

Absolute Linear Encoders

For Numerically Controlled Machine Tools



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Summary

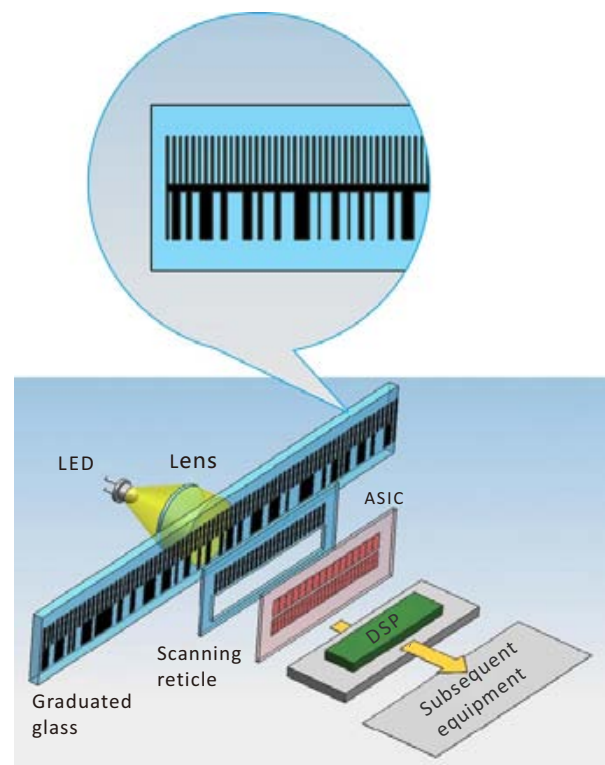
Usage:

- Absolute linear encoder is the optimal selection for Closed Loop operation in numerically controlled machine tools. The position value is available from the absolute linear encoder immediately upon switch-on. So there is no need to move the axes to find the reference position, which greatly increases the efficiency of the NC machine tool.
- Absolute linear encoder feedback the position of linear axes without additional mechanical transfer elements, then the control loop includes the entire feed mechanics. So the transfer errors from the mechanics, including positioning error caused by thermal behavior of the recirculating ball screw, reversal error, and kinematic error through ball-screw pitch error, can be detected by the absolute linear encoder and corrected by the control system.
- Therefore, absolute linear encoder has been widely used in high performance NC system with full closed loop.

Measuring principles:

JC series absolute linear encoder's position information is read from two graduations on glass: absolute graduation and incremental graduation. The absolute graduation is a unique binary code which is imprinted along the measuring length of encoder, and the incremental graduation is periodic lines for generating Moire fringe.

ASIC transform the image of the binary code and the Moire fringe into electrical signals, then the signal processing unit calculates the position information, then the position information can be transmitted to subsequent equipment through serial interface.



Working principle



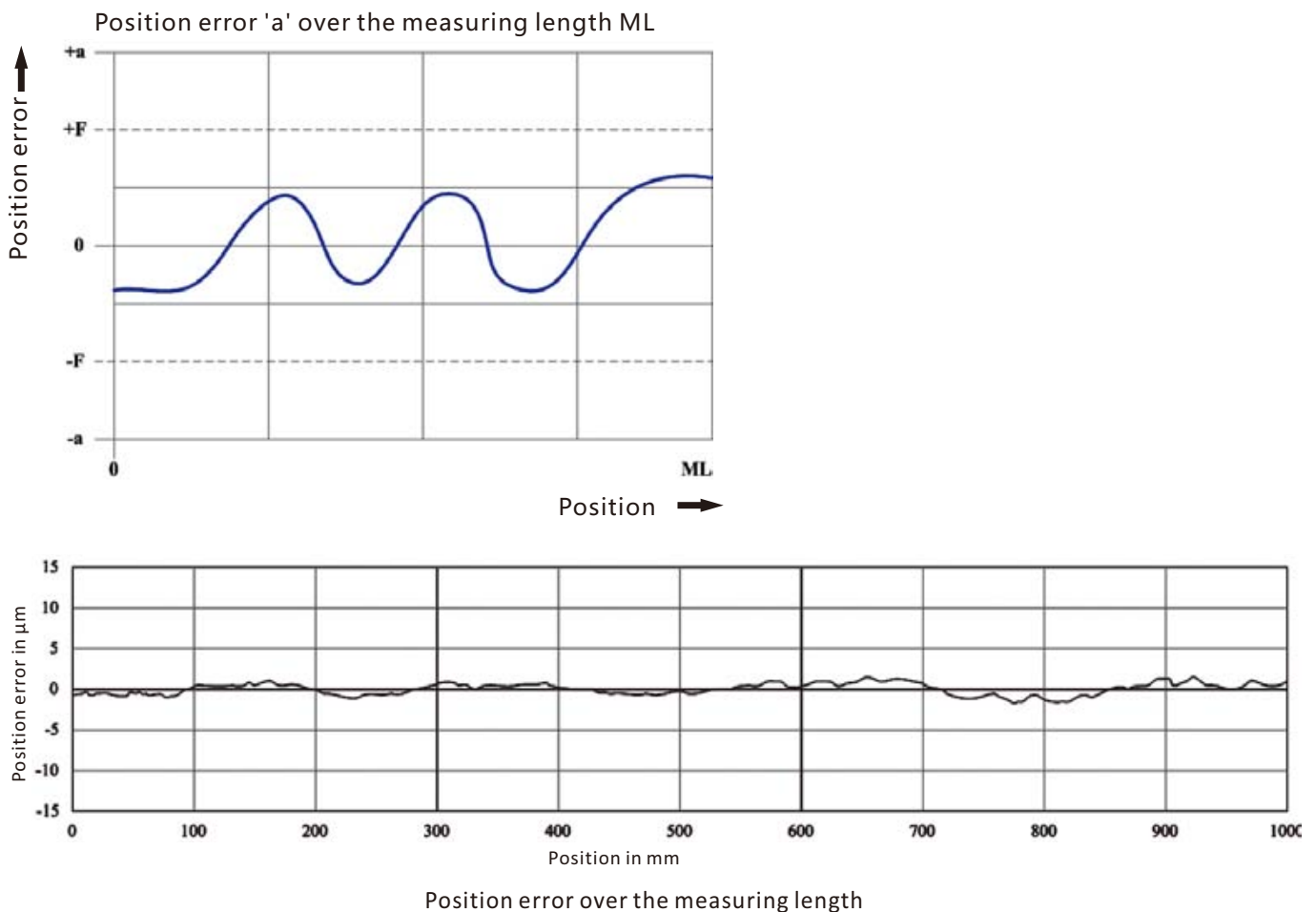
Graduated glass with absolute code and incremental track

Characteristic:

- Absolute position measurement
The current position value can be obtained immediately after switch-on, and there is no need to find the machine tool reference position.
- ASIC
Use custom IC to get the image of the binary code and the Moire fringe signal synchronously, which increase the performance of working speed, acceleration, shock resistance and vibration.
- Single field scanning
The single field scanning technology is used to improve the quality of photoelectric scanning signal, and improve the measuring accuracy and enhance the anti-pollution ability of the product.

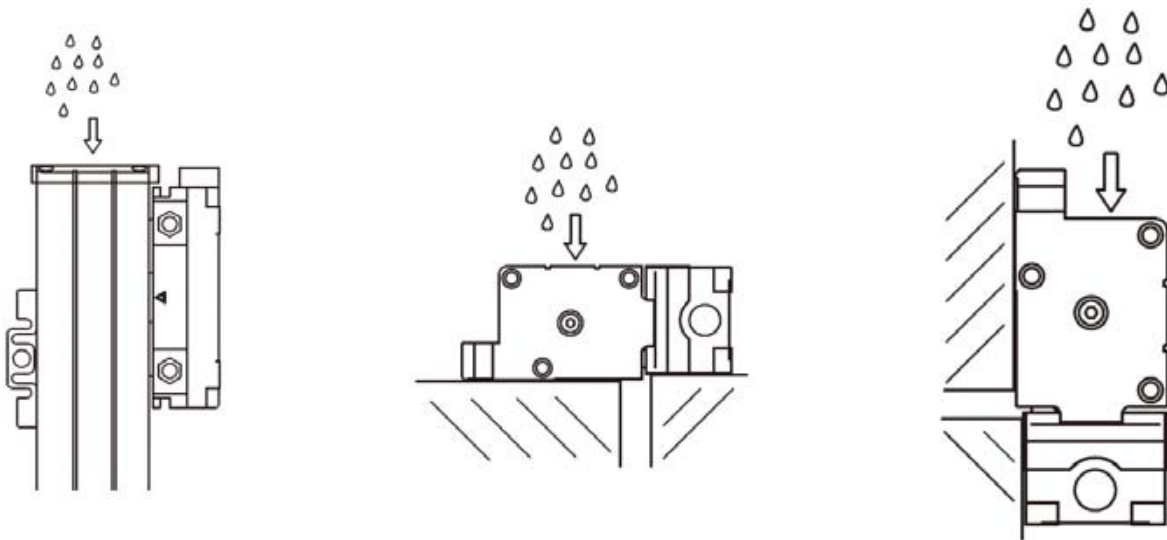
Measuring accuracy:

Under the environmental condition of 20 °C, the limit value $\pm F$ of the measurement curve does not exceed the precision $\pm a$ grade in the range of any 1 meter measurement length.



Mounting information :

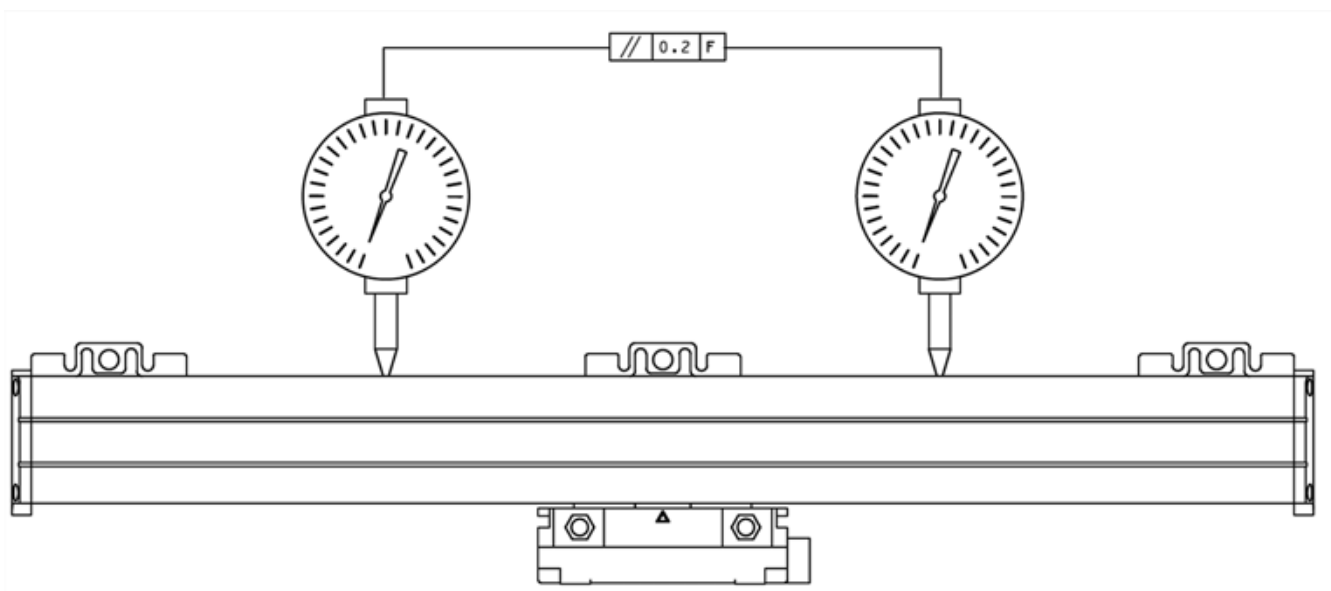
- The following principles should be taken into account in the choice of installation:
 - 1.The sealing lips of scale unit must avoid the splashing direction of the cutting fluid, which is beneficial to the effective sealing. As shown in the following figure:



- 2.The scale unit of JC09 should be fastened onto a machined surface in the full-length fixed way to get high vibration rating.
- 3.To simplify cable routing, the mounting block of the scanning unit is usually screwed onto a stationary machine part, and the scale housing on the moving part.

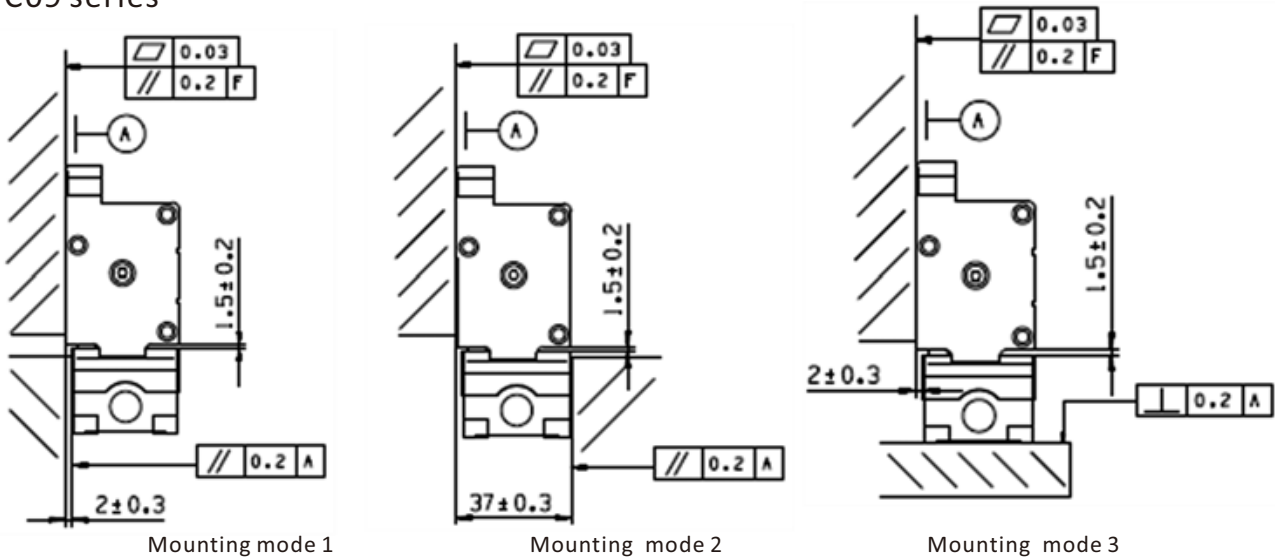
- Mounting accuracy

- 1.The parallelism error between the encoder and the machine guideway should be less than 0.2 mm;

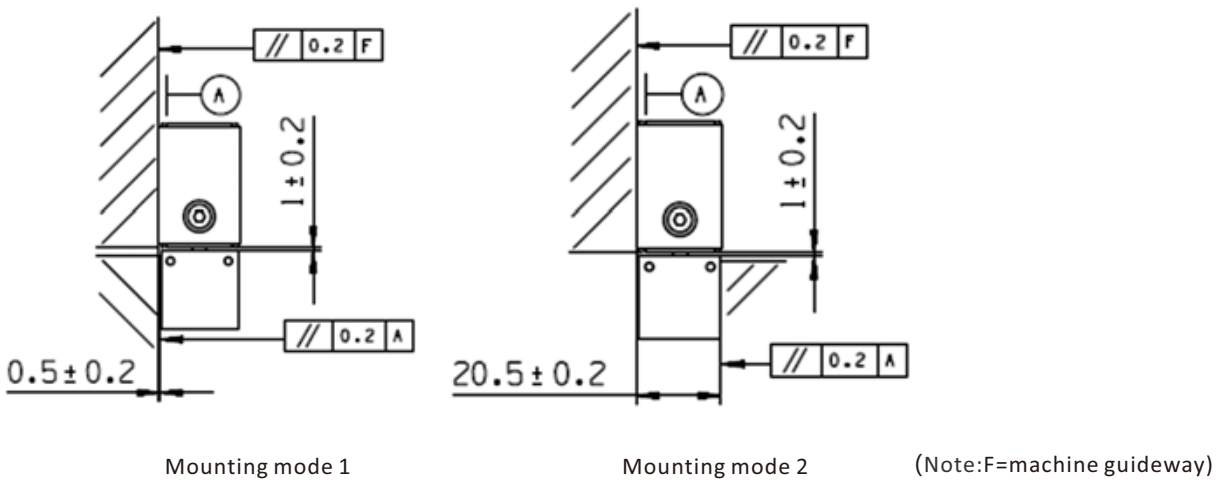


2.The parallelism error between the encoder and the mounting surface should be less than 0.2 mm;

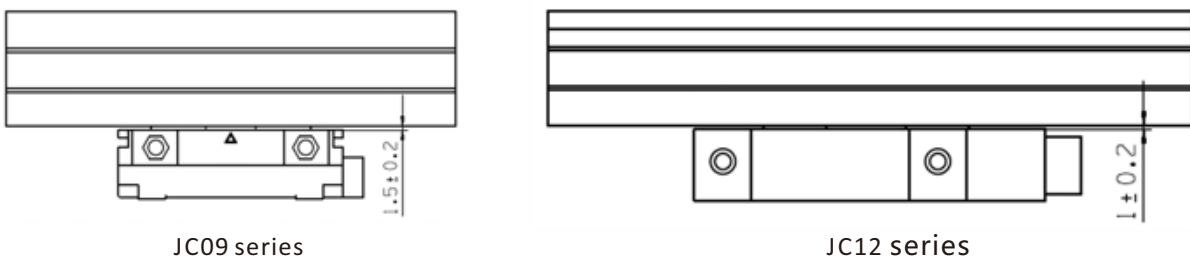
JC09 series



JC12 series



3.The gap error between the scanning unit and the housing should be less than 0.2mm.

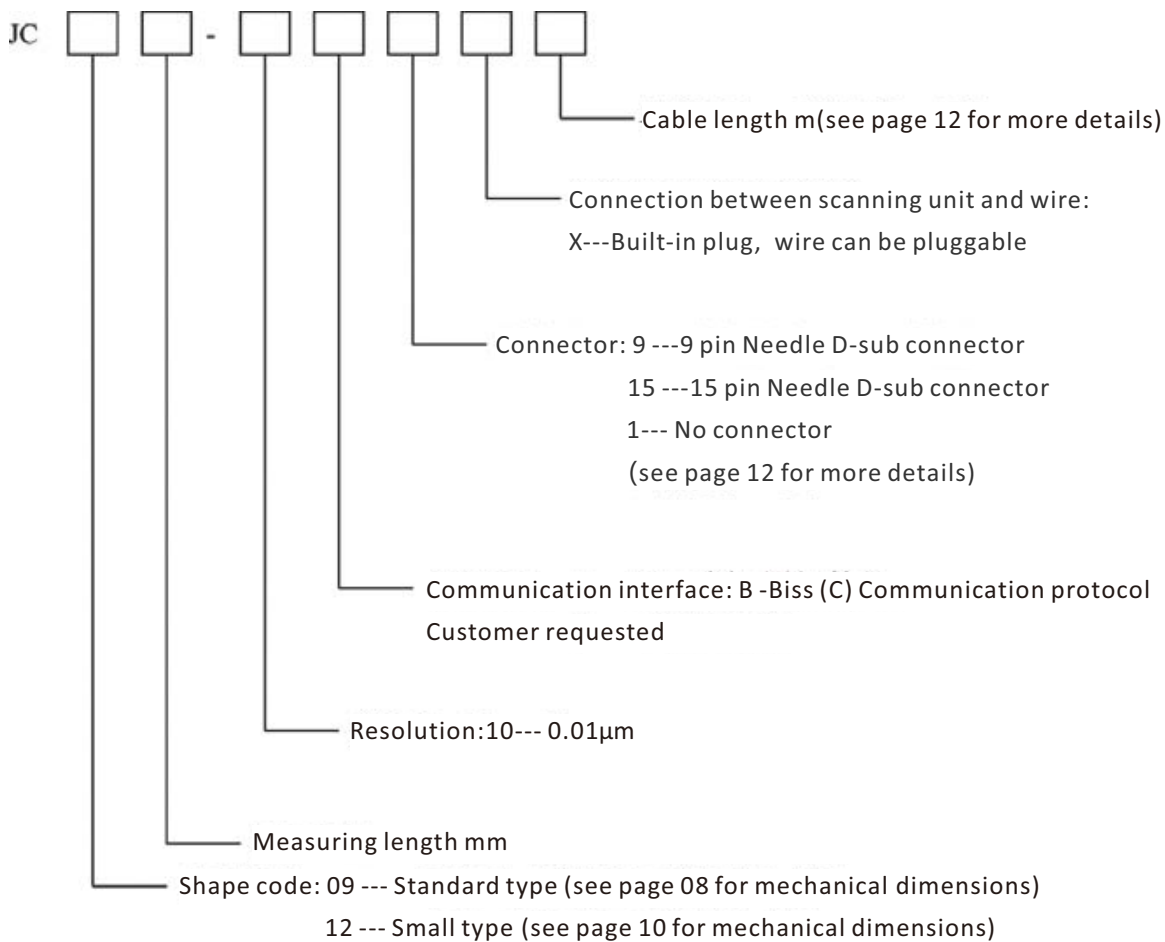


Selection guide

Appearance:

- Standard type: JC09 series
Good structure rigidity, strong anti-vibration ability, priority selection.
- Small type : JC12 series
For applications with limited installation space.

Product model:



Example: JC091240-1B15-3

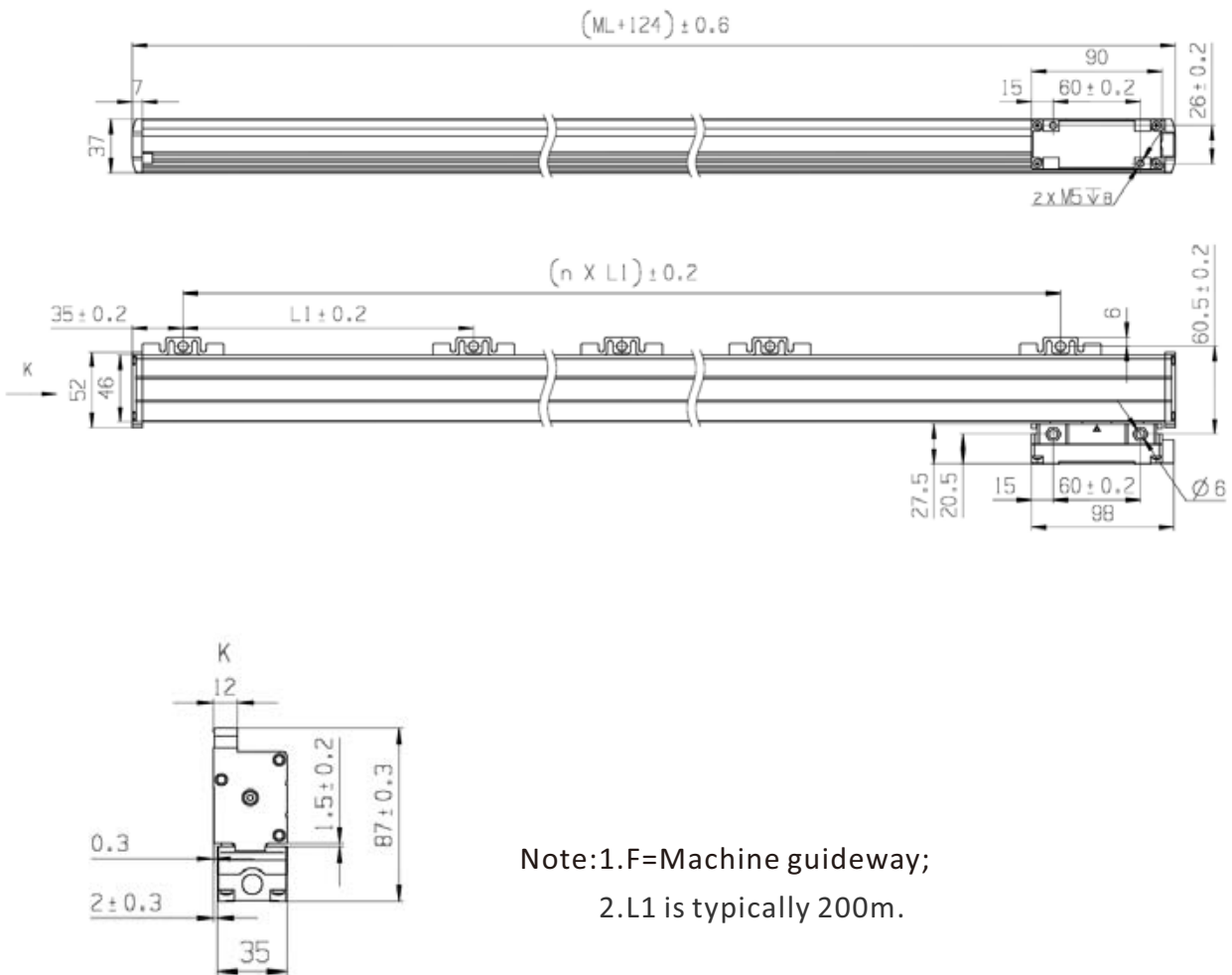
JC09series , measuring length1240mm, resolution 0.01 μ m,Biss(C) communication protocol, 15-pin pin type D-sub connector, cable 3 m.

JC 09 series

Good structure rigidity, strong anti-vibration ability, priority selection.



Mechanical dimension diagram



Note: 1.F=Machine guideway;
2.L1 is typically 200m.

Specifications

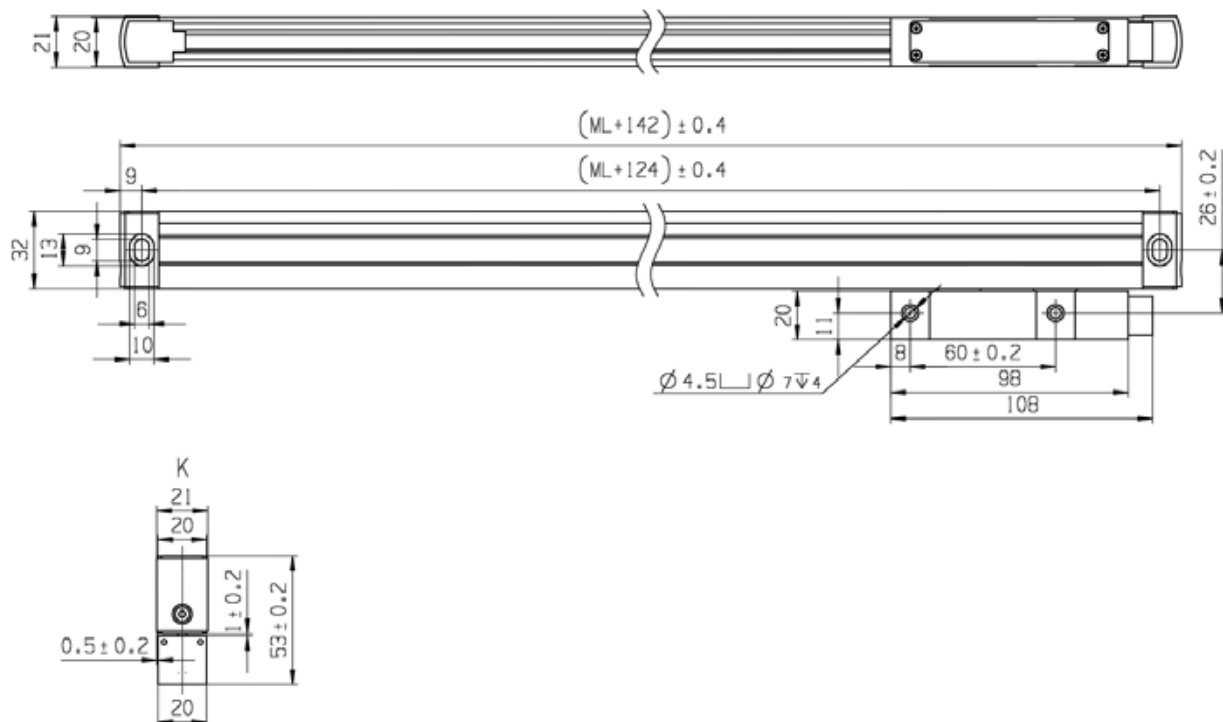
| | |
|---------------------------|--|
| Measuring standard | Graduated glass with absolute code and incremental track |
| Accuracy grade | $\pm 5\mu\text{m}$ |
| Resolution | $0.01\mu\text{m}$ |
| Measuring length (mm) | 220 270 320 370 420 470 520 570 620 670 720 770 820 870 920 970 1020 1140 1240 1340 |
| Communication protocol | Biss (C) |
| Increment signal | $\sim 1\text{Vpp}$ |
| Signal period | $20\mu\text{m}$ |
| Cutoff frequency | $\geq 150\text{kHz}$ for 1Vpp (-3dB) |
| Traversing speed | $\leq 180\text{m/min}$ |
| Power supply without load | $5\text{V} \pm 5\%$, 350mA |
| Scanning unit | Built-in socket, cable can be pluggable |
| Vibration | 10g |
| Shock | 30g |
| Operating temperatur | $0^{\circ}\text{C} \sim 50^{\circ}\text{C}$ |
| Storage temperatur | $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$ |
| Weight | $0.3\text{kg} + 2.1\text{kg/m}$ |
| Relative humidity | $20\% \sim 80\%$ |
| Protection | IP53 IP64 (Using compressed air) |

JC12 series

Small type JC12 series ,for applications with limited installation space.



Mechanical dimension diagram



Note:F=Machine guideway

Specifications

| | |
|---------------------------|---|
| Measuring standard | Graduated glass with absolute code and incremental track |
| Accuracy grade | $\pm 5\mu\text{m}$ |
| Resolution | $0.01\mu\text{m}$ |
| Measuring leongth (mm) | 70 120 170 220 270 320 370 420 470 520 570 620 670 720 770 820 870 920 970 |
| Communication protocol | Biss (C) |
| Increment signal | $\sim 1\text{Vpp}$ |
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| Scanning unit | Built-in socket, cable can be pluggable |
| Vibration | 10g |
| Shock | 30g |
| Operating temperatur | $0^{\circ}\text{C} \sim 50^{\circ}\text{C}$ |
| Storage temperatur | $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$ |
| Weight | $0.1\text{kg} + 0.5\text{kg/m}$ |
| Relative humidity | 20%~80% |
| Protection | IP53 IP64 (Using compressed air) |

Electrical character

Power source

The requirement of power supply is +5V \pm 5% DC, and the maximum allowable ripple is 250mV. Due to resistance of the cable, it will cause the voltage drop of the power supply. The maximum length of the cable is 10m.

Linear encoder power on

2 seconds after power on , the position value is available.

Cable

3m, 5m cables are available, and we are not liable if the user uses the connection cables provided by other companies.

Note: use of spare pins or wires is prohibited.

Connector

The type of connector is selected according to the user's different needs.

9 pin Needle D-sub connector



| 9 pin Needle D-sub connector | | | | | | |
|------------------------------|-----|-------|-------|--------|--------|-------|
| PIN | 1 | 6 | 8 | 4 | 9 | 5 |
| SIGNL | +5V | 0V | CLOCK | /CLOCK | DATA | /DATA |
| COLOR | RED | BLACK | GREEN | WHITE | YELLOW | BLUE |

15 pin Needle D-sub connector



| 15 pin Needle D-sub connector | | | | | | | | | | | | | |
|-------------------------------|-----|-------------|-------|-----------|--------|------|--------|------|-------|--------|--------|-------|--------|
| PIN | 1 | 9 | 2 | 10 | 3 | 11 | 4 | 12 | 14 | 7 | 15 | 8 | 13 |
| SIGNL | +5V | +5V SENSOR | 0V | 0V SENSOR | A | /A | B | /B | CLOCK | /CLOCK | DATA | /DATA | SHIELD |
| COLOR | RED | LIGHT GREEN | BLACK | BROWN | PURPLE | GREY | ORANGE | PINK | GREEN | WHITE | YELLOW | BLUE | / |

Data acquisition unit

Usage

The position information can be displayed on PC through data acquisition unit.

Interface

USB interface

