JTEKT

SSI Output Absolute Encoder
Series TRD-MB
Operation Manual

Thank you for purchasing the TRD-MB series SSI Output Absolute Encoder. Please read this Operation Manual carefully before applying this product.

JTEKT ELECTRONICS (WUXI) CO.,LTD.

Add: No.6 Lianhe Road, Hudai Town Binhu District, Wuxi, Jiangsu, P.R.China

Pc: 214161 https：//www.jtektele.com.cn

Tel: (0510)85167888 Fax: (0510)85161393

JELWX-M8173D-E

■ Safety Consideration

⚠Warning	This indicates contents which can cause large accidents leading to loss of life or severe injury when the indication is disregarded and wrong handling is executed.
⚠Caution	This indicates contents which can cause injury or material damage when the indication is disregarded and wrong handling is executed.

Explanation of the pictograms

⃠ This symbol indicates a general prohibition.

❗ This symbol indicates a compulsory item or an instruction.

[Operating environment and conditions]

⚠Warning

⃠ Do not use in a combustible or explosive atmosphere.
Otherwise personal injury or fire may be caused.

⃠ Do not use this product for applications related to human safety.
Use is assumed in an application where an accident or incorrect use will not immediately cause danger to humans.

[Operating environment and conditions]

⚠Caution

❗ Use and store the equipment within the scope of the environment (vibrations, impact, temperature, humidity, etc.) specified in the specifications.
Otherwise fire or product damage may be caused.

❗ Understand the product first before use it.

[Installation and wiring]

⚠Warning

❗ Use only with the power supply voltage listed in the specifications.
Otherwise fire, electric shock, or accidents may be caused.

❗ Use only with the wiring and layout specified in the specifications.
Otherwise fire, electric shock, or accidents may be caused.

❗ Do not apply any kind of stress to the wires.
Otherwise electric shock or fire may be caused.

■ Connection

Wire color	Function	
Brown	5V	Power supply
Blue	0V	
White	Clock＋	The clock pulse signal outputs to the encoder
Gray	Clock－	
Black	Data＋	The position data outputs from the encoder
Purple	Data－	
Yellow	Zero	Zero position setting wire *1

*1 The yellow wire is used to set the zero position.

1. When the encoder is operating normally, the zero position setting wire should be connected to the 0V power wire.
2. Zero position setting steps: first rotate the encoder to the desired zero position, then connect the zero position setting wire to the 5V power wire for at least 100ms, then disconnect, and the setting is complete.

Note: If the encoder does not have the zero setting function, it does not have the yellow wire.

■ Composition of model number

TRD-□MB□4096□SS-5M

- Outside diameter
  - Blank: φ 25
  - 38: φ 38
- Shaft Type
  - Blank: solid shaft
  - H: hollow shaft (except for TRD-MB**)
- Resolution
- Count increases direction
  - Blank: Positive (CW)
  - R: Reverse (CCW)
- Output mode
  - SS: SSI single mode
  - SF: SSI continuous mode
- Cable length
  - Blank: Cable length is standard length
  - 5M: Cable length is 5m

■ Electrical specifications

Item				Specification		Remark
Output circuit				Line driver		SN65LBC179 or equivalent
Power supply	Operating voltage			5V±0.25V DC		
	Allowable ripple			Max. 3%rms		
	Current consumption			Max. 50mA		
Output code				binary code		SSI serial output
Clock frequency				33kHz~4MHz		
Input signal	Item			Min.	Max.	The clock pulse signal outputs to the encoder.
	Clock	Voltage	V_{IH}	2.1V	V_{CC}	
			V_{IL}		0.9V	
Output signal	Data	Voltage	V_{OH}	2.0V	V_{CC}	The position data outputs from the encoder.
			V_{OL}		0.5V	
		Current	I_O		15mA	

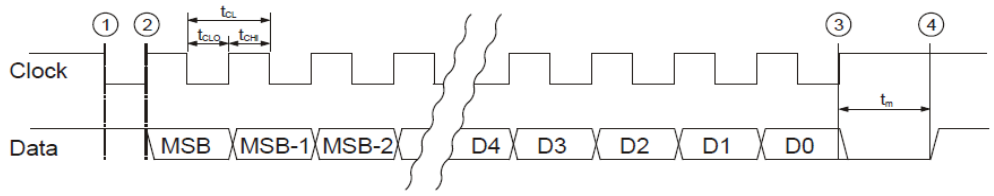
■ Resolution and Speed

		Maximum rotating speed （rpm）							
Resolution		4096	2048	1024	512	256	128	64	32
Output Mode	SS	300	800	2000	4000	Mechanically permissible maximum rotating speed			
	SF	1000	2000	4000	Mechanically permissible maximum rotating speed				

Note：When the maximum rotating speed exceeds the upper limit, the electrical signal may be lost.

■ Brief description of SSI PROTOCOL

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Clock period	t_{CL}	0.25		2 x tm	μs	
Clock high	t_{CHI}	0.1		tm	μs	
Clock low	t_{CLO}	0.1		tm	μs	
Monoflop time	tm	15	19	25	μs	



SSI timing diagram with monoflop timeout

The users obtain the current position data by sending a continuous clock signal to the encoder. At the first falling edge (position ①), the encoder stores the current location information. At the first rising edge (position ②), the most significant bit of data is outputted through the data line (Data). At each subsequent rising edge of the clock signal, the next bit of data is outputted through the data line (Data). While reading the data, the t_{CHI} and t_{CLO} should be less than t_{mMin}. After reading a complete position data (point ③), the data line (Data) outputs low.

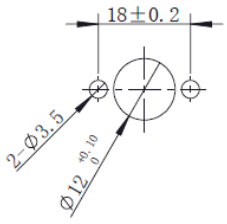
SS mode: After reading the previous position data, if you want to read the previous position data again, you need to continue to transmit the clock signal to the encoder. In this case, between two adjacent output data, the encoder outputs low for one clock cycle; if you want to read the new position data, you need to wait tm time (the data line (Data) outputs high) for encoder to response.

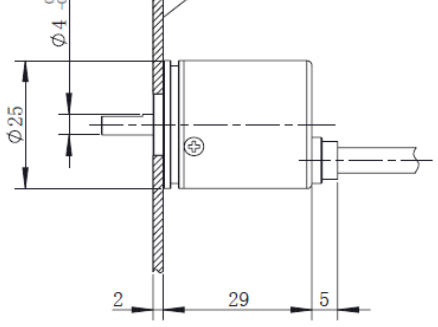
SF mode: After reading the previous position data, if you want to continuously read the new position data, you need to continue to transmit the clock signal to the encoder. In this case, between two adjacent output data, the encoder outputs low for one clock cycle.

■ External dimensions and mounting

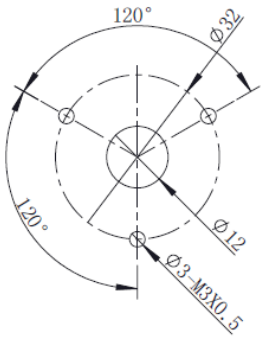
- TRD-MB**

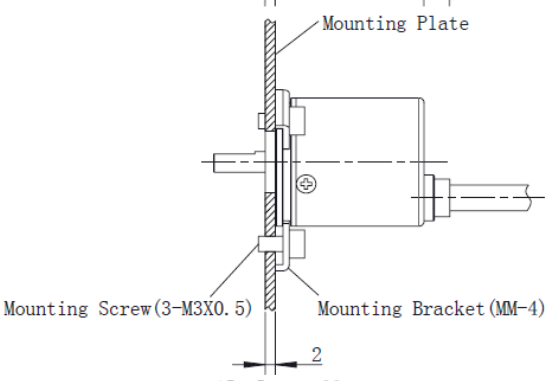
Two-hole mounting



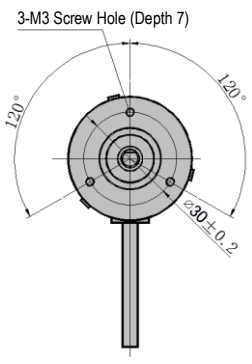


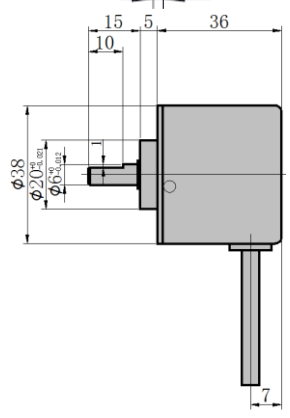
Bracket mounting





- TRD-38MB**





■ Mechanical specifications

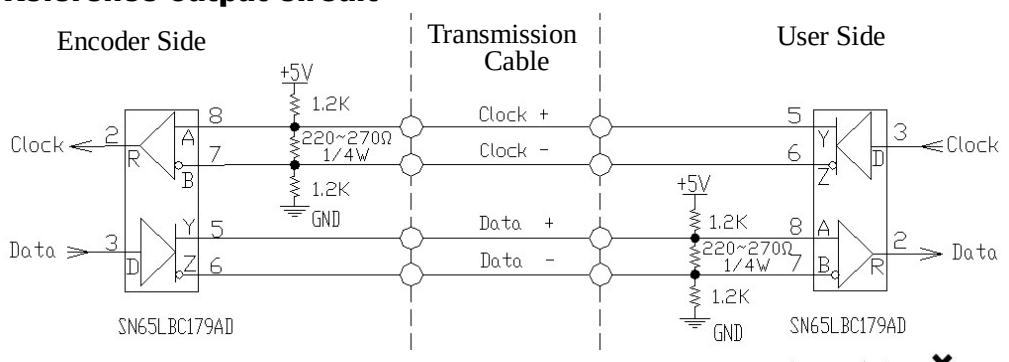
Model		TRD-MB**	TRD-38MB**
Starting torque		≤ 001N・m (+20℃)	≤ 01N・m (+20℃)
Max. allowable shaft load	Radial	10N	20N
	Thrust	5N	30N
Shaft moment of inertia		1×10^{-7} kg·m²	3×10^{-7} kg·m²
Cable	Material	Oil resistant PVC cable	
	Outer diameter	Approx. φ 5mm (8 cores)	
	Length	0.5m (Standard)	1.0m (Standard)
	Specification	Nominal cross-sectional area is 0.14mm², AWG26	
Max. allowable speed		6000rpm	5000rpm
Weight		50g	111g

■ Environmental requirements

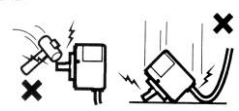
Model		TRD-MB**	TRD-38MB**
Ambient temperature	Operation	−25～+85℃	−25～+85℃
	Store	−40～+100℃	−25～+85℃
Ambient humidity		35～85%RH (non-condensing)	
Withstand voltage		AC500V (50/60Hz) for 1 min※1	
Insulation resistance		min. 20MΩ	
Vibration resistance		10 to 55Hz with 0.75mm amplitude Durable for 1h along 3 axes	
Shock resistance		11ms with 490m /s² Applied 3 times 3 axes	
Protection construction		IP50	

※1 A capacitor of 0.01μF/630V is connected between 0V and FG wire，A capacitor of 0.01μF/630V is also connected between Vcc and FG wire.

■ Reference output circuit



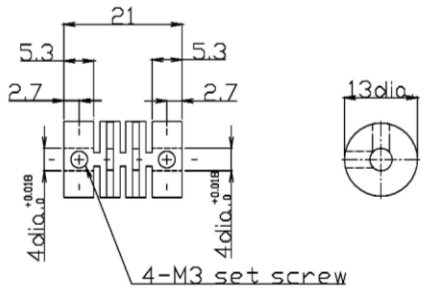
■ Cautions for use



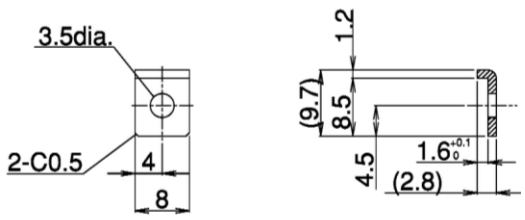
- Do not wire the cable in parallel with other power lines and do not share a duct with other cables.
- Use capacitors or surge absorption elements to remove the sparks caused by relays and switches in the control panel as far as possible.
- Be sure to connect all wires properly, as wrong wiring can damage the internal circuitry.
- Erroneous data may be caused at the time of power ON and power OFF. After power ON, wait for at least 0.5 sec. before use.
- Do not disassemble the product. Do not expose the product for a long time to water, even if it is a dust-resistant, jet-proof type. Wipe off any water getting onto the product.
- As the rotary encoder is composed of precision parts, its parts will be impaired when it is subjected to shocks. Use sufficient care for handling and mounting.

■ Options(Only Suitable for TRD-MB** Series)

- Coupling(GJ-4)



- Mounting bracket(MM-4)



Type No.	Material	α	ε	s
GJ−4	PBT resin	5° MAX	0.5mmMAX	0.12mmMAX