

## Light duty incremental encoders

Our miniature incremental encoders produce a quadrature-type output and come in two shaft types:

- Standard shaft
- Hollow shaft (connects directly to other shaft with no coupling)

### Other features:

- 38mm diameter body
- 200KHz maximum response frequency
- available in 5V line driver (differential) or 12VDC (NPN open collector) models

### Accessories:

- GJ-6D: Fiber glass coupling for TRD-S models
- RU-075D: Aluminum alloy coupling for TRD-S models



Standard shaft model



Hollow shaft model

Environmental Specifications	
<b>Ambient temperature</b>	-10 to 70°C 14 to 158°F
<b>Storage temperature</b>	-25 to 85°C -13 to 185°F
<b>Ambient humidity</b>	35-85% RH
<b>Protection</b>	IP40: dust proofed

Mechanical Specifications	
<b>Starting torque</b>	Max. 0.001 Nm (.00074 ft lbs) @+20°C (68°F)
<b>Max. allowable shaft load</b>	Radial: 20N (4.5 lbs) Axial: 10N (2.25 lbs)
<b>Max. allowable speed</b>	6000 rpm
<b>Wire size</b>	AWG26
<b>Weight</b>	Aprox. 150g (5.3 oz) with 2m cable

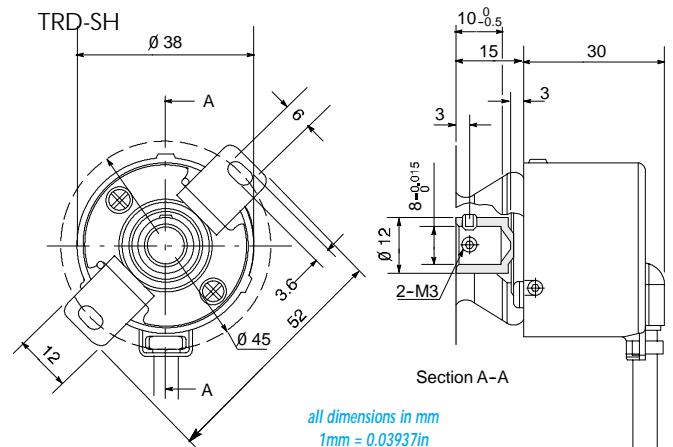
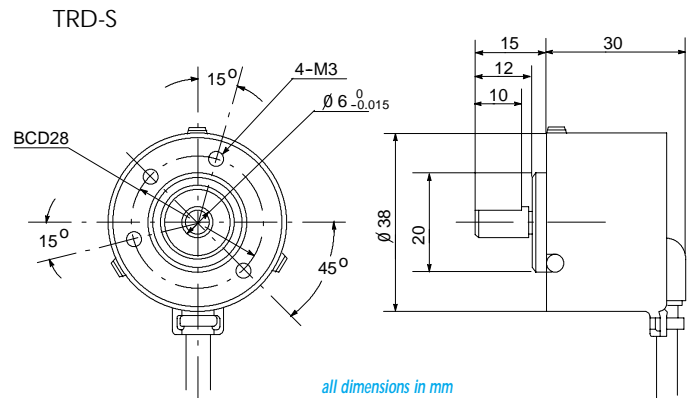
### Light Duty Standard Shaft Incremental Encoders

Model	Pulses per revolution	Input voltage	Output	Body diameter
TRD-S100-BD	100	12-24 VDC	NPN open collector	38mm
TRD-S360-BD	360			
TRD-S500-BD	500			
TRD-S1000-BD	1000			
TRD-S2500-BD	2500			
TRD-S100-VD	100	5VDC	Line driver (differential)	
TRD-S360-VD	360			
TRD-S500-VD	500			
TRD-S1000-VD	1000			
TRD-S2500-VD	2500			

### Light Duty Hollow Shaft Incremental Encoders

Model	Pulses per revolution	Input voltage	Output	Body diameter
TRD-SH100-BD	100	12-24 VDC	NPN open collector	38mm
TRD-SH360-BD	360			
TRD-SH500-BD	500			
TRD-SH1000-BD	1000			
TRD-SH2500-BD	2500			
TRD-SH100-VD	100	5VDC	Line driver (differential)	
TRD-SH360-VD	360			
TRD-SH500-VD	500			
TRD-SH1000-VD	1000			
TRD-SH2500-VD	2500			

### External dimensions



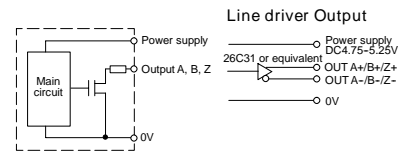
# Light Duty Incremental Encoders



Electrical Specifications			
		TRD-Sxxxx-BD TRD-SHxxxxBD	TRD-Sxxxx-VD TRD-SHxxxxVD
Power supply	Operating voltage	10.8 - 26.4VDC*	+4.75 - 5.25VDC*
	Allowable ripple	3% rms or less	3% rms or less
	Current consumption	50 mA or less	150 mA or less
Output waveform	Signal format	Quadrature output: Phase difference $25 \pm 12.5\%$	
	Max. response frequency	200KHz	
	Operating speed	(Max. response frequency/pulses per revolution) x 60 rpm or 6000 rpm (whichever is lower)	
	Duty ratio	50 $\pm$ 25%	
	Index signal width	50 - 150% of one cycle	
	Rise/fall time	1 $\mu$ s or less	100ns or less**
Output	Output type	Inflow N channel MOSFET, open drain output	Line driver output (26C31 or equivalent)
	Output current	"H"	2.3 V or more
	Output voltage	"L"	0.4 V or less
	Load power voltage	35 VDC or less	
	Short-circuit protection	Between output and power supply	

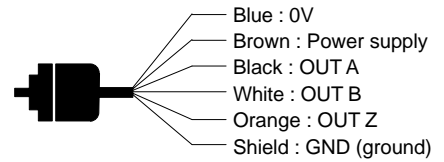
\* To be supplied by class II source \*\* With a 2m or less cable

## Output circuit

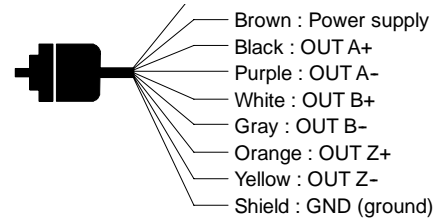


## Connections

TRD-S/SHxxxx-BD models

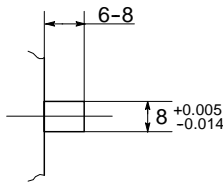


TRD-S/SHxxxx-VD models



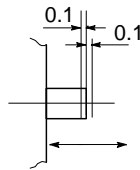
## Mating shaft requirements

Dimensions of the mating part

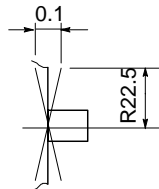


TRD-SH models

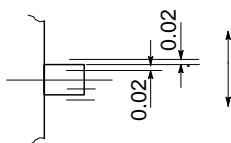
Tolerance in shaft direction



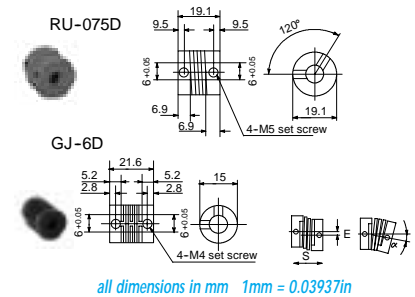
Rectangularity of the mounting surface in regard to the shaft



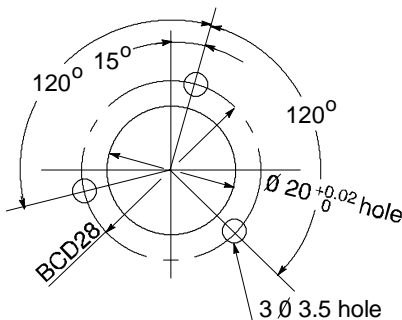
Tolerance at a right angle to the shaft



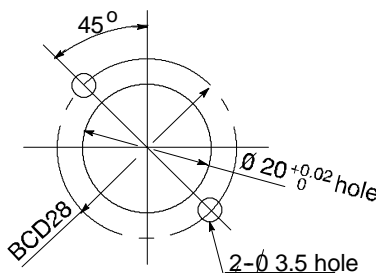
## Couplings for TRD-S models



## Mounting



For installation with 3 screws



For installation with 2 screws

Couplings				
Part No.	Material	$\alpha$	E	S
RU-075D	Aluminum alloy (7075)	5° max.	0.25mm max.	0.12mm max.
GJ-6D	Glass-fiber reinforced polyacetal	6° max.	0.5mm max.	0.12mm max.

Available soon!

6mm to 1/4" couplings • 6mm to 3/8" couplings

Encoders



# Medium Duty Incremental Encoders

Our medium duty incremental quadrature-type output incremental encoders.

Two shaft types are available:

- Standard shaft
- Hollow shaft (connects directly to other shaft with no coupling)

Other features:

- 50mm diameter body
- 100KHz maximum response frequency
- 5-30 VDC, totem pole output

Accessories:

- GJ-8D: Fiber glass coupling for TRD-N models
- JU-100D: Aluminum coupling for TRD-N models
- JT-035D: Metal mounting bracket for TRD-N models

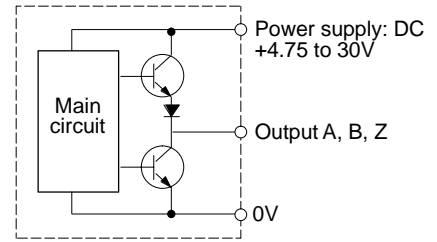


Standard shaft model

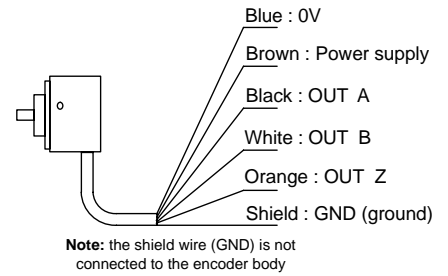


Hollow shaft model

## Output circuit



## Connections



TRD-N/NHxxxx-RZWD Electrical Specifications		
<b>Operating voltage</b>	4.75 - 30VDC*	
<b>Allowable ripple</b>	3% rms max.	
<b>Current consumption</b>	60 mA max. w/no output load	
<b>Signal format</b>	Quadrature output: Phase difference 25 ±12.5%	
<b>Max. response frequency</b>	100Khz	
<b>Operating speed</b>	(Max. response frequency/pulses per revolution) x 60 rpm or 3,000 rpm (whichever is lower)	
<b>Duty ratio</b>	50 ± 25%	
<b>Index signal width</b>	50 - 150% of one cycle	
<b>Rise/fall time</b>	3µs or less**	
<b>Output type</b>	Push pull	
<b>Output current</b>	<b>Inflow</b>	30mA max.
	<b>Outflow</b>	30mA max.
<b>Output voltage</b>	<b>"H"</b>	Power supply voltage - 2.5 V or more
	<b>"L"</b>	0.4 V or less
<b>Load power voltage</b>	35 VDC or less	
<b>Short-circuit protection</b>	Between output and 0V	

\* To be supplied by Class II source \*\* With a 2m or less cable

Incremental Medium Duty Standard Shaft Encoders				
Model	Pulses per revolution	Input voltage	Output	Body dia.
TRD-N60-RZWD	60	5-30 VDC	Totem pole	50mm
TRD-N100-RZWD	100			
TRD-N360-RZWD	360			
TRD-N500-RZWD	500			
TRD-N1000-RZWD	1000			
TRD-N2500-RZWD	2500			
Incremental Medium Duty Hollow Shaft Encoders				
TRD-NH100-RZWD	100	5-30 VDC	Totem pole	50mm
TRD-NH360-RZWD	360			
TRD-NH500-RZWD	500			
TRD-NH1000-RZWD	1000			
TRD-NH2500-RZWD	2500			

# Medium Duty Absolute Encoders

## Medium duty absolute encoders

### Absolute encoders:

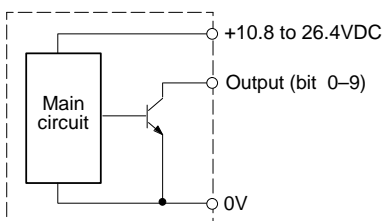
- 8mm stainless steel solid shaft
- 50mm diameter body
- 20KHz maximum response frequency
- 10-26 VDC input, totem pole output

### Accessories:

- GJ-8D: Fiber glass coupling
- JU-100D: Aluminum coupling
- JT-035D: Metal mounting bracket



### Output circuit

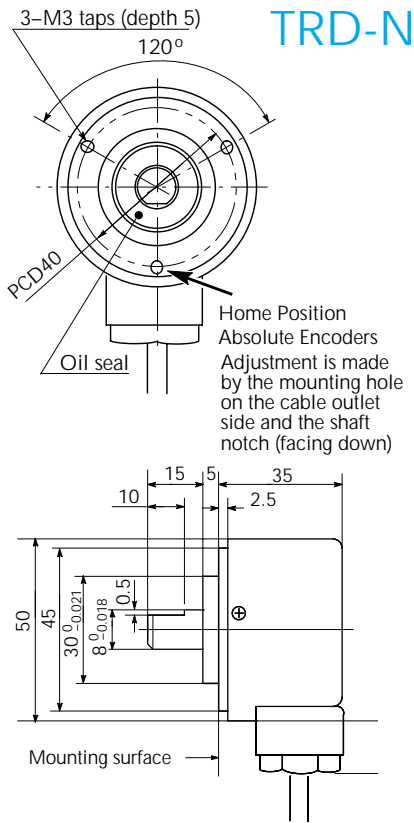


Electrical Specifications	
<b>Operating voltage</b>	10.8 - 26.4VDC (to be supplied by Class II source)
<b>Allowable ripple</b>	3% rms max.
<b>Current consumption</b>	70mA max.
<b>Output code</b>	Gray binary (Excess gray code: 38 @ 180 resolution, 76 @ 360 res., and 152 @ 720 res.)
<b>Max. response frequency</b>	20Khz
<b>Operating speed</b>	(Max. response frequency/resolution) x 60 rpm or 3000 rpm (whichever is lower)
<b>Accuracy</b>	360/resolution x 2°
<b>Direction of rotation</b>	Normal (CW) or reversed (CCW)
<b>Rise/fall time</b>	2µs max. (at 1kW load resistance and w/2m or less cable)
<b>Output type</b>	NPN open collector
<b>Output logic</b>	Negative logic (active low)
<b>Residual voltage</b>	0.4V max.
<b>Sinking current</b>	16mA
<b>Load power voltage</b>	35 VDC or less
<b>Short-circuit protection</b>	Not protected

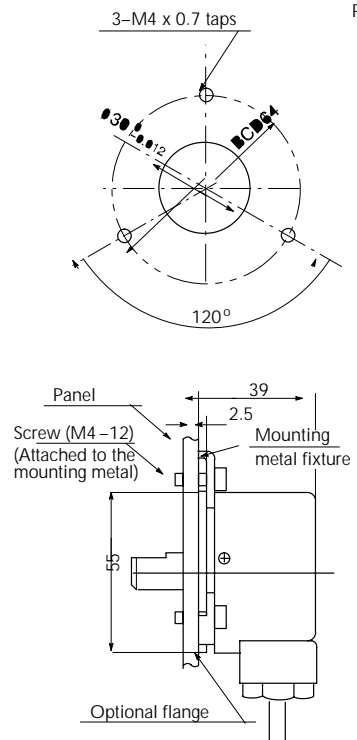
Absolute Medium Duty Standard Shaft Encoders				
Model	Resolution	Input voltage	Output	Body dia.
TRD-NA256NWD	8 bit gray code	11-26 VDC	NPN open collector	50mm
TRD-NA360NWD	9 bit gray code			
TRD-NA720NWD	10 bit gray code			
TRD-NA1024NWD	10 bit gray code			

Connections			
Wire color	1024/720 Resolution	360 Resolution	256 Resolution
Blue	0V	0V	0V
Brown	12/24V	12/24V	12/24V
Black	bit 0 (2 <sup>0</sup> )	No connection	No connection
Red	bit 1 (2 <sup>1</sup> )	bit 0 (2 <sup>0</sup> )	No connection
Orange	bit 2 (2 <sup>2</sup> )	bit 1 (2 <sup>1</sup> )	bit 0 (2 <sup>0</sup> )
Yellow	bit 3 (2 <sup>3</sup> )	bit 2 (2 <sup>2</sup> )	bit 1 (2 <sup>1</sup> )
Green	bit 4 (2 <sup>4</sup> )	bit 3 (2 <sup>3</sup> )	bit 2 (2 <sup>2</sup> )
Purple	bit 5 (2 <sup>5</sup> )	bit 4 (2 <sup>4</sup> )	bit 3 (2 <sup>3</sup> )
Gray	bit 6 (2 <sup>6</sup> )	bit 5 (2 <sup>5</sup> )	bit 4 (2 <sup>4</sup> )
White	bit 7 (2 <sup>7</sup> )	bit 6 (2 <sup>6</sup> )	bit 5 (2 <sup>5</sup> )
Black/white	bit 8 (2 <sup>8</sup> )	bit 7 (2 <sup>7</sup> )	bit 6 (2 <sup>6</sup> )
Red/white	bit 9 (2 <sup>9</sup> )	bit 8 (2 <sup>8</sup> )	bit 7 (2 <sup>7</sup> )
Shield	GND	GND	GND

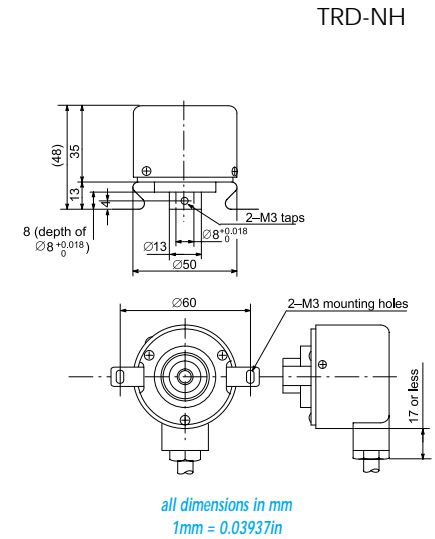
External dimensions of standard shaft encoders (absolute and incremental)



Servo mounting absolute encoder



External dimensions of hollow shaft encoder

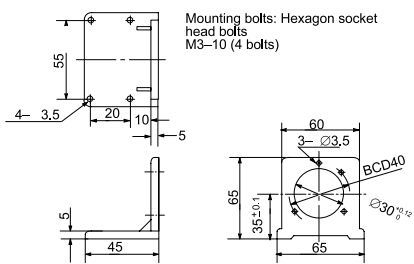


Environmental Specifications	
<b>Ambient temperature</b>	-10 to 70°C 14 to 158°F
<b>Storage temperature</b>	-25 to 85°C -13 to 185°F
<b>Ambient humidity</b>	25-85% RH
<b>Protection</b>	IP65: dust and splash proofed

Mechanical Specifications	
<b>Starting torque</b>	Max. 0.03 Nm (.022 ft lbs) (@+20°C)
<b>Max. allowable shaft load</b>	Radial: 50 N (11.24 lbs) Axial: 30N (6.74 lbs)
<b>Max. allowable speed</b>	3000 rpm continuous/ 5000 rpm momentary
<b>Wire size</b>	AWG24 (incremental) AWG26 (absolute)
<b>Weight</b>	Aprox. 250g (8.82 oz) (with 2m cable)

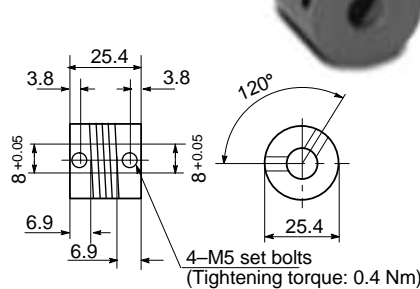
## Mounting Bracket

JT-035D: Metal mounting bracket for all TRD-N models

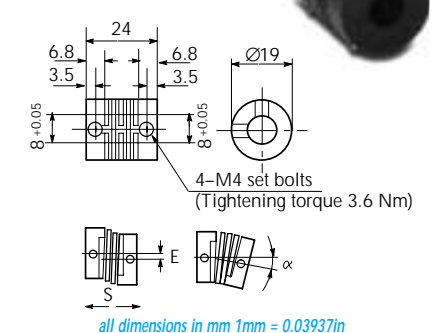


Couplings									
Part no.	Material	a	E	S	Part no.	Material	a	E	S
<b>JU-100D</b>	Aluminum alloy (7075)	5° max.	0.25m m max.	0.12m m max.	<b>GJ-8D</b>	Glass-fiber reinforced polyacetal	6° max.	0.5mm max.	0.12m m max.

JU-100D: aluminum coupling for TRD-N models



GJ-8D: fiberglass coupling for TRD-N models



Available soon!

6mm to 1/4" couplings  
6mm to 3/8" couplings  
Check our Web site for product updates

# Heavy Duty Incremental

## Heavy duty incremental encoders

Our heavy duty incremental encoders produce a quadrature-type output and have the following features:

- 10mm solid shaft
- 78mm diameter body
- 100KHz maximum response frequency
- 10-30 VDC, totem pole output

### Accessories:

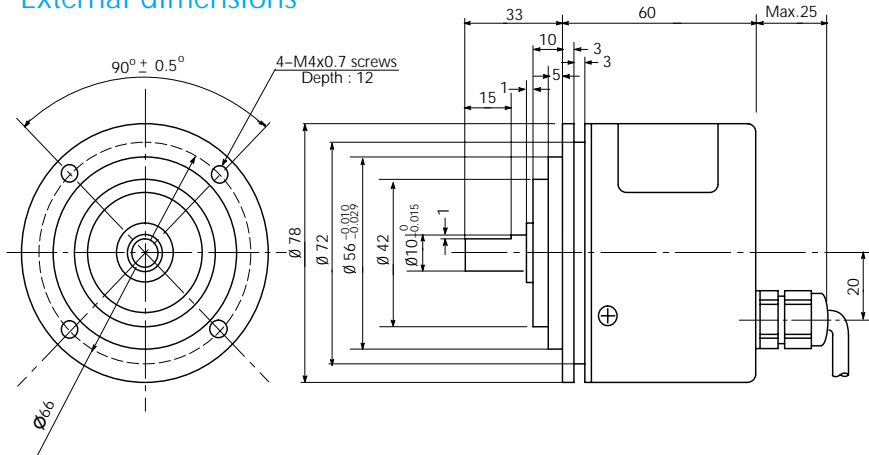
- GJ-10D: Fiber glass coupling
- RU-100D: Aluminum coupling
- RT-11D: Metal mounting bracket



Environmental Specifications	
<b>Ambient temperature</b>	-10 to 70°C 14 to 158°F
<b>Storage temperature</b>	-25 to 85°C -13 to 185°F
<b>Ambient humidity</b>	35-85% RH
<b>Protection</b>	IP65: dust and splash proofed

Mechanical Specifications	
<b>Starting torque</b>	Max. 0.1 Nm (.074 ft lbs) (@+20C°)
<b>Max. allowable shaft load</b>	Radial: 100N (22.48 lbs) Axial: 50N (11.24 lbs)
<b>Max. allowable speed</b>	5000 rpm
<b>Wire size</b>	AWG24
<b>Weight</b>	Aprox. 600g (21.16 oz) with 2m cables

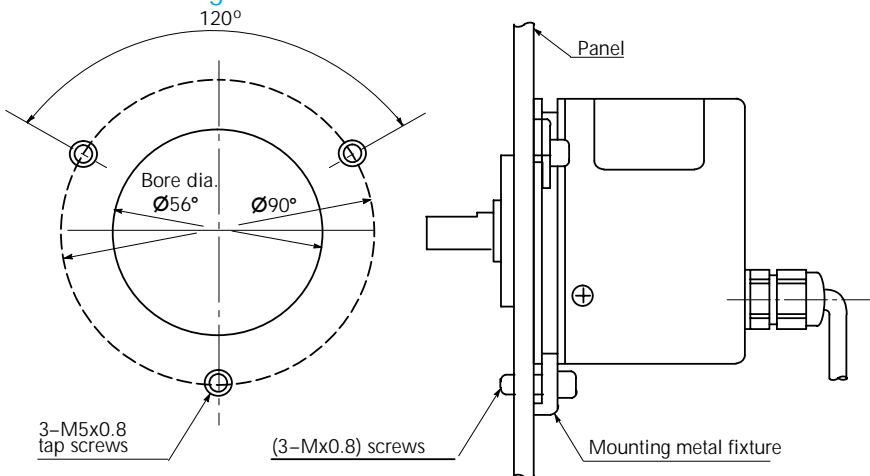
### External dimensions



all dimensions in mm 1mm = 0.03937in

Heavy Duty Standard Shaft Incremental Encoders				
Model	Pulses per revolution	Input voltage	Output	Body diameter
TRD-GK100-RZD	100	10-30 VDC	Totem pole	78mm
TRD-GK200-RZD	200			
TRD-GK360-RZD	360			
TRD-GK500-RZD	500			
TRD-GK1000-RZD	1000			

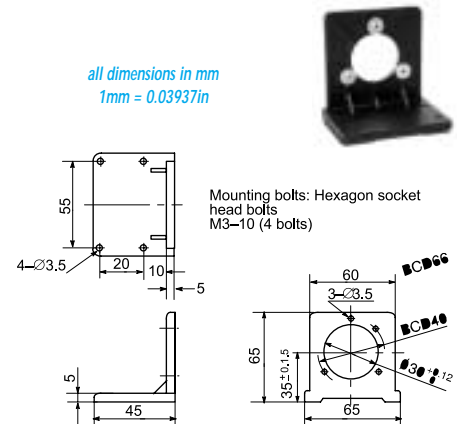
### Servo mounting



### Mounting Bracket

RT-11D: metal mounting bracket

all dimensions in mm  
1mm = 0.03937in



Encoders

Encoder Accessories Encoders Encoders

Electrical Specifications			
Power supply	Operating voltage	10 - 30VDC*	
	Allowable ripple	3% rms max.	
	Current consumption	At less than 16VDC: 50mA max. / at 16VDC or more: 70mA max.	
Output waveform	Signal format	Quadrature output: Phase difference $25 \pm 2.5\%$	
	Max. response frequency	100 KHz	
	Operating speed	(Max. response frequency/pulses per revolution) x 60 rpm or 5000 rpm (whichever is lower)	
	Duty ratio	$50 \pm 25\%$	
	Rise/fall time	$3\mu s$ or less**	
Output	Output type	Push pull	
	Output current	Inflow	30mA max.
		Outflow	30mA max.
	Output voltage	"H"	Power supply voltage - 4 V or more
		"L"	2 V or less
	Load power voltage	35 VDC or less	
	Short-circuit protection	Between output and 0V	

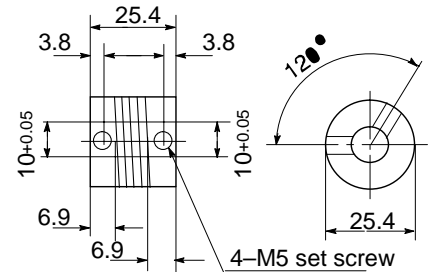
\* To be supplied by class II source \*\* With a 2m or less cable

## Couplings

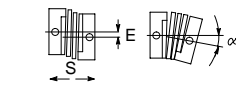
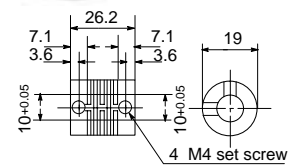
Couplings				
Part no.	Material	$\alpha$	E	S
RU-100D	Aluminum alloy (7075)	$5^\circ$ max.	0.25mm max.	0.12mm max.
GJ-10D	Glass-fiber reinforced polyacetal	$5^\circ$ max.	0.5mm max.	0.12mm max.



**RU-100D:**  
aluminum coupling



**GJ-10D:**  
fiberglass coupling



all dimensions in mm 1mm = 0.03937in

## Available soon!

6mm to 1/4" couplings  
6mm to 3/8" couplings  
Check our Web site for product updates