Datasheet

ABA100 Series Optical Encoder System

Highlights

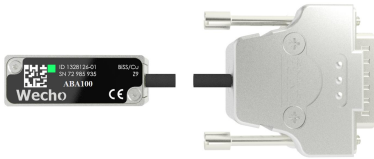|	
Optical Readhead	• Non-contact optical absolute encoder • Industry-standard BiSS C (Unidirectional), EnDat 2.2 (Bidirectional) & Mitsubishi (Mit03-2) communication protocol (**Up to 50 nm resolution**) • Integrated Automatic Gain Control ensures optimal signal strength • Ideal for high-precision applications • Compact design optimized for integration into space-constrained systems • Simple installation with the diagnostic LED

Wecho Systems

1. Specifications

Optical Readhead		
Image		
Series	ABA100	
Description	Recommended for long-stroke linear motion, suitable for high-precision applications	
Scanning Principle	Optical (Reflective)	
Scanning Type	Absolute	
Signal Period	100 µm	
Output Signal	BiSS C (Unidirectional)	
	EnDat 2.2 (Bidirectional)	
	Mitsubishi (Mit03-2)	
Resolution	50 nm (32-bit)	
Power Supply (Without Load)	3.6 VDC to 14 VDC	100 mA at 5 VDC
Temperature	Storage	-20 °C to +70 °C @ RH < 80% (Non-condensing)
	Operating	-10 °C to +70 °C @ RH < 80% (Non-condensing)
Acceleration	Operating	500 m/s^2, 3 Axes
Shock	Non-Operating	<1000 m/s^2, 6 ms, ½ Sine, 3 Axes
Vibration	Operating	<500 m/s^2 Max @ 55 to 2000 Hz, 3 Axes
Mass	Readhead	12 g
	Cable	22 g/m
Cable Design	8 Cores, Single Shielded	
Cable Diameter	3.7±0.2 mm	
Cable Bend Radius	Static	8 mm
	Dynamic	40 mm
Cable Termination	DSUB 15 Male	
Readhead Dimension	Length	36.0 mm
	Width	13.5 mm
	Height	14.8 mm
IP Rating	IP40	

2. Speed Performance

2.1 Linear Motion

Max Speed (m/s)
10

3. LED Definition

Model	ABA100
LED Location	On readhead body
LED Colour	Green	Optimal signal quality
	Yellow	Warning
	Red	Error

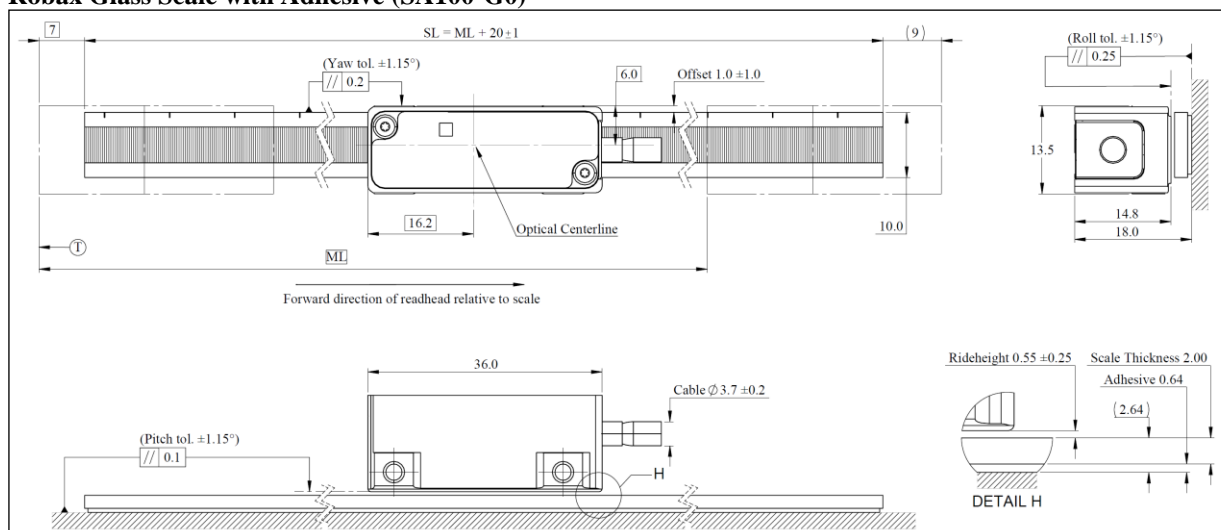## 4. Readhead Dimension Drawing
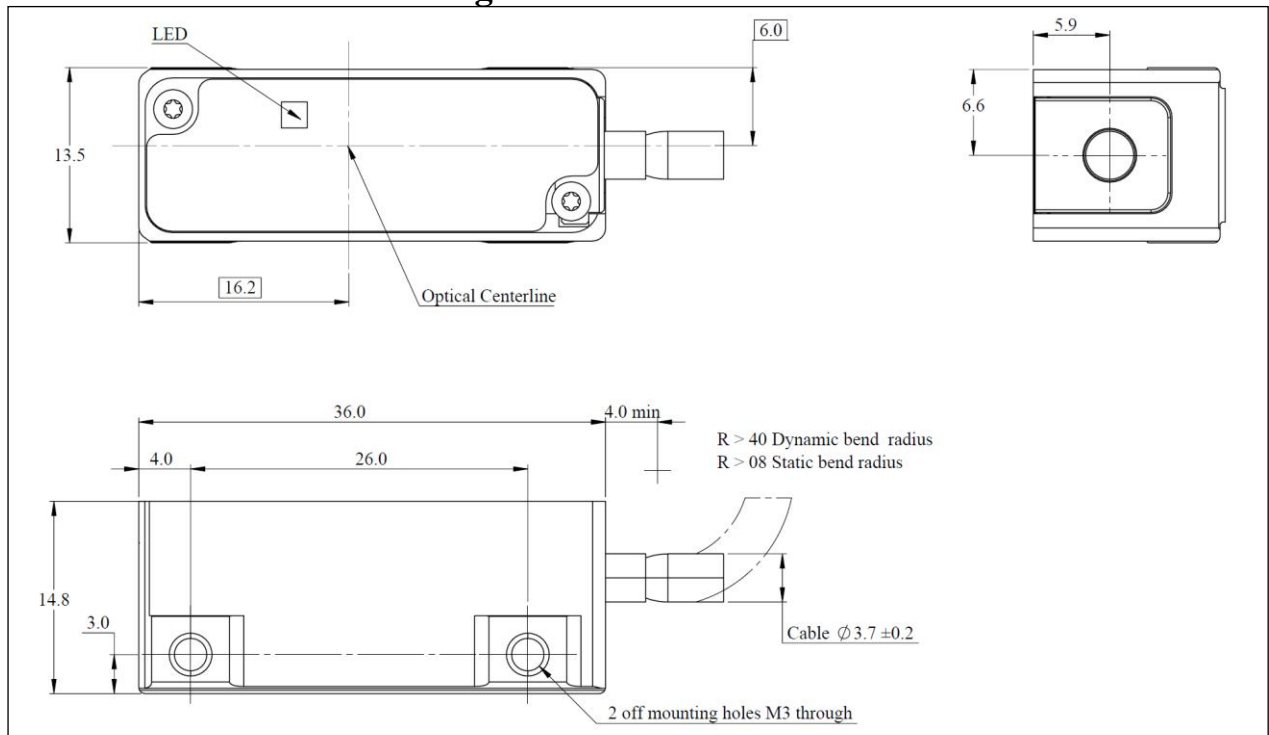
Note:

1. All dimensions are in mm.
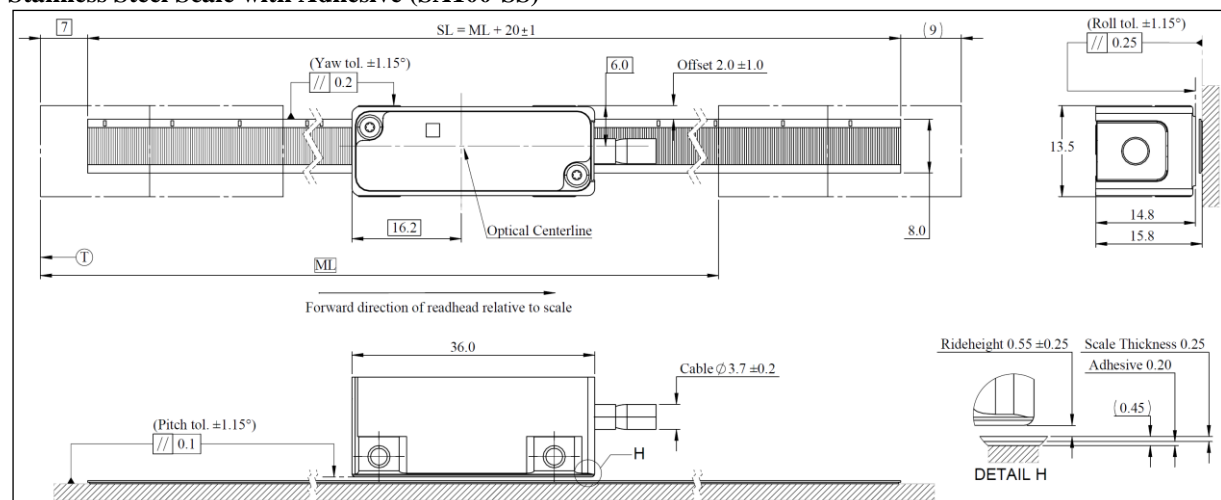
5. Readhead Installation Guide

5.1 Robax Glass Scale with Adhesive (SA100-G0)

Note:
1. All dimensions are in mm.
2. SL = Scale length
3. ML = Measuring length
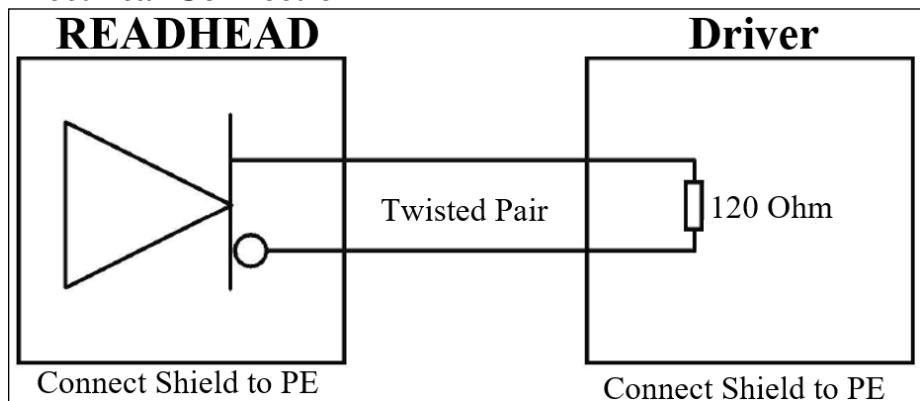4. (T) = Beginning of the measuring length

5.2 Stainless Steel Scale with Adhesive (SA100-SS)

Note:
1. All dimensions are in mm.
2. SL = Scale length
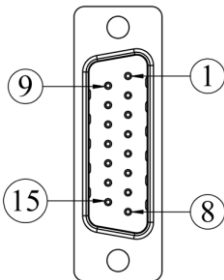3. ML = Measuring length
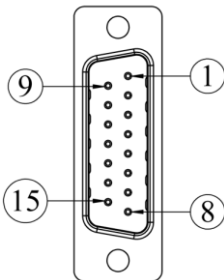4. (T) = Beginning of the measuring length

6. Electrical Connection

IMPORTANT: Readhead shield must be connected to the driver earth (Field ground).

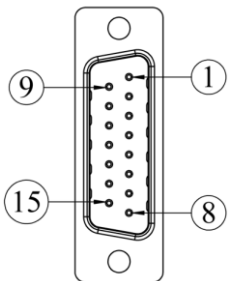**Maximum readhead cable length:** 3 m

7. Pinout

7.1 BiSS C (Unidirectional) Output Signal

Connector	Pinout	Signal	Function	Colour
Type: DSUB 15 Male **Jack Screws:** UNC 4-40 **Mating Recommendation** **Type:** DSUB 15 Female **Hex Extender:** UNC 4-40, 6 mm	Pin 1	NC	Not connected	-
	Pin 2	0 V	Encoder supply (0 V)	White / Green
	Pin 3	NC	Not connected	-
	Pin 4	VCC	Encoder supply (5 V)	Brown / Green
	Pin 5	SLO+	SLO+	Grey
	Pin 6	NC	Not connected	-
	Pin 7	NC	Not connected	-
	Pin 8	MA+	MA+	Violet
	Pin 9	NC	Not connected	-
	Pin 10	0 V Sensor	Encoder supply (0 V) Shorted with Pin 2	White
	Pin 11	NC	Not connected	-
	Pin 12	VCC Sensor	Encoder supply (5 V) Shorted with Pin 4	Blue
	Pin 13	SLO-	SLO-	Pink
	Pin 14	NC	Not connected	-
	Pin 15	MA-	MA-	Yellow
	Case	Outer Shield	Outer Shield	-

7.2 EnDat 2.2 (Bidirectional) Output Signal

Connector	Pinout	Signal	Function	Colour
Type: DSUB 15 Male **Jack Screws:** UNC 4-40 **Mating Recommendation** **Type:** DSUB 15 Female **Hex Extender:** UNC 4-40, 6 mm	Pin 1	NC	Not connected	-
	Pin 2	0 V	Encoder supply (0 V)	White / Green
	Pin 3	NC	Not connected	-
	Pin 4	VCC	Encoder supply (5 V)	Brown / Green
	Pin 5	Data+	Data+	Grey
	Pin 6	NC	Not connected	-
	Pin 7	NC	Not connected	-
	Pin 8	Clock+	Clock+	Violet
	Pin 9	NC	Not connected	-
	Pin 10	0 V Sensor	Encoder supply (0 V) Shorted with Pin 2	White
	Pin 11	NC	Not connected	-
	Pin 12	VCC Sensor	Encoder supply (5 V) Shorted with Pin 4	Blue
	Pin 13	Data-	Data-	Pink
	Pin 14	NC	Not connected	-
	Pin 15	Clock-	Clock-	Yellow
	Case	Outer Shield	Outer Shield	-

7.3 Mitsubishi (Mit03-2) Output Signal

Connector	Pinout	Signal	Function	Colour
Type: DSUB 15 Male Jack Screws: UNC 4-40 **Mating Recommendation** Type: DSUB 15 Female Hex Extender: UNC 4-40, 6 mm	Pin 1	NC	Not connected	-
	Pin 2	0 V	Encoder supply (0 V)	White / Green
	Pin 3	NC	Not connected	-
	Pin 4	VCC	Encoder supply (5 V)	Brown / Green
	Pin 5	Reserved	Do not connect	Grey
	Pin 6	NC	Not connected	-
	Pin 7	NC	Not connected	-
	Pin 8	Request/Data+	Request/Data+	Violet
	Pin 9	NC	Not connected	-
	Pin 10	0 V Sensor	Encoder supply (0 V) Shorted with Pin 2	White
	Pin 11	NC	Not connected	-
	Pin 12	VCC Sensor	Encoder supply (5 V) Shorted with Pin 4	Blue
	Pin 13	Reserved	Do not connect	Pink
	Pin 14	NC	Not connected	-
	Pin 15	Request/Data+	Request/Data+	Yellow
	Case	Outer Shield	Outer Shield	-

8. Communication Protocol

8.1 BiSS C (Unidirectional)

8.1.1 Single Cycle Data (SCD) Format
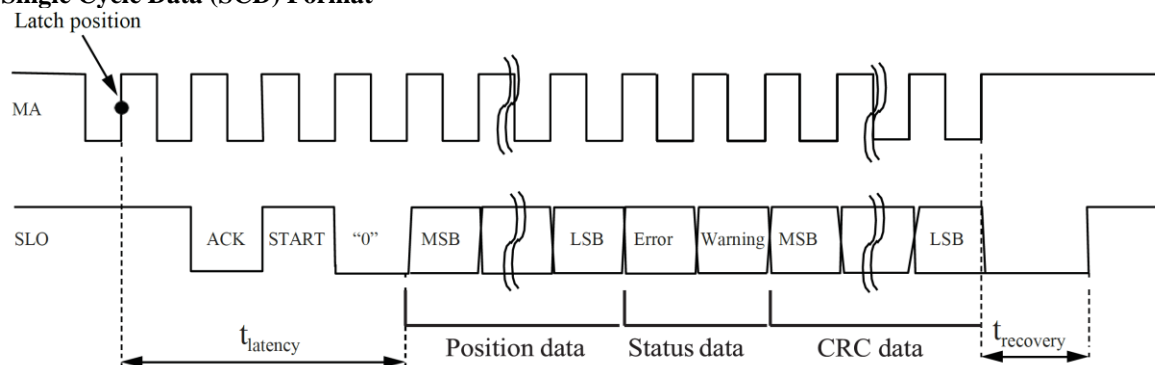
8.1.2 Timing Specifications

Communication Protocol	
Type of interface	BiSS C (Unidirectional), point to point
Signal level	RS485
Master clock (MA) frequency	See table below
Length of position data	32-bit
Length of status data	2 bit (Error and warning, active LOW)
Length of cyclic redundancy check (CRC)	6 bit (polynomial 0×43, transmitted inverted)
Position data encoding	Binary
Latency time	5.5μs (at 10MHz)
Recovery time	≥ 300ns
Request cycle rate	90 kHz (at 10MHz)

8.1.3 Master Clock (MA) Frequency

Frequency, kHz*	OK		Frequency, MHz*	OK
100.0	√		1.0	√
111.1	√		1.1	√
125.0	√		1.2	√
142.9	√		1.4	√
166.7	√		1.7	√
200.0	√		2.0	√
250.0	√		2.5	√
333.3	√		3.3	√
500.0	√		5.0	√
625.0	√		10.0	√
666.7	√			
714.3	√			
769.2	√			
833.3	√			
909.1	√			

*BiSS is a trade mark of ic-Haus GmbH, who tested and specified all these frequencies

9. Model Name

ABA100-B-05C1

Cable Termination:
C1: DSUB 15 Male

Cable Length:
05: 0.5 m
30: 3.0 m

Output Signal:
B: BiSS C (Unidirectional) communication protocol, resolution 50 nm (32-bit)
E: EnDat 2.2 (Bidirectional) communication protocol, resolution 50 nm (32-bit)
M: Mitsubishi (Mit03-2) communication protocol, resolution 50 nm (32-bit)

Series:
ABA100: Recommended for long-stroke linear motion for 100 μm signal period

Note:
1. For customization, please contact our sales team for more information.

10. Compatible Scale/Disc

Type	Model	Description
Scale	SA100-G0	Linear absolute 100 μm grating period, robax glass with adhesive
	SA100-SS	Linear absolute 100 μm grating period, stainless steel with adhesive
Disc	Not recommended	If needed, please contact our sales team

11. Accessories List

Part Number	Image	Description
N/A		**0.55 mm Shim Kit** is used during readhead assembly to precisely adjust the rideheight between the readhead and the scale, ensuring optimal signal quality. By using the appropriate shims, the required rideheight can be accurately achieved, preventing signal degradation and enhancing the overall performance of the readhead. *Included in every readhead*