

# Light Duty Incremental Encoders

## Features

A light-duty encoder is a cost-effective encoder for small applications and has the following features:

- Small body with 38 mm diameter and 30 mm depth
- Dust proof (IP40 rating)
- 6 mm standard shaft or 8 mm hollow shaft
- Resolution available from 100 pulses per revolution to 2500 pulses per revolution
- Open collector or line driver output
- Up to 200 kHz response frequency
- Two-meter cable, tinned ends



**Standard shaft (TRD-S) model**



**Hollow shaft (TRD-SH) model**

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

| Light Duty Standard Shaft Incremental Encoders (NPN Open Collector and Line Driver models) |                       |               |                    |               |      |
|--|-----------------------|---------------|--------------------|---------------|------|
| Part Number  | Pulses per Revolution | Input Voltage | Output             | Body Diameter |      |
| TRD-S100-BD  | 100                   | 12-24 VDC     | NPN open collector | 38mm          |      |
| TRD-S200BD   | 200                   |               |                    |               |      |
| TRD-S250BD   | 250                   |               |                    |               |      |
| TRD-S300BD   | 300                   |               |                    |               |      |
| TRD-S360-BD  | 360                   |               |                    |               |      |
| TRD-S400BD   | 400                   |               |                    |               |      |
| TRD-S500-BD  | 500                   |               |                    |               |      |
| TRD-S600BD   | 600                   |               |                    |               |      |
| TRD-S800BD   | 800                   |               |                    |               |      |
| TRD-S1000-BD   | 1000                  |               |                    |               |      |
| TRD-S1024-BD   | 1024                  |               |                    |               |      |
| TRD-S1200BD  | 1200                  |               |                    |               |      |
| TRD-S2000BD  | 2000                  |               |                    |               |      |
| TRD-S2500-BD   | 2500                  |               |                    |               |      |
| TRD-S100-VD  | 100                   |               |                    |               | 5VDC |
| TRD-S200VD   | 200                   |               |                    |               |      |
| TRD-S250VD   | 250                   |               |                    |               |      |
| TRD-S300VD   | 300                   |               |                    |               |      |
| TRD-S360-VD  | 360                   |               |                    |               |      |
| TRD-S400VD   | 400                   |               |                    |               |      |
| TRD-S500-VD  | 500                   |               |                    |               |      |
| TRD-S600VD   | 600                   |               |                    |               |      |
| TRD-S800VD   | 800                   |               |                    |               |      |
| TRD-S1000-VD   | 1000                  |               |                    |               |      |
| TRD-S1024-VD   | 1024                  |               |                    |               |      |
| TRD-S1200VD  | 1200                  |               |                    |               |      |
| TRD-S2000VD  | 2000                  |               |                    |               |      |
| TRD-S2500-VD   | 2500                  |               |                    |               |      |

| Light Duty Hollow Shaft Incremental Encoders (NPN Open Collector and Line Driver models) |                       |               |                    |               |      |
|--|-----------------------|---------------|--------------------|---------------|------|
| Part Number  | Pulses per Revolution | Input Voltage | Output             | Body Diameter |      |
| TRD-SH100-BD   | 100                   | 12-24 VDC     | NPN open collector | 38mm          |      |
| TRD-SH200BD  | 200                   |               |                    |               |      |
| TRD-SH250BD  | 250                   |               |                    |               |      |
| TRD-SH300BD  | 300                   |               |                    |               |      |
| TRD-SH360-BD   | 360                   |               |                    |               |      |
| TRD-SH400BD  | 400                   |               |                    |               |      |
| TRD-SH500-BD   | 500                   |               |                    |               |      |
| TRD-SH600BD  | 600                   |               |                    |               |      |
| TRD-SH800BD  | 800                   |               |                    |               |      |
| TRD-SH1000-BD  | 1000                  |               |                    |               |      |
| TRD-SH1024BD   | 1024                  |               |                    |               |      |
| TRD-SH1200BD   | 1200                  |               |                    |               |      |
| TRD-SH2000BD   | 2000                  |               |                    |               |      |
| TRD-SH2500-BD  | 2500                  |               |                    |               |      |
| TRD-SH100-VD   | 100                   |               |                    |               | 5VDC |
| TRD-SH200VD  | 200                   |               |                    |               |      |
| TRD-SH250VD  | 250                   |               |                    |               |      |
| TRD-SH300VD  | 300                   |               |                    |               |      |
| TRD-SH360-VD   | 360                   |               |                    |               |      |
| TRD-SH400VD  | 400                   |               |                    |               |      |
| TRD-SH500-VD   | 500                   |               |                    |               |      |
| TRD-SH600VD  | 600                   |               |                    |               |      |
| TRD-SH800VD  | 800                   |               |                    |               |      |
| TRD-SH1000-VD  | 1000                  |               |                    |               |      |
| TRD-SH1024VD   | 1024                  |               |                    |               |      |
| TRD-SH1200VD   | 1200                  |               |                    |               |      |
| TRD-SH2000VD   | 2000                  |               |                    |               |      |
| TRD-SH2500-VD  | 2500                  |               |                    |               |      |

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

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# Light Duty Incremental Encoders

## Specifications

| Electrical Specifications            |   |   |  |
|--------------------------------------|---|---|--|
| <b>Model</b>                         |   | <b>TRD-Sxxxx-BD</b><br><b>TRD-SHxxxxBD</b><br><b>(open collector)</b> | <b>TRD-Sxxxx-VD</b><br><b>TRD-SHxxxxVD</b><br><b>(line driver)</b> |
| <b>Power Supply</b>                  | <b>Operating Voltage</b>  | 10.8 - 26.4VDC*   | +4.75 - 5.25VDC*   |
|                                      | <b>Allowable Ripple</b>   | 3% max.   | -  |
|                                      | <b>Current Consumption</b>  | 50 mA max.  |  |
| <b>Signal Waveform</b>               |   | Two-phase + home position   |  |
| <b>Max. Response Frequency</b>       |   | 200kHz  |  |
| <b>Duty Ratio</b>                    |   | 50 ± 25%  |  |
| <b>Phase Difference Width</b>        |   | 25 ± 12.5%  |  |
| <b>Signal Width at Home Position</b> |   | 100 ± 50%   |  |
| <b>Output</b>                        | <b>Rise/Fall Time</b>   |   | 1µs max. (when cable length is 1m)                                 |
|                                      | <b>Output Type</b>  |   | NPN open collector output, sinking                                 |
|                                      | <b>Output Logic</b>   |   | Negative logic (active low)  |
|                                      | <b>Output Current</b>   | <b>H</b>  | -  |
|                                      | <b>Output Voltage</b>   | <b>L</b>  | 0.4 V max.   |
|                                      | <b>Influx Current</b>   |   | 30mA max.  |
|                                      | <b>Load Power Voltage</b>   |   | 35 VDC max.  |
| <b>Short-Circuit Protection</b>      |   | Between output and power supply                                       |  |
| * To be supplied by Class II source  |   |   |  |
| Mechanical Specifications            |   |   |  |
| <b>Starting Torque</b>               | Max. 0.001 Nm (.00074 ft./lbs)  |   |  |
| <b>Max. Allowable Shaft Load</b>     | Radial: 20N (4.5 lbs) Axial: 10N (2.25 lbs)                                   |   |  |
| <b>Max. Allowable Speed</b>          | 6000 rpm (highest speed that can support the mechanical integrity of encoder) |   |  |
| <b>Wire Size</b>                     | AWG26   |   |  |
| <b>Weight</b>                        | Approx. 150g (5.3 oz) with 2m cable   |   |  |
| Environmental Specifications         |   |   |  |
| <b>Ambient Temperature</b>           | 10 to 70°C; 14 to 158°F   |   |  |
| <b>Storage Temperature</b>           | -25 to 85°C; -13 to 185°F   |   |  |
| <b>Operating Humidity</b>            | 35-85% RH   |   |  |
| <b>Voltage Withstand</b>             | 500VAC (50/60Hz) for one minute   |   |  |
| <b>Insulation Resistance</b>         | 50MΩ min.   |   |  |
| <b>Vibration Resistance</b>          | Durable for one hour along three axes at 10 to 55 Hz with 0.75 amplitude      |   |  |
| <b>Shock Resistance</b>              | 11 ms with 490 m/s <sup>2</sup> applied three times along three axes          |   |  |
| <b>Protection</b>                    | IP40: dust 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.

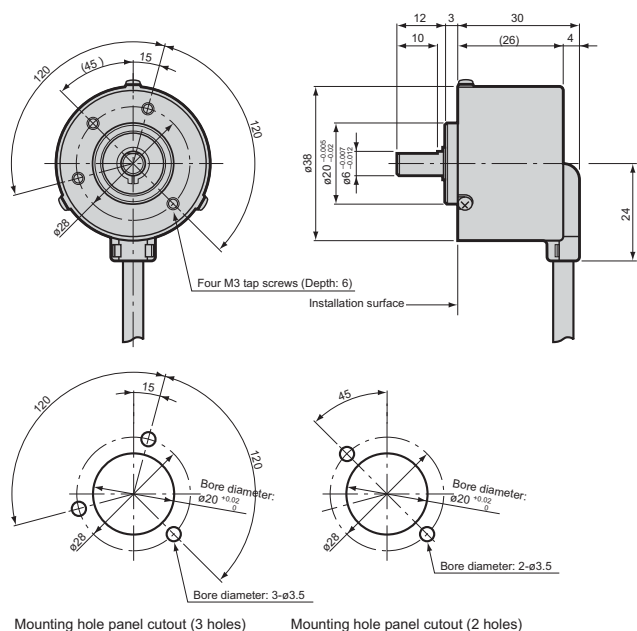
See page 20-16 for more information on couplings.

**Mounting brackets are not available for light-duty encoders.**

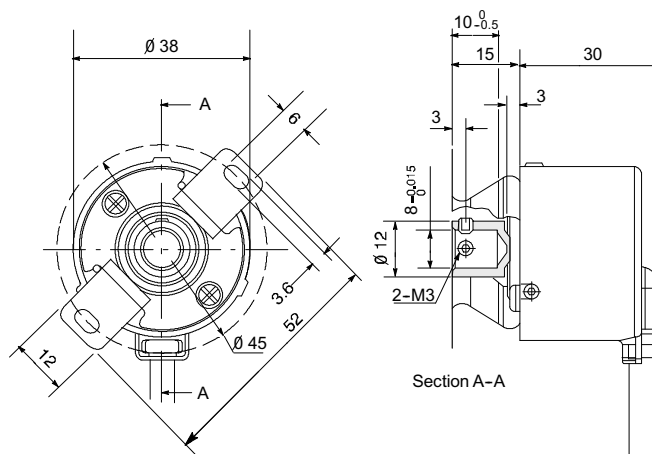
# Light Duty Incremental Encoders

## Dimensions

### Standard shaft models



### Hollow shaft models

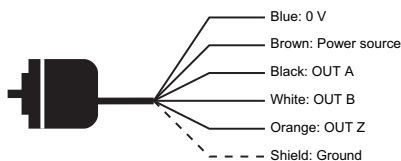


All dimensions in mm  
1mm = 0.03937in

## Wiring diagrams

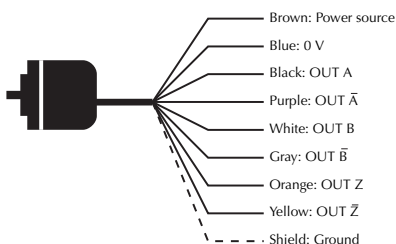
### Open collector connections

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



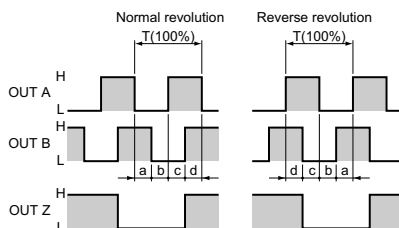
### Line driver connections

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

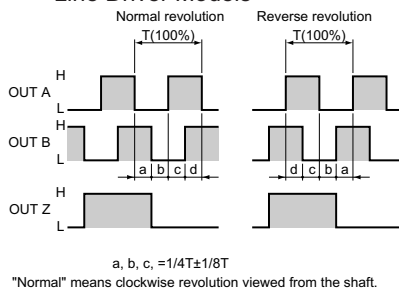


## Channel timing charts

### Open Collector Models



### Line Driver Models



## How to read the timing charts

### Open Collector Models

Out A and Out B are 90 degrees out of phase. Like any quadrature encoder, four unique logic states are created internally to the encoder. This is based on the rising edge to rising edge (one cycle) on channel A or B that indicates one set of bars on the internal encoder disk has passed by the optical sensor.

OUT Z is the absolute reference added to an incremental encoder and is also known as home position. It signifies a full rotation of the encoder disk.

### Line Driver Models

Channel A (OUT A and A-not) and Channel B (OUT B and B-not) are also 90 degrees out of phase on line driver encoders. OUT Z is the same as on open collector models, and is the absolute reference (home position). It signifies one full rotation of the encoder.

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