

# Light Duty Incremental Encoders (Metric Dimension Encoders)

## TRD-SR series

### Features

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

- Small body available in 38mm or 40mm diameters
- Separate dust proof (IP50 rating) and water resistant (IP65) ratings
- 6 mm solid 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, pigtail
- Mounting dimensions: 2 and 3 hole patterns on 28mm and 30mm diameters



Solid-shaft (TRD-SR) model

TRD-SR Light Duty Solid Shaft Incremental Encoders (NPN Open Collector and Line Driver models)								
Part Number	Price	Pulses per Revolution	Drawing	Input Voltage	Output	Weight	Protection Rating	Body Diameter
<a href="#">TRD-SR100AD</a>	\$98.00	100	<a href="#">PDF</a>	5–26 VDC	NPN open collector	160g with 2m cable	IP50	38mm
<a href="#">TRD-SR200AD</a>	\$98.00	200	<a href="#">PDF</a>					
<a href="#">TRD-SR360AD</a>	\$98.00	360	<a href="#">PDF</a>					
<a href="#">TRD-SR500AD</a>	\$98.00	500	<a href="#">PDF</a>					
<a href="#">TRD-SR600AD</a>	\$98.00	600	<a href="#">PDF</a>					
<a href="#">TRD-SR1000AD</a>	\$98.00	1000	<a href="#">PDF</a>					
<a href="#">TRD-SR1024AD</a>	\$104.00	1024	<a href="#">PDF</a>					
<a href="#">TRD-SR2000AD</a>	\$104.00	2000	<a href="#">PDF</a>					
<a href="#">TRD-SR2500AD</a>	\$104.00	2500	<a href="#">PDF</a>					
<a href="#">TRD-SR100VD</a>	\$98.00	100	<a href="#">PDF</a>					
<a href="#">TRD-SR200VD</a>	\$98.00	200	<a href="#">PDF</a>					
<a href="#">TRD-SR360VD</a>	\$98.00	360	<a href="#">PDF</a>					
<a href="#">TRD-SR500VD</a>	\$98.00	500	<a href="#">PDF</a>					
<a href="#">TRD-SR600VD</a>	\$98.00	600	<a href="#">PDF</a>					
<a href="#">TRD-SR1000VD</a>	\$98.00	1000	<a href="#">PDF</a>					
<a href="#">TRD-SR1024VD</a>	\$104.00	1024	<a href="#">PDF</a>					
<a href="#">TRD-SR2000VD</a>	\$104.00	2000	<a href="#">PDF</a>					
<a href="#">TRD-SR2500VD</a>	\$104.00	2500	<a href="#">PDF</a>					
<a href="#">TRD-SR100AWD</a>	\$131.00	100	<a href="#">PDF</a>	5–26 VDC	NPN open collector	190g with 2m cable	IP65	40mm
<a href="#">TRD-SR200AWD</a>	\$131.00	200	<a href="#">PDF</a>					
<a href="#">TRD-SR360AWD</a>	\$131.00	360	<a href="#">PDF</a>					
<a href="#">TRD-SR500AWD</a>	\$131.00	500	<a href="#">PDF</a>					
<a href="#">TRD-SR600AWD</a>	\$131.00	600	<a href="#">PDF</a>					
<a href="#">TRD-SR1000AWD</a>	\$131.00	1000	<a href="#">PDF</a>					
<a href="#">TRD-SR1024AWD</a>	\$137.00	1024	<a href="#">PDF</a>					
<a href="#">TRD-SR2000AWD</a>	\$137.00	2000	<a href="#">PDF</a>					
<a href="#">TRD-SR2500AWD</a>	\$137.00	2500	<a href="#">PDF</a>					
<a href="#">TRD-SR100VWD</a>	\$131.00	100	<a href="#">PDF</a>					
<a href="#">TRD-SR200VWD</a>	\$131.00	200	<a href="#">PDF</a>					
<a href="#">TRD-SR360VWD</a>	\$131.00	360	<a href="#">PDF</a>					
<a href="#">TRD-SR500VWD</a>	\$131.00	500	<a href="#">PDF</a>					
<a href="#">TRD-SR600VWD</a>	\$131.00	600	<a href="#">PDF</a>					
<a href="#">TRD-SR1000VWD</a>	\$131.00	1000	<a href="#">PDF</a>					
<a href="#">TRD-SR1024VWD</a>	\$137.00	1024	<a href="#">PDF</a>					
<a href="#">TRD-SR2000VWD</a>	\$137.00	2000	<a href="#">PDF</a>					
<a href="#">TRD-SR2500VWD</a>	\$137.00	2500	<a href="#">PDF</a>					

# Light Duty Incremental Encoders (Metric Dimension Encoders)

## TRD-SHR series

### Features

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

- Small body available in 38mm or 40mm diameters
- Separate dust proof (IP50 rating) and water resistant (IP65) ratings
- 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, pigtail
- IP50=45mm Ø mounting pattern (can change to 40mm with SHRS-040D), IP65=40mm Ø mounting pattern



*Hollow-shaft (TRD-SHR) model*

TRD-SHR Light Duty Hollow Shaft Incremental Encoders (NPN Open Collector and Line Driver models)								
Part Number	Price	Pulses per Revolution	Drawing	Input Voltage	Output	Weight	Protection Rating	Body Diameter
<a href="#">TRD-SHR100A5D</a>	\$105.00	100	<a href="#">PDF</a>	5-26 VDC	NPN open collector	170g with 2m cable	IP50	38mm
<a href="#">TRD-SHR200A5D</a>	\$105.00	200	<a href="#">PDF</a>					
<a href="#">TRD-SHR360A5D</a>	\$105.00	360	<a href="#">PDF</a>					
<a href="#">TRD-SHR500A5D</a>	\$105.00	500	<a href="#">PDF</a>					
<a href="#">TRD-SHR600A5D</a>	\$105.00	600	<a href="#">PDF</a>					
<a href="#">TRD-SHR1000A5D</a>	\$105.00	1000	<a href="#">PDF</a>					
<a href="#">TRD-SHR1024A5D</a>	\$109.00	1024	<a href="#">PDF</a>					
<a href="#">TRD-SHR2000A5D</a>	\$109.00	2000	<a href="#">PDF</a>					
<a href="#">TRD-SHR2500A5D</a>	\$109.00	2500	<a href="#">PDF</a>					
<a href="#">TRD-SHR100V5D</a>	\$105.00	100	<a href="#">PDF</a>	5VDC	Line driver (differential)			
<a href="#">TRD-SHR200V5D</a>	\$105.00	200	<a href="#">PDF</a>					
<a href="#">TRD-SHR360V5D</a>	\$105.00	360	<a href="#">PDF</a>					
<a href="#">TRD-SHR500V5D</a>	\$105.00	500	<a href="#">PDF</a>					
<a href="#">TRD-SHR600V5D</a>	\$105.00	600	<a href="#">PDF</a>					
<a href="#">TRD-SHR1000V5D</a>	\$105.00	1000	<a href="#">PDF</a>					
<a href="#">TRD-SHR1024V5D</a>	\$109.00	1024	<a href="#">PDF</a>					
<a href="#">TRD-SHR2000V5D</a>	\$109.00	2000	<a href="#">PDF</a>					
<a href="#">TRD-SHR2500V5D</a>	\$109.00	2500	<a href="#">PDF</a>					
<a href="#">TRD-SHR100AW0D</a>	\$138.00	100	<a href="#">PDF</a>	5-26 VDC	NPN open collector	200g with 2m cable	IP65	40mm
<a href="#">TRD-SHR200AW0D</a>	\$138.00	200	<a href="#">PDF</a>					
<a href="#">TRD-SHR360AW0D</a>	\$138.00	360	<a href="#">PDF</a>					
<a href="#">TRD-SHR500AW0D</a>	\$138.00	500	<a href="#">PDF</a>					
<a href="#">TRD-SHR600AW0D</a>	\$138.00	600	<a href="#">PDF</a>					
<a href="#">TRD-SHR1000AW0D</a>	\$138.00	1000	<a href="#">PDF</a>					
<a href="#">TRD-SHR1024AW0D</a>	\$142.00	1024	<a href="#">PDF</a>					
<a href="#">TRD-SHR2000AW0D</a>	\$142.00	2000	<a href="#">PDF</a>					
<a href="#">TRD-SHR2500AW0D</a>	\$142.00	2500	<a href="#">PDF</a>					
<a href="#">TRD-SHR100VW0D</a>	\$138.00	100	<a href="#">PDF</a>	5VDC	Line driver (differential)			
<a href="#">TRD-SHR200VW0D</a>	\$138.00	200	<a href="#">PDF</a>					
<a href="#">TRD-SHR360VW0D</a>	\$138.00	360	<a href="#">PDF</a>					
<a href="#">TRD-SHR500VW0D</a>	\$138.00	500	<a href="#">PDF</a>					
<a href="#">TRD-SHR600VW0D</a>	\$138.00	600	<a href="#">PDF</a>					
<a href="#">TRD-SHR1000VW0D</a>	\$138.00	1000	<a href="#">PDF</a>					
<a href="#">TRD-SHR1024VW0D</a>	\$142.00	1024	<a href="#">PDF</a>					
<a href="#">TRD-SHR2000VW0D</a>	\$142.00	2000	<a href="#">PDF</a>					
<a href="#">TRD-SHR2500VW0D</a>	\$142.00	2500	<a href="#">PDF</a>					

# Light Duty Incremental Encoders (Metric Dimension Encoders)

## Specifications – TRD-SR/SRH series

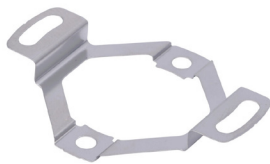
Electrical Specifications				
<b>Model</b>		<b>TRD-SRxxxxAx TRD-SHRxxxxAxx (open collector)</b>	<b>TRD-SRxxxxVx TRD-SHRxxxxVxx (line driver)</b>	
<b>Power Supply</b>	<b>Operating Voltage *</b>	5–26 VDC (nominal) * Range: 4.75–26.4 VDC	5VDC (nominal) * Range: 4.75–5.25 VDC	
	<b>Allowable Ripple</b>	3% max.		
	<b>Current Consumption</b>	90mA max.		
<b>Signal Waveform</b>		Quadrature + home position		
<b>Resolutions Available</b>		100 to 2500 pulses per revolution		
<b>Max. Response Frequency</b>		200kHz		
<b>Max. Electrical Speed**</b>		(max response frequency / resolution) x 60		
<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	Line driver output (26C31 or equivalent)	
	<b>Output Logic</b>	Negative logic (active low)	Positive logic (active high)	
	<b>Output Voltage</b>	<b>H</b>	–	2.5 V min.
		<b>L</b>	0.4 V max.	0.5 V max.
	<b>Current</b>	30mA max.	20 mA max.	
	<b>Load Power Voltage</b>	30 VDC max.	–	
	<b>Short-Circuit Protection</b>	Between output and power supply	–	
Mechanical Specifications				
<b>Starting Torque</b>	0.001 Nm (0.00074 ft/lb) max			
<b>Shaft Moment of Inertia</b>	0.6 x 10 <sup>4</sup> kg·m <sup>2</sup>			
<b>Max. Allowable Shaft Load</b>	Radial: 30N (6.7 lb-f); Axial: 20N (4.5 lb-f)			
<b>Max. Mechanical Speed**</b>	6000rpm (maximum possible without compromising encoder mechanical integrity)			
<b>Wire Size</b>	AWG26			
<b>Mounting Orientation</b>	can be mounted in any orientation			
Environmental Specifications				
<b>Ambient Temperature</b>	-10 to 80 °C (14 to 176 °F)			
<b>Storage Temperature</b>	-25 to 85°C ( -13 to 185°F)			
<b>Operating Humidity</b>	35–85% RH (non-condensing)			
<b>Withstand Voltage</b>	Grounded through capacitor			
<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 mm amplitude			
<b>Shock Resistance</b>	11 ms with 490 m/s <sup>2</sup> applied three times along three axes			
<b>Protection</b>	IP50 standard encoders. IP65 for encoders with "W" in the part number.			
<b>Agency Approvals</b>	cUL <sub>US</sub> (E189395)			
* To be supplied by Class II source.				
** Encoder maximum speed is the lesser value of Max. Electrical Speed and Max. Mechanical Speed.				

# Light Duty Incremental Encoders (Metric Dimension Encoders)

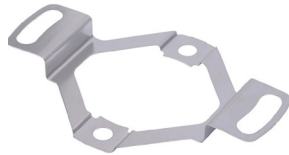
## TRD-SR/SHR series Mounting Accessories

Mounting Accessories					
Part Number	Price	Description	Weight	Drawing	Compatibility
<b>SHRS-040D*</b>	\$9.00	Flexible mounting bracket for IP50 hollow shaft encoders, converts standard 45mm mounting to 40mm mounting.	<2g	<a href="#">PDF</a>	TRD-SHR series, IP50
<b>SHRS-045D*</b>	\$9.00	Replacement 45mm flexible mounting bracket for IP50 rated hollow shaft encoders.		<a href="#">PDF</a>	
<b>SHRS-W40D*</b>	\$9.00	Replacement 40mm flexible mounting bracket for IP65 rated hollow shaft encoders.		<a href="#">PDF</a>	
<b>SRT-035D</b>	\$23.00	Right angle mounting bracket for solid shaft TRD-SR encoders.	140g	<a href="#">PDF</a>	TRD-SR series

\* Note: The IP50 flexible mounting brackets will not fit on the IP65 encoders. Likewise, the IP65 flexible mounting bracket will not fit on the IP50 encoders.



SHRS-040D



SHRS-045D



SHRS-W40D

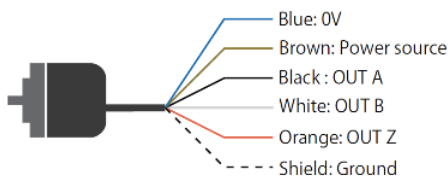


SRT-035D

## Wiring diagrams

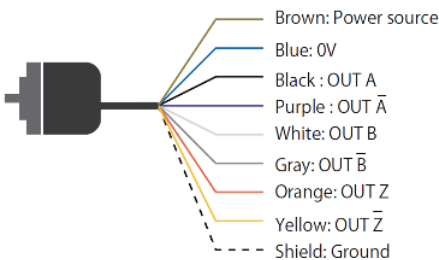
### Open Collector Models

Cable shield is NOT connected to the encoder body (frame ground)



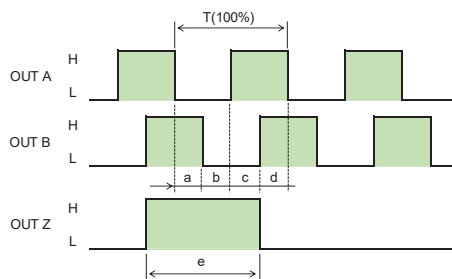
### Line Driver Models

Cable shield is NOT connected to the encoder body (frame ground)

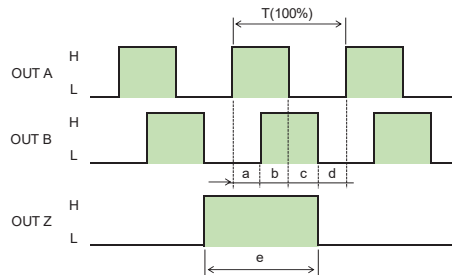


## Channel timing charts

### TRD-SR/SHR "A" Models



### TRD-SR/SHR "V" Models



$$T = a + b + c + d \quad a, b, c, d = 1/4 T \pm 1/8 T \quad e = 1 \pm$$

This Output waveform is Normal revolution (CW).  
"Normal" means clockwise revolution viewed from the shaft end.

## 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

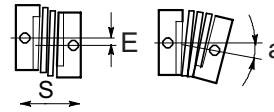
Channel A (OUT A and A-not) and Channel B (OUT B and B-not) are also 90 degrees out of phase on line driver encoders. OUT Z is the same as on open collector models, and is the absolute reference (home position). It signifies one full rotation of the encoder shaft.

# 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



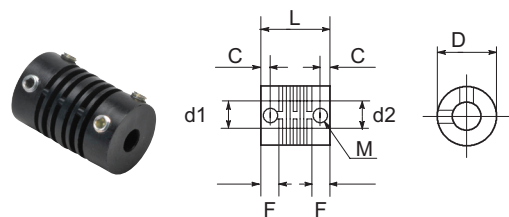
Couplings Selection Guide and Dimensions																
Type	Part Number	Price	Applicable Encoders (shaft size)	Shaft Diameter		D	L	F	C	M	a	E	S	Working Torque (N·m)	Torsional Rigidity	Material
				d1	d2	( mm [in] )					max	( mm [in] )				
Fiberglass (metric)	<a href="#">GJ-4D</a>	\$12.00	TRD-MX (4mm)	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
	<a href="#">GJ-6D</a>	\$9.25	TRD-S/SR (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	
	<a href="#">GJ-8D</a>	\$11.00	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	
	<a href="#">GJ-10D</a>	\$12.00	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)	<a href="#">GJ-635D</a>	\$22.00	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
	<a href="#">GJK-953D</a>	\$27.00	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)	<a href="#">STP-MTRA-SC-1412</a>	\$30.00	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
	<a href="#">STP-MTRA-SC-3812</a>	\$30.00	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)	<a href="#">ARM-075-5-4D</a>	\$51.50	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
	<a href="#">RU-075D</a>	\$58.00	TRD-S/SR (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	
	<a href="#">JU-100D</a>	\$51.50	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	
	<a href="#">RU-100D</a>	\$60.00	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)	<a href="#">ML13P-4-476D</a>	\$51.50	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)
	<a href="#">ML16P-4-635D</a>	\$51.50	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	
	<a href="#">MCGL16-6-635</a>	\$33.00	TRD-S/SR (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	
	<a href="#">MCGL20-8-635</a>	\$43.00	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	
	<a href="#">MCGL20-8-952</a>	\$44.00	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	
	<a href="#">MCGL25-10-635</a>	\$54.00	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	
	<a href="#">MCGL25-10-952</a>	\$55.00	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)	<a href="#">ARM-075-635-635D</a>	\$52.00	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
	<a href="#">ARM-100-9525-9525D</a>	\$50.00	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

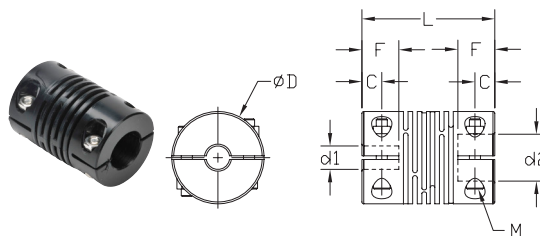
# Encoder Accessories – Couplings

## Encoder Couplings – Dimensions

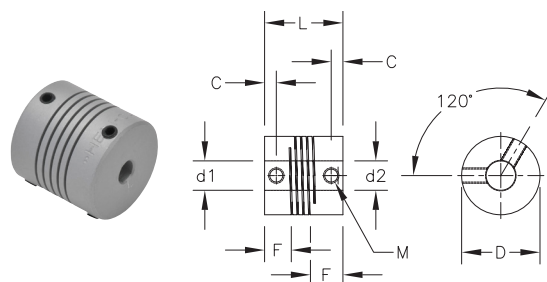
**GJ-xxD Fiberglass Couplings (metric) & GJx-xxxD Fiberglass Couplings (SAE)**



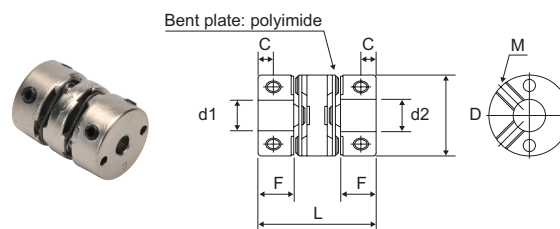
**STP-MTRA-SC-xxxx Polymer Couplings**



**ARM-xxxxxxD Aluminum Couplings (metric & SAE)**



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



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

