

Battery Backup Multi-turn Absolute Encoder

Hollow shaft type **Model : 37HA-MB**

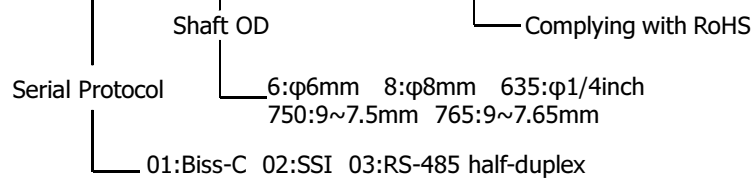
■ Features

- 39-bits resolution: 16-bits battery backup multi-turn & 23-bits optical single-turn
- Built-in communication protocol (option): BiSS C mode, SSI mode & RS-485 half-duplex
- Overall encoder outer diameter $\varnothing 37$ mm and typical mounting height 28 mm
- Supporting standard hollow taper shaft, short hollow taper shaft and $\frac{1}{4}$ inch, 6mm and 8mm diameter of the hollow blind shaft options.



■ Model

37HA-MB - - **000-00E**



■ Specification

1. Basic specification

General		
Outside diameter	37mm	At housing
Height	27.6mm	From Motor Mounting Surface
Bearing	With Bearing	
Shaft	Hollow shaft: $\varnothing 1/4, \varnothing 6, \varnothing 8$	
	Taper shaft: $\varnothing 9$ - $\varnothing 7.5$ mm; 1:10 $\varnothing 9$ - $\varnothing 7.65$ mm; 1:10	
Measuring Methods	Optical transparent / Absolute	
Electrical		
Single-turn Resolution	23bits (8,388,607 counts)	
Multi-turn Resolution	16bits (65,535 counts)	
Main Supply Voltage	+5.0V $\pm 10\%$	
Main Supply Current	Typical 115mA	Without load, Ta=+25°C
External Battery Voltage	Typical +3.6V Max +4.5V	
External Battery Current	Typical 95uA	Ta=+25°C, No shaft rotation
Electrically Permissible Speed	$\leq 6,000$ min ⁻¹	
Electrically Permissible Acceleration	Normal mode: $\leq 8.0 \times 10^4$ rad/s ²	
	Battery mode: $\leq 4.0 \times 10^4$ rad/s ²	
Data Interface	BiSS-C, SSI, RS-485 half-duplex	

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- Note: 1. Normal mode: Encoder operates on encoder main power supply.
2. Battery mode: Encoder operates in "OFF" State, while multi-turn data is tracked by battery circuitry.

Mechanical		
System Accuracy	Typical ± 80 Arc-sec	With electrical correction, $T_a = +25^\circ\text{C}$
Mechanical Permissible Speed	$\leq 6,000\text{min}^{-1}$	
Mechanical Permissible Acceleration	$\leq 8.0 \times 10^4 \text{ rad/s}^2$	
Moment of inertia	$\leq 1.0 \times 10^{-6} \text{ kgm}^2$	
Shaft Radial Play	$\leq \pm 0.05 \text{ mm}$	
Shaft Axial Play	$\leq \pm 0.1 \text{ mm}$	
Starting torque	$\leq 9.8 \times 10^{-3} \text{ N.m}$ $T_{amb} = 25^\circ\text{C}$	
Environmental		
Operating Temperature Range	$-20 \sim +105^\circ\text{C}$	
Storage Temperature Range	$-20 \sim +105^\circ\text{C}$	
Vibration	$\leq 98\text{m/s}^2$ 10 to 2000Hz	Per IEC 60068-2-6
Shock	$\leq 1960\text{m/s}^2$ 6ms; Half Sine	Per IEC 60068-2-27
Protection	IP40	
Weight	0.047kg ($\pm 10\%$)	
Relative Air Humidity (Non-Condensing)	RH 90 %	$T_a = +40^\circ\text{C}$
Others		
Counting Direction	Increase with Counter Clockwise (CCW) shaft rotation, view from coupling end (Figure 1)	
External Battery Recommendation	3.60V/ 2,000mAh Lithium battery	
External Battery Alarm	Typical 3.10V $\pm 0.1\text{V}$	
System Down Error	Typical 2.90V $\pm 0.25\text{V}$	
Multi-turn value by Counter Clear	0	
Internal Memory	EEPROM	
Usable Memory Area	5Kbit	
Initialization Time	500ms	

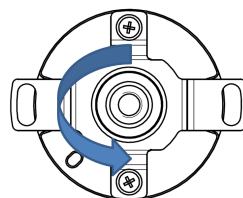


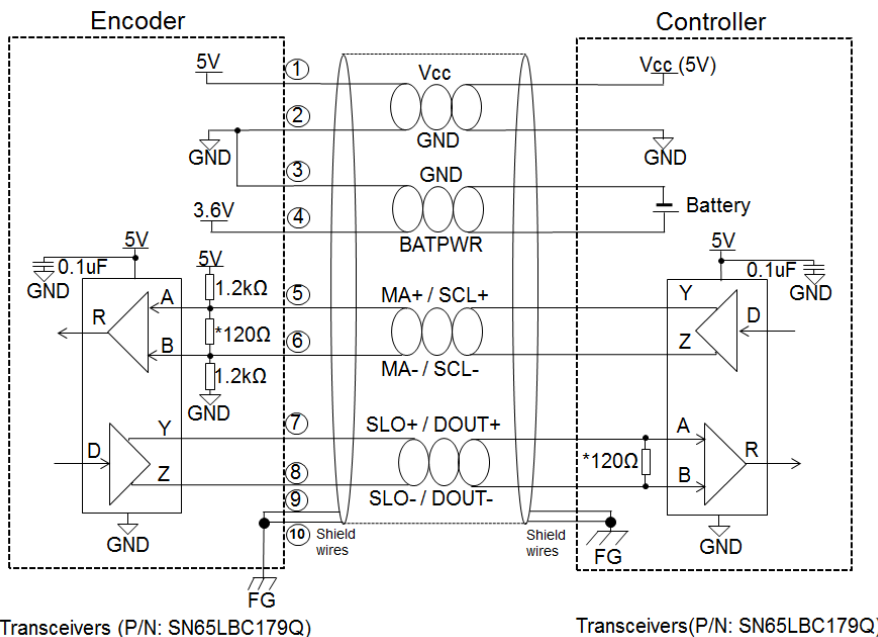
Figure 1

Note: Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Interface Diagram

The following are examples of the circuit diagram of full-duplex and half-duplex transceiver.

Full-duplex transceiver (BiSS C mode / SSI mode protocol):

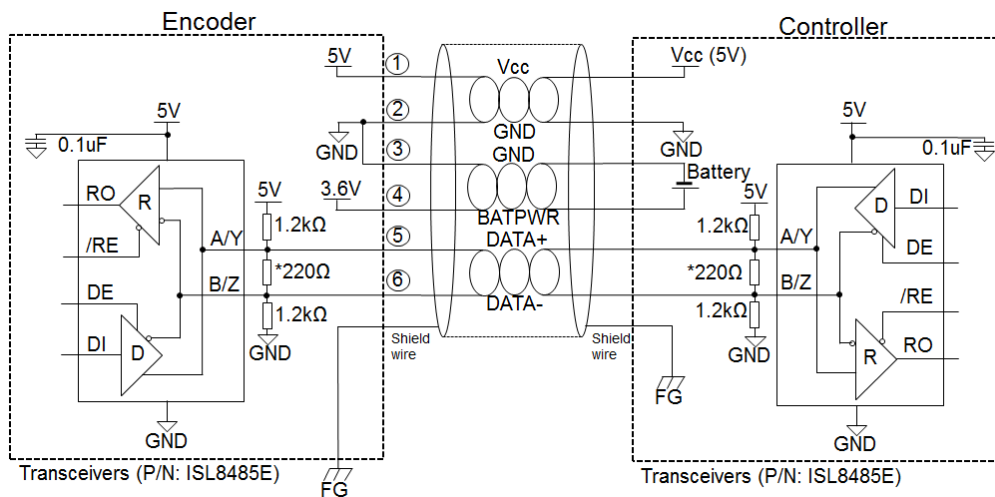


Transceivers (P/N: SN65LBC179Q)

Transceivers(P/N: SN65LBC179Q)

Figure 2: Circuit diagram of full-duplex transceiver

Half-duplex transceiver (RS-485 half-duplex protocol):



Transceivers (P/N: ISL8485E)

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Figure 3: Circuit diagram of half-duplex transceiver

Note:

- 1) Termination resistor, *120ohm and *220ohm are recommended but may depends on the characteristic impedance of cable used.
- 2) Recommended to connect encoder chassis and cable shield to frame ground (FG) in application for enhanced noise immunity in harst operating condition.

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■ Connector Output Assignment

Pin	BiSS-C mode protocol (Output: 10 pins connector)	SSI mode protocol (Output: 10 pins connector)	RS-485 half-duplex protocol (Output: 7 pins connector)
1	VCC, Encoder Supply	VCC, Encoder Supply	VCC, Encoder Supply
2	GND, Ground	GND, Ground	GND, Ground
3	GND (External Battery)	GND (External Battery)	GND (External Battery)
4	BATPWR (External Battery)	BATPWR (External Battery)	BATPWR (External Battery)
5	MA+	SCL+	DATA+
6	MA-	SCL-	DATA-
7	SLO+	DOUT+	Cable Shield, Connect to Chassis
8	SLO-	DOUT-	N/A
9	Cable Shield, Connect to Chassis	Cable Shield, Connect to Chassis	N/A
10	Cable Shield, Connect to Chassis	Cable Shield, Connect to Chassis	N/A

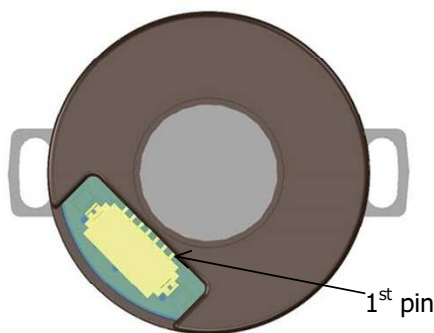


Figure 4: 7pins Connector Pin Assignment

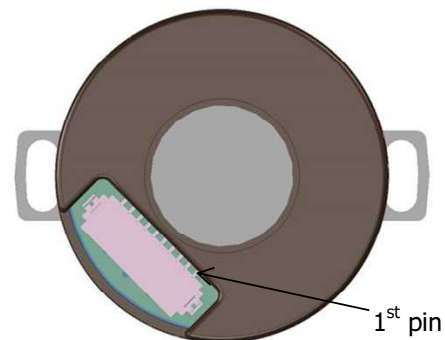


Figure 5: 10pins Connector Pin

*Recommended mating connector:

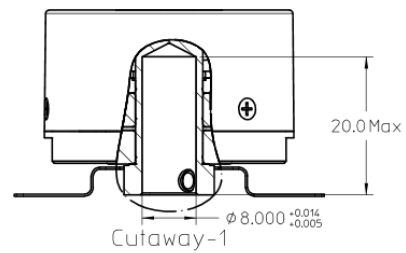
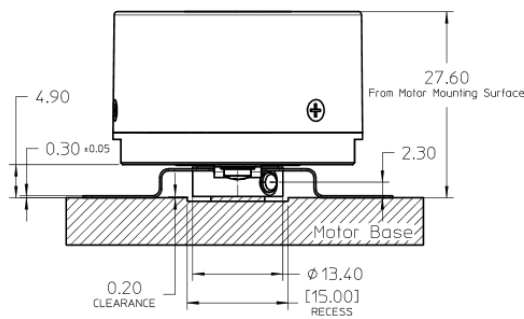
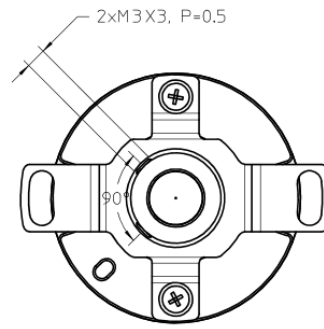
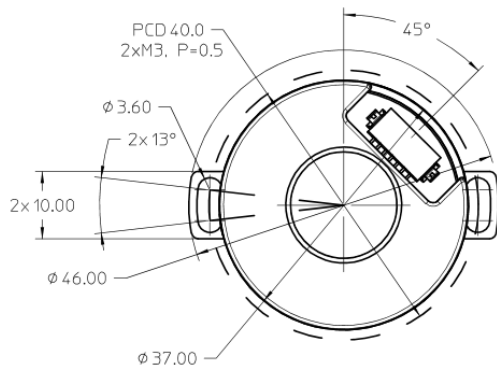
Hirose Part No : DF13-7S-1.25C for 7pins connector and DF13-10S-1.25C for 10 pins connector
(CL No.536-0006-8)

Hirose (Terminal Pin for Wire 26~30AWG): DF13-2630SCF (CL No.536-0300-5)

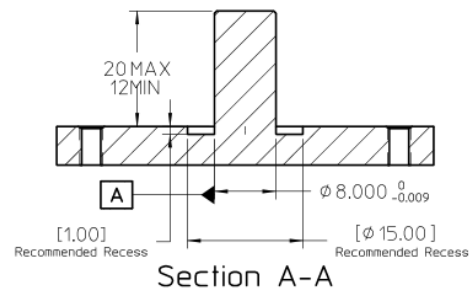
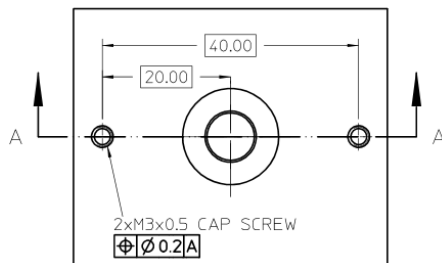
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■ Mechanical Drawing

Hollow Blind Shaft Option (Φ8mm)



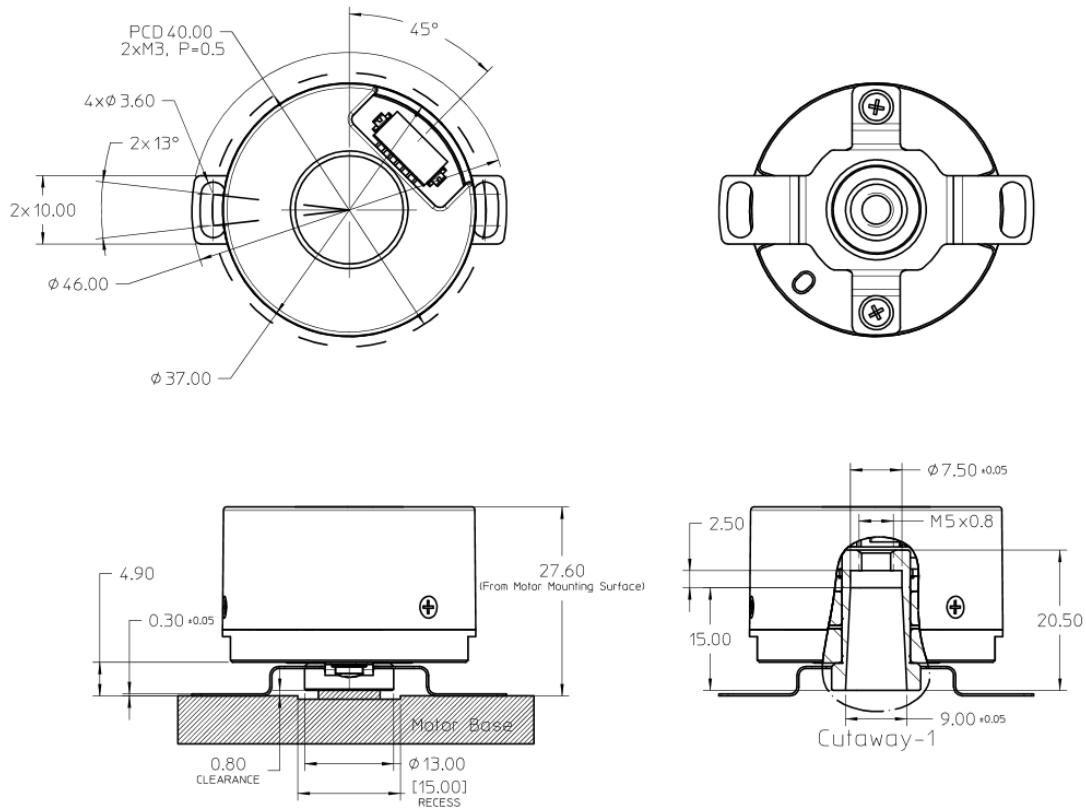
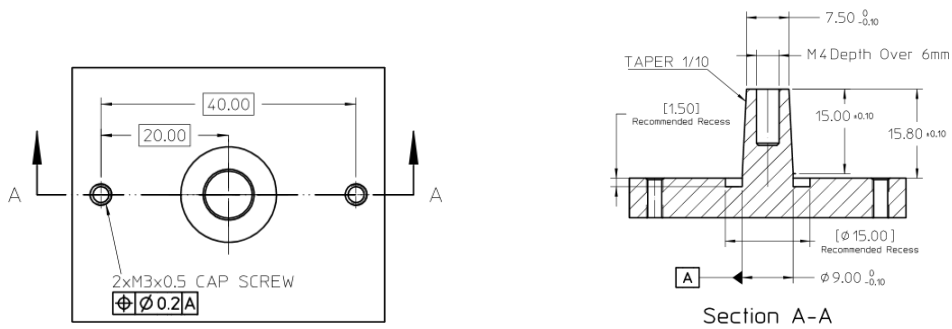
Recommended Shaft and Mounting Requirement



Note:

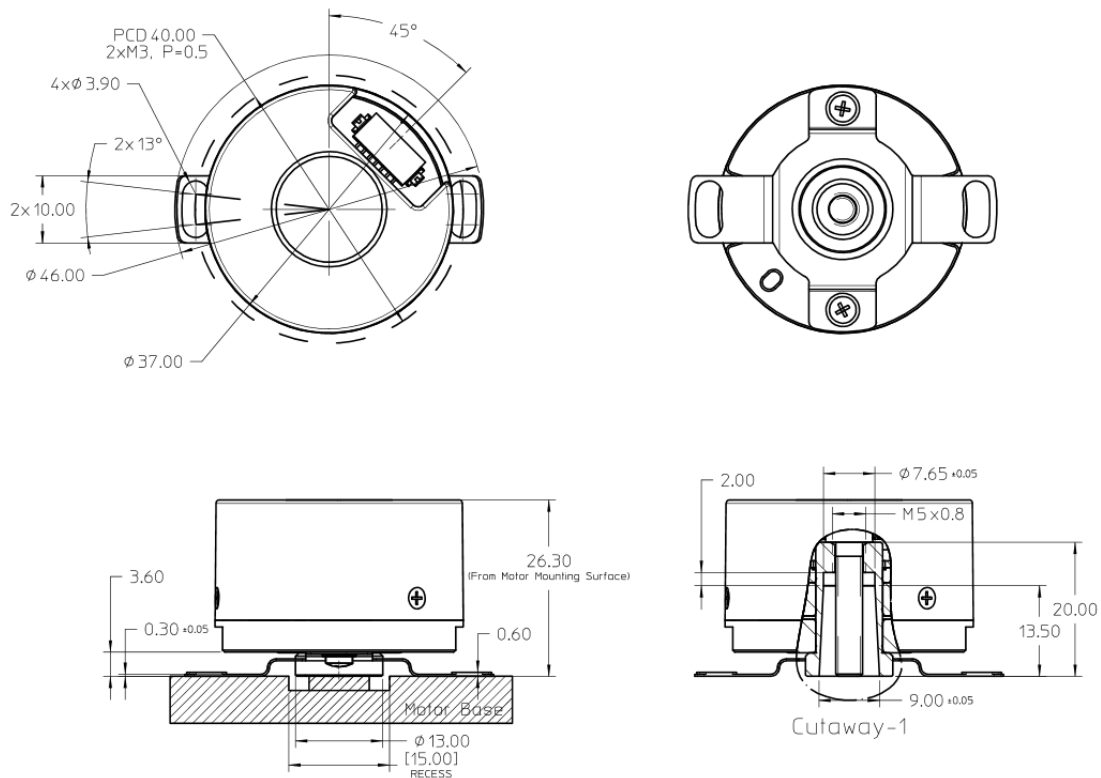
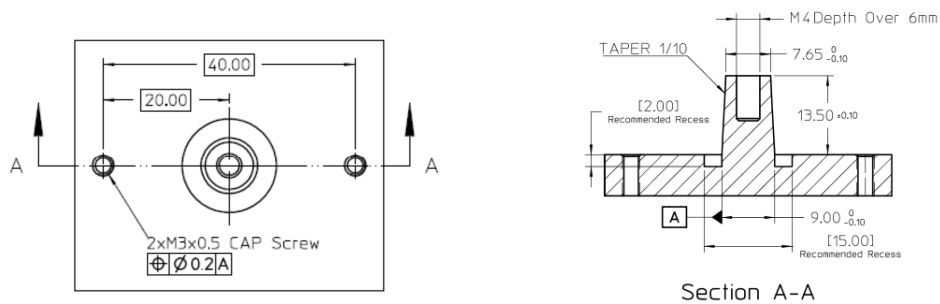
1. Dimensions are in millimeters.
2. 3rd Angle Projection.
3. Unless otherwise specified, all tolerances are within ±0.5 mm.
4. Recommended to have a recess on motor mounting surface to prevent encoder shaft interference with motor base.

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Standard Hollow Taper Shaft Option ($\Phi 9$ - $\Phi 7.5$ mm; 1:10)**Recommended Shaft and Mounting Requirement****Note:**

1. Dimensions are in millimeters.
2. 3rd Angle Projection.
3. Unless otherwise specified, all tolerances are within ± 0.5 mm.
4. Recommended to have a recess on motor mounting surface to prevent encoder shaft interference with motor base.

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Short Hollow Taper Shaft Option ($\Phi 9$ - $\Phi 7.65$ mm; 1:10)**Recommended Shaft and Mounting Requirement****Note:**

1. Dimensions are in millimeters.
2. 3rd Angle Projection.
3. Unless otherwise specified, all tolerances are within ± 0.5 mm.
4. Recommended to have a recess on motor mounting surface to prevent encoder shaft interference with motor base.

Applications

- Robotics
- Factory automation
- CNC machine tool

NOTE

These encoders are not recommended for use in safety critical applications. E.g. ABS braking systems, power steering, life support systems and critical care medical equipment. Please contact sales representative if more clarification is needed.

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