

# Medium Duty Incremental Encoders (SAE Dimension Encoders)

## TRDA-20 series

### Features

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

- Small body with 2.0 in. diameter and 1.7 in. depth
- 0.375 in. diameter solid shaft
- Resolution available from 100 pulses per revolution to 2500 pulses per revolution
- Totem pole or line driver output
- Up to 100 kHz response frequency (totem pole)
- Up to 200 kHz response frequency (line driver)
- Two-meter cable with tinned ends
- IP50 environmental rating



TRDA-20R1N models

TRDA-20 Medium Duty Solid-shaft Incremental Encoders (Totem-pole and Line-driver Output Models)					
Part Number	Price	Pulses per Revolution	Input Voltage	Output	Body Dia.
<a href="#">TRDA-20R1N100RZD</a>	\$154.00	100	5-30 VDC	Totem-pole sink/source	2.0 in.
<a href="#">TRDA-20R1N360RZD</a>	\$154.00	360			
<a href="#">TRDA-20R1N500RZD</a>	\$154.00	500			
<a href="#">TRDA-20R1N1000RZD</a>	\$154.00	1000			
<a href="#">TRDA-20R1N1024RZD</a>	\$165.00	1024			
<a href="#">TRDA-20R1N2500RZD</a>	\$167.00	2500	5VDC	Line-driver (differential)	
<a href="#">TRDA-20R1N100VD</a>	\$154.00	100			
<a href="#">TRDA-20R1N360VD</a>	\$154.00	360			
<a href="#">TRDA-20R1N500VD</a>	\$154.00	500			
<a href="#">TRDA-20R1N1000VD</a>	\$154.00	1000			
<a href="#">TRDA-20R1N1024VD</a>	\$166.00	1024			
<a href="#">TRDA-20R1N2500VD</a>	\$167.00	2500			

## Accessories

Accessories for TRDA-20 Series Encoders *		
Part Number *	Price	Description
<a href="#">TRDA-20R1D</a>	\$27.00	Mounting flange, round, 1.5 inch bolt-hole circle
<a href="#">TRDA-20R2D</a>	\$39.00	Mounting flange, round, 1.625 inch bolt-hole circle
<a href="#">TRDA-20SND</a>	\$59.00	Mounting flange, square
<a href="#">LM-001D**</a>	\$120.00	Mounting bracket for TRDA-20 & TRDA-25 encoders

\* The accessories in this table work only with TRDA-20R1Nxxxxx series encoders, unless marked otherwise.

\*\* Use of LM-001D also requires a TRDA-20SND replacement mounting flange, plus four customer-supplied 6-32 x 0.50 in long fasteners.

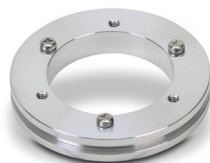
### Couplings

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.



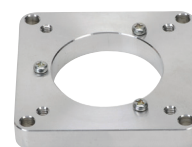
LM-001D



TRDA-20R1D



TRDA-20R2D



TRDA-20SND

# Medium Duty Incremental Encoders (SAE Dimension Encoders)

## Specifications – TRDA-20 series

Electrical Specifications (SAE Dimension Medium Duty)				
Model		TRDA-20R1NxxxRZD (Totem-pole)	TRDA-20R1NxxxVD (Line Driver)	
Power Supply	Operating Voltage *	5–30 VDC (nominal) * Range: 4.75–30.0 VDC	5VDC (nominal) * Range: 4.75–5.25 VDC	
	Allowable Ripple	3% rms max		
	Current Consumption	60 mA max		
Output Waveform	Signal Waveform	Quadrature + home position		
	Max. Response Frequency	100 kHz	200 kHz	
	Operating Speed	(max response frequency / resolution) x 60		
	Duty Ratio (Symmetry)	50% ±25%		
	Index Signal Width (at home position)	100% ±50%		
Output	Rise/Fall Time **	3µs max **	100 ns max **	
	Output Type	Totem-pole	Line driver (26C31 or equivalent)	
	Output Current	Inflow	30 mA max	20 mA max
		Outflow	10 mA max	
	Output Voltage	H	[(power voltage voltage) - (2.5V)] min	2.5V min
		L	0.4V max	0.5V max
	Load Power Supply Voltage	35 VDC max		–
Short-Circuit Protection	between each output and 0V terminal		–	
* To be supplied by Class II source. ** With a cable of 2m or less; Max load.				
Mechanical Specifications				
Starting Torque		0.003 N·m (0.002 lb-ft) max @ 20 °C [68 °F]		
Max Allowable Shaft Load		Radial: 50N (11.2 lb); Axial: 30N (6.7 lb)		
Max Allowable Speed		5000 rpm (max speed that the mechanical integrity of encoder can support)		
Wire Size		0.2 mm <sup>2</sup> [24 AWG] shielded, oil-resistant PVC		
Mounting Orientation		can be mounted in any orientation		
Weight		approx 270g (9.52 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 to 85 %RH		
Voltage Withstand		500 VAC @ 50/60Hz for one minute	grounded through capacitor	
Insulation Resistance		50 MΩ min (excluding shield)		
Vibration Resistance		10 to 55 Hz with 0.75 mm half amplitude; durable for one hour along three axes		
Shock Resistance		11 ms ~ 500 P/R metal slit 981 m/s <sup>2</sup> applied three times along three axes 11 ms ~ 600 P/R glass slit 490 m/s <sup>2</sup> applied three times along three axes		
Protection		IP50		
Agency Approvals		cUL <sub>US</sub> (E189395)		

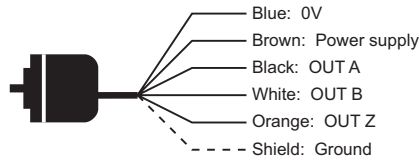
# Medium Duty Incremental Encoders (SAE Dimension Encoders)

## Specifications – TRDA-20 series

### Wiring Diagrams

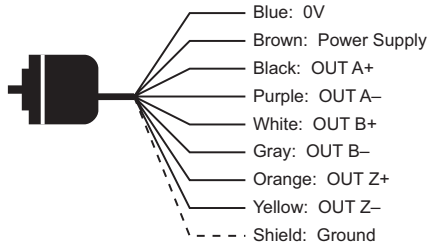
#### Totem Pole Connections

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

#### Totem Pole 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.

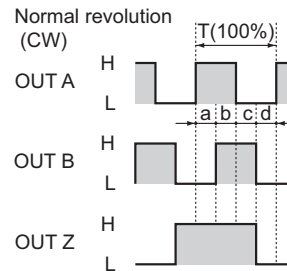
OUT Z is the absolute reference added to an incremental encoder and is also known as home position. It signifies a full rotation of the encoder shaft.

#### 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.

### Channel Timing Charts

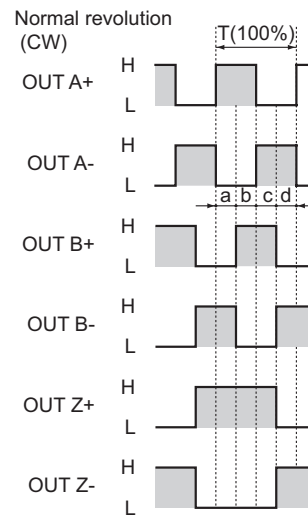
#### Totem Pole Models (TRDA-20R1NxxxRZD)



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

"Normal" means clockwise revolution viewed from the shaft

#### Line Driver Models (TRDA-20R1NxxxVD)



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

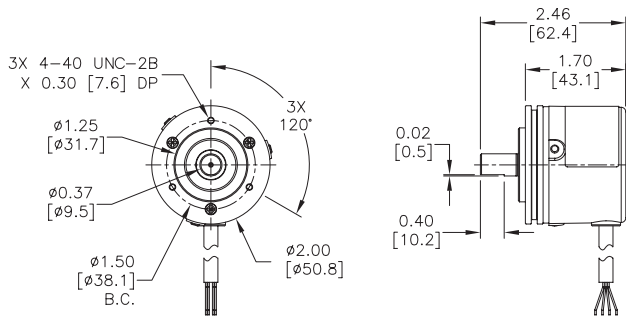
"Normal" means clockwise revolution viewed from the shaft

# Medium Duty Incremental Encoders (SAE Dimension Encoders)

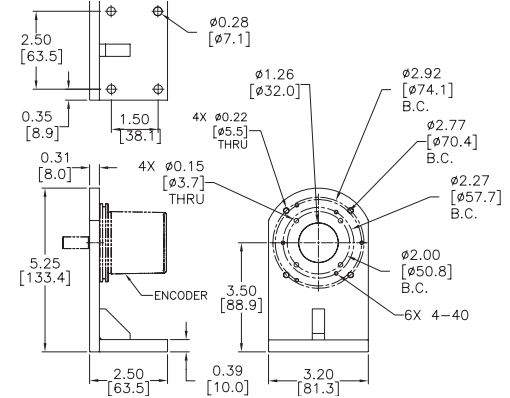
## Dimensions – TRDA-20 series

Dimensions = in [mm]

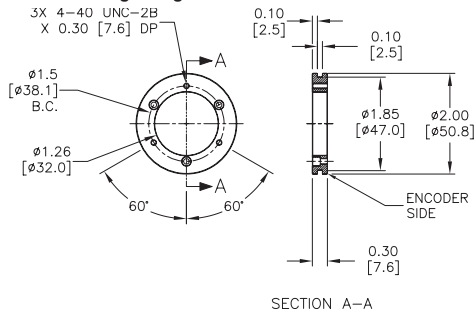
### TRDA-20R1NxxxxxD



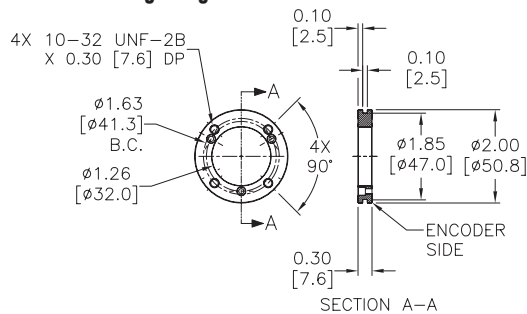
### LM-001D Mounting Bracket



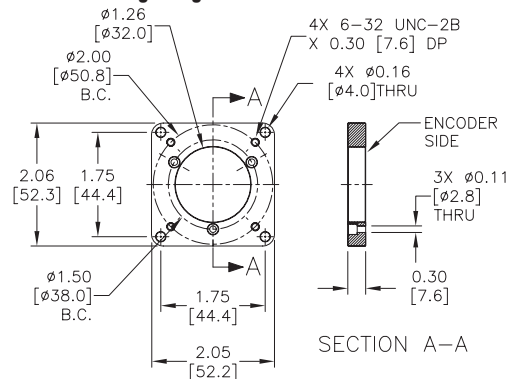
### TRDA-20R1D Mounting Flange



### TRDA-20R2D Mounting Flange



### TRDA-20SND Mounting Flange



# Medium Duty Incremental Encoders (SAE Dimension Encoders)

## TRDA-25 series

### Features

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

- Small body with 2.0 in. diameter and 2.15 in. depth
- 0.375 in diameter solid shaft
- Removable 2.5 in. round flange
- Resolution available from 100 pulses per revolution to 2500 pulses per revolution
- Totem pole or line driver output
- Up to 100 kHz response frequency (totem pole)
- Up to 200 kHz response frequency (line driver)
- Military-style connector (cable sold separately)
- IP65 environmental rating



TRDA-25 models

### Accessories

#### 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 on.



TRDA-25-CON-RZWD



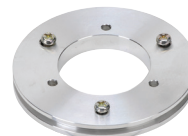
TRDA-25-CON-VWD



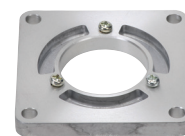
LM-001D



TRDA-25CBL-RZWD



TRDA-25RND



TRDA-25SND



TRDA-25CBL-VWD

TRDA-25 Medium Duty Solid-shaft Incremental Encoders – (Totem-pole and Line-driver Output Models) – MS Connector *					
Part Number *	Price	Pulses per Revolution	Input Voltage	Output	Body Dia.
<a href="#">TRDA25RN100RZWDMS</a>	\$248.00	100	5–30 VDC	Totem-pole sink/source	2.0 in. (2.5 in. round flange)
<a href="#">TRDA25RN360RZWDMS</a>	\$248.00	360			
<a href="#">TRDA25RN500RZWDMS</a>	\$248.00	500			
<a href="#">TRDA25RN1000RZWDMS</a>	\$248.00	1000			
<a href="#">TRDA25RN1024RZWDMS</a>	\$248.00	1024			
<a href="#">TRDA25RN2500RZWDMS</a>	\$268.00	2500	5VDC	Line-driver (differential)	
<a href="#">TRDA25RN100VWDM</a>	\$248.00	100			
<a href="#">TRDA25RN360VWDM</a>	\$248.00	360			
<a href="#">TRDA25RN500VWDM</a>	\$248.00	500			
<a href="#">TRDA25RN1000VWDM</a>	\$248.00	1000			
<a href="#">TRDA25RN1024VWDM</a>	\$248.00	1024			
<a href="#">TRDA25RN2500VWDM</a>	\$269.00	2500			

\* TRDA25RNxxxxWDMS encoders do NOT include cables or connectors, which are sold separately in the "Accessories" section.

Accessories for TRDA-25 Series Encoders *		
Part Number *	Price	Description
<a href="#">TRDA-25RND</a>	\$39.00	Mounting flange, round (2.5 in. dia. w/ 1.88 in B.C.)
<a href="#">TRDA-25SND</a>	\$39.00	Mounting flange, square (2.5 in. dia.)
<a href="#">TRDA-25CON-RZWD</a>	\$55.00	Connector for TRDA-25RNxxxRZWD-MS, Totem Pole output, 7-pin MS connector
<a href="#">TRDA-25CBL-RZWD-10**</a>	\$96.00	Cable for TRDA-25RNxxxRZWD-MS, Totem Pole output, 7-pin MS connector, 10 ft
<a href="#">TRDA-25CBL-RZWD-20**</a>	\$118.00	Cable for TRDA-25RNxxxRZWD-MS, Totem Pole output, 7-pin MS connector, 20 ft
<a href="#">TRDA-25CBL-RZWD-30**</a>	\$134.00	Cable for TRDA-25RNxxxRZWD-MS, Totem Pole output, 7-pin MS connector, 30 ft
<a href="#">TRDA-25CON-VWD</a>	\$61.00	Connector for TRDA-25RNxxxVWD-MS, Line Driver output, 10-pin MS connector
<a href="#">TRDA-25CBL-VWD-10**</a>	\$114.00	Cable for TRDA-25RNxxxVWD-MS, Line Driver output, 10-pin MS connector, 10 ft
<a href="#">TRDA-25CBL-VWD-20**</a>	\$114.00	Cable for TRDA-25RNxxxVWD-MS, Line Driver output, 10-pin MS connector, 20 ft
<a href="#">TRDA-25CBL-VWD-30**</a>	\$119.00	Cable for TRDA-25RNxxxVWD-MS, Line Driver output, 10-pin MS connector, 30 ft
<a href="#">LM-001D***</a>	\$120.00	Mounting bracket for TRDA-20 & TRDA-25 encoders

<sup>‡</sup> The accessories in this table work only with TRDA-25RNxxxxWD-MS series encoders, unless marked otherwise.  
<sup>\*\*</sup> Cables have IP65 environmental rating.  
<sup>\*\*\*</sup> Use of LM-001D also requires a TRDA-25SND replacement mounting flange, plus four customer-supplied 6-32 x 0.50 in long fasteners.

# Medium Duty Incremental Encoders (SAE Dimension Encoders)


## Specifications – TRDA-25 series

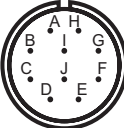
Electrical Specifications – TRDA-25 (SAE Dimension Medium Duty)				
Model		TRDA25RNxxxRZWDMS (Totem-pole)	TRDA25RNxxxVWDMS (Line Driver)	
Power Supply	Operating Voltage *	5–30 VDC (nominal) * Range: 4.75–30.0 VDC	5VDC (nominal) * Range: 4.75–5.25 VDC	
	Allowable Ripple	3% rms max		
	Current Consumption	60 mA max		
Output Waveform	Signal Waveform	Quadrature + home position		
	Max. Response Frequency	100 kHz	200 kHz	
	Operating Speed	(max response frequency / resolution) x 60		
	Duty Ratio (Symmetry)	50% ±25%		
	Index Signal Width (at home position)	100% ±50%		
Output	Rise/Fall Time **	3µs max **	100 ns max **	
	Output Type	Totem-pole	Line driver (26C31 or equivalent)	
	Output Current	Inflow	30 mA max	20 mA max
		Outflow	10 mA max	
	Output Voltage	H	[(power voltage voltage) - (2.5V)] min	2.5V min
		L	0.4V max	0.5V max
	Load Power Supply Voltage	35 VDC max	–	
Short-Circuit Protection	between each output and 0V terminal	–		
* To be supplied by Class II source. ** With a cable of 2m or less; Max load.				
Mechanical Specifications				
Starting Torque		0.05 N·m [0.04 lb·ft] @ 20 °C [68 °F]		
Max Allowable Shaft Load		Radial: 50N [11.2 lb]; Axial: 30N [6.7 lb]		
Max Allowable Speed		3000 rpm (max speed that the mechanical integrity of encoder can support)		
Wire Size		–		
Mounting Orientation		can be mounted in any orientation		
Weight		approx 280g [9.88 oz]		
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 to 85 %RH		
Voltage Withstand		500 VAC @ 50/60Hz for one minute	grounded through capacitor	
Insulation Resistance		50 MΩ min (excluding shield)		
Vibration Resistance		10 to 55 Hz with 0.75 mm half amplitude; durable for one hour along three axes		
Shock Resistance		11 ms ~ 500 P/R metal slit 981 m/s <sup>2</sup> applied three times along three axes 11 ms ~ 600 P/R glass slit 490 m/s <sup>2</sup> applied three times along three axes		
Protection		IP65		
Agency Approvals		cUL <sub>US</sub> (E189395)		

# Medium Duty Incremental Encoders (SAE Dimension Encoders)

## Specifications – TRDA-25 series

### Connector Pin-out

TRDA25RNxxxRZWDMS (Totem Pole)		
Connector	Pin	Signal
 <p>Viewed from wiring side (rear)</p>	A	Out A
	B	Out B
	C	Out Z
	D	Power Supply
	E	n.c.
	F	0V
	G	ground
A shielding wire is connected to frame ground.		

TRDA25RNxxxVWDMS (Line Driver)		
Connector	Pin	Signal
 <p>Viewed from wiring side (rear)</p>	A	Out A+
	B	Out B+
	C	Out Z+
	D	Power Supply
	E	n.c.
	F	0V
	G	ground
	H	Out A-
	I	Out B-
	J	Out Z-
A shielding wire is connected to frame ground.		

## How to read the timing charts

### Totem Pole 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.

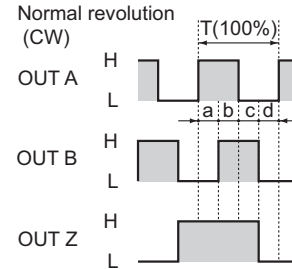
OUT Z is the absolute reference added to an incremental encoder and is also known as home position. It signifies a full rotation of the encoder shaft.

### 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.

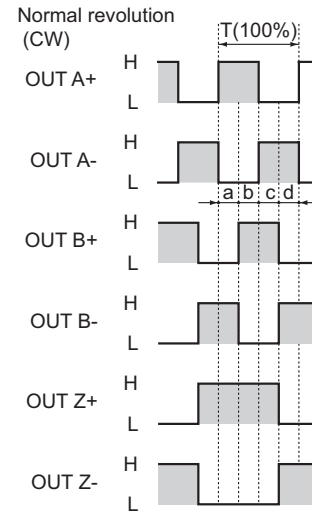
## Channel Timing Charts

### Totem Pole Models (TRDA25RNxxxRZWDxx)



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

### Line Driver Models (TRDA25RNxxxVWDxx)



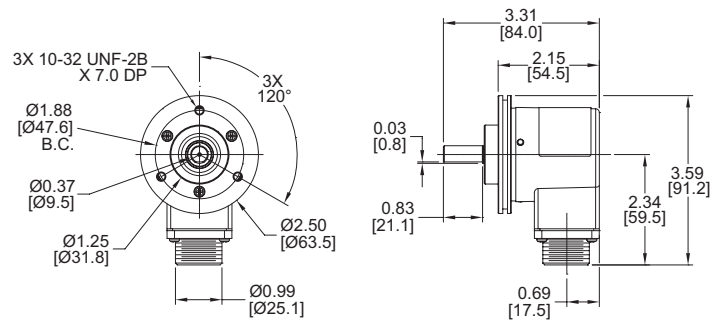
$a, b, c, d = 1/4T \pm 1/8T$   
 "Normal" means clockwise revolution viewed from the shaft

# Medium Duty Incremental Encoders (SAE Dimension Encoders)

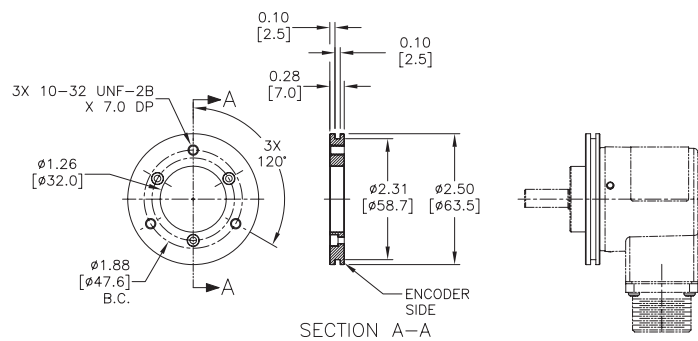
## Dimensions – TRDA-25 series

Dimensions = in [mm]

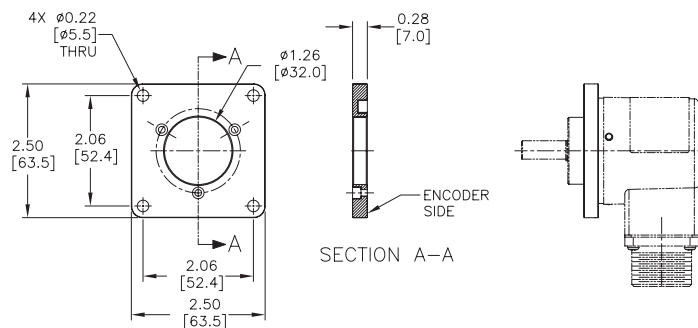
### TRDA25RN Encoder



### TRDA-25RND Mounting Flange



### TRDA-25SND Mounting Flange





# Medium Duty Incremental Encoders (Metric Dimension Encoders)

## TRD-N(H) series

### Features

The medium duty encoder offers the greatest flexibility of choice in a very high-quality encoder, all for a very low price. Features:

- Small body with 50 mm diameter and 35 mm depth
- Splash proof (IP65 rating)
- 8 mm solid shaft or 8 mm hollow shaft
- Incremental resolution available from 3 pulses per revolution to 5,000 pulses per revolution
- Line driver or Totem-pole (push-pull) output
- Up to 200 kHz response frequency



**Solid-shaft (TRD-N) model**



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

Incremental Medium Duty Solid Shaft Encoders (Totem-pole Output, TRD-Nxxx-RZWD)					
Part Number	Price	Pulses per Revolution	Input Voltage	Output	Body Dia.
<a href="#">TRD-N3-RZWD</a>	\$160.00	3	5-30 VDC	Totem-pole (push-pull) sink/source	50 mm
<a href="#">TRD-N4-RZWD</a>	\$160.00	4			
<a href="#">TRD-N5-RZWD</a>	\$160.00	5			
<a href="#">TRD-N10-RZWD</a>	\$160.00	10			
<a href="#">TRD-N30-RZWD</a>	\$160.00	30			
<a href="#">TRD-N40-RZWD</a>	\$160.00	40			
<a href="#">TRD-N50-RZWD</a>	\$160.00	50			
<a href="#">TRD-N60-RZWD</a>	\$160.00	60			
<a href="#">TRD-N100-RZWD</a>	\$160.00	100			
<a href="#">TRD-N120-RZWD</a>	\$180.00	120			
<a href="#">TRD-N200-RZWD</a>	\$180.00	200			
<a href="#">TRD-N240-RZWD</a>	\$180.00	240			
<a href="#">TRD-N250-RZWD</a>	\$180.00	250			
<a href="#">TRD-N300-RZWD</a>	\$180.00	300			
<a href="#">TRD-N360-RZWD</a>	\$180.00	360			
<a href="#">TRD-N400-RZWD</a>	\$180.00	400			
<a href="#">TRD-N480-RZWD</a>	\$180.00	480			
<a href="#">TRD-N500-RZWD</a>	\$180.00	500			
<a href="#">TRD-N600-RZWD</a>	\$180.00	600			
<a href="#">TRD-N750-RZWD</a>	\$180.00	750			
<a href="#">TRD-N1000-RZWD</a>	\$180.00	1000			
<a href="#">TRD-N1024-RZWD</a>	\$180.00	1024			
<a href="#">TRD-N1200-RZWD</a>	\$235.00	1200			
<a href="#">TRD-N2000-RZWD</a>	\$235.00	2000			
<a href="#">TRD-N2500-RZWD</a>	\$236.00	2500			
<a href="#">TRD-N3000-RZWD</a>	\$236.00	3000			
<a href="#">TRD-N3600-RZWD</a>	\$236.00	3600			
<a href="#">TRD-N5000-RZWD</a>	\$236.00	5000			

Incremental Medium Duty Hollow Shaft Encoders (Totem-pole Output, TRD-NHxxx-RZWD)					
Part Number	Price	Pulses per Revolution	Input Voltage	Output	Body Dia.
<a href="#">TRD-NH3-RZWD</a>	\$180.00	3	5-30 VDC	Totem-pole (push-pull) sink/source	50 mm
<a href="#">TRD-NH4-RZWD</a>	\$180.00	4			
<a href="#">TRD-NH5-RZWD</a>	\$180.00	5			
<a href="#">TRD-NH10-RZWD</a>	\$180.00	10			
<a href="#">TRD-NH30-RZWD</a>	\$180.00	30			
<a href="#">TRD-NH40-RZWD</a>	\$180.00	40			
<a href="#">TRD-NH50-RZWD</a>	\$180.00	50			
<a href="#">TRD-NH60-RZWD</a>	\$180.00	60			
<a href="#">TRD-NH100-RZWD</a>	\$180.00	100			
<a href="#">TRD-NH120-RZWD</a>	\$200.00	120			
<a href="#">TRD-NH200-RZWD</a>	\$200.00	200			
<a href="#">TRD-NH240-RZWD</a>	\$200.00	240			
<a href="#">TRD-NH250-RZWD</a>	\$200.00	250			
<a href="#">TRD-NH300-RZWD</a>	\$200.00	300			
<a href="#">TRD-NH360-RZWD</a>	\$200.00	360			
<a href="#">TRD-NH400-RZWD</a>	\$200.00	400			
<a href="#">TRD-NH480-RZWD</a>	\$200.00	480			
<a href="#">TRD-NH500-RZWD</a>	\$200.00	500			
<a href="#">TRD-NH600-RZWD</a>	\$205.00	600			
<a href="#">TRD-NH750-RZWD</a>	\$205.00	750			
<a href="#">TRD-NH1000-RZWD</a>	\$205.00	1000			
<a href="#">TRD-NH1024-RZWD</a>	\$201.00	1024			
<a href="#">TRD-NH1200-RZWD</a>	\$251.00	1200			
<a href="#">TRD-NH2000-RZWD</a>	\$251.00	2000			
<a href="#">TRD-NH2500-RZWD</a>	\$251.00	2500			
<a href="#">TRD-NH3000-RZWD</a>	\$255.00	3000			
<a href="#">TRD-NH3600-RZWD</a>	\$251.00	3600			
<a href="#">TRD-NH5000-RZWD</a>	\$255.00	5000			

# Medium Duty Incremental Encoders (Metric Dimension Encoders)

## TRD-N(H) series

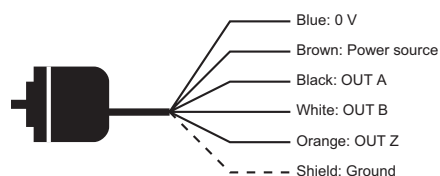
Incremental Medium Duty Solid Shaft Encoders (Line Driver Output, TRD-Nxxx-RZVWD)					
Part Number	Price	Pulses per Revolution	Input Voltage	Output	Body Dia.
<a href="#">TRD-N3-RZVWD</a>	\$167.00	3	5VDC	Line driver (differential)	50 mm
<a href="#">TRD-N4-RZVWD</a>	\$167.00	4			
<a href="#">TRD-N5-RZVWD</a>	\$167.00	5			
<a href="#">TRD-N10-RZVWD</a>	\$167.00	10			
<a href="#">TRD-N30-RZVWD</a>	\$167.00	30			
<a href="#">TRD-N40-RZVWD</a>	\$167.00	40			
<a href="#">TRD-N50-RZVWD</a>	\$167.00	50			
<a href="#">TRD-N60-RZVWD</a>	\$167.00	60			
<a href="#">TRD-N100-RZVWD</a>	\$167.00	100			
<a href="#">TRD-N120-RZVWD</a>	\$198.00	120			
<a href="#">TRD-N200-RZVWD</a>	\$198.00	200			
<a href="#">TRD-N240-RZVWD</a>	\$198.00	240			
<a href="#">TRD-N250-RZVWD</a>	\$198.00	250			
<a href="#">TRD-N300-RZVWD</a>	\$198.00	300			
<a href="#">TRD-N360-RZVWD</a>	\$198.00	360			
<a href="#">TRD-N400-RZVWD</a>	\$198.00	400			
<a href="#">TRD-N480-RZVWD</a>	\$198.00	480			
<a href="#">TRD-N500-RZVWD</a>	\$198.00	500			
<a href="#">TRD-N600-RZVWD</a>	\$198.00	600			
<a href="#">TRD-N750-RZVWD</a>	\$198.00	750			
<a href="#">TRD-N1000-RZVWD</a>	\$200.00	1000			
<a href="#">TRD-N1024-RZVWD</a>	\$200.00	1024			
<a href="#">TRD-N1200-RZVWD</a>	\$235.00	1200			
<a href="#">TRD-N2000-RZVWD</a>	\$235.00	2000			
<a href="#">TRD-N2500-RZVWD</a>	\$235.00	2500			
<a href="#">TRD-N3000-RZVWD</a>	\$236.00	3000			
<a href="#">TRD-N3600-RZVWD</a>	\$236.00	3600			
<a href="#">TRD-N5000-RZVWD</a>	\$236.00	5000			

Incremental Medium Duty Hollow Shaft Encoders (Line Driver Output, TRD-NHxxx-RZVWD)					
Part Number	Price	Pulses per Revolution	Input Voltage	Output	Body Dia.
<a href="#">TRD-NH3-RZVWD</a>	\$180.00	3	5VDC	Line driver (differential)	50 mm
<a href="#">TRD-NH4-RZVWD</a>	\$180.00	4			
<a href="#">TRD-NH5-RZVWD</a>	\$180.00	5			
<a href="#">TRD-NH10-RZVWD</a>	\$180.00	10			
<a href="#">TRD-NH30-RZVWD</a>	\$180.00	30			
<a href="#">TRD-NH40-RZVWD</a>	\$180.00	40			
<a href="#">TRD-NH50-RZVWD</a>	\$180.00	50			
<a href="#">TRD-NH60-RZVWD</a>	\$180.00	60			
<a href="#">TRD-NH100-RZVWD</a>	\$180.00	100			
<a href="#">TRD-NH120-RZVWD</a>	\$198.00	120			
<a href="#">TRD-NH200-RZVWD</a>	\$198.00	200			
<a href="#">TRD-NH240-RZVWD</a>	\$198.00	240			
<a href="#">TRD-NH250-RZVWD</a>	\$198.00	250			
<a href="#">TRD-NH300-RZVWD</a>	\$198.00	300			
<a href="#">TRD-NH360-RZVWD</a>	\$198.00	360			
<a href="#">TRD-NH400-RZVWD</a>	\$198.00	400			
<a href="#">TRD-NH480-RZVWD</a>	\$198.00	480			
<a href="#">TRD-NH500-RZVWD</a>	\$198.00	500			
<a href="#">TRD-NH600-RZVWD</a>	\$217.00	600			
<a href="#">TRD-NH750-RZVWD</a>	\$217.00	750			
<a href="#">TRD-NH1000-RZVWD</a>	\$217.00	1000			
<a href="#">TRD-NH1024-RZVWD</a>	\$217.00	1024			
<a href="#">TRD-NH1200-RZVWD</a>	\$251.00	1200			
<a href="#">TRD-NH2000-RZVWD</a>	\$251.00	2000			
<a href="#">TRD-NH2500-RZVWD</a>	\$251.00	2500			
<a href="#">TRD-NH3000-RZVWD</a>	\$251.00	3000			
<a href="#">TRD-NH3600-RZVWD</a>	\$251.00	3600			
<a href="#">TRD-NH5000-RZVWD</a>	\$251.00	5000			

## Wiring diagrams

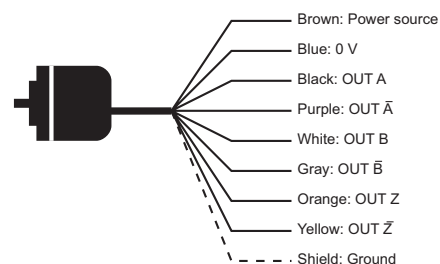
### Totem-pole (push-pull) connections

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



# Medium Duty Incremental Encoders (Metric Dimension Encoders)

## Specifications – TRD-N(H) series

Electrical Specifications				
Model		TRD-N(H)xxxx-RZWD (Totem-pole)	TRD-N(H)xxxx-RZVWD (Line Driver)	
Power Supply	Operating Voltage *	5–30 VDC (nominal) * Range: 4.75–30.0 VDC	5VDC (nominal) * Range: 4.75–5.25 VDC	
	Allowable Ripple	3% rms max.		
	Current Consumption	60 mA max.		
Signal Waveform		Quadrature + home position		
Max. Response Frequency		100 kHz	100kHz for ≤ 3000 ppr 200kHz for > 3000 ppr	
Operating Speed		(max response frequency / resolution) x 60		
Duty Ratio		50% ±25% (square wave)		
Signal Width at Home Position		100% ±50%		
Output	Rise/Fall Time **	3µs max **	100 ns max **	
	Output Type	Totem Pole (Push Pull)	Line Driver (26C31 or equivalent)	
	Output Current	Negative logic (active low)	Positive logic (active high)	
	Output Current	“H” (inflow)	30 mA max.	20 mA max
		“L” (outflow)	10 mA max.	
	Output Voltage	“H”	[(Load power volt) - 2.5V]	2.5V min
“L”		0.4V max	0.5V max	
Load Power Voltage		35 VDC max	–	

\* To be supplied by Class II source

\*\* Cable length ≤2m or less. Maximum load.

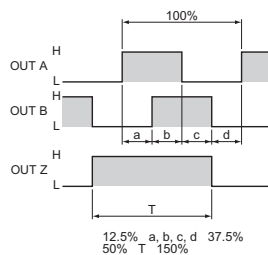
Mechanical Specifications	
Starting Torque	N (solid shaft): 0.02 N·m [0.18 lb-ft]; NH (hollow shaft): 0.05 N·m [0.44 lb-ft]
Max. Allowable Shaft Load	Radial: 50N [11.24 lb]; Axial: 30N [6.74 lb]
Max. Allowable Speed	Continuous: 3,000 rpm; Instantaneous: 5,000 rpm
Wire Size	24 AWG
Weight	Approx. 270g [9.52 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 * Grounded through a capacitor
Insulation Resistance	50 MΩ min. (excluding shield between power supply, signal cable and case) durable for one hour along three axes at 10 to 55 Hz with 0.75 mm amplitude (excluding shield between power supply, signal cable and case)
Vibration Resistance	≤500 ppr (metal slit) = 11 ms with 981 m/s <sup>2</sup> applied three times along three axes ≥600 ppr (glass slit) = 11 ms with 490 m/s <sup>2</sup> applied three times along three axes
Shock Resistance	can be mounted in any orientation
Mounting Orientation	IP65
Protection	CUL-US (E189395)

\* Voltage withstand is good for power supply, signal, and case; not good for shield wire.

## Channel timing chart

Output Signal Timing Chart - Totem Pole Models



The above waveforms apply to normal (clockwise) revolution viewed from the shaft. OUT Z phase is reversed on the RZL and RZWL models.

## Accessories

### Couplings

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

See the “Encoder Couplings” section for more information.

### Mounting Flange & Brackets

Mounting Accessories		
Part #	Price	Description
JT-035D	\$18.00	Mounting Bracket: Metal; for use with all TRD-N/NH/NA encoders
NM-9D*	\$8.00	Mounting Clamp: Metal; for use with all TRD-N/NA encoders *
NF-55D*	\$20.00	Mounting Flange Kit: includes aluminum flange & NM-9D clamp; for use with all TRD-N/NA encoders *
TRD-NH-BKT	\$6.50	Flexible mounting bracket, replacement. For use with Koyo TRD-NH series hollow shaft encoders

\* Order NF-55D (flange & clamp) for new installations.  
Order NM-9D (clamp) for replacement parts only.

TRD-NH-BKT



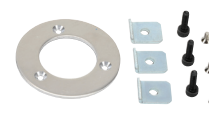
NM-9D



JT-035D



NF-55D



## How to read the timing charts

### Totem Pole 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.

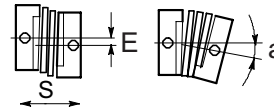


# Encoder Accessories – Couplings

## 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



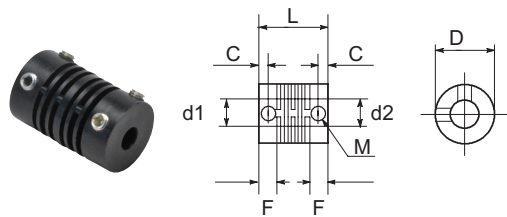
Couplings Selection Guide and Dimensions																
Type	Part Number	Price	Applicable Encoders (shaft size)	Shaft Diameter		D	L	F	C	M	a	E	S	Working Torque (N·m)	Torsional Rigidity	Material
				d1	d2	( mm [in] )					max					
								( mm [in] )								
Fiberglass (metric)	<a href="#">GJ-4D</a>	\$12.00	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

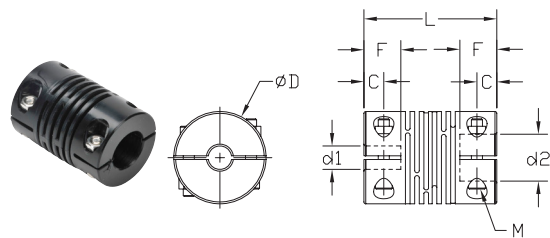
# Encoder Accessories – Couplings

## Encoder Couplings – Dimensions

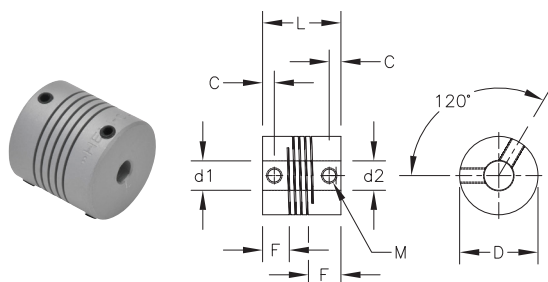
**GJ-xxD Fiberglass Couplings (metric) & GJx-xxxD Fiberglass Couplings (SAE)**



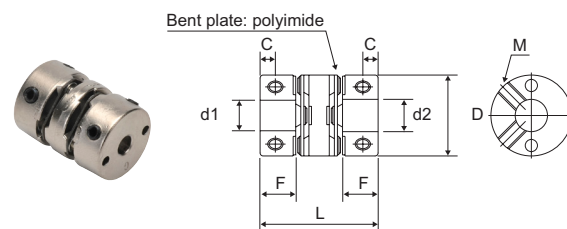
**STP-MTRA-SC-xxxx Polymer Couplings**



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



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



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

