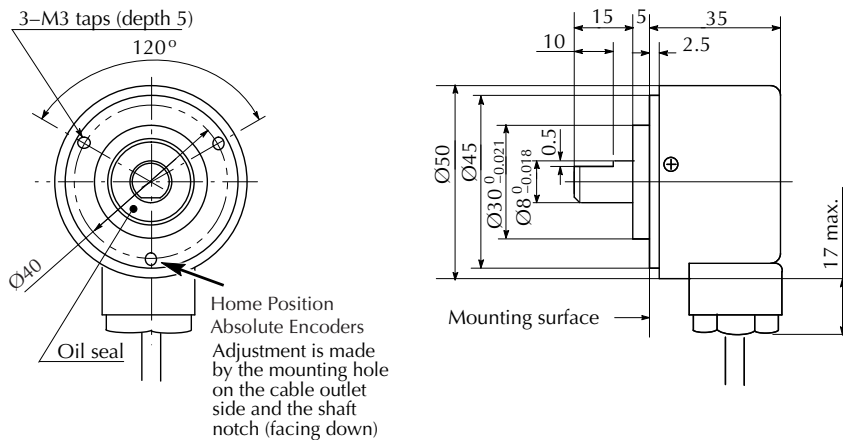
Mounting bracket

JT-035D metal mounting bracket can be used for all TRD-N/NH/NA encoders.
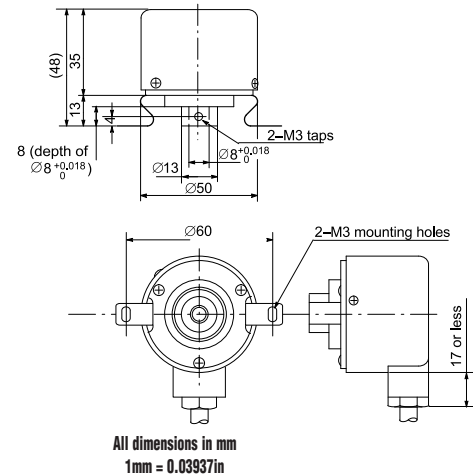
Medium Duty Absolute and Incremental

Dimensions

The following are the external dimensions of both incremental and absolute medium duty encoders and the optional mounting bracket.
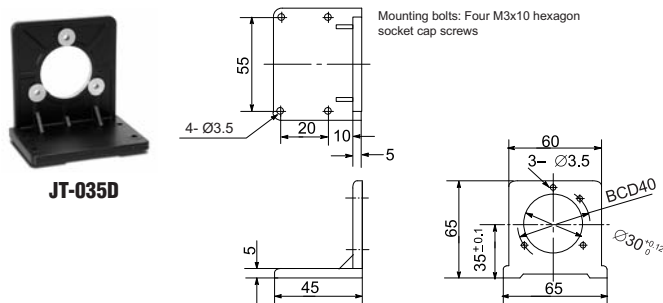
Standard shaft incremental and absolute encoders (TRD-N, TRD-NA)

3−M3 taps (depth 5)
120°

∅40

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

Oil seal

15 5   35
10   2.5

∅50
∅45
∅30 $^{0}_{-0.021}$
∅8 $^{0}_{-0.018}$
0.5

17 max.

Mounting surface

Hollow shaft incremental encoders only (TRD-NH)

(48)
35
13
4

8 (depth of ∅8 $^{+0.018}_{0}$)

∅13
∅8 $^{+0.018}_{0}$
∅50
2−M3 taps

∅60
2−M3 mounting holes

17 or less

All dimensions in mm
1mm = 0.03937in

Optional mounting bracket for all medium duty encoders

JT-035D

Mounting bolts: Four M3x10 hexagon socket cap screws

55
4- ∅3.5   20   10
5
5
45

60
3- ∅3.5
65
35 $^{+0.1}_{0}$
65
BCD40
∅30 $^{+0.12}_{0}$