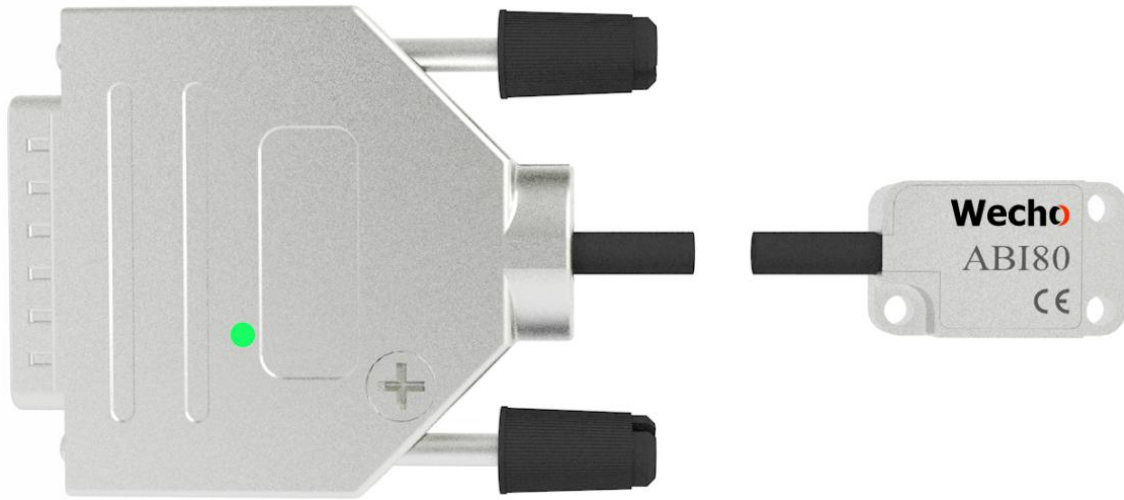


Datasheet

ABI80 Series Optical Encoder System

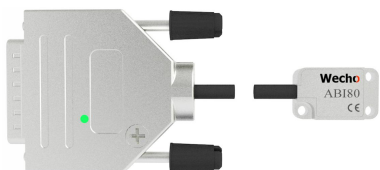


Highlights

Optical Readhead

- Non-contact optical incremental encoder
- Industry-standard SinCos 1Vpp signals or TTL signals (**Up to 0.1 μ m resolution**)
- Integrated Automatic Gain Control ensures optimal signal strength
- Ideal for high-precision applications
- Ultra-compact optimized for integration into space-constrained systems
- Simple installation with the diagnostic LED

1. Specifications

Optical Readhead		
Image		
Series		ABI80
Description		Miniature readhead, supports short-stroke linear and rotary motion, suitable for compact systems
Scanning Principle		Optical (Reflective)
Scanning Type		Incremental
Signal Period		80 μm
Output Signal		SinCos 1Vpp
		TTL
Resolution	SinCos 1Vpp	Depends on the driver's interpolation factor
	TTL	1.0 μm (80X angle steps per period)
		0.5 μm (160X angle steps per period)
		0.2 μm (400X angle steps per period)
Power Supply (Without Load)		<65 mA (Typical)
Temperature	Storage	-20 °C to +70 °C @ RH < 80% (Non-condensing)
	Operating	0 °C to +70 °C @ RH < 80% (Non-condensing)
Acceleration	Operating	500 m/s², 3 Axes
Shock	Non-Operating	<1000 m/s², 6 ms, ½ Sine, 3 Axes
Vibration	Operating	<100 m/s² Max @ 55 to 2000 Hz, 3 Axes
Mass	Readhead	3.5 g
	Cable	25 g/m
Cable Design		10 Cores, Double Shielded
Cable Diameter		3.5±0.2 mm
Cable Bend Radius	Static	30 mm
	Dynamic	70 mm
Cable Termination		DSUB 15 Male
Readhead Dimension	Length	20.57 mm
	Width	12.70 mm
	Height	7.50 mm
IP Rating		IP40

2. Speed Performance

2.1 SinCos 1Vpp Output Signal

2.1.1 Linear Motion

Max Speed (m/s)
8

2.1.2 Rotary Motion

Lines per Revolution, LPR	Outer Diameter (mm)	Inner Diameter (mm)	Max Speed (RPM)
1024	31.00	17.00	5625
1650	46.00	32.00	3491
2048	57.00	43.00	2813
2500	68.00	54.00	2304
3000	81.00	67.00	1920
3600	96.00	82.00	1600
4096	109.00	95.00	1406
5000	132.00	118.00	1152

2.2 TTL Output Signal

2.2.1 Linear Motion

2.2.1.1 Minimum Edge Separation: 50 ns (Maximum AB signal frequency 20Mhz, before interpolation)

Interpolator Factor	Angle Steps per Period	Resolution (μm)	Max Speed (m/s)
20X	80X	1.0	8
40X	160X	0.5	8
100X	400X	0.2	3
200X	800X	0.1	1.6

2.2.1.2 Minimum Edge Separation: 200 ns (Maximum AB signal frequency 5Mhz, before interpolation)

Interpolator Factor	Angle Steps per Period	Resolution (μm)	Max Speed (m/s)
20X	80X	1.0	4
40X	160X	0.5	1.8
100X	400X	0.2	0.7
200X	800X	0.1	0.4

2.2.2 Rotary Motion

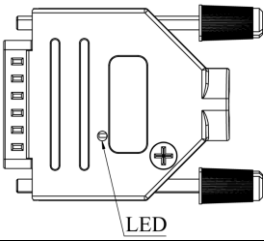
2.2.2.1 Minimum Edge Separation: 50 ns (Maximum AB signal frequency 20Mhz, before interpolation)

Lines per Revolution, LPR	Angle Steps per Period					
	80X		160X		400X	
	Counts per Revolution, CPR	Max Speed (RPM)	Counts per Revolution, CPR	Max Speed (RPM)	Counts per Revolution, CPR	Max Speed (RPM)
1024	81920	5625	163840	5625	409600	2347
1650	132000	3491	264000	3491	660000	1457
2048	163840	2813	327680	2813	819200	1174
2500	200000	2304	400000	2304	1000000	962
3000	240000	1920	480000	1920	1200000	801
3600	288000	1600	576000	1600	1440000	668
4096	327680	1406	655360	1406	1638400	587
5000	400000	1152	800000	1152	2000000	481

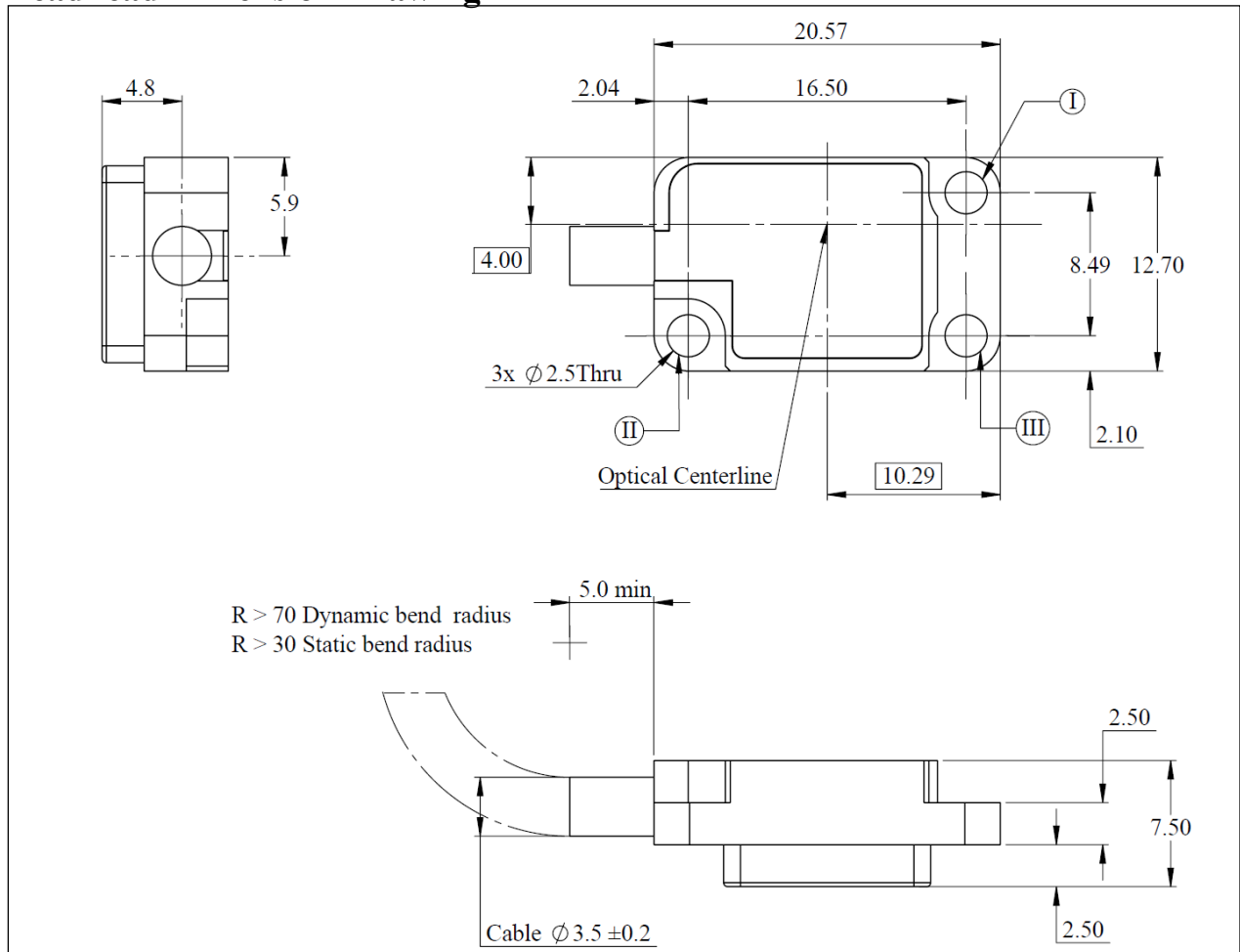
2.2.2.2 Minimum Edge Separation: 200 ns (Maximum AB signal frequency 5Mhz, before interpolation)

Lines per Revolution, LPR	Angle Steps per Period					
	80X		160X		400X	
	Counts per Revolution, CPR	Max Speed (RPM)	Counts per Revolution, CPR	Max Speed (RPM)	Counts per Revolution, CPR	Max Speed (RPM)
1024	81920	2930	163840	1348	409600	527
1650	132000	1818	264000	836	660000	327
2048	163840	1465	327680	674	819200	264
2500	200000	1200	400000	552	1000000	216
3000	240000	1000	480000	460	1200000	180
3600	288000	833	576000	383	1440000	150
4096	327680	732	655360	337	1638400	132
5000	400000	600	800000	276	2000000	108

3. LED Definition

Model		ABI80
LED Location		On DSUB 15 Male connector
		
LED Colour	Green	Optimal signal quality
	Amber	Warning
	Red	Error

4. Readhead Dimension Drawing

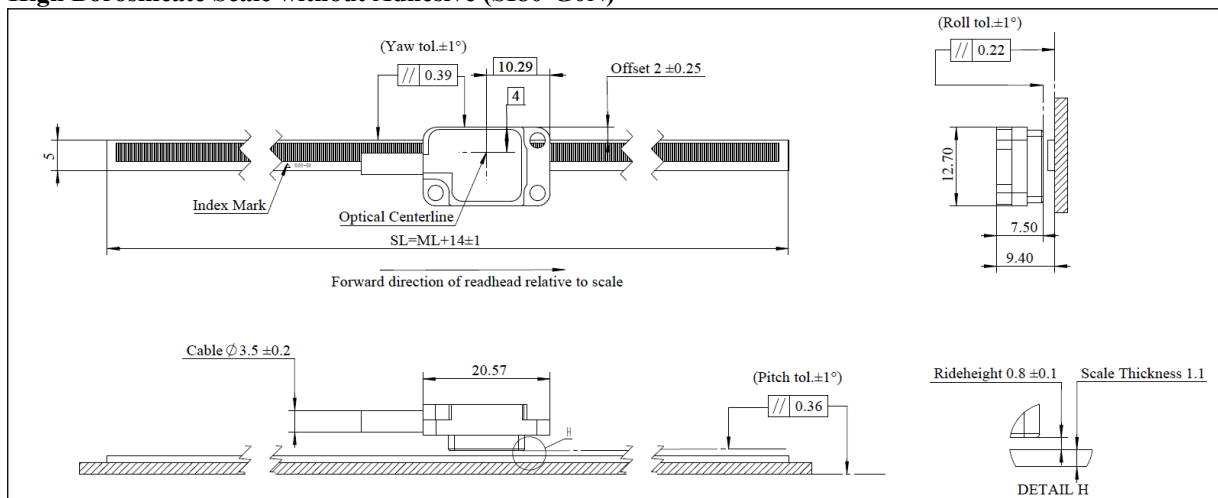


Note:

1. All dimensions are in mm.
2. Mount the readhead using two holes, such as (I II) or (II III).

5. Readhead Installation Guide

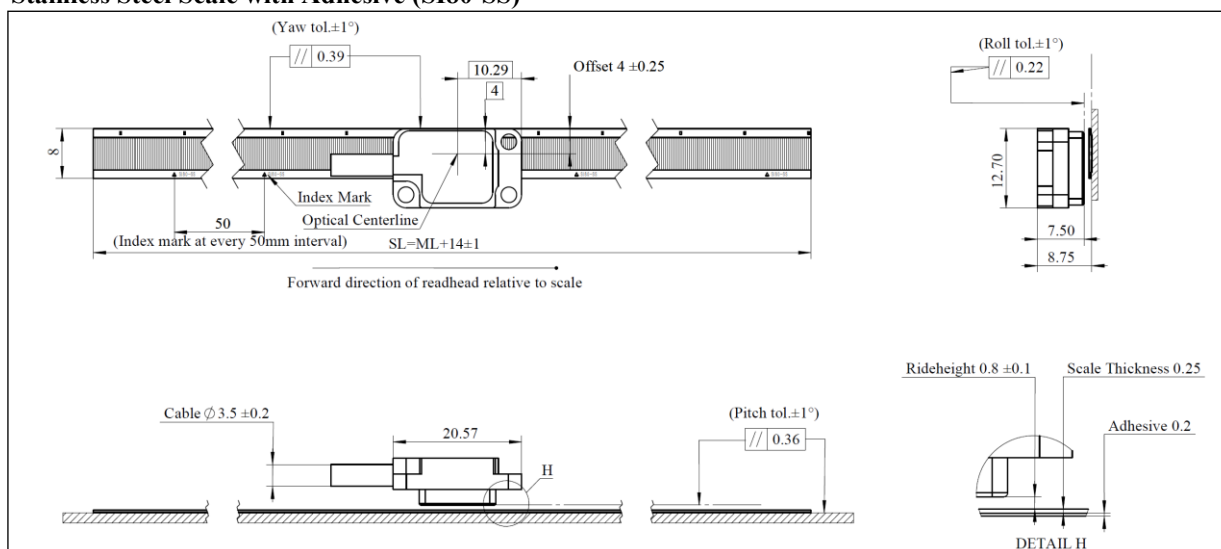
5.1 High Borosilicate Scale without Adhesive (SI80-G0N)



Note:

1. All dimensions are in mm.
2. SL = Scale length
3. ML = Measuring length

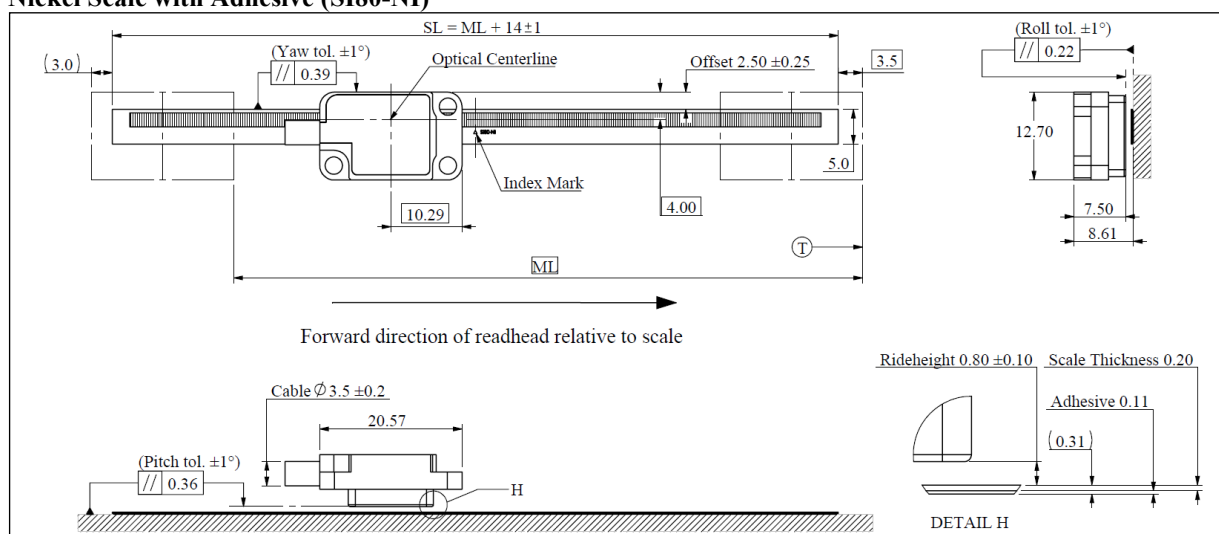
5.2 Stainless Steel Scale with Adhesive (SI80-SS)



Note:

1. All dimensions are in mm.
2. SL = Scale length
3. ML = Measuring length
4. Ensure the correct installation direction for the scale.
5. The index mark cannot be arbitrarily selected using a magnet. If this feature is required, please refer to the ABI 80L series.

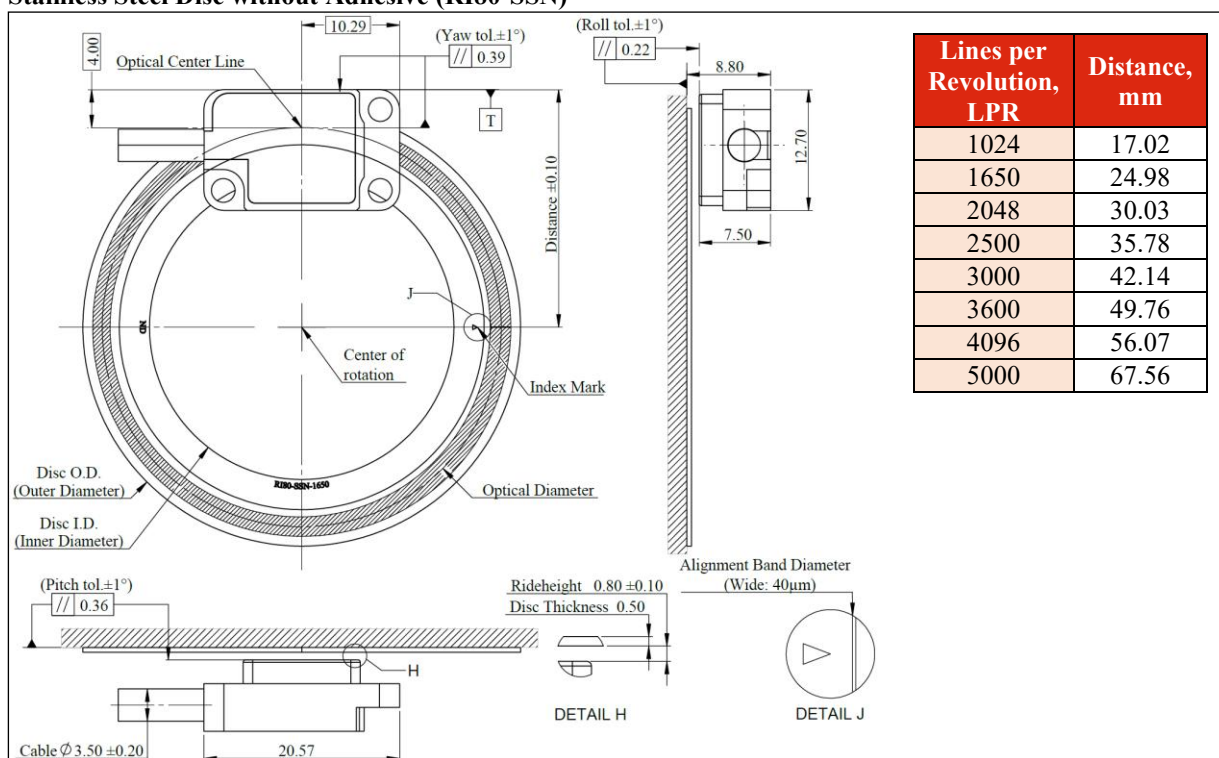
5.3 Nickel Scale with Adhesive (SI80-NI)



Note:

6. All dimensions are in mm.
7. SL = Scale length
8. ML = Measuring length
9. (T) = Beginning of the measuring length
10. Δ = Index mark

5.4 Stainless Steel Disc without Adhesive (RI80-SSN)

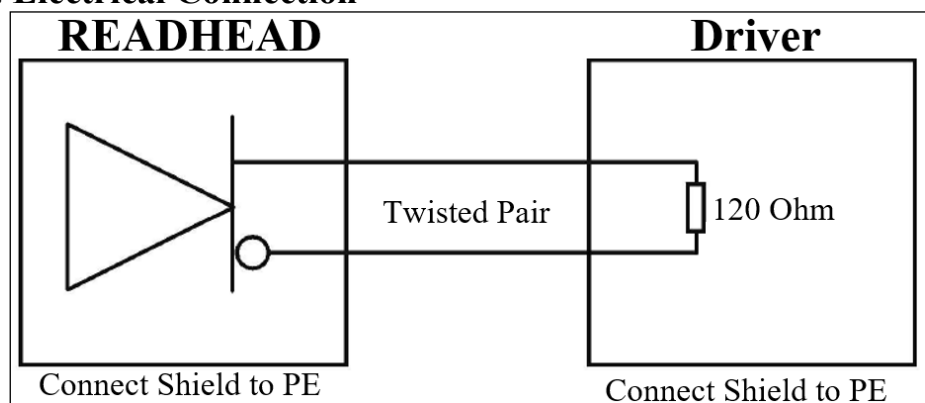


Lines per Revolution, LPR	Distance, mm
1024	17.02
1650	24.98
2048	30.03
2500	35.78
3000	42.14
3600	49.76
4096	56.07
5000	67.56

Note:

1. All dimensions are in mm.
2. (T) = Datum T
3. Δ = Index mark
4. Use UV glue for installation, do not use 502 glue.

6. Electrical Connection

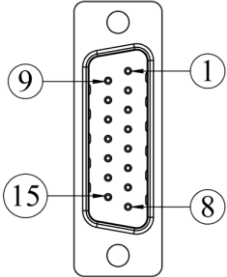


IMPORTANT: Readhead shield must be connected to the driver earth (Field ground).

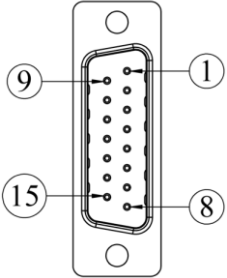
Maximum readhead cable length: 3 m

7. Pinout

7.1 SinCos 1Vpp Output Signal

Connector	Pinout	Signal	Function
 Type: DSUB 15 Male Jack Screws: UNC 4-40 Mating Recommendation Type: DSUB 15 Female Hex Extender: UNC 4-40, 6 mm	Pin 1	A+	Sin+ signal
	Pin 2	0 V	Encoder supply (0 V)
	Pin 3	B+	Cos+ signal
	Pin 4	VCC	Encoder supply (5 V)
	Pin 5	TX	Transmitter
	Pin 6	NC	Not connected
	Pin 7	I-	Index- signal
	Pin 8	NC	Not connected
	Pin 9	A-	Sin- signal
	Pin 10	0 V Sensor	Encoder supply (0 V) Shorted with Pin 2
	Pin 11	B-	Cos- signal
	Pin 12	VCC Sensor	Encoder supply (5 V) Shorted with Pin 4
	Pin 13	RX	Receiver
	Pin 14	I+	Index+ signal
	Pin 15	TEST	Testing
	Case	Outer Shield	Outer Shield

7.2 TTL Output Signal

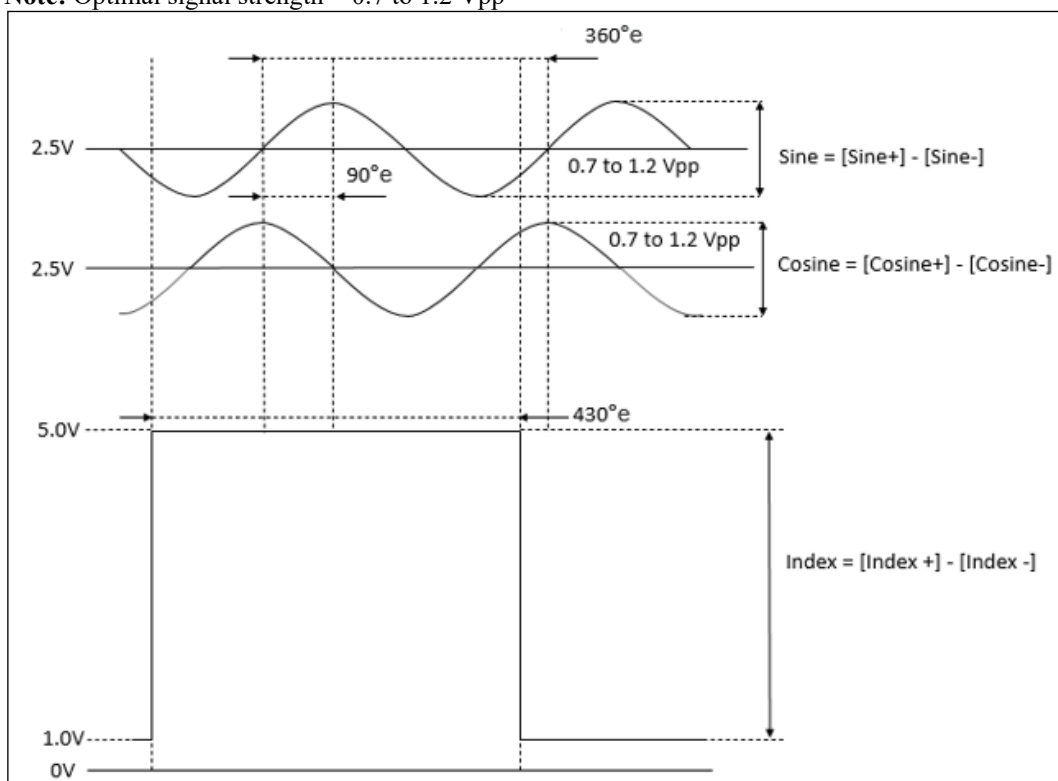
Connector	Pinout	Signal	Function
 Type: DSUB 15 Male Jack Screws: UNC 4-40 Mating Recommendation Type: DSUB 15 Female Hex Extender: UNC 4-40, 6 mm	Pin 1	A+	TTL A+ signal
	Pin 2	0 V	Encoder supply (0 V)
	Pin 3	B+	TTL B+ signal
	Pin 4	VCC	Encoder supply (5 V)
	Pin 5	Modbus A	Modbus A
	Pin 6	NC	Not connected
	Pin 7	I-	Index- signal
	Pin 8	NC	Not connected
	Pin 9	A-	TTL A- signal
	Pin 10	0 V Sensor	Encoder supply (0 V) Shorted with Pin 2
	Pin 11	B-	TTL B- signal
	Pin 12	VCC Sensor	Encoder supply (5 V) Shorted with Pin 4
	Pin 13	Modbus B	Modbus B
	Pin 14	I+	Index+ signal
	Pin 15	TEST	Testing
	Case	Outer Shield	Outer Shield

8. Output Specifications

8.1 SinCos 1Vpp Output Signal

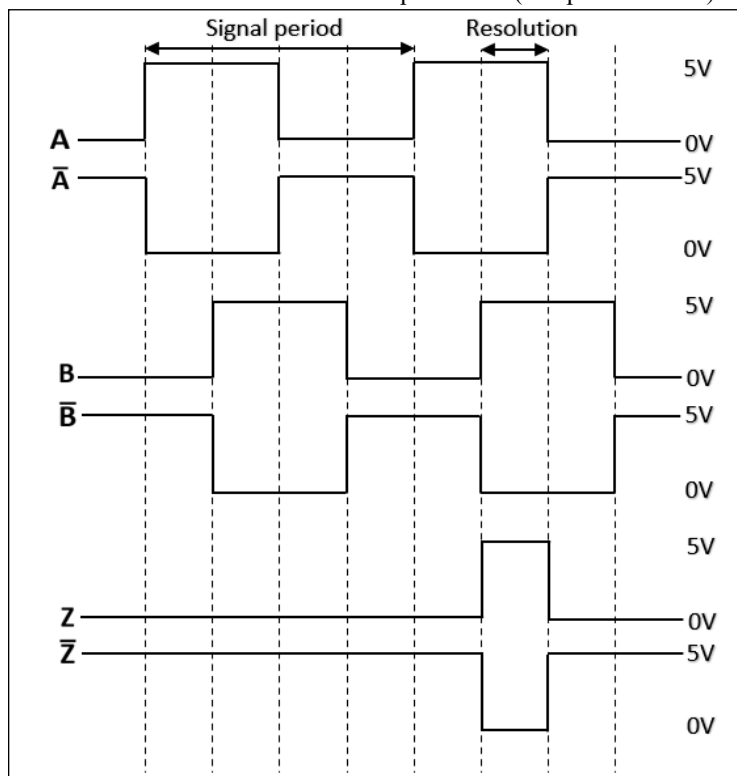
Incremental 2 channels differential Sin & Cos signal (90° phase shifted)

Note: Optimal signal strength = 0.7 to 1.2 Vpp



8.2 TTL Output Signal

Incremental 2 channels A and B in quadrature (90° phase shifted)



9. Model Name

ABI80-1VPP-05C1		
		Cable Termination: C1: DSUB 15 Male
		Cable Length: 05: 0.5 m 10: 1.0 m 30: 3.0 m
		Output Signal: 1VPP: SinCos 1Vpp (80 µm) output signal 80X: TTL output signal, resolution 1.0 µm (80X angle steps per period) 160X: TTL output signal, resolution 0.5 µm (160X angle steps per period) 400X: TTL output signal, resolution 0.2 µm (400X angle steps per period) 800X: TTL output signal, resolution 0.1 µm (800X angle steps per period)
		Series: ABI80: Miniature readhead, supports short-stroke linear and rotary motion for 80 µm signal period

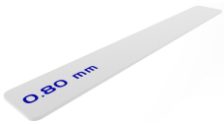
Note:

- For customization, please contact our sales team for more information.

10. Compatible Scale/Disc

Type	Model	Description
Scale	SI80-G0N	Linear incremental 80 µm grating period, high borosilicate without adhesive
Scale	SI80-SS	Linear incremental 80 µm grating period, stainless steel with adhesive
Scale	SI80-NI	Linear incremental 80 µm grating period, nickel with adhesive
Disc	RI80-SSN	Rotary incremental 80 µm grating period, stainless steel without adhesive

11. Accessories List

Part Number	Image	Description
N/A		0.80 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. <i>* Included in every readhead</i>

12. Introduction to Similar Products

Model	Image	Description
ABI80L		Recommended for long-stroke linear motion, equipped with a Hall sensor for multiple indexing selection