

Light Duty Incremental Encoders (Metric Dimension Encoders)

TRD-S(H) series

Features

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

- Small body with 38 mm diameter and 30 mm depth
- Dust proof (IP40 rating)
- 6 mm solid 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



Solid-shaft (TRD-S) model



Hollow-shaft (TRD-SH) model

Light Duty Solid Shaft Incremental Encoders (NPN Open Collector and Line Driver models)					
Part Number	Price	Pulses per Revolution	Input Voltage	Output	Body Diameter
TRD-S100AD	<--->	100	5-12 VDC	NPN open collector	38mm
TRD-S360AD	<--->	360			
TRD-S500AD	<--->	500			
TRD-S1000AD	<--->	1000			
TRD-S1024AD	<--->	1024			
TRD-S2500AD	<--->	2500			
TRD-S100-BD	<--->	100	12–24 VDC	NPN open collector	
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	Line driver (differential)	
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	Price	Pulses per Revolution	Input Voltage	Output	Body Diameter
TRD-SH100AD	<---	100	5-12 VDC	NPN open collector	38mm
TRD-SH360AD	<---	360			
TRD-SH500AD	<---	500			
TRD-SH1000AD	<---	1000			
TRD-SH1024AD	<---	1024			
TRD-SH2500AD	<---	2500			
TRD-SH100-BD	<---	100	12-24 VDC	NPN open collector	
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	Line driver (differential)	
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			

Light Duty Incremental Encoders (Metric Dimension Encoders)

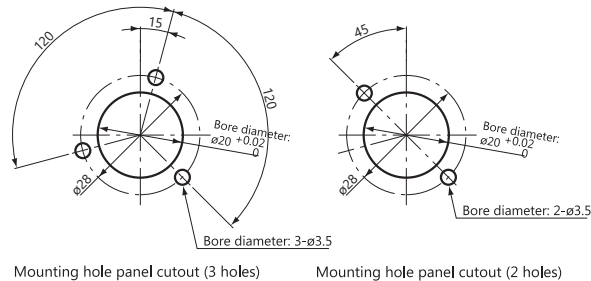
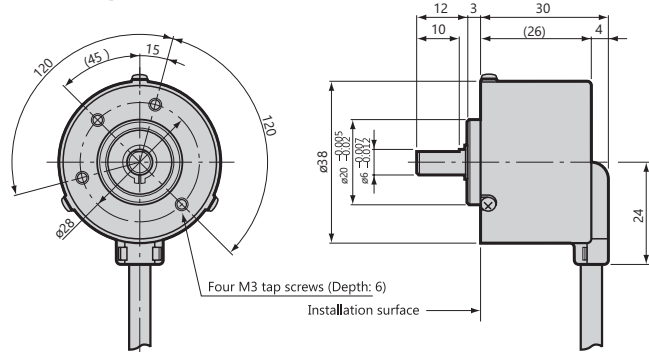
Specifications – TRD-S(H) series

Electrical Specifications				
Model		TRD-SxxxxAD TRD-SHxxxxAD (open collector)	TRD-Sxxxx-BD TRD-SHxxxxBD (open collector)	TRD-Sxxxx-VD TRD-SHxxxxVD (line driver)
Power Supply	Operating Voltage *	5–12 VDC (nominal) * Range: 4.75–13.2 VDC	12–24 VDC (nominal) * Range: 10.8–26.4 VDC	5VDC (nominal) * Range: 4.75–5.25 VDC
	Allowable Ripple	3% max.		
	Current Consumption	50 mA max.		
Signal Waveform		Quadrature + home position		
Max. Response Frequency		200kHz		
Operating Speed		(max response frequency / resolution) x 60		
Duty Ratio		50% ±25%		
Phase Difference Width		25% ±12.5%		
Signal Width at Home Position		100 ±50%		
Output	Rise/Fall Time		1µs max. (when cable length is 1m)	–
	Output Type		NPN open collector output, sinking	Line driver output (26C31 or equivalent)
	Output Logic		Negative logic (active low)	Negative logic (active high)
	Output Voltage	H	–	2.5 V min.
		L	0.4 V max.	0.5 V max.
	Current		30mA max.	20 mA max.
	Load Power Voltage		35 VDC max.	–
Short-Circuit Protection		Between output and power supply		
* To be supplied by Class II source				
Mechanical Specifications				
Starting Torque	0.001 Nm (0.00074 ft/lb) max			
Max. Allowable Shaft Load	Radial: 20N (4.5 lb); Axial: 10N (2.25 lb)			
Max. Allowable Speed	6000 rpm (highest speed that can support the mechanical integrity of encoder)			
Wire Size	AWG26			
Mounting Orientation	can be mounted in any orientation			
Weight	approx. 150g (5.3 oz) with 2m cable			
Environmental Specifications				
Ambient Temperature	-10 to 70°C; 14 to 158°F			
Storage Temperature	-25 to 85°C; -13 to 185°F			
Operating Humidity	35–85% RH			
Withstand Voltage	500VAC (50/60Hz) for one minute			
Insulation Resistance	50MΩ min.			
Vibration Resistance	durable for one hour along three axes at 10 to 55 Hz with 0.75 amplitude			
Shock Resistance	11 ms with 490 m/s ² applied three times along three axes			
Protection	IP40			

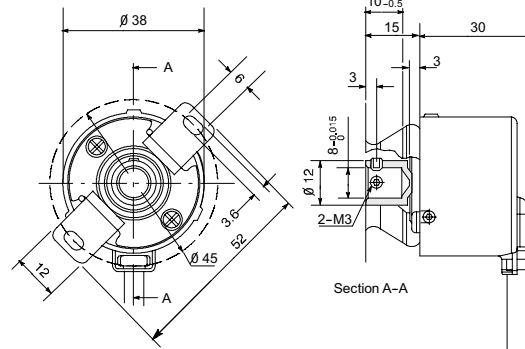
Light Duty Incremental Encoders (Metric Dimension Encoders)

Dimensions – TRD-S(H) series

Solid-shaft models



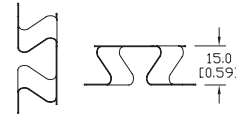
Hollow-shaft models



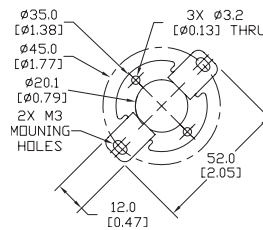
All dimensions in mm
1mm = 0.03937in

Mounting Accessories

Part #	Price	Description
TRD-SH-BKT		Flexible mounting bracket, replacement. For use with Koyo TRD-SH series hollow shaft encoders



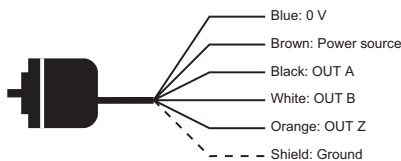
TRD-SH-BKT (bracket)



Wiring diagrams

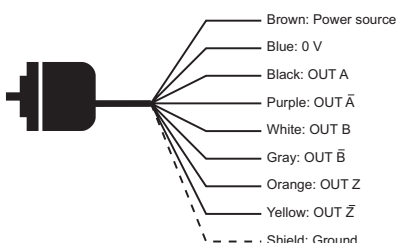
Open collector connections

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



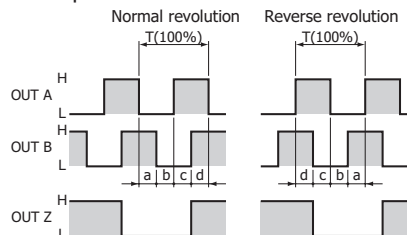
Line driver connections

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

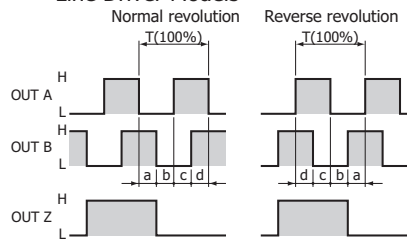


Channel timing charts

Open Collector Models



Line Driver Models



a, b, c, = $1/4T \pm 1/8T$
"Normal" means clockwise revolution viewed from the shaft.

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 shaft.

Line Driver Models

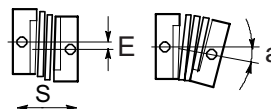
Channel A (OUT A and A-not) and Channel B (OUT B and B-not) are also 90 degrees out of phase on line driver encoders. OUT Z is the same as on open collector models, and is the absolute reference (home position). It signifies one full rotation of the encoder shaft.

Encoder Accessories – Couplings

Encoder Couplings

Couplings provide a connection between solid-shaft encoders and solid shafts. We offer aluminum, fiberglass, and polymer couplings for metric, S.A.E. and metric-to-S.A.E. applications.

Misalignment compensation



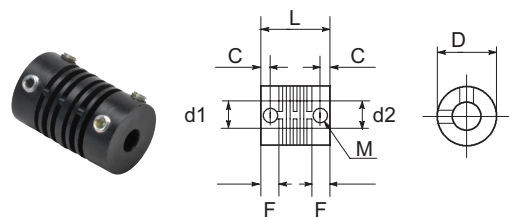
Couplings Selection Guide and Dimensions																
Type	Part Number	Price	Applicable Encoders (shaft size)	Shaft Diameter		D	L	F	C	M	a	E	S	Working Torque	Torsional Rigidity	Material
				d1	d2						max					
						(mm [in])					(mm [in])		(N·m)			
Fiberglass (metric)	GJ-4D	<---	TRD-MX (4mm)	4mm	4mm	13 [0.51]	21 [0.83]	5.3 [0.21]	3 [0.12]	M3 set screw	5°	0.4 [0.02]	0.4 [0.02]	0.6 N·m	6 N·m/rad	Glass-fiber reinforced resin
	GJ-6D	<---	TRD-S (6mm)	6mm	6mm	15 [0.59]	22 [0.87]	5.2 [0.20]	3 [0.12]	M3 set screw	6°	0.5 [0.02]	0.12 [0.005]	0.8 N·m	10 N·m/rad	
	GJ-8D	<---	TRD-N/NA (8mm)	8mm	8mm	19 [0.75]	24 [0.94]	6.8 [0.27]	3.5 [0.14]	M4 set screw	5°	0.5 [0.02]	0.4 [0.016]	1.5 N·m	20 N·m/rad	
	GJ-10D	<---	TRD-GK (10 mm)	10 mm	10 mm	22 [0.87]	26 [1.02]	7.1 [0.28]	4 [0.16]	M4 set screw	5°	0.5 [0.02]	0.12 [0.005]	2.0 N·m	32 N·m/rad	
Fiberglass (SAE)	GJ-635D	<---	TRDA-2E (0.25 in)	0.25 in	0.25 in	15 [0.59]	22 [0.87]	5.2 [0.20]	3 [0.12]	M3 set screw	5°	0.5 [0.02]	0.12 [0.005]	0.8 N·m	10 N·m/rad	Glass-fiber reinforced resin
	GJK-953D	<---	TRDA-20/25 (0.375 in)	0.375 in	0.375 in	25 [0.98]	32 [1.26]	7.3 [0.29]	3.5 [0.14]	M4 set screw	5°	0.5 [0.02]	0.12 [0.005]	2.0 N·m	32 N·m/rad	
Polymer (SAE)	STP-MTRA-SC-1412	<---	TRDA-2E (0.25 in)	0.25 in	0.50 in	25 [0.98]	38 [1.50]	9.9 [0.39]	5.4 [0.21]	M3 cap screw	5°	0.3 [0.01]	0.12 [0.005]	3.7 N·m	0.36 °/lb-in	Engineered polymer
	STP-MTRA-SC-3812	<---	TRDA-20/25 (0.375 in)	0.375 in	0.50 in	25 [0.98]	38 [1.50]	9.9 [0.39]	5.4 [0.21]	M3 cap screw	5°	0.3 [0.01]	0.12 [0.005]	3.7 N·m	0.36 °/lb-in	
Aluminum (metric)	ARM-075-5-4D	<---	TRD-MX (4mm)	4mm	5mm	19.1 [0.75]	19.1 [0.75]	4.6 [0.18]	2.4 [0.09]	M3 set screw	5°	0.25 [0.01]	0.25 [0.01]	2.3 N·m	8.2 N·m/rad	Aluminum alloy
	RU-075D	<---	TRD-S (6mm)	6mm	6mm	19.1 [0.75]	19.1 [0.75]	4.6 [0.18]	2.4 [0.09]	M3 set screw	5°	0.25 [0.01]	0.12 [0.005]	1.0 N·m	8.2 N·m/rad	
	JU-100D	<---	TRD-N/NA (8mm)	8mm	8mm	25.4 [1.00]	25.4 [1.00]	6.6 [0.26]	3.8 [0.15]	M5 set screw	5°	0.25 [0.01]	0.25 [0.01]	1.6 N·m	14.3 N·m/rad	
	RU-100D	<---	TRD-GK (10 mm)	10 mm	10 mm	25.4 [1.00]	25.4 [1.00]	6.6 [0.26]	3.8 [0.15]	M5 set screw	5°	0.25 [0.01]	0.12 [0.005]	1.6 N·m	14.3 N·m/rad	
Aluminum (metric-to-SAE)	ML13P-4-476D	<---	TRD-MX (4mm)	4mm	0.1875 in	13 [0.51]	19 [0.75]	5.5 [0.22]	2.5 [0.10]	M2 set screw	5°	0.4 [0.02]	0.2 [0.01]	0.25 N·m	44 N·m/rad	Aluminum alloy (Bent plate: Polyimide)
	ML16P-4-635D	<---	TRD-MX (4mm) TRDA-2E (0.25 in)	4mm	0.25 in	16 [0.63]	23 [0.91]	7 [0.28]	3 [0.12]	M3 set screw	5°	0.6 [0.02]	0.3 [0.01]	0.4 N·m	70 N·m/rad	
	MCGL16-6-635	<---	TRD-S (6mm) TRDA-2E (0.25 in)	6mm	0.25 in	16 [0.63]	23.2 [0.91]	7 [0.28]	3 [0.12]	M3 set screw	3.5°	0.3 [0.01]	0.3 [0.01]	0.4 N·m	70 N·m/rad	
	MCGL20-8-635	<---	TRD-N/NA (8mm) TRDA-2E (0.25 in)	8mm	0.25 in	20 [0.79]	26 [1.02]	7.5 [0.30]	3.7 [0.15]	M3 set screw	3.5°	0.3 [0.01]	0.4 [0.02]	0.6 N·m	130 N·m/rad	
	MCGL20-8-952	<---	TRD-N/NA (8mm) TRDA-20/25 (0.375 in)	8mm	0.375 in	20 [0.79]	26 [1.02]	7.5 [0.30]	3.7 [0.15]	M3 set screw	3.5°	0.3 [0.01]	0.4 [0.02]	0.6 N·m	130 N·m/rad	
	MCGL25-10-635	<---	TRD-GK (10 mm) TRDA-2E (0.25 in)	10 mm	0.25 in	25 [0.98]	30.2 [1.19]	9 [0.35]	4 [0.16]	M4 set screw	3.5°	0.3 [0.01]	0.5 [0.02]	1.4 N·m	240 N·m/rad	
	MCGL25-10-952	<---	TRD-GK (10 mm) TRDA-20/25 (0.375 in)	10 mm	0.375 in	25 [0.98]	30.2 [1.19]	9 [0.35]	4 [0.16]	M4 set screw	3.5°	0.3 [0.01]	0.5 [0.02]	1.4 N·m	240 N·m/rad	
Aluminum (SAE)	ARM-075-635-635D	<---	TRDA-2E (0.25 in)	0.25 in	0.25 in	19.1 [0.75]	19.1 [0.75]	4.6 [0.18]	2.4 [0.09]	M3 set screw	5°	0.25 [0.01]	0.25 [0.01]	1.0 N·m	8.2 N·m/rad	Aluminum alloy
	ARM-100-9525-9525D	<---	TRDA-20/25 (0.375 in)	0.375 in	0.375 in	25.4 [1.00]	25.4 [1.00]	6.6 [0.26]	3.8 [0.15]	M5 set screw	5°	0.25 [0.01]	0.25 [0.01]	1.6 N·m	14.3 N·m/rad	
* mm ÷ 25.4 = inches																

* mm ÷ 25.4 = inches

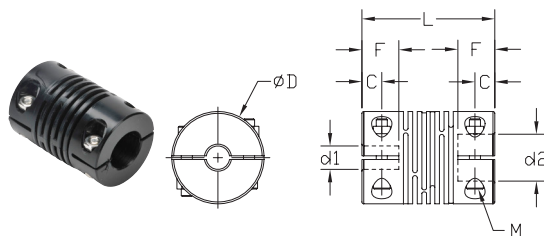
Encoder Accessories – Couplings

Encoder Couplings – Dimensions

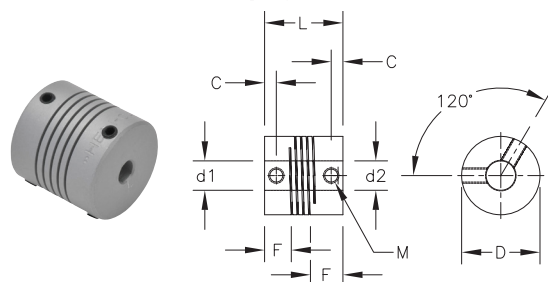
**GJ-xxD Fiberglass Couplings (metric) &
GJx-xxxD Fiberglass Couplings (SAE)**



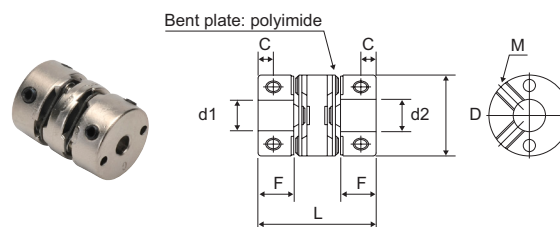
STP-MTRA-SC-xxxx Polymer Couplings



ARM-xxxxxD Aluminum Couplings (metric & SAE)



**MCGLxx Aluminum Couplings &
ML1xP-4-xxxD Aluminum Couplings**



RU-075D, RU-100D, and JU-100D Aluminum Couplings

