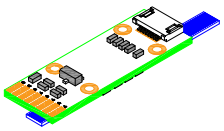
1. LS100 Incremental Linear Encoder

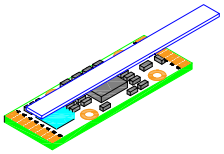
1.1 Introduction：

LS100 is a linear encoder assembly composed of a photoelectric reflective encoder and a linear grating scale. The LED light of the read head is reflected back to the light receiving point on the grating scale to detect different modules on the grating scale, and outputs A and B phase signals of complete sine and cosine waves. The division multiple can be set arbitrarily through the interpolator to achieve high resolution. The division multiple of A and B phases can reach up to 6400 times.

Side A
(read head facing down)



Side B
(read head facing up)



1.2 Feature：

- Encoder overall size is 26.8mm x 9.2mm, total thickness 3.2mm (excluding the grating scale), which realizes a miniaturized ultra-thin component;
- The installation size is 6.6mm x 13mm, fixed with 4 M1.2 x 3mm bolts;
- Adopt non-contact photoelectric reflection principle;
- Resolution 40μm~0.0125μm;
- The electrical interface uses differential RS422;
- Effective stroke max 150mm.

1.3 Application range：

Micro linear motors, micro-stroke high-precision linear motion control mechanisms, etc.

1.4 Connection：

- With FPC socket, can also direcly solder the leads
- Directly solder the leads on the PCB board (without socket)

1.5 Weight：

About 15g

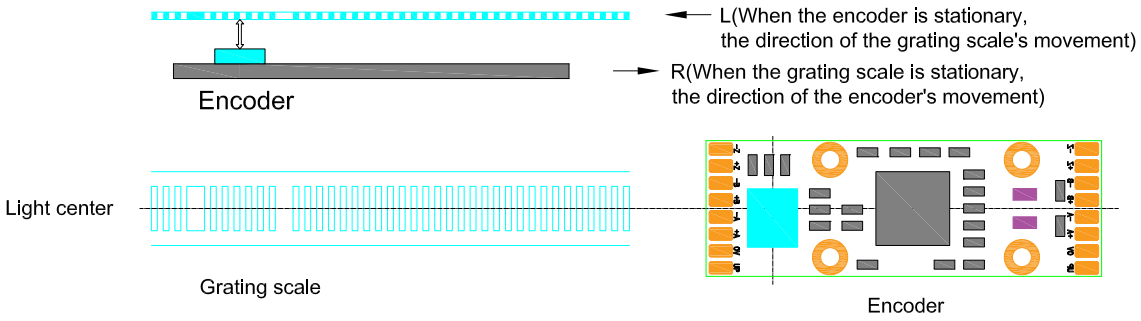
2. Selection Guide

Model composition (select parameters)

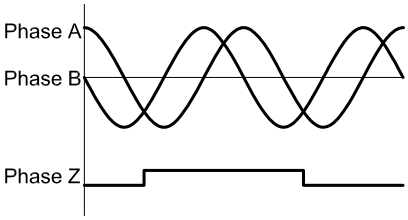
LS100–	F	50G	K					–	000
Product series model	Connection method: F=With FPC socket +soldering on PCB board P=Soldering on PCB board (without socket)	Effective stroke distance: Grating 10G=10mm(Glass); 10M=10mm(Metal); 15G=15mm(Glass); 15M=15mm(Metal); 20G=20mm(Glass); 20M=20mm(Metal); 25G=25mm(Glass); 25M=25mm(Metal); 30G=30mm(Glass); 30M=30mm(Metal); 50G=50mm(Glass); 50M=50mm(Metal); 100G=100mm(Glass); 100M=100mm(Metal); 150G=100mm(Glass); 150M=100mm(Metal).	Resolution：(Accuracy μm) A=40 B=20 C=10 D=5 E=2.5 F=1.6 G=1.25 H=0.8 J=0.625 K=0.4 L=0.2 M=0.1 N=0.05 P=0.025 Q=0.0125 Please consult sales for other resolutions		Electrical interface： Indication= Differential RS-422	Phase： No indicaton =A/$\overline{A}$/B/$\overline{B}$/Z/$\overline{Z}$	Supply voltage： Indication=DC5V	Special specifications	Management No.

3. Principles

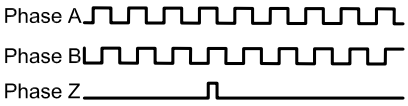
3.1 Structural principle



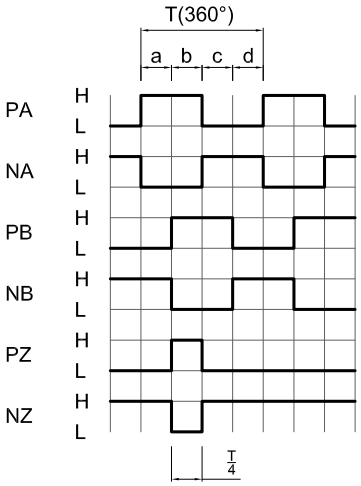
3.2 A.B sine and cosine waves and Z index signals output from the encoder read head



3. 3 A.B.Z signals output from interpolator



3.4 Output waveform(differential RS422)

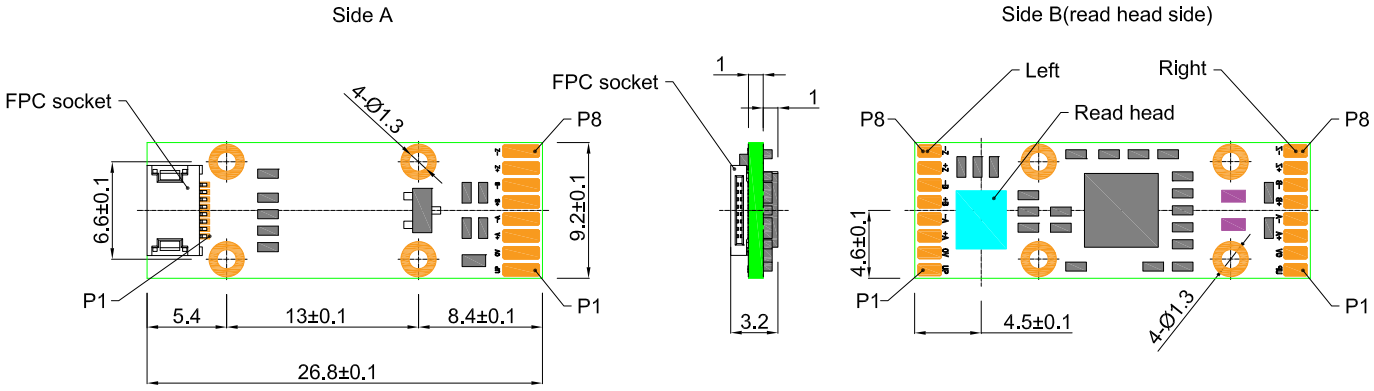


When the encoder is stationary and the grating scale is moving to the left or the grating scale is stationary and the encoder is moving to the right, the A phase is $\frac{T}{4}$ phase ahead of the B phase.

4. Basic Dimensions

4.1 Encoder dimensions

2:1

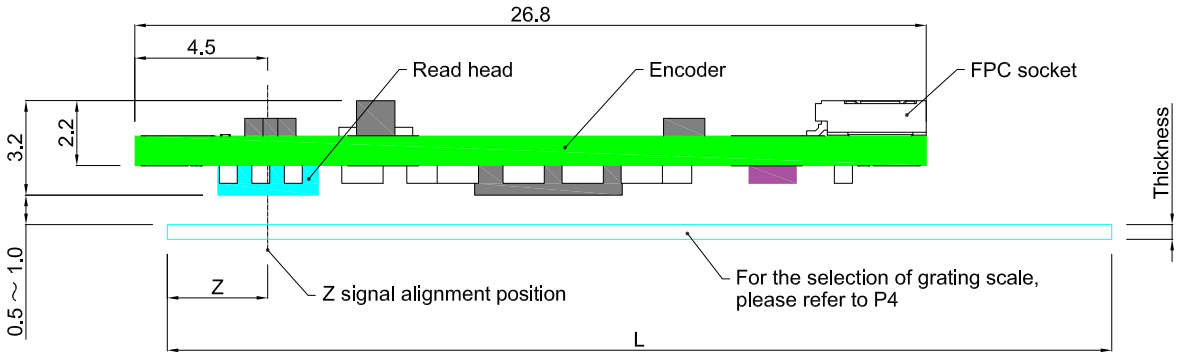


- The A and B sides of the encoder can be signal output welding points.
- The output signal definitions of P1-P8 pads and socket are：

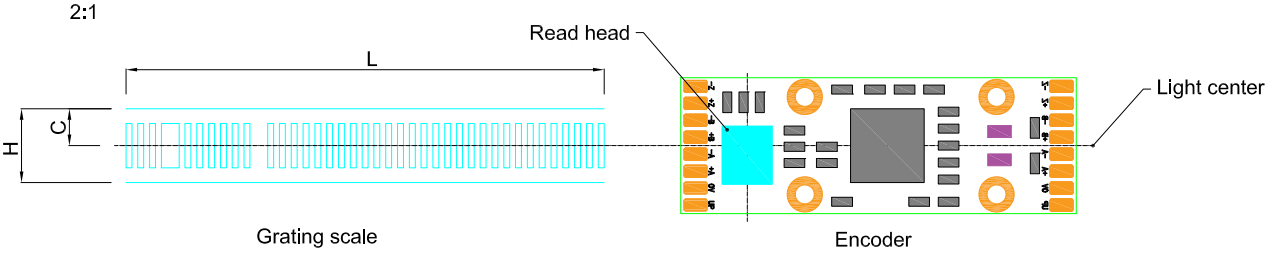
P1=UP；P2=0V；P3=+A；P4=-A；P5=+B；P6=-B；P7=+Z；P8=-Z。

4.2 Relative position of encoder and grating scale

4:1

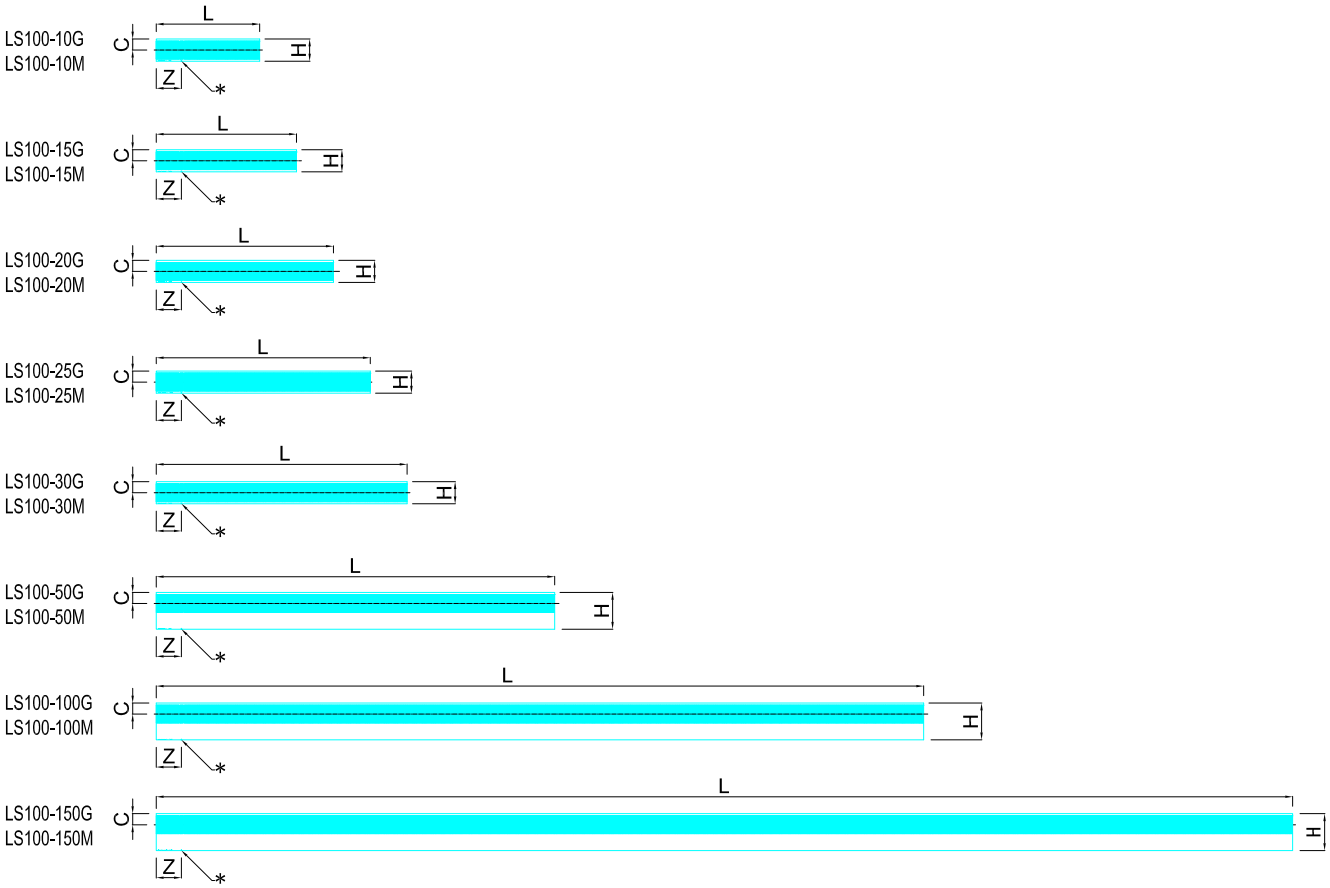


2:1



Unit: mm

4.3 Grating scale size



Model	Order No.	Effective stroke (mm)	Material	Thickness (mm)	L (mm)	Z (mm)	H (mm)	Light center C(mm)
LS100-10G	2600792	10	Glass	0.5±0.05	14±0.05	3.4	$3^{-0.01}_{-0.05}$	$1.5^{-0.01}_{-0.05}$
LS100-10M	2800954		Stainless steel	0.2±0.05				
LS100-15G	2600790	15	Glass	0.5±0.05	19±0.05	3.4	$3^{-0.01}_{-0.05}$	$1.5^{-0.01}_{-0.05}$
LS100-15M	2800956		Stainless steel	0.2±0.05				
LS100-20G	2600788	20	Glass	0.5±0.05	24±0.05	3.4	$3^{-0.01}_{-0.05}$	$1.5^{-0.01}_{-0.05}$
LS100-20M	2800958		Stainless steel	0.2±0.05				
LS100-25G	2600798	25	Glass	0.5±0.05	29±0.05	3.4	$3^{-0.01}_{-0.05}$	$1.5^{-0.01}_{-0.05}$
LS100-25M	2800968		Stainless steel	0.2±0.05				
LS100-30G	2600782B	30	Glass	0.5±0.05	34±0.05	3.4	$3^{-0.01}_{-0.05}$	$1.5^{-0.01}_{-0.05}$
LS100-30M	2800960		Stainless steel	0.2±0.05				
LS100-50G	2600796	50	Glass	1.0±0.05	54±0.05	3.4	$5^{-0.01}_{-0.05}$	$1.5^{-0.01}_{-0.05}$
LS100-50M	2800962		Stainless steel	0.2±0.05				
LS100-100G	2600794	100	Glass	1.0±0.05	104±0.05	3.4	$5^{-0.01}_{-0.05}$	$1.5^{-0.01}_{-0.05}$
LS100-100M	2800964		Stainless steel	0.2±0.05				
LS100-150G	2600822	150	Glass	1.0±0.05	154±0.05	3.4	$5^{-0.01}_{-0.05}$	$1.5^{-0.01}_{-0.05}$
LS100-150M	2800974		Stainless steel	0.2±0.05				

*.Read head alignment position, Z phase mode center position can be changed according to customer requirements, stroke length can also be customized (up to 150mm).

5. Basic Specifications

5.1 Resolution

Item	Brief description
Method	Photoelectric reflective type
Division number setting range	80μm (2~6400 times)
Resolution	40μm～0.0125μm

5.2 Electrical parameters

Item			Output type (differential RS422) parameters
Supply voltage			DC5V±5%
Current consumption			80mA Max
Allowable ripple			≤3%rms
Maximum speed			9.6m/s(2 times)～0.12m/s(6400 times)
Output capacity	Output current	Input	≤±20mA
		Output	
	Output voltage	“H”	≥2.5V
		“L”	≤0.5V
	Load voltage		—
Raise and fall time			Less than 1us(wire length：2m)
Output signal			Refer to P2 3.4

5.3 Mechanical dimensions

Item	Parameters
Overall and installation dimensions	Refer to P3 4.1
Mechanical effective stroke	Refer to P1 2.0 (Refer to P4 4.3 for selecting stroke grating scale)
Weight	About 15g

5.4 Environmental parameters

Item	Parameters
Using temperature range	-20～80°C， below 90%RH
Storage temperature range	-20～80°C， below 90%RH

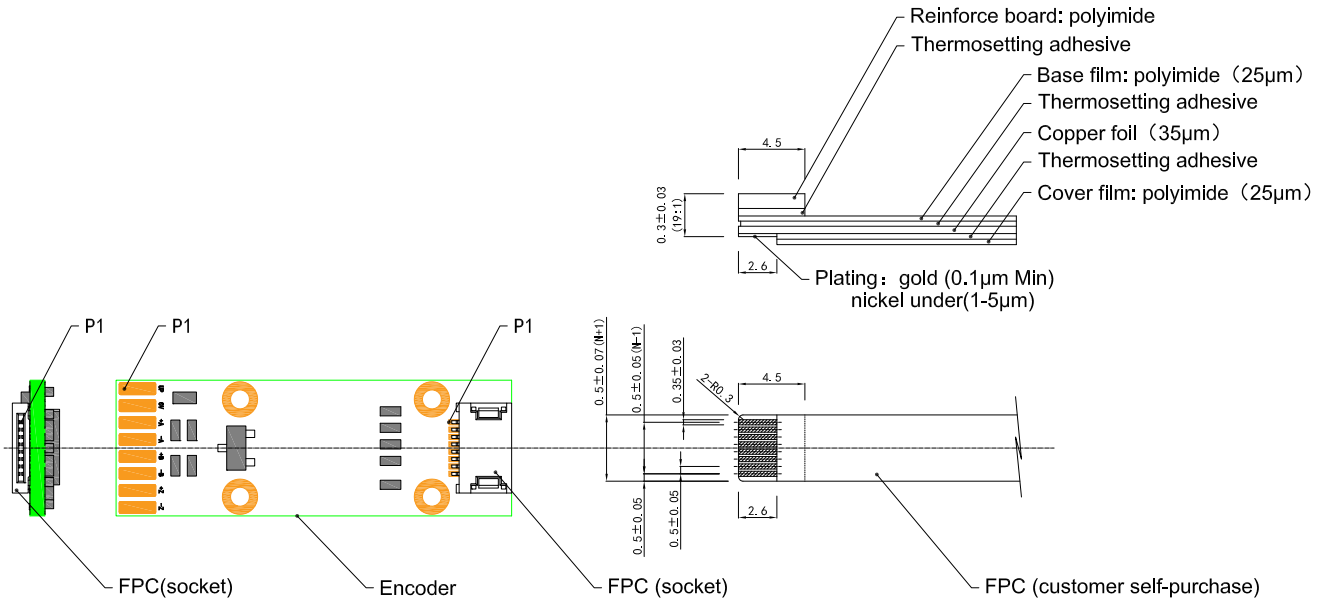
6. Wiring

6.1 Wiring table

Pin No.	Signal	Explanation	Recommended to use twisted pair
1	UP	Power supply positive	
2	0V	Power supply negative	
3	+A	Phase A positive signal output	
4	−A	Phase A negative signal output	
5	+B	Phase B positive signal output	
6	−B	Phase B negative signal output	
7	+Z	Phase Z positive signal output	
8	−Z	Phase Z negative signal output	

- Pad position definition refer to P3 4.1

6.2 FPC socket & FPC(purchased by customer)



Unit: mm

7. Notes

7.1 About the bonding of the grating scale

For the bonding of the grating scale, due to the different expansion coefficients of the materials, if a harder adhesive is used, the adhesive material is easy to fall off when the temperature changes greatly.

The thermal expansion and contraction of the adhesive material will affect the high-precision positioning of the grating scale.

Therefore, a softer silicone numerical adhesive is recommended: quick-acting adhesive (Super-X8008 black).

7.2 General matters

- For the contents recorded in this manual, some product improvements will be updated without notice.
- For the contents of this manual, if you find any errors, please contact our company directly.

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