Light Duty Incremental Encoders (SAE Dimension Encoders)

TRDA-2E series

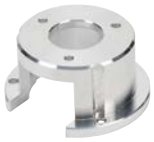
Accessories

Accessories for TRDA-2E Series Encoders		
Part Number	***Price***	***Description***
F-2D		JTEKT round mounting flange, 1.86in bolt hole circle, (1.05in height), metal. For use with JTEKT TRDA-2E series encoders. Flange and encoder mounting hardware included.
F-3D		JTEKT round mounting flange, 2.95in bolt hole circle (1.34in height), metal. For use with JTEKT TRDA-2E series encoders. Flange and encoder mounting hardware included.
F-6D		JTEKT round mounting flange, 1.86in bolt hole circle, (1.34in height), metal. For use with JTEKT TRDA-2E series encoders. Flange and encoder mounting hardware included.
F-7D		JTEKT round mounting flange, 1in bolt hole circle (0.20in height), metal. For use with JTEKT TRDA-2E series encoders. Flange and encoder mounting hardware included.
F-8D		JTEKT round mounting flange, 2.95in bolt hole circle, (1.71in height), metal. For use with JTEKT TRDA-2E series encoders. Flange and encoder mounting hardware included.
2ET-035D		JTEKT right angle bracket, metal. For use with JTEKT TRDA-2E series encoders. Bracket and encoder mounting hardware included.

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

See the "Encoder Couplings" section for more information.

2ET-035D



F-2D

F-3D

F-6D

F-7D

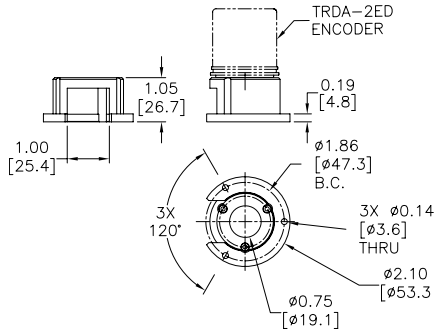
F-8D

Light Duty Incremental Encoders (SAE Dimension Encoders)

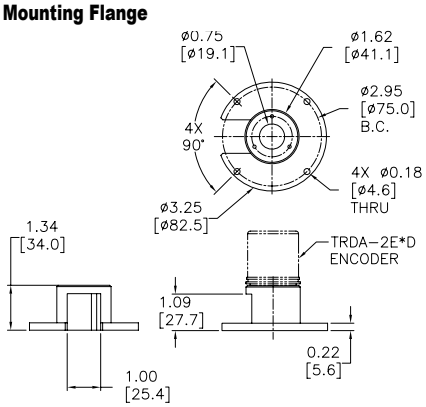
Dimensions – TRDA-2E series

Dimensions = in [mm]

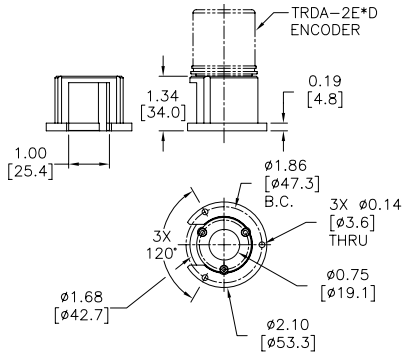
F-2D Mounting Flange



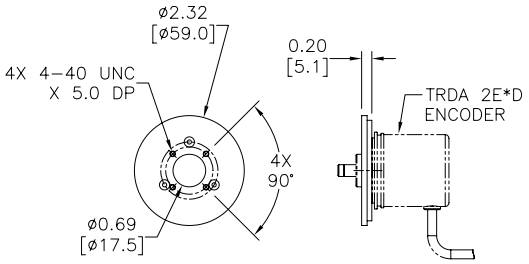
F-3D Mounting Flange



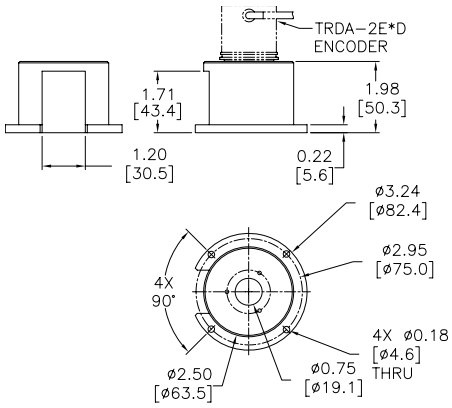
F-6D Mounting Flange



F-7D Mounting Flange



F-8D Mounting Flange



Light Duty Incremental Encoders (Metric Dimension Encoders)

TRD-MX series Features

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

- Small body with 25mm diameter and 29mm depth
- 4 mm diameter solid shaft
- Resolution available from 100 pulses per revolution to 1024 pulses per revolution
- Open collector output (4.5–13.2 or 10.8–26.4 VDC), or line driver output (4.75–5.25 VDC)
- Up to 100 kHz response frequency
- Two-meter cable with tinned ends
- IP50 environmental rating
- Mounting bracket and couplings are available

TRD-MXxxxx-AD/BD models

TRD-MXxxxx-VD models

Light Duty Solid-shaft Incremental Encoders (NPN Open-collector Output, TRD-MXxxxAD/BD)

Part Number	Price	Pulses per Revolution	Input Voltage	Output	Body Dia.
TRD-MX100AD		100	4.5–13.2 VDC	NPN Open Collector	25 mm
TRD-MX360AD		360			
TRD-MX500BD		500	10.8–26.4 VDC		

Light Duty Solid-shaft Incremental Encoders (Line Driver Output, TRD-MXxxxVD)

Part Number	Price	Pulses per Revolution	Input Voltage	Output	Body Dia.
TRD-MX100VD		100	4.75–5.25 VDC	Line Driver	25mm
TRD-MX360VD		360			
TRD-MX500VD		500			

Accessories

Accessories for TRD-MX Series Encoders

Part Number	Price	Description
MM-4D		Servo mounting clamp for TRD-MX series encoders
MT-030D		Right-angle mounting bracket for TRD-MX series encoders

MM-4D

MT-030D

Couplings

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

See the "Encoder Couplings" section for more information.

Couplings

Light Duty Incremental Encoders (Metric Dimension Encoders)

Specifications – TRD-MX series

Electrical Specifications (Metric Dimension Light Duty TRD-MX)					
Model			**TRD-MXxxxAD (open collector)**	**TRD-MXxxxBD (open collector)**	**TRD-MXxxxVD (line driver)**
Power Supply	**Operating Voltage ***		5–12 VDC (nominal) * 4.5–13.2 VDC	12–24 VDC (nominal) * 10.8–26.4 VDC	5VDC (nominal) * 4.75–5.25 VDC
	Allowable Ripple		3% rms max		
	Current Consumption		50 mA max (no load)		
	Circuit Protection Required		Limit current to 100 mA or less		–
Output Waveform	**Signal Waveform**		Quadrature + home position		
	Max. Response Frequency		100 kHz		
	Operating Speed		(max response frequency / resolution) x 60 Hz		
	Duty Ratio (Symmetry)		50% ±25%		
	Index Signal Width (at Home Position)		100% ±50%		
Output	**Rise/Fall Time ******		2µs ** (sink current < 30 mA)		0.1 µs max ** (source current < 20 mA)
	Output Type		Open collector (NPN sinking)		Line driver (26C31 or equivalent)
	Output Logic		Negative logic (active low)		Positive logic (active high)
	Output Current	**Inflow**	30 mA max		20 mA max
		Outflow	–		
	Output Voltage	**H**	–		2.5V min (source current < 20 mA)
		L	0.4V max (sink current < 30 mA)		0.5V max (source current < 20 mA)
	Load Power Voltage		30 VDC max		–
	Short-circuit Protection		–		–

** To be supplied by Class II source.*
*** Cable length ≤2m or less. Maximum load.*

Mechanical Specifications (Metric Dimension Light Duty TRD-MX)	
Starting Torque	0.001 N·m [0.009 lb·in] max @ 20 °C [68 °F]
Max. Allowable Shaft Load	Axial: 5N [1.1 lb]; Radial: 10N [2.2 lb]
Max. Allowable Speed	6000 rpm (highest speed that can support the mechanical integrity of encoder)
Wire Size	26 AWG, shielded, oil-resistant PVC
Weight	approx 120g [0.3 lb]

Environmental Specifications (Metric Dimension Light Duty TRD-MX)	
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 (non-condensing)
Withstand Voltage *	630V grounded through capacitor (a 630V cap is connected between 0V & FG lines)
Insulation Resistance	20 MΩ min
Vibration Resistance	durable for one hour along three axes @ 10 to 55 Hz with 0.75mm half-amplitude
Shock Resistance	490 m/s^2 (11 ms applied 3-times, each X, Y, Z)
Mounting Orientation	can be mounted in any orientation
Protection	IP50
Agency Approvals	CE, RoHS, $_{C}UL_{US}$ (E189395)

** Withstand voltage is good for power supply, signal, and case; not good for shield wire.*

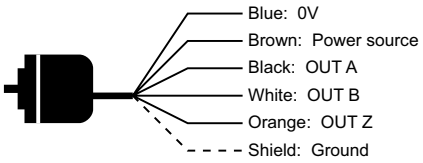
Light Duty Incremental Encoders (Metric Dimension Encoders)

Specifications – TRD-MX series

Wiring Diagrams

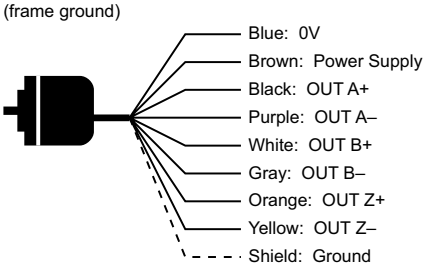
Open Collector Connections

Cable shield is connected to the encoder body (frame ground)



Line Driver Connections

Cable shield is connected to the encoder body (frame ground)



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.

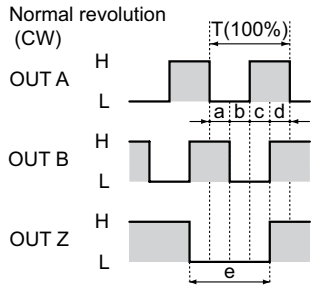
OUT Z is the absolute reference added to an incremental encoder and is also known as home position. It signifies a full rotation of the encoder shaft. It pulses once per revolution.

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. It pulses once per revolution.

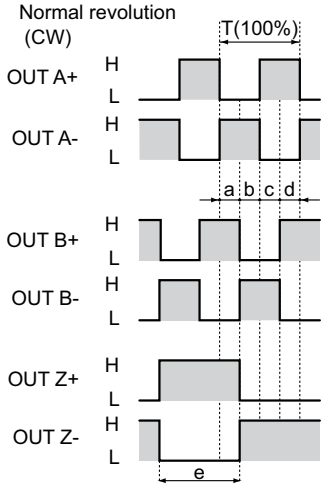
Channel Timing Charts

Open Collector Models (TRD-MXxxxAD/BD)



a, b, c, d = 0.25T ±0.125T; e = 1T ±0.125T
"Normal" means clockwise revolution viewed from the shaft

Line Driver Models (TRD-MXxxxVD)

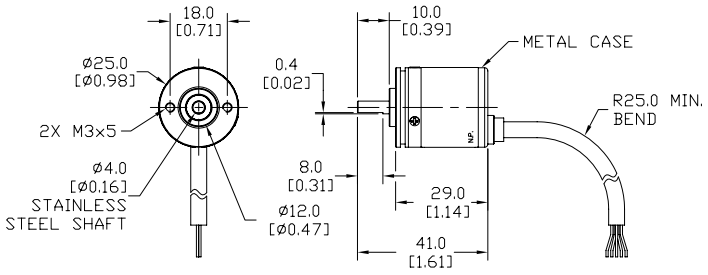


a, b, c, d = 0.25T ±0.125T; e = 1T ±0.125T
"Normal" means clockwise revolution viewed from the shaft

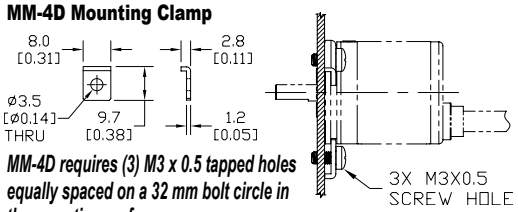
Dimensions – TRD-MX series

Dimensions = mm [in]

TRD-MXxxxxD

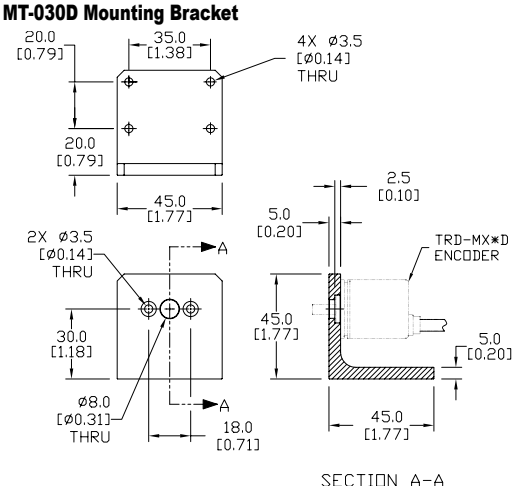


MM-4D Mounting Clamp



MM-4D requires (3) M3 x 0.5 tapped holes equally spaced on a 32 mm bolt circle in the mounting surface.

MT-030D Mounting Bracket



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 38mm diameter and 30mm depth
- Dust proof (IP40 rating)
- 6mm solid shaft or 8mm 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-S250BD		250	12–24 VDC	NPN open collector	
TRD-S300BD		300			
TRD-S600BD		600			
TRD-S1000-BD		1000			
TRD-S1024-BD		1024			
TRD-S1200BD		1200			
TRD-S100-VD		100	5 VDC	Line driver (differential)	
TRD-S250VD		250			
TRD-S300VD		300			
TRD-S400VD		400			
TRD-S800VD		800			
TRD-S1000-VD		1000			
TRD-S1200VD		1200			
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-SH400BD		400	12–24 VDC	NPN open collector	
TRD-SH500-BD		500			
TRD-SH600BD		600			
TRD-SH1000-BD		1000			
TRD-SH1200BD		1200			
TRD-SH2000BD		2000			
TRD-SH2500-BD		2500			
TRD-SH100-VD		100	5 VDC	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-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			200 kHz		
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***		1 µs 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		30 mA 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

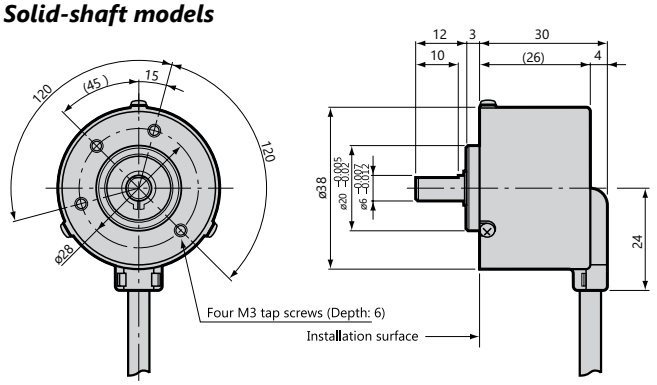
Environmental Specifications	
Ambient Temperature	-10 to +70 °C; 14 to 158 °F
Storage Temperature	-25 to +85 °C; -13 to +185 °F
Operating Humidity	35–85% RH
Withstand Voltage	500 VAC (50/60Hz) for one minute
Insulation Resistance	50 MΩ min.
Vibration Resistance	durable for one hour along three axes at 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)

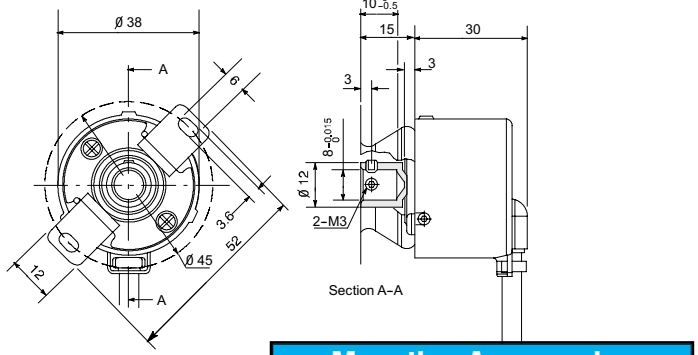
Dimensions – TRD-S(H) series

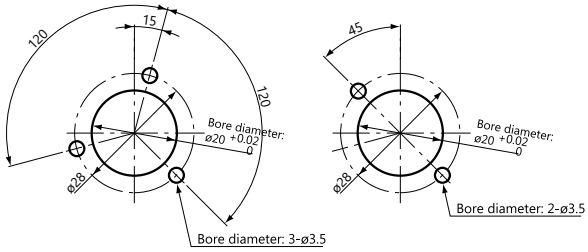
All dimensions in mm
1mm = 0.03937in

Solid-shaft models



Hollow-shaft models

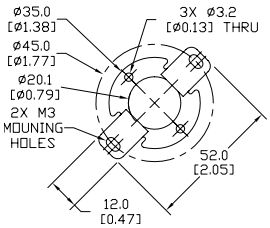


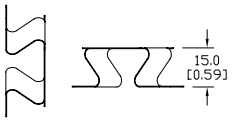


Mounting hole panel cutout (3 holes)

Mounting hole panel cutout (2 holes)

TRD-SH-BKT (bracket)





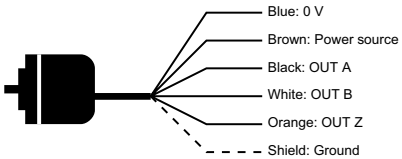
Mounting Accessories

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

Wiring diagrams

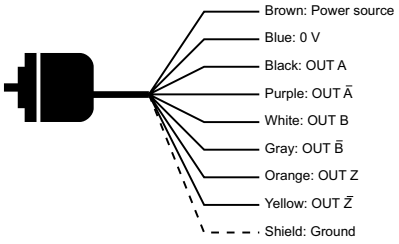
Open collector connections

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



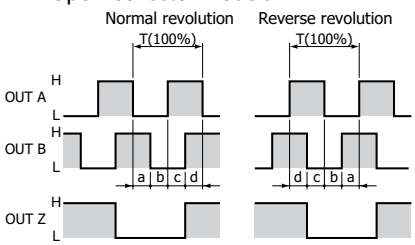
Line driver connections

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

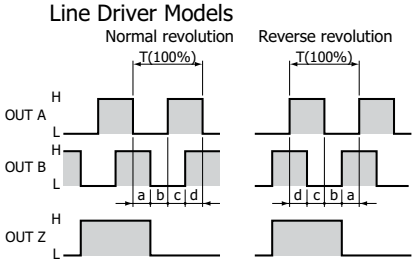


Channel timing charts

Open Collector Models



Line Driver Models



a, b, c, =1/4T±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

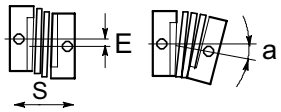
Channel A (OUT A and A-not) and Channel B (OUT B and B-not) are also 90 degrees out of phase on line driver encoders. OUT Z is the same as on open collector models, and is the absolute reference (home position). It signifies one full rotation of the encoder shaft.

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

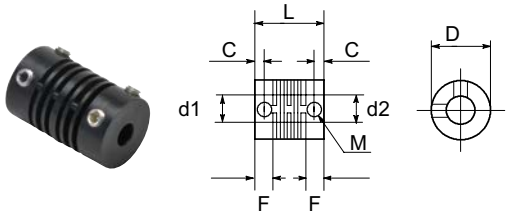
Type	Part Number	Price	Applicable Encoders (shaft size)	Shaft Diameter		D	L	F	C	M	a	E	S	Working Torque	Torsional Rigidity	Material
												max				
				d1	d2	(mm [in])						(mm [in])		(N·m)		
Fiberglass (metric)	GJ-4D		TRD-MX (4mm)	4mm	4mm	13 [0.51]	21 [0.83]	5.3 [0.21]	3 [0.12]	M3 set screw	5°	0.4 [0.02]	0.4 [0.02]	0.6 N·m	6 N·m/rad	Glass-fiber reinforced resin
	GJ-6D		TRD-S/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	
	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 (10mm)	10mm	10mm	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 (0.25in)	0.25 in	0.25in	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	
	GJK-953D		TRDA-20/25 (0.375in)	0.375 in	0.375in	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 (0.25in)	0.25 in	0.50in	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 (0.375in)	0.375in	0.50in	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/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	
	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 (10mm)	10mm	10mm	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	0.1875in	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 (0.25in)	4mm	0.25in	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/SR (6mm) TRDA-2E (0.25in)	6mm	0.25in	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 (0.25in)	8mm	0.25in	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 (0.375in)	8mm	0.375in	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 (0.25in)	10mm	0.25in	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 (0.375in)	10mm	0.375in	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 (0.25in)	0.25in	0.25in	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 (0.375in)	0.375in	0.375in	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*

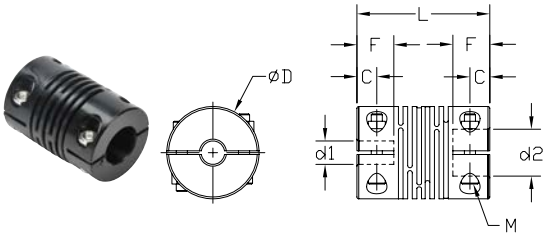
Encoder Accessories – Couplings

Encoder Couplings – Dimensions

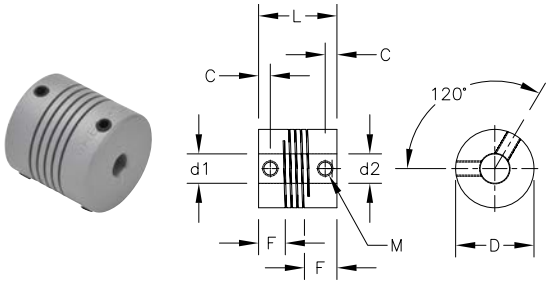
GJ-xxD Fiberglass Couplings (metric) &
GJx-xxxD Fiberglass Couplings (SAE)



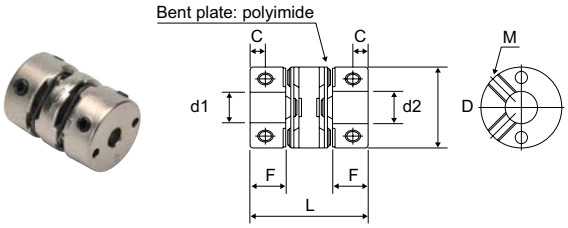
STP-MTRA-SC-xxxx Polymer Couplings



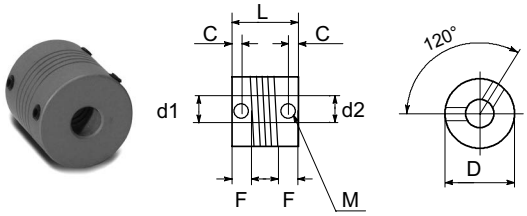
ARM-xxxxxxD Aluminum Couplings (metric & SAE)



MCGLxx Aluminum Couplings &
ML1xP-4-xxxD Aluminum Couplings



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



Encoder Selection Guide

SAE Dimension Encoders & Metric Dimension Encoders

Encoder Selection Guide

Type	Duty	Series	Encoder Diameter	Shaft Diameter	Shaft Type	Operating Voltage (VDC) and Electrical Output	IP Rating	Cable	Max Radial Load (N)	Max Axial Load (N)	Available Resolutions (PPR)	Brand
Incremental	Modular Kit	AMT	28mm, 42mm	2, 3, 4, 5, 6, 8 mm 3/16, 1/4, 3/8, 1/2, 5/8 inch	Hollow	5V Line Driver (TTL) or 5V Push-Pull (Totem Pole)	IP20	Custom cables sold separately	N/A	N/A	Programmable up to 4096	Same Sky
		MTRA	31mm	5mm 1/4", 3/8"	Hollow	5V Line Driver (TTL) or 5V Push-Pull (Totem Pole)	IP20	Custom cables sold separately	N/A	N/A	400, 1000	SureStep
	Light Duty	TRD-S(H)R	38mm, 40mm	8mm	Solid or Hollow	5V Line Driver (TTL) or 5–26V NPN/PNP Open Collector (HTL)	IP50 or IP65	Integral 2m pigtal cable	20	10	100, 200, 360, 500, 600, 1000, 1024, 2000, 2500	JTEKT
		A41	41mm	1/4"	Solid or Hollow	5–30 VDC Universal output circuit: Push-Pull (Totem Pole), or NPN/PNP Open Collector (HTL), or Line Driver (TTL)	IP64	Integral 2m pigtal cable	20	20	100, 200, 360, 500, 1000, 1024, 200, 2048, 3600, 4096	Lika
	Medium Duty	A50	50mm	1/4", 3/8"	Hollow		IP65	M12 cables sold separately	20	20	360, 1000, 1024, 2048	
		A80	80mm	30mm (reducer bushings available for 19 & 20mm, 5/8", 7/8", 1, and 1 1/8")	Hollow		IP64	M23 cables sold separately	30	30	1024	
		AQ58/59	58mm, 59mm	3/8" solid, 15mm hollow (reducer bushings available for 6, 8, 10, 11, 12 mm; 1/4, 3/8, 1/2 inch)	Solid or Hollow		IP65	M12 cables sold separately	100	100	Programmable from 1 to 16,384 (default 1024)	
		AR01	58mm	15mm	Solid Dual-shaft		IP65	M12 cables sold separately	50	50	250 (linear res: 0.36 deg/cts) 1250 (linear res: 0.072 deg/cts)	
		TRDA-20	2"	3/8"	Solid	5VDC Line Driver (TTL) or 5–30 VDC Push-Pull (Totem Pole)	IP50	Integral 2m pigtal cable	50	30	100, 360, 500, 1000, 1024, 2500	JTEKT
		TRDA-25	2.5" flange (w/2.0" body)	3/8"	Solid		IP65	Military Spec (MS) cables sold separately	50	30	100, 360, 500, 1000, 1014, 2500	
		TRD-N(H)	50mm	8mm	Solid or Hollow		IP65	Integral 2m pigtal cable	50	30	3, 4, 5, 10, 30, 40, 50, 60, 100, 120, 200, 240, 250, 300, 360, 400, 480, 500, 600, 750, 1000, 1024, 1200, 2000, 2500	
	Heavy Duty	TRD-GK	78mm	10mm	Solid	10–30 VDC Push-Pull (Totem Pole)	IP65	Integral 2m pigtal cable	100	50	30, 100, 120, 200, 240, 250, 300, 360, 400, 500, 600, 1000, 1200, 2000, 2500, 3600, 5000	
Absolute	Medium Duty	TRD-NA	50mm	8mm	Solid	10–30V NPN/PNP Open Collector (HTL)	IP65	Integral 2m pigtal cable	50	30	32, 64, 128, 180, 256, 360, 512, 720, 1024 (Gray code)	
		AM5x[1]	58mm	6–15mm, 3/8"	Solid or Hollow	5–30 VDC, 10–30 VDC	IP65	M12 cables sold separately	40	40	Programmable up to 8192 ppr (13 bit), up to 16384 turns (14 bit)	Lika

1 - AM5x encoders have different versions supporting 4 different outputs - Ethernet/IP, Modbus TCP, EtherCAT, and Modbus RTU (RS485).