Koyo

Incremental Encoder

Series TRD-SR/SHR

Safety Manual

Thank you for purchasing this Series **TRD-SR/SHR** Incremental Encoder.

Plase read this Safety Manual carefully before applying this product.

KEEP THIS MANUAL IN A SAFE PLACE.

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Specifications and dimensions are subject to change without notice due to product improvement.

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Safety Considerations

⚠ **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.

⚠ WARNING

- Do not disassemble the product.
- 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.
- 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.
- BURN HAZARD: Dependent on the ambient temperature, that surfaces may reach dangerous temperature. Avoid the direct skin contact with encoder.
- Align the shaft of the encoder with the shaft of the other device. If more than allowable load is applied to the shaft, it may cause an unexpected accident.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

⚠ 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.
- Read this Safety Manual, and understand this product before using it.

WARNINGS for Use

- It must be mounted within an enclosure that is suitably designed for mechanical and environmental specifications.
- If this product gets dirty, please wipe with a cloth dampened with water to remove any dirt.
- Do not wire the cable in parallel with other power lines, and do not share a wiring duct with other cables.
- Use capacitors or surge absorption elements to remove the sparks caused by relays and switches in the control panel.
- Connect all wires properly. Incorrect wiring can damage the internal circuitry.
- Erroneous pulses may be caused at the time of power ON and power OFF. After power ON, wait at least a 0.5 second before use.
- Use care when handling and mounting the rotary encoder. It is made of precision components that can be damaged by physical shocks.

Model Numbering System

		A	B	C	D	E	F	G		H
TRD	-	SHR	3600	C	W	E	0	D	-	10M

A	Series Name	SR	Solid Shaft
		SHR	Hollow Shaft
B	A / B Pulse Number	xxxx	xxxx Pulse par Revolution
C	Output type	A	Open collector
		C	Totem-pole
		V	Line driver
D	Protective Structure / Cable Outlet position	None	IP50 / side
		W	IP65 / side
		B	IP50 / back
E	Shaft Length * TRD-SR series only	None	16.4 mm
		E	20.0 mm
F	Pitch of Spindle Spring *TRD-SHR series only	0	PCD 40
		5	PCD 45
G	Destination	None	Japan
		D	Other Countries
H	Cable Length	None	1 meter
		xx M	xx meter

Electrical Specifications

Models			TRD-SR/SHR□A	TRD-SR/SHR□C	TRD-SR/SHR□V
Power Supply	Operating voltage *1		4.75 VDC to 26.4 VDC	10.8VDC to 26.4 VDC	4.75 VDC to 5.25 VDC
	Allowable ripple		3% rms max		
	Current consumption *2		Less than 90mA		
Output Waveform	Signal wave form		Quadrature output + home position		
	Max response frequency *3		200kHz	100kHz	200kHz
	Duty ratio(Symmetry)		50±25%		
	Index signal width		100±50%		
Output	Rising/falling time *4		1 μs max	3 μs max	1 μs max
	Output configuration		NPN Open Collector Output	Totem Pole Output	Line Driver Output *5
	Output voltage	"H"	--	[(Power supply voltage) - 2.5V] min	2.5V min
		"L"	0.4V max	0.4V max	0.5V max
	Output current	Outflow	--	Negative 10mA max	Positive 20mA max
		Inflow	Positive 30mA max	Positive 30mA max	
	Load power supply voltage		30 VDC max	30 VDC max	--

*1 To be supplied by Class II source. *2 Maximum load *3 When the operating speed is exceeded, the signal will not follow up electrically. Maximum operating speed = (Maximum response frequency / Resolution) x 60

*4 With 1m cable, Maximum load *5 26C31 or equivalent.

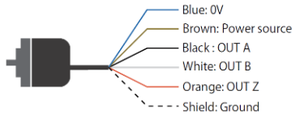
Mechanical Specifications

Starting Torque	0.001N m max (+20℃)	
Shaft Moment of Inertia	0.6 x 10^{-6} kg m^2	
Max Allowable Shaft Load	Radial	30N
	Axial	20N
Max Allowable Speed *6	6000 min^{-1}	
Cable	External diameter φ6 mm with 1m Oil-resistant PVC , AWG 26 5-conductor shielded cable （TRD-SR/SHR□V : 8-conductor cable）	
Weight	150g (With 1m cable)	

*6 Highest speed that can support mechanical integrity of the encoder

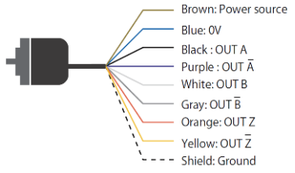
Connections

TRD-SR/SHR□A
TRD-SR/SHR□C



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

TRD-SR/SHR□V



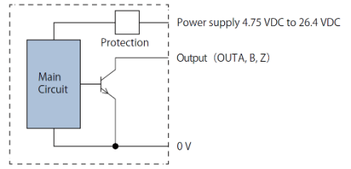
Calbe shield is NOT connected to the encoder body (frame ground)

Environmental Specifications

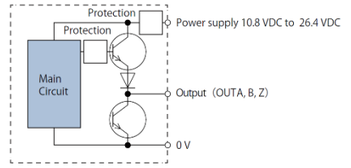
Ambience	Indoor use (avoid direct sunlight)
Altitude	2000m or less above sea level
Ambient Temperature	-10℃ to +80℃ (Operation)
	-25℃ to +85℃ (Store)
Ambient Humidity	35% to 85% RH (non-condensing)
Withstand Voltage	Grounded through capacitor
Insulation Resistance	50MΩ min
Vibration Resistance	Half amplitude 0.75 mm 10-55Hz 1hour along 3axes.
Shock Resistance	490m/s 11ms 3 times 3 axes.
Protective Construction	IP50 / IP65 (Not scope of UL/cUL certification)

Output Circuits

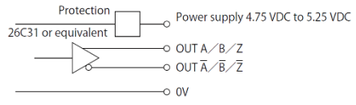
TRD-SR/SHR□A
(Open Collector)



TRD-SR/SHR□C
(Totem Pole)



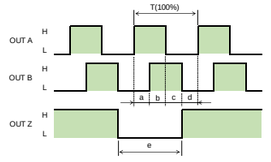
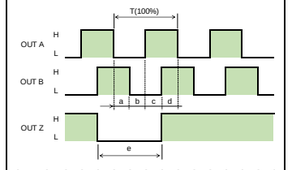
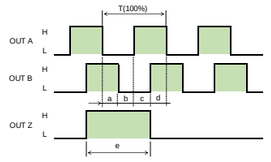
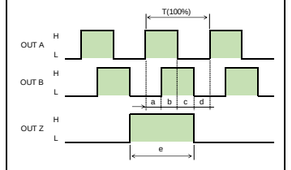
TRD-SR/SHR□V
(Line Driver)



Mounting Screw Information

TRD-SR (include)	Socket-head screw M3 x 0.5 x 6 mm [Tightening Torque 0.5 N m]
TRD-SHR	n/a

Output Waveform

	TRD-SR/SHR□A	TRD-SR/SHR□C	TRD-SR/SHR□V
A			
B			

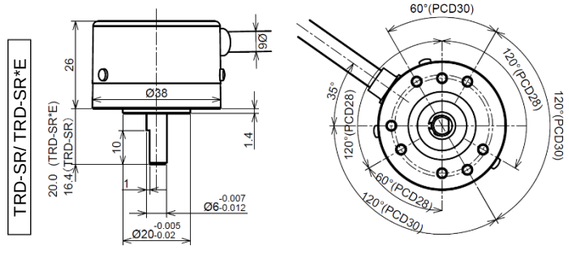
A: 10 to 60 Pulse Number B: 100 to 3600 Pulse Number

T = a + b + c + d a, b, c, d = 1 / 4 T ± 1 / 8 T e = 1 ± 1 / 2 T

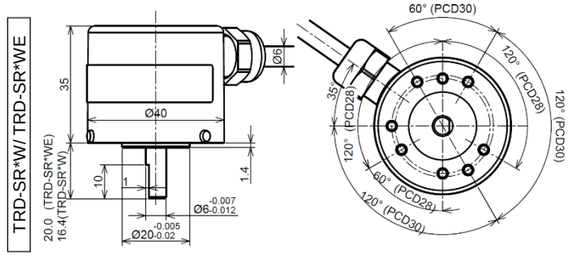
This Output waveform is Normal revolution (CW). "Normal" means clockwise revolution viewed from the shaft end.

Dimensions

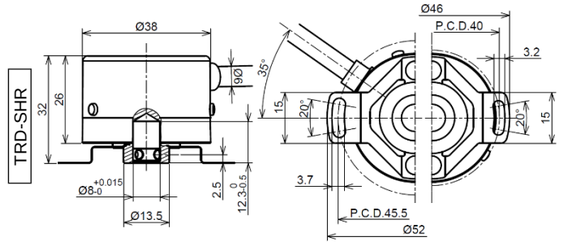
TRD-SR/ TRD-SR*E



TRD-SR*W/ TRD-SR*WE



TRD-SHR



TRD-SHR*W