Changchun Rongde Optics Co., Ltd.

RLC 700 series linear grating sensor

The RLC-700 series grating sensor is composed of advanced optical electromechanical components.
It is a precision measurement device using high-precision grating as a detection component. Matched with the digital display meter to form a high-precision digital measuring instrument. The grating ruler adopts a sealed design. The aluminum alloy ruler shell protects the built-in glass grating. When the reading head moves along the aluminum shell, the high-quality sealing strip can prevent cutting fluid and other substances from entering the inside of the ruler shell. The reading head moving along the glass grating can accurately reflect the displacement of the equipment, because the reading head uses precision bearings. , which minimizes moving friction. There are air inlets at both ends of the grating sensor. Clean compressed air is connected to form positive pressure air inside the ruler housing, which can prevent external substances and liquids from the grating sensor from entering the inside of the ruler housing to improve the sealing level of the grating ruler. The slim appearance design can meet the needs of small spaces.
usage requirements.

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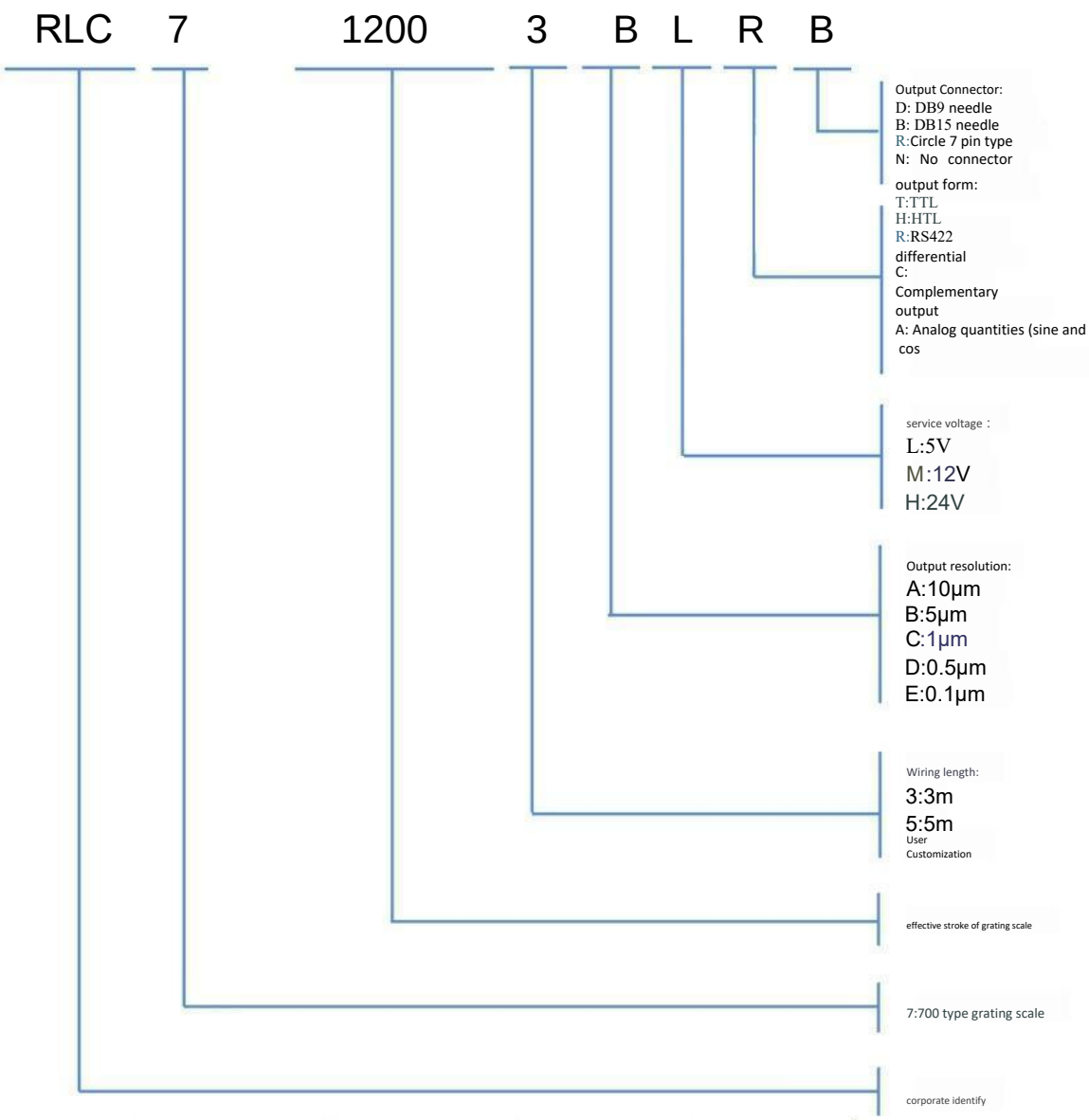
Part No.:



Example: 700 linear grating sensor, 1200mm stroke,3m lead length,5 μ m resolution,5V power supply, RS422 differential output, DB15 pin connector.

RLC-700 Series Linear Grating Sensor

High Precision Grating Line Displacement Sensor

The sliding part structure of the read head adopts the five-bearing design that has been proven to be the most reliable and durable, ensuring that the optical sensing system can slide smoothly on the grating ruler stably for a long time.

All bearings adopt imported high-grade high-precision bearings to ensure smooth sliding, low runout, reliability and durability.

The scale uses a dedicated IC for subdivision and uses the full hardware phase shift principle for subdivision to minimize real-time measurement errors. The phase shift operations of the dedicated IC are all performed in the same chip. Due to the consistency of the semiconductor temperature coefficient within the chip, the subdivision error caused by temperature changes is greatly reduced and the subdivision accuracy is improved to obtain higher repeat positioning errors. The scale bar uses special IC for subdivision, and the whole hardware phase shift principle is used to subdivision, which reduces the real-time measurement error to the lowest. The phase shift operation of special IC is carried out in the same chip. Because of the consistency of the temperature coefficient of the semiconductor in the chip, the subdivision error caused by temperature change is greatly reduced, and the subdivision precision is improved to obtain higher repeat positioning error.

Measurement Length:unit mm

·50·70·120·170·220·270·320·370·
420·470·520·570·620·670·720·
770·820·870·920·970·1020·1070·
1140·1240·1340·1440·1540·1640
·1740·1840·2040

Grating Sensor Output Signal Characteristics

Output signal:A, /A, B, /B, Z, /Z
Signal level:VH>2.5V IH=20mA

VL≤0.5V IL=20mA Reference mark signal: Z and A B signals are synchronized

Power supply voltage and current: 5 V±10%, <150mA
Signal period: 20Hm, 4Hm

The load impedance between positive and negative dynamic signals:
Zo =120Ω

Electrical Parameters

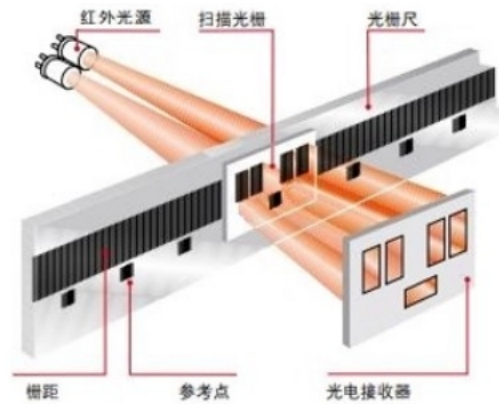
Power supply	5V±10%150mA
Output signal	TL square wave, RS422 differential, HTL, complementary analog output (sinusoidal/cosinusoidal)
Resolution ratio	10μm, 5μm, 1μm, 0.5μm, 0.1μm Sin/Cos 1Vpp
Electronic subdivision error	<50nm
Reference zero	Interval 50mm, interval 200mm, as required by the user
Working temperature	10° C-40° ℃

Mechanical Parameters

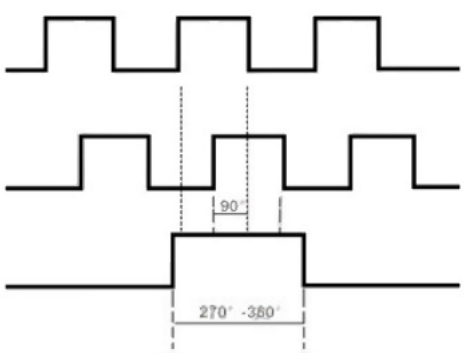
Per meter accuracy	±3μm/m, ±5μm/m
Extreme length	50mm-2040mm (glass grating) 3040mm-5040mm (steel strip grating)
Levels of protection	IP54, which can be upgraded to IP64 when exposed to clean gas
Maximum speed	60 m/s is related to resolution and the minimum clock frequency of the counter
Maximal acceleration	30G
Cable diameter	Single-core 0.15mm² shielded cable
Bending radius	R=75mm
Measurement reproducibility	1-2 resolutions

Principle of Signal Generation

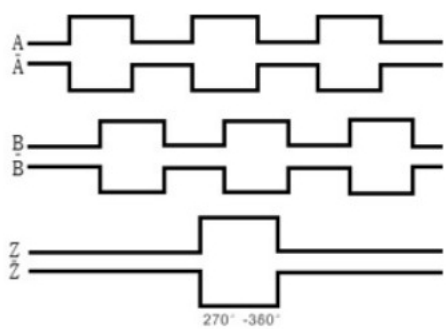
The principle of imaging scanning of incremental linear grating is to use the optical principle of transmission to generate signals. The infrared light source on one end emits an infrared beam, which passes through the main grating and scanning auxiliary grating with the same pitch density. When the main grating and scanning auxiliary grating move relative to each other, Moiré fringes are generated. The changes are received by the photoelectric tube at the other end, generating four sine and cosine signals with a phase difference of 90. This set of signals is processed by the post-circuit and converted into standard signals commonly used in control systems. When there is a zero mark on the grating scale, the special stripes at the zero position allow the photoelectric tube to receive it and read the zero signal.



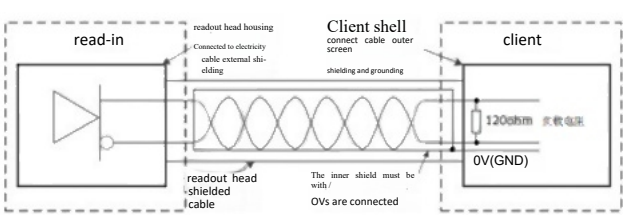
grating output waveform



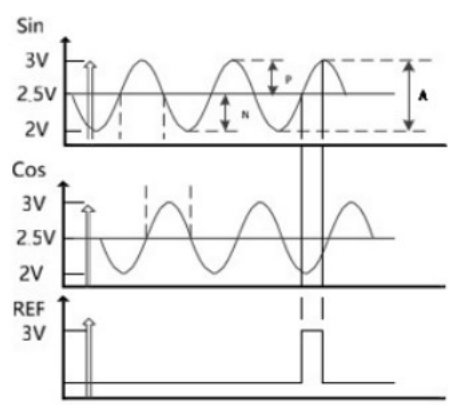
(TTL Signal)



RS422 differential signal



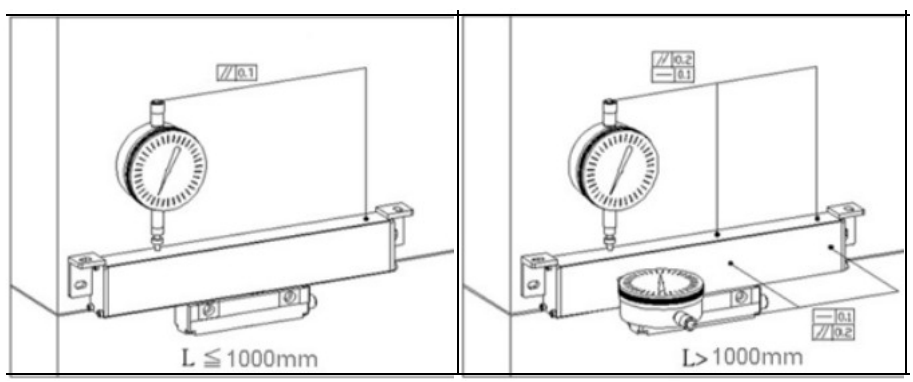
Differential Output Suggestion Circuit



The Sin/Cos signal and Z signal are both differential signals (Sin/-Cos), while the-Z signal is not plotted.

Grating Scale Installation Guide

1、 Before installation, check the position of the optical grating scale on the equipment and install it on the machining surface with minimal vibration.
2、 To avoid the influence of temperature on the measurement accuracy, keep away from the heat source.
3、 For the installation of the grating scale, when the scale length is within 1000mm, the vertical and horizontal errors relative to the guide rail should not exceed 0.1-0.15mm. For scales longer than 1000mm, the vertical and horizontal errors should not exceed 0.2mm.
4、 The reading head is installed with a clearance of 0.7-1.3mm between the reading head and the scale body.
5、 After installing the reading head, remove the plastic positioning block.



Compressed air hole of grating scale

Compression Air Inlet

Meaning of Grating Scale Signal

TTL interface line sequence for grating scale (DB9-pin connector)					
Pin	Function	Line Color	footnote	Function	Line Color
PIN1	+5V	Red	PIN6	Empty	
PIN2	0V	Black	PIN7	Empty	
PIN3	A	Lan	PIN8	Empty	
PIN4	B	Hispid arthraxon	PIN9	Empty	
PIN5	Z	Huang	Metal case	SHIELD	

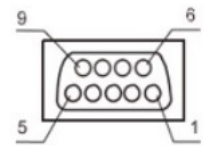
RS422 interface line sequence for grating scale (DB9-pin plug)					
Pin	Function	Line Color	Pin	Function	Line Color
PIN1	+5V	Red	PIN6	-A	Palm
PIN2	0V	Black	PIN7	-B	Ash
PIN3	A	Lan	PIN8	-Z	White
PIN4	B	Hispid arthraxon	PIN9	Empty	
PIN5	Z	Huang	Metal case	SHIELD	

TTL interface line sequence of grating scale (round seven-pin plug)					
footnote	Function	Line Color	Pin	Function	Line Color
PIN1	0V	Black	PIN5	+5V	Red
PIN2	Empty		PIN6	Z	Huang
PIN3	A	Lan	PIN7	SHIELD	
PIN4	B	Hispid arthraxon	Metal case	SHIELD	

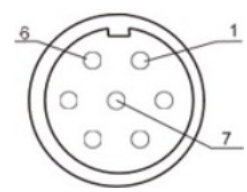
Grating scale TTL interface line sequence (DB15-pin plug)					
Pin	Function	Line Color	Pin	Function	Line Color
PIN1	A	Lan	PIN9	+5V	Red
PIN2	/A	Palm	PIN10	Empty	
PIN3	B	Hispid arthraxon	PIN11	0V	Black
PIN4	/B	Ash	PIN12	Empty	
PIN5	Z	Huang	PIN13	Empty	
PIN6	Z	White	PIN14	Empty	
PIN7	Empty		PIN15	SHIELD	Shield
PIN8	Empty		Metal case	SHIELD	Shield

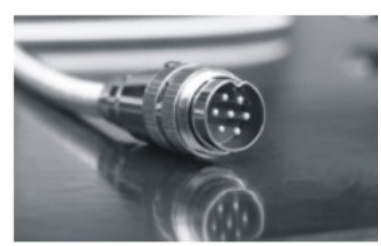
When necessary, the internal shielding layer should be connected to 0V to enhance anti-interference performance.

1、 DB9 plug TTL/RS422 (standard type)

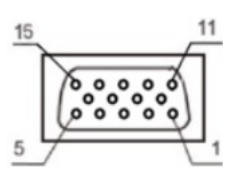


2、 Seven-Pin Plug (optional)

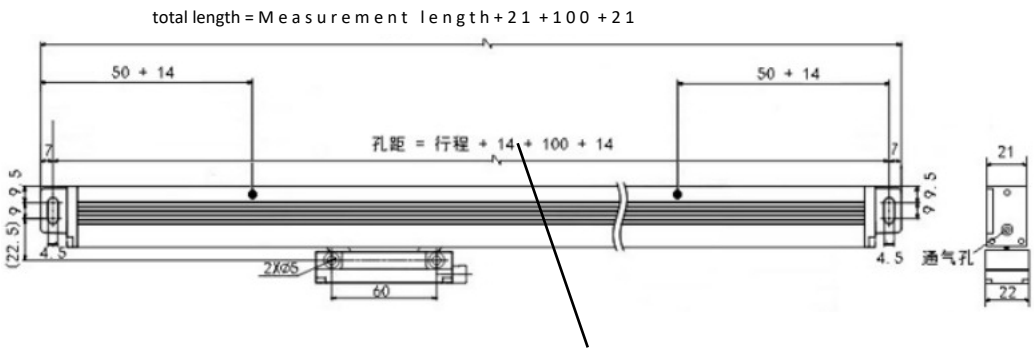




3、 DB15 plug TTL/RS422 (standard type)



Installation Dimension Diagram



Hole spacing = Stroke + 14 + 100 + 14