

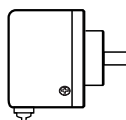
- Thin design with an external diameter of Ø38 mm / depth of 37 mm
- Easy installation in narrow spaces
- Small diameter lineup with resolution up to 5000 P/R
- Low price contributes to cost reduction of system
- IP54 protective structure
- Wide range of power sources : 5~24VDC, 5VDC ±5%
- Various output types



### Order Code Shaft Version

Series	Incremental	Outer Dia	Shaft Dia 6mm	Pulse Per Revolution (PPR)	Output	Power Supply
<b>B</b>	<b>I</b>	<b>38</b>	<b>S</b> Standard shaft dia 6mm	<b>30, 50, 60, 100, 200, 250, 360, 400, 500, 600, 720, 1000, 1024, 1800, 2000, 2048, 2500, 3600, 4096, 5000</b> (other PPR are available on request)	<b>P</b> Push Pull <b>N</b> Open Collector NPN <b>L</b> Line Driver	<b>U</b> 5~24VDC <b>5</b> 5VDC

A simple way of sensing rotary movements



High rotational  
speed



Temperature  
-20° + 85°



Shock/vibration  
resistant



Magnetic field  
proof



Short-circuit  
proof



Optical sensor

### Electrical Characteristics

Output Circuit	Push Pull	NPN Open Collector	Line Driver
Supply Voltage	5-30 VDC		5 V ±5%
Power Consumption (no load)	≤125mA	≤80mA	≤100mA
Permissible Load / Channel	±80mA	±50mA	±80mA
Pulse Frequency	Max. 250 kHz		
Signal Level High	Min. VCC 1.5V	Min. Ub*70%*	Min. 3.4V
Signal Level Low	Max. 0.8V	Max. 0.4V*	Max. 0.4V
Rising Edge Time	Max. 1μs	Max. 1μs**	<200ns
Falling Edge Time	Max. 1μs	Max. 1μs**	<200ns
Short Circuit Proof Outputs	Yes		
Reverse Polarity Protection of the Power Supply	Yes		No
Over Current Protection	Yes		
	* NPN Open collector depends on pull-up resistor **NPN Open collector depends on pull-up resistor and cable length		

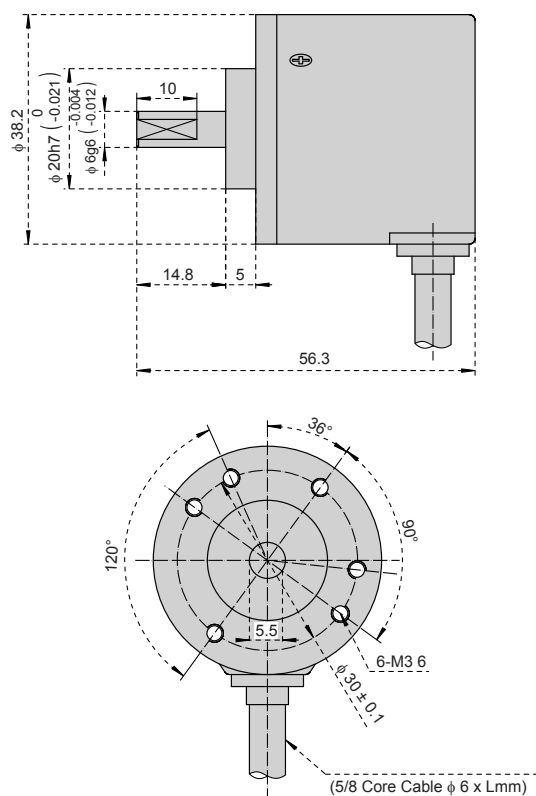
### Mechanical Characteristics

Max. Speed	6000RPM
Max. Speed Continuous	Max. Response Frequency / Resolution
Rotor Moment of Inertia	approx. $1.8 \times 10^{-6}$ kgm <sup>2</sup>
Shock Resistance	50G/11ms
Vibration Resistance	10G, 10-200Hz
Starting Torque	<0.05 Nm
Shaft Material	SS
Body Material	Aluminum alloy 2A12
Outer Case Material	Iron
Disk Material	Glass
Cable	2 Mtr. Black shield cable, side entry
Degree of Protection	IP 54
Weight	150g
Position Deflection of Allowable Shaft	Radial : Less than 0.05mm, Axial : Less than 0.2mm
Allowable Shaft Load	Radial : 2.5kg Max. Axial : 1.3kg Max.
Operating Temperature Range	-30°C ~ +85°C (No freezing) at 30% ~ 85% RH

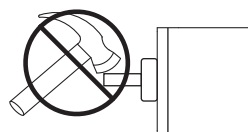
### Connection Table

Wire Colour	Black	Red	Green	White	Yellow	Brown	Grey	Orange	Shield
Push Pull / NPN Open Collector	0 V	+V	A	B	Z				Ground
Line Driver	0 V	+V	A	B	Z	$\bar{A}$	$\bar{B}$	$\bar{Z}$	Ground

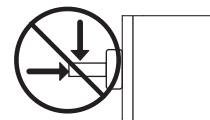
## Dimension Drawing



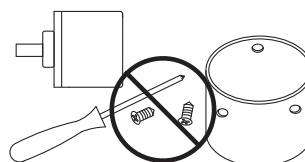
**Caution:** Avoid damage to your **BTH** Encoder. The following actions may cause damage, and void product warranty.



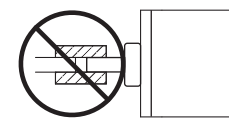
Do not shock or strike



Do not subject shaft to excessive axial or radial shaft stresses



Do not disassemble

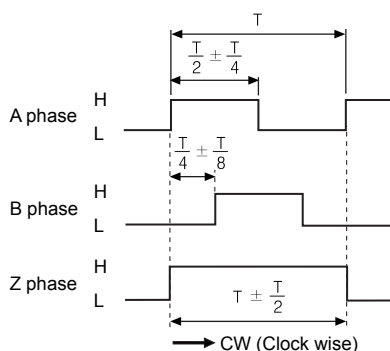


Do not use a rigid coupling

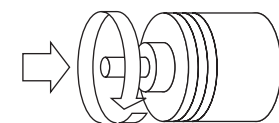
Incremental Encoder is the direct use of the principle of photoelectric conversion output. Incremental output phases are A phase, B phase which have phase difference at  $90^\circ$  and Z phase one pulse per revolution for benchmarking point positioning. The advantage is that the principle of simple structure, the average life span of the machine can be in the tens of thousands of hours, anti-interference ability, high reliability, suitable for long distance transmission. Shaft Encoders are useful because they can be mounted easily with flexible coupling to the shaft.

## Output Waveform

- Push Pull output / NPN open collector output

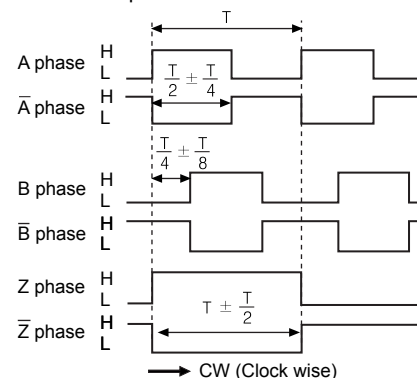


※ Inverse type of Z phase is optional.



CW → Rotating Toward Clockwise  
Viewed from an Arrow

- Line driver output



※ CW : In a view of shaft

## Industries

- Automotive Assembly
- Chemical, Petrochemical
- Drive Technology
- Electronic Production
- Food, Beverage, Semi-luxury Goods
- Graphical Machinery
- Handling and Robotics
- Injection Molding, Die Casting
- Machine Tools
- Medical Industry
- Pharmaceutical, Bio Technology
- Semiconductor Industry
- Textile Machinery
- Transportation
- Water, Energy, Mining
- Warehouse and Logistics
- Wood Machinery

## Applications

- Drive and conveyor technology
- Lift construction
- Processing machines
- Handling Control
- Robotics
- Metal sheet processing
- Profile milling machines
- Machinery for plastics and semiconductor industry
- Wood processing machines
- Spindle positioning at profile milling machines
- Graphical machinery (printing machines)
- Environment plant engineering and textile machinery
- Conveying systems in day-mining
- Ship construction
- Gear test stands
- Packaging machines
- Blister and carton box packaging
- Labelling machines
- Foil-winding machines
- High racks
- Chipboard production plants
- Warehouse and logistics
- Metal sheet processing machines