



# HEIDENHAIN

安装说明  
*Mounting Instructions*

## LB 302

## LB 382

单段光栅尺  
*Single-Section*

11/2008

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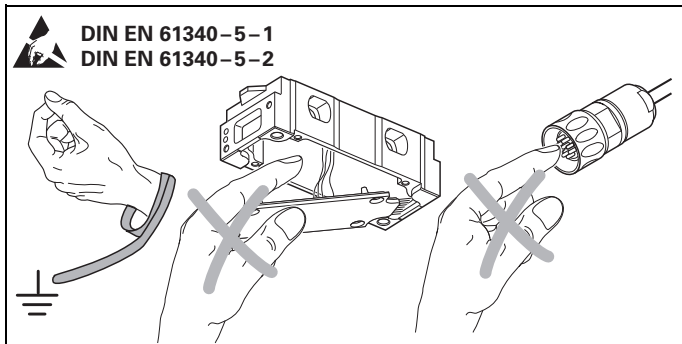
20 *LB 302/LB 302 C*

22 *LB 382/LB 382 C*

*Mechanical Data*

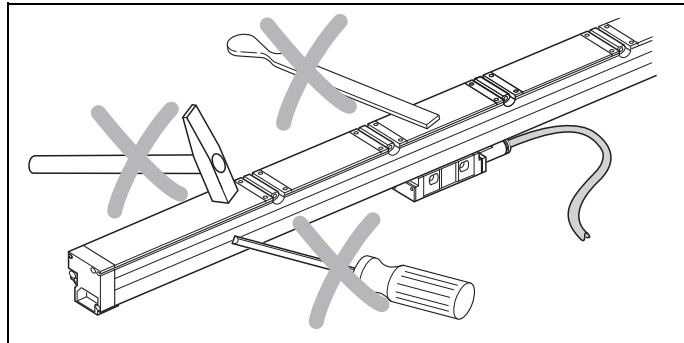
23 *LB 302/LB 302 C*

23 *LB 382/LB 382 C*



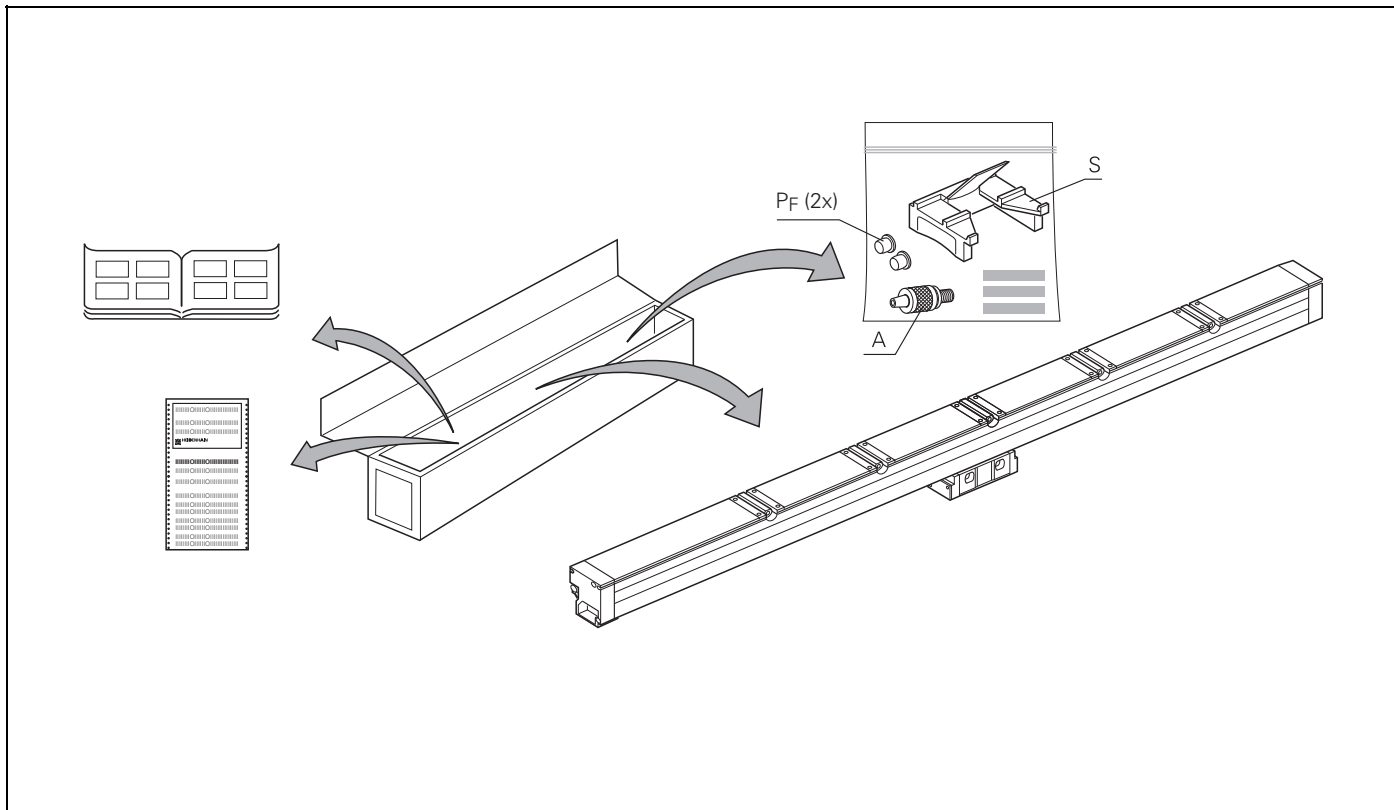
**注意：** 安装和调试任务只能由电气和精密机械专业技术人员并在符合当地安全法规要求的条件下进行。  
带电时，严禁连接或断开任何连线。  
安装期间，严禁驱动系统工作。

尺寸单位 mm



**Note:** Mounting and commissioning is to be conducted by a specialist in electrical equipment and precision mechanics under compliance with local safety regulations.  
Do not engage or disengage any connections while under power.  
The drive must not be put into operation during installation.

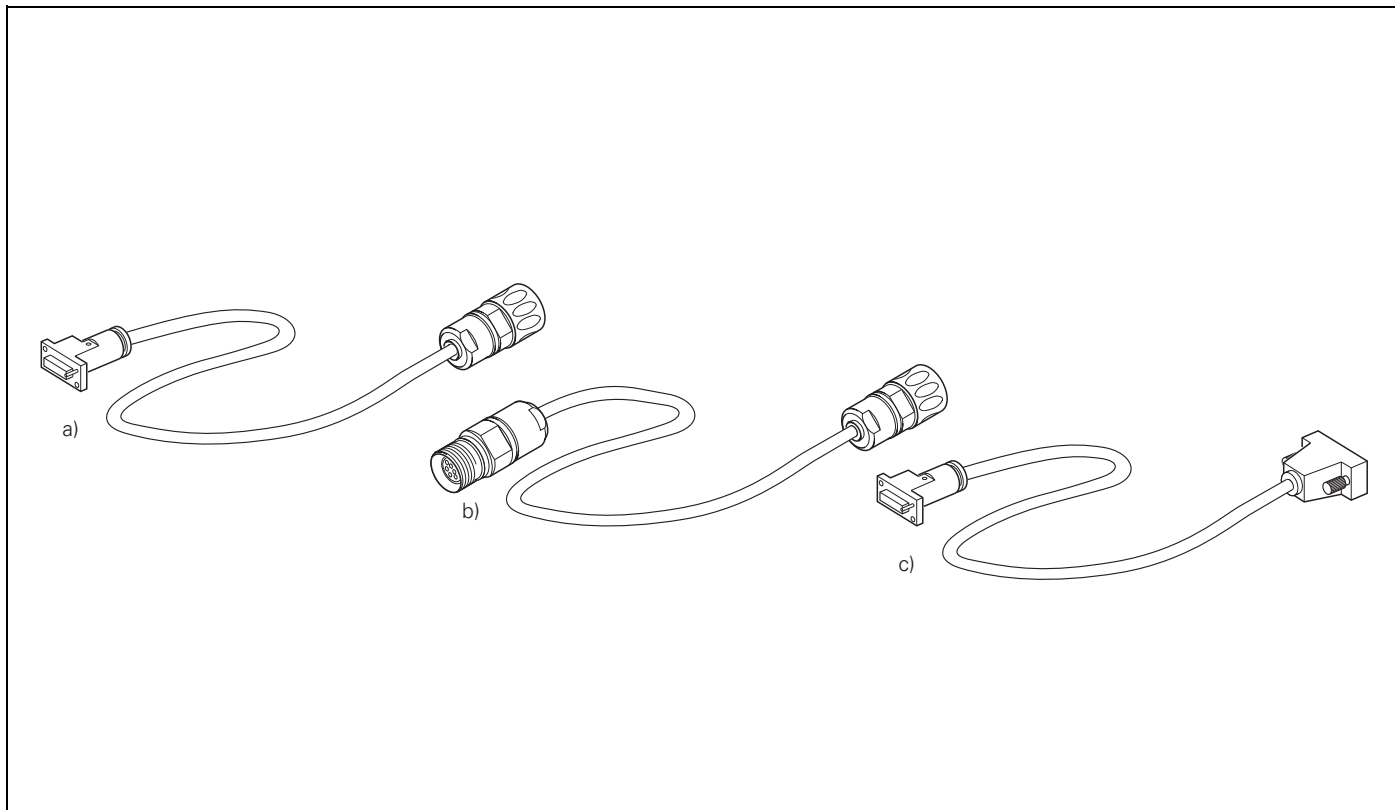
Dimensions in mm



自带零件  
 参考点滑架S<sup>1)</sup>  
 接头A  
 塞帽PF (备件)

<sup>1)</sup> 用于LB 302/LB 382

Items supplied  
 Reference mark slider S<sup>1)</sup>  
 Connecting piece A  
 Plugs PF (replacement)  
<sup>1)</sup> with LB 302/LB 382



**单独订购电缆：**

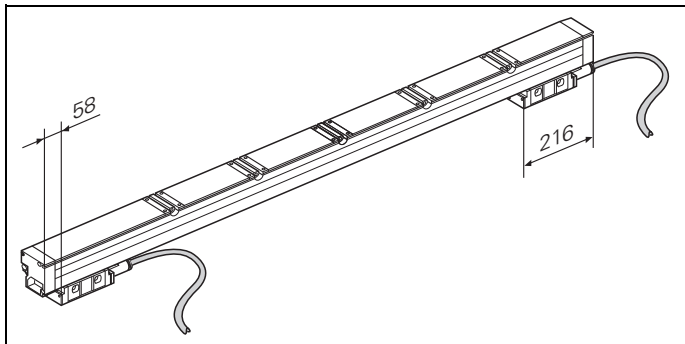
- a) 适配电缆
  - b) 连接电缆
- 带或不带金属网和接头

c) D-sub接头的适配电缆

**Order cable separately:**

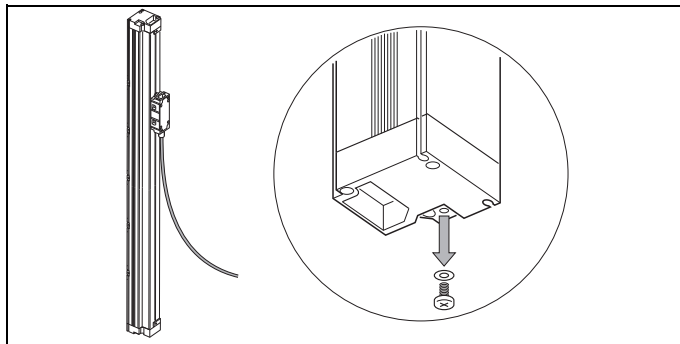
- a) Adapter cables
  - b) Connecting cable
- Both with or without metal armor tubing and connector

c) Adapter cables with D-sub connector



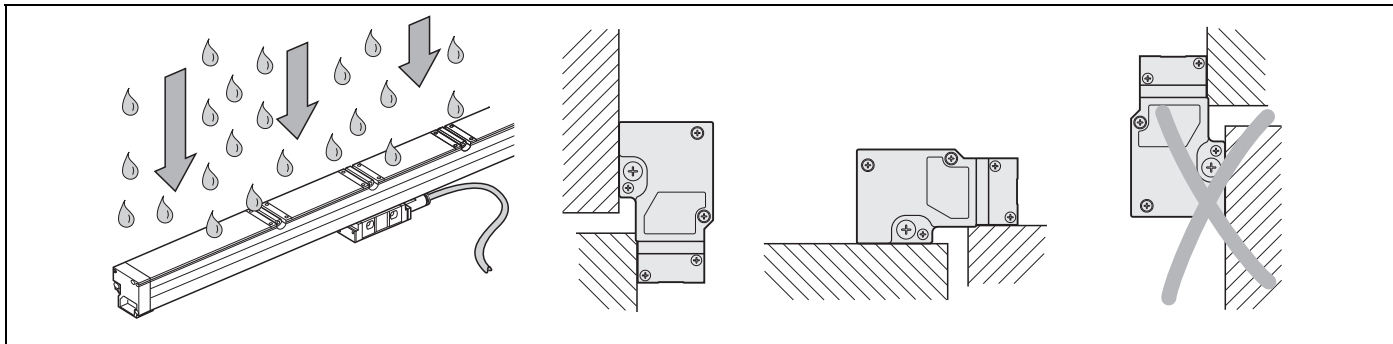
选择安装位置，确保读数头不接触端头。

*Choose a mounting position to ensure that the scanning unit cannot touch the end sections.*



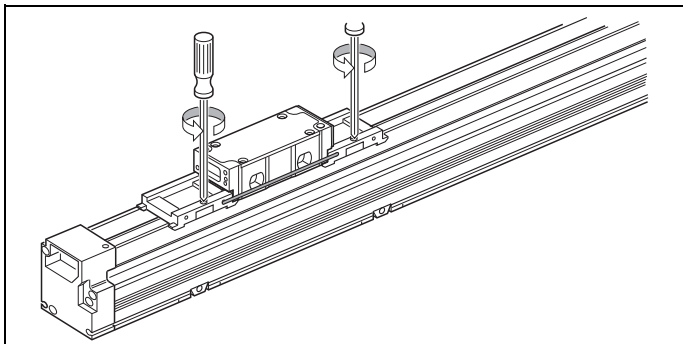
垂直安装时，如果不用压缩空气，拆下放气螺丝。

*When mounting vertically, remove the drain screw if compressed air is not used.*



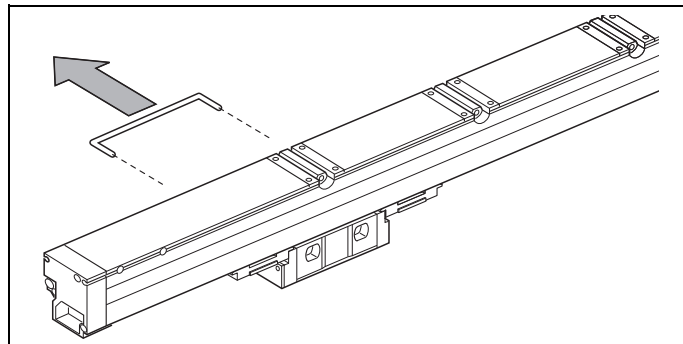
安装时，必须使密封条背离可能的污染源。

*Mount with **sealing lips facing away from possible sources of contamination.***



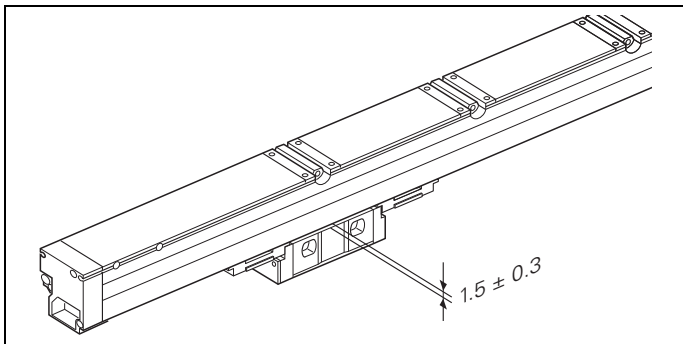
轻轻松开安装辅件的螺栓。

*Loosen screws on shipping braces slightly.*



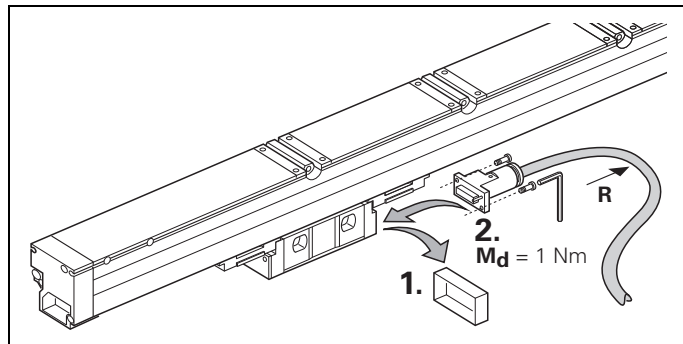
拆下安装辅件卡子。

*Remove the shipping brace clip.*



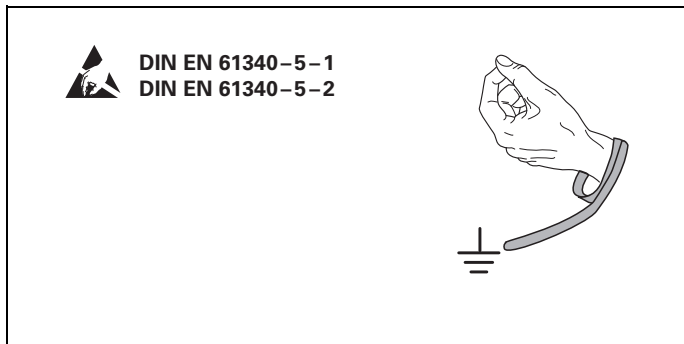
安装辅件用于调整读数头与光栅尺间的扫描间隙。

*The shipping brace can be used to adjust the scanning gap between the scanning unit and the scale.*



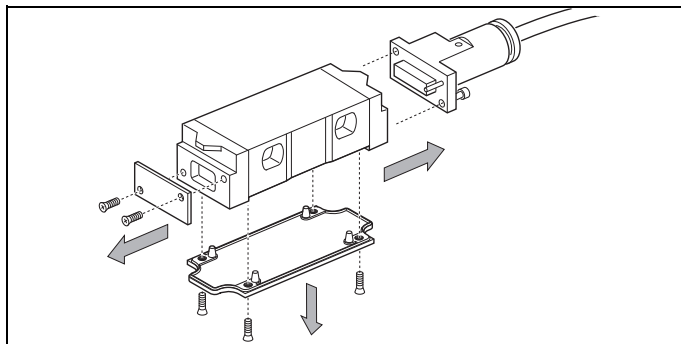
拧入适配电缆（1 Nm）。调整电缆位置使电缆弯曲半径不小于最小半径R（参见“技术参数”）。

*Screw on the adapter cables (1 Nm). Configure the cable such that the bending radius R is not smaller than permissible (see Specifications).*



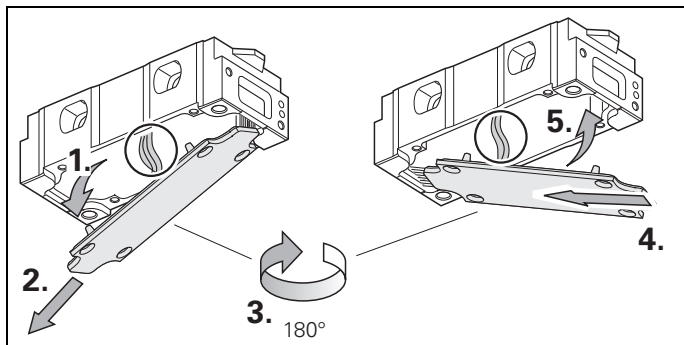
确保电子设备无静电。  
操作期间，戴上接地手链确保无静电。

Protect the electronics from accumulating electrostatic charge. A grounded bracelet can ensure protection during handling.



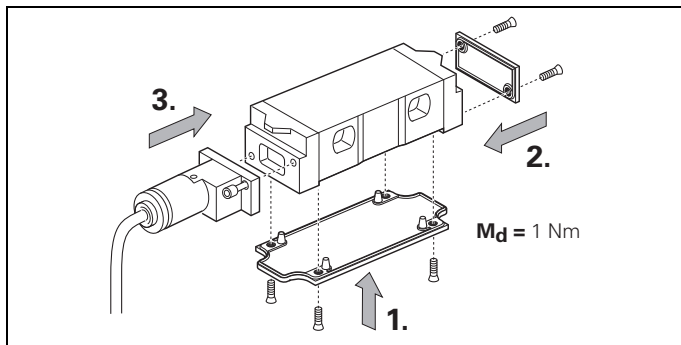
打开读数头盖子和（根据需要）  
拔出适配电缆。

Detach the cover and (if necessary) the adapter cables.



小心使印刷电路板朝下方，拉出印刷电路板并将它转动180°。先插入电路板接头端。禁止捏紧电线。

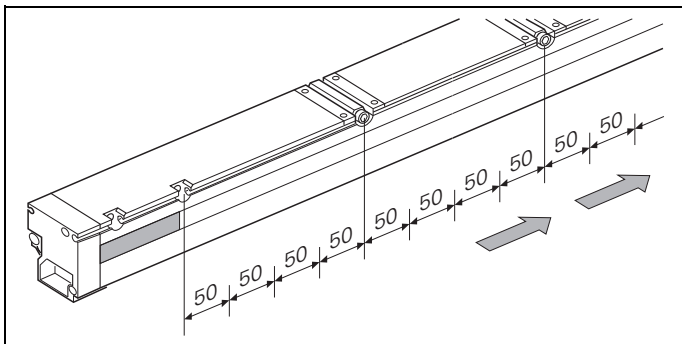
Tilt the printed circuit board down carefully, pull it out and rotate it by 180°. Insert board connector side first. **Do not pinch the wires.**



然后再安装盖和连接适配电缆（1 Nm）。

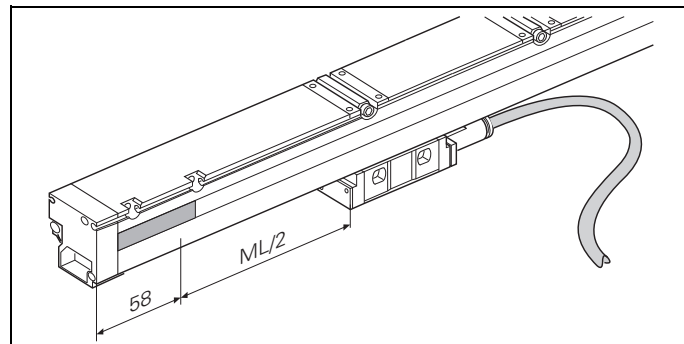
Then attach cover and adapter cables again (1 Nm).





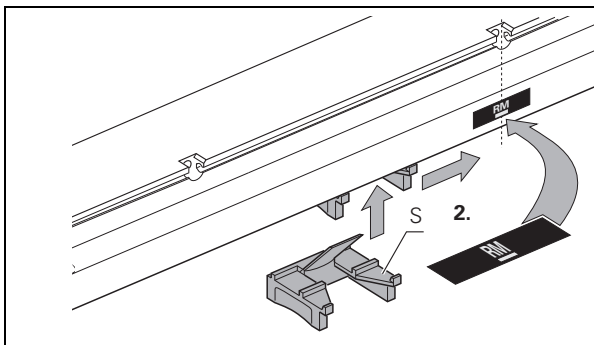
参考点可设置在任何一个固定孔位置处和距固定孔  $n \times 50$  mm 的位置处。

*A reference mark can be activated at any mounting hole and at intervals of  $n \times 50$  mm therefrom.*

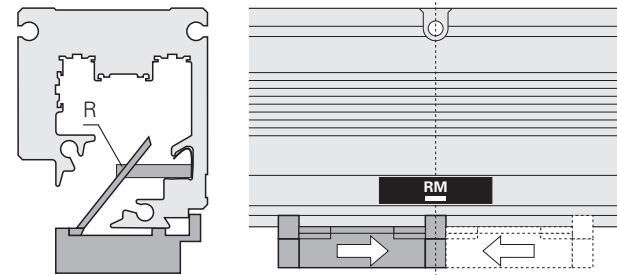


交货时，参考点设置在测量长度的中点位置处。

*As delivered, the reference mark is activated at the midpoint of the measuring length ML.*



在所需参考点位置处的光栅尺外壳上固定一个RM标签以示参考点。小心插入参考点滑架使其穿过密封条和使选择板运动至所需位置处。

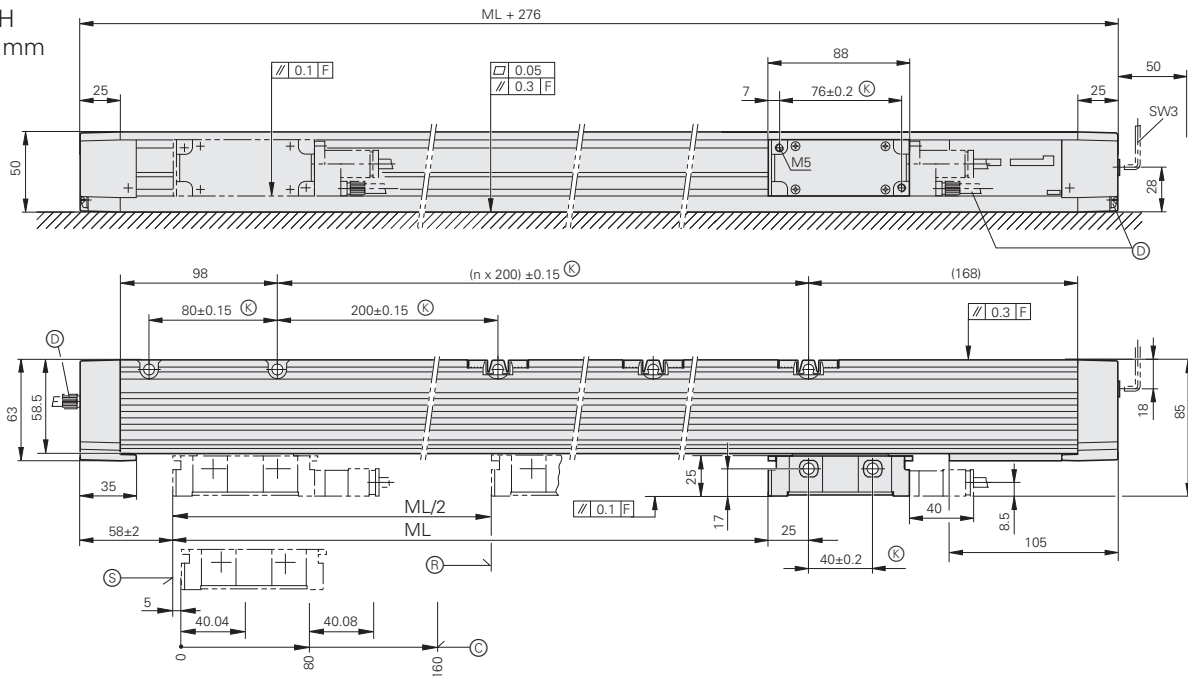


*Indicate the desired reference mark position by affixing the RM label on the housing. Carefully insert reference mark slider through the sealing lips and move the selector plate to the desired position.*

mm



公差 ISO 8015  
ISO 2768 - m H  
< 6 mm: ±0.2 mm



F = 机床导轨

⊙ = 要求配合尺寸

⊕ = 压缩空气进气口

⊙ = 参考点位置

LB 302/LB 382

⊙ = 参考点位置

LB 302C/LB 382C

⊙ = 测量长度ML起点

F = Machine guideway

⊙ = Required mating dimensions

⊕ = Compressed air inlet

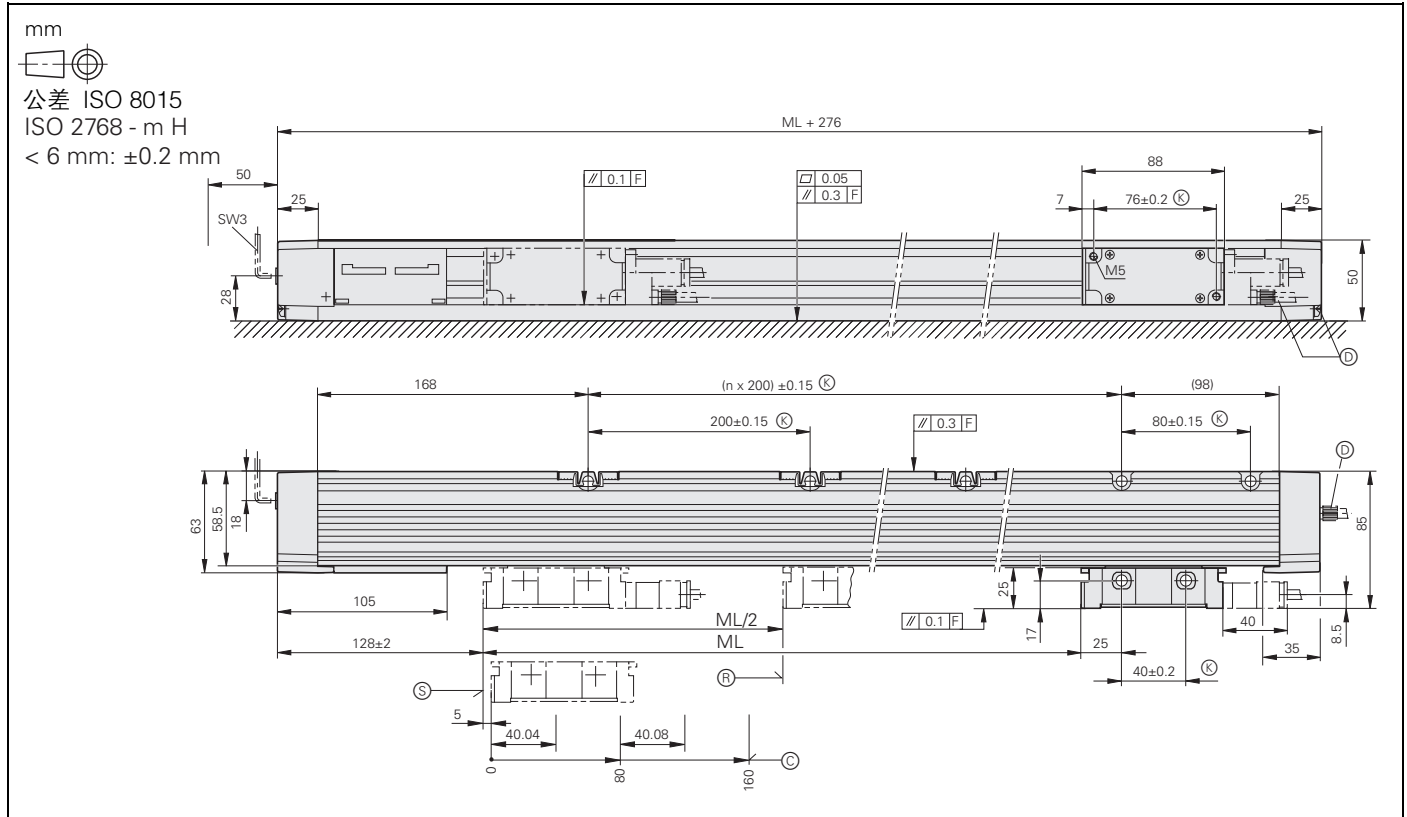
⊙ = Reference mark position

LB 302/LB 382

⊙ = Reference mark position

LB 302C/LB 382C

⊙ = Start of measuring length ML

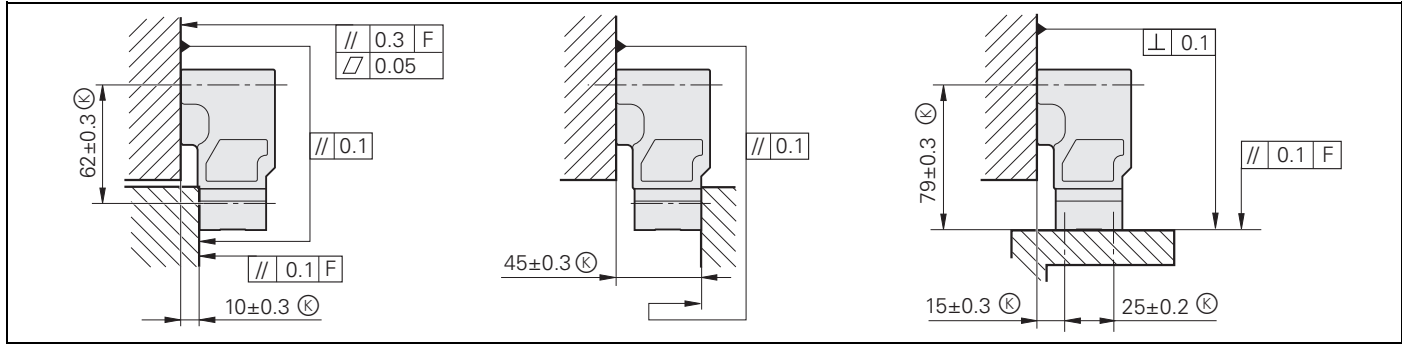


F = 机床导轨  
⊗ = 要求配合尺寸  
⊙ = 压缩空气进气口

⊕ = 参考点位置  
LB 302/LB 382  
⊖ = 参考点位置  
LB 302C/LB 382C  
⊗ = 测量长度ML起点

F = Machine guideway  
⊗ = Required mating  
dimensions  
⊕ = Compressed air inlet

⊖ = Reference mark position  
LB 302/LB 382  
⊖ = Reference mark position  
LB 302C/LB 382C  
⊗ = Start of measuring length ML



安装位置和公差

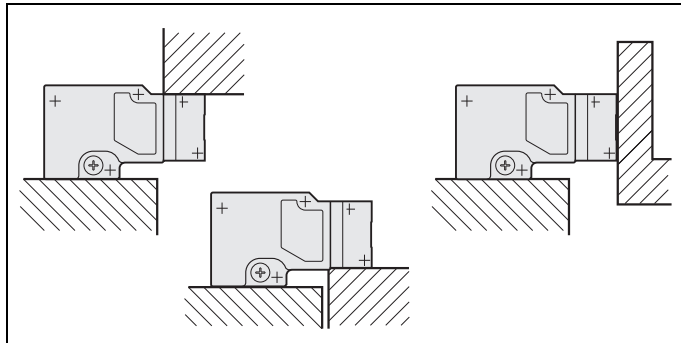
F = 机床导轨

Ⓞ = 需要的配合尺寸

Mounting possibilities and tolerances

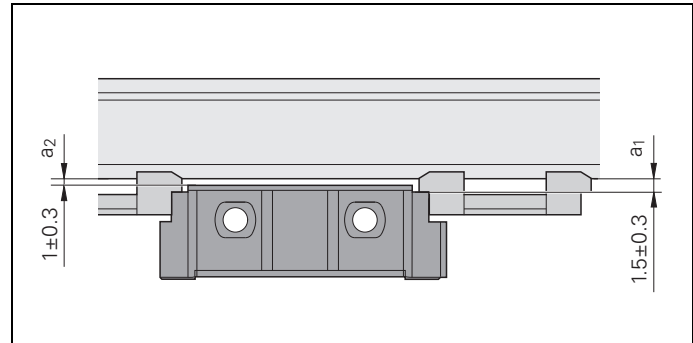
F = Machine guideway

Ⓞ = Required mating dimensions



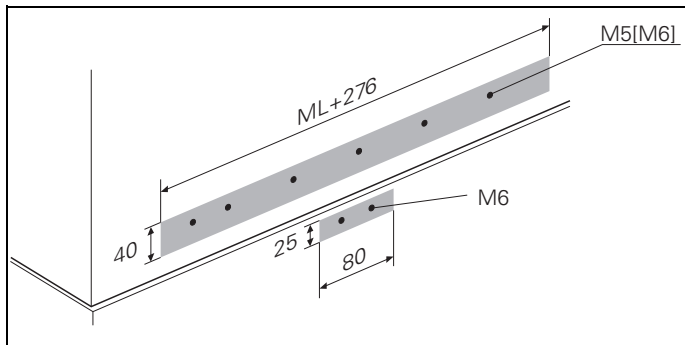
允许水平方向安装。

A horizontal mounting attitude is possible.



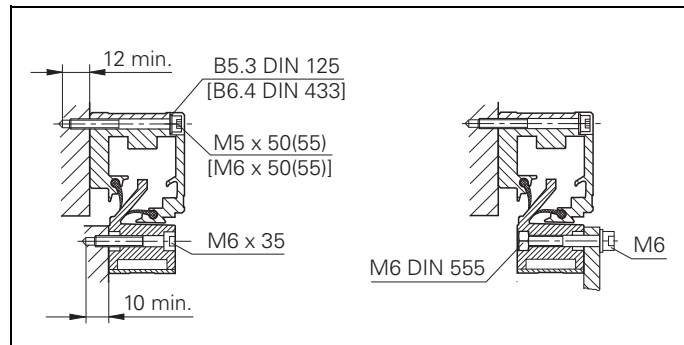
必须确保在整个测量长度 (ML) 上扫描间隙保持一致。用安装辅件 ( $a_1$ ) 或安装量规 ( $a_2$ ) 调整扫描间隙 (ID 647 933-01)。

The scanning gap  $a$  must be maintained over the entire measuring length ML. The gap can be set with the shipping brace ( $a_1$ ) or the mounting gauge ( $a_2$ ) (ID 647 933-01).



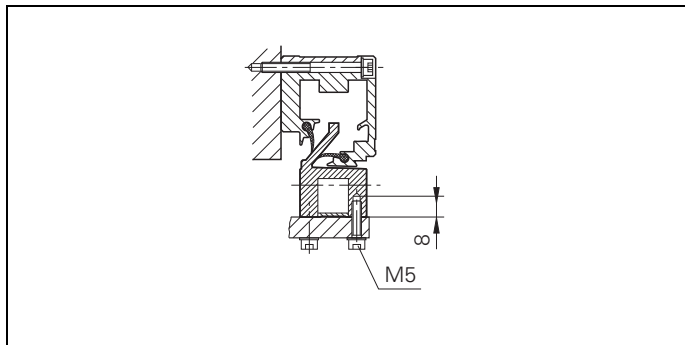
钻固定孔和攻丝。清除安装面油漆。

*Drill and tap fixing holes. Remove paint from mounting surface.*



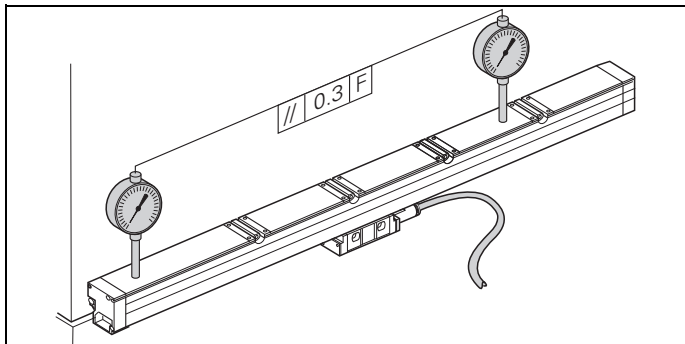
固定光栅尺。拧上但不拧紧螺栓。

*Secure the encoder. Attach screws loosely.*



读数头盖上的安装位置。拧上但不拧紧螺栓。

*Mounting possibility on the cover of the scanning unit. Attach screws loosely.*



找正光栅尺。  
两端测量点。其它测量点在  
等间距位置。

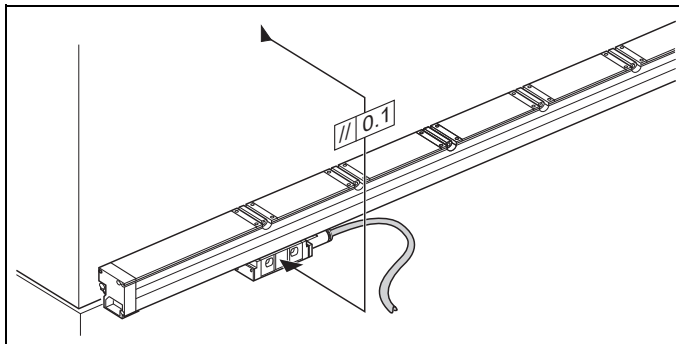
**测量点数:**

最大测量长度ML 840: 2  
最大测量长度ML 1740: 3  
最大测量长度ML 3040: 4.  
检查与机床导轨F的平行度。

*Align the encoder.  
Gauging position at the ends.  
Further gauging positions at  
regular intervals.*

**Number of measuring points:**

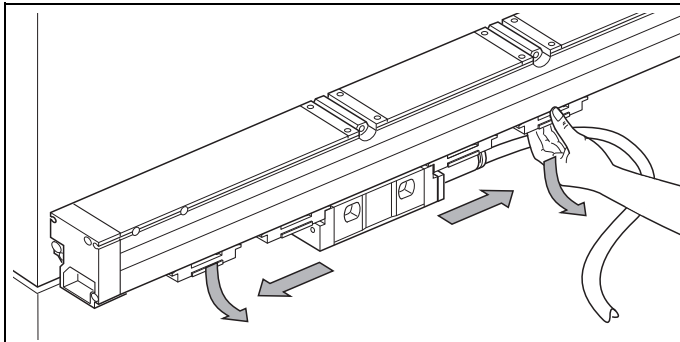
*Up to ML 840: 2  
Up to ML 1740: 3  
Up to ML 3040: 4.  
Check parallelism to machine  
guideway F.*



均匀紧固螺栓: M5: 5 Nm; M6: 8  
Nm.

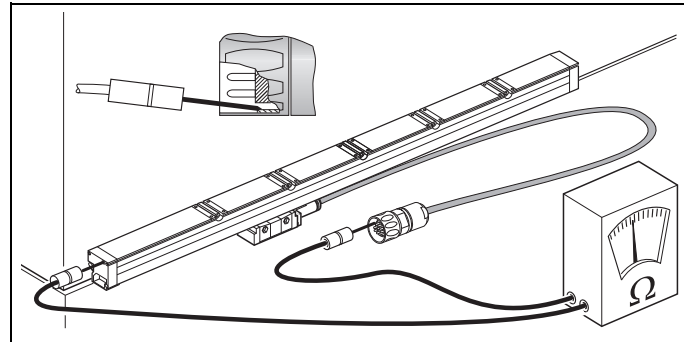
检查读数头端面与光栅尺安装面  
的平行度。

*Tighten screws evenly:  
M5: 5 Nm; M6: 8 Nm.  
Check parallelism of side surface  
of scanning unit to the scale  
mounting surface.*



使安装辅件离开读数头，将其拆下。

*Slide shipping braces away from scanning unit and remove them.*

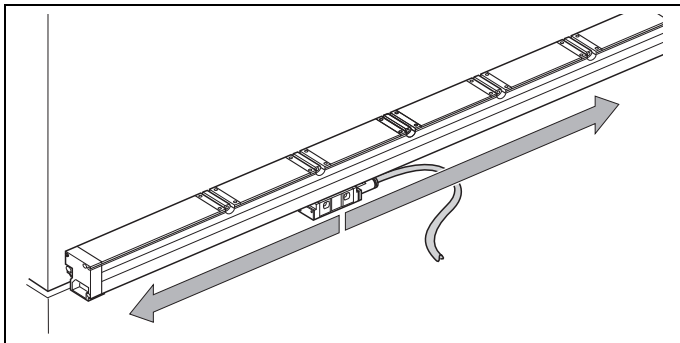


测量接头外壳与光栅尺间电阻，检查屏蔽情况。

**允许值： 1 Ω max.**

*Check the shielding by measuring the resistance between connector housing and scale.*

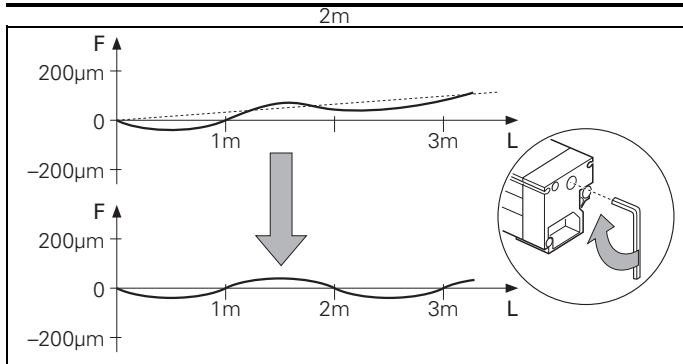
**Desired value: 1 Ω max.**



检查安装公差和光栅尺在整个运动行程上的工作情况。

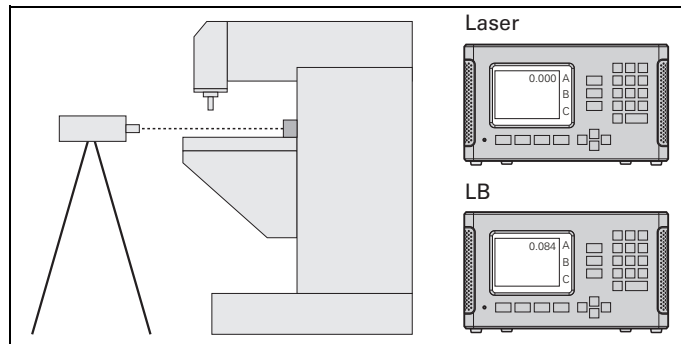
*Check mounting tolerances and functioning of encoder over the entire traverse range.*

## Linear Error Compensation



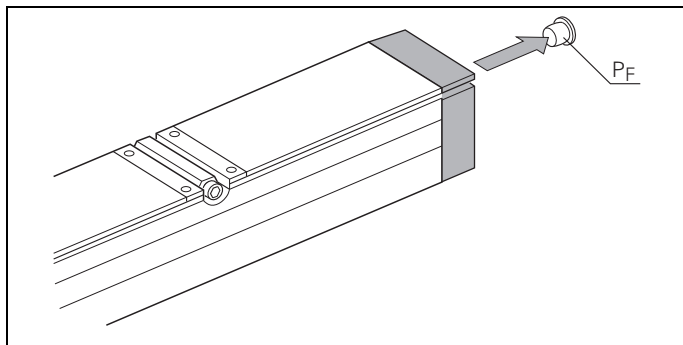
如果钢带光栅尺有钢带张紧装置，测量长度全长的最大**线性误差补偿值**可达 $\pm 100 \mu\text{m}$ 。

A **linear error compensation** of up to  $\pm 100 \mu\text{m}$  can be applied to the entire measuring length with the tape tensioning device.



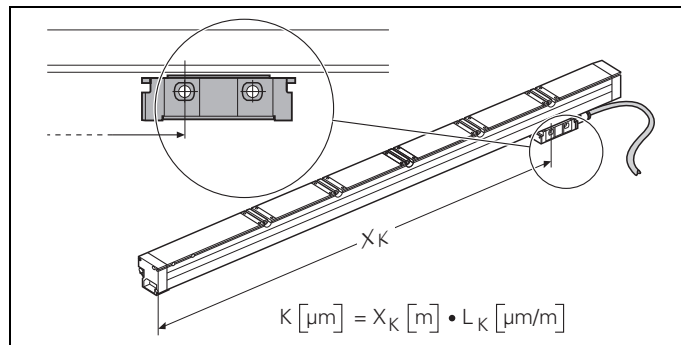
将比较仪系统（例如激光干涉仪）安装在工件平面上和测量机床。

Set up a comparator system (such as a laser interferometer) in the workpiece plane and measure the machine tool.



拆下塞帽PF。

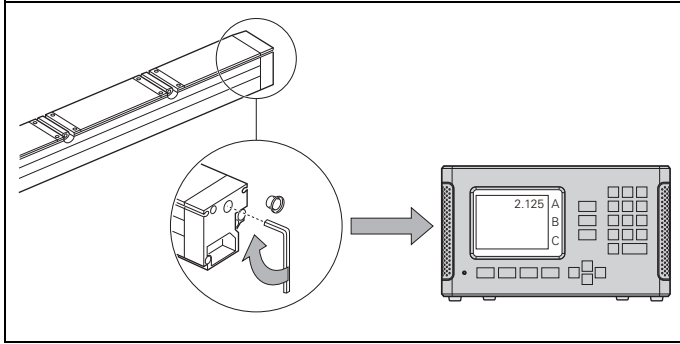
Remove plug PF.



计算误差补偿K：  
测量距离 $X_K$ 和乘以线性误差补偿值 $L_K$ （机床测量值）。

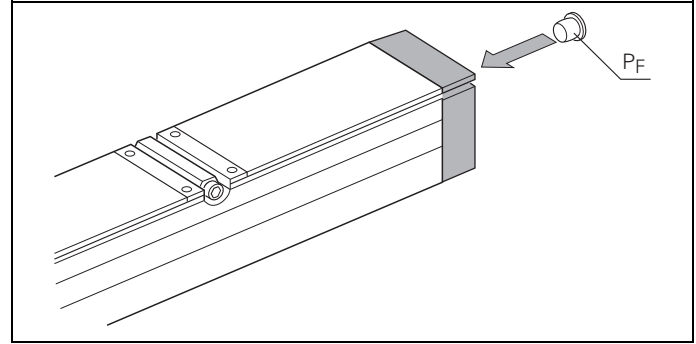
Calculate compensation value K: measure distance  $X_K$  and multiply with linear compensation value  $L_K$  (from measurement of machine).





增加钢带光栅尺张力直到显示值等于刚才的计算值。

*Increase the tape tension until the display shows the value previously calculated.*

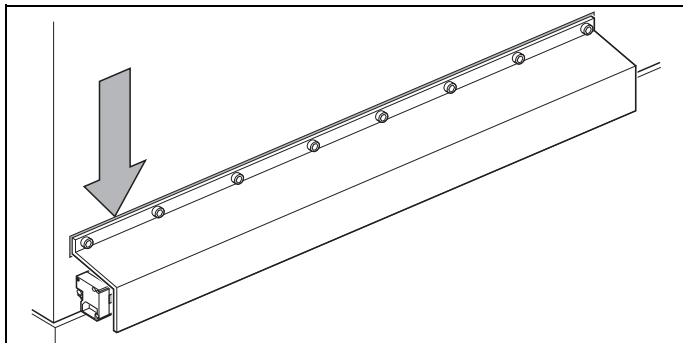


安装回塞帽 $P_F$ 。

*Now replace plug  $P_F$ .*

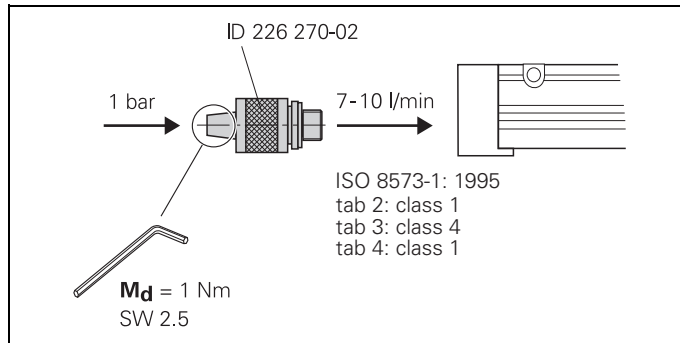
## 防护措施

## Protective Measures



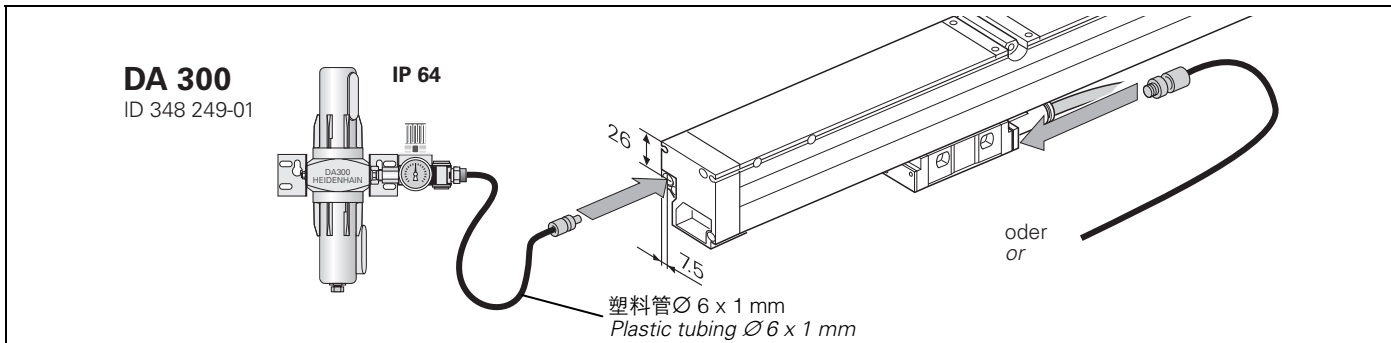
如果光栅尺使用环境受污染可能性高，在密封条和安装面间的全长上安装一个防护盖，保护光栅尺。

*If there is significant danger of contamination, fit a protective cover over the encoder with a seal between it and the mounting surface.*



压缩空气： 14.5 psi，只允许用接头连接。  
只允许使用干燥干净空气。

*Compressed air: 14.5 psi only via connecting piece.  
Use only clean, dry air.*



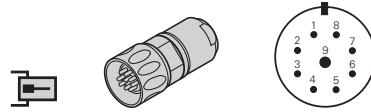
将压力空气连接至读数头。  
压缩空气装置是附件。

*Connection of compressed air at scanning unit.  
Compressed air unit available as accessory.*

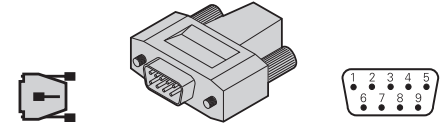
将压缩空气连接至光栅尺端头。

*Connect compressed air at scale end sections.*

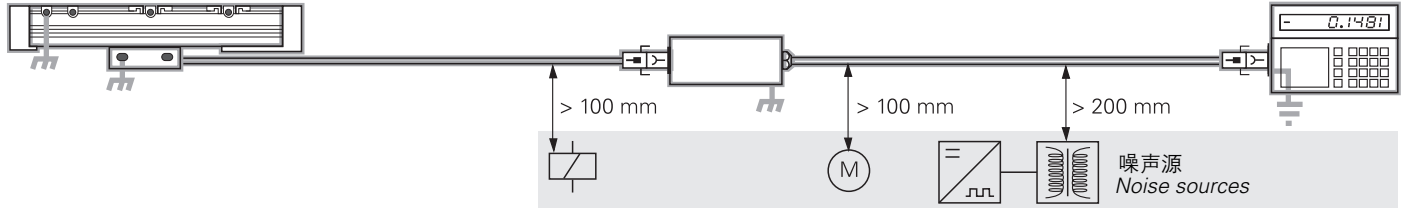
9针海德汉接头



9针D-sub接头

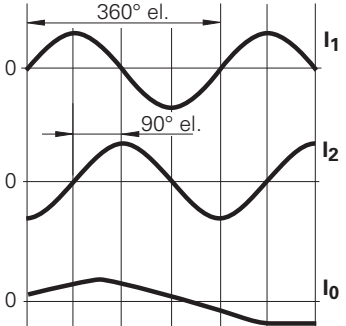
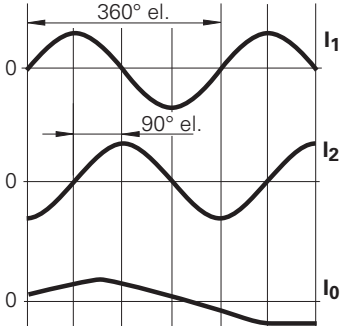


	1	2	5	6	7	8	3	4	壳 Housing	9
	6	1	8	3	9	5	7	2	壳 Housing	4
	$I_1$		$I_2$		$I_0$		5 V $U_P$	0 V $U_N$	外屏蔽 Ext. shield	内屏蔽 Int. shield
	+	-	+	-	+	-	棕色 Brown	白色 White		白色/棕色 White/Brown
	绿色 Green	黄色 Yellow	蓝色 Blue	红色 Red	灰色 Gray	粉色 Pink				
EN 50 178; PELV ⚡: EN 60 204-1										



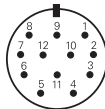
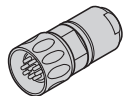
一般电气信息，参见海德汉样本

For general electrical information, refer to the HEIDENHAIN brochure

电气参数	LB 302/LB 302 C	Electrical Data	LB 302/LB 302 C
电源	5 V ± 5 %/ 100 mA ( 无负载 )	<b>Power supply</b>	5 V ± 5 %/100 mA (with no load)
输出信号		<b>Output signals</b>	
增量信号	两路正弦信号 $I_1$ 和 $I_2$	<b>Incremental signals</b>	2 sinusoidal signals $I_1$ and $I_2$
1 k $\Omega$ 负载时信号幅值	$I_1$ : 7至16 $\mu A_{PP}$ $I_2$ : 7至16 $\mu A_{PP}$	<b>Signal amplitude with 1 k<math>\Omega</math> load</b>	$I_1$ : 7 to 16 $\mu A_{PP}$ $I_2$ : 7 to 16 $\mu A_{PP}$
参考点信号	一个 ( LB 302 ) 或多个 ( LB 302 C ) 信号峰值 $I_0$	<b>Reference mark signal</b>	One ( LB 302 ) or several ( LB 302 C ) signal peaks $I_0$
1 k $\Omega$ 负载时信号幅值	$I_0$ : 2至8 $\mu A$ ( 可用分量 )	<b>Signal amplitude with 1 k<math>\Omega</math> load</b>	$I_0$ : 2 to 8 $\mu A$ (usable component)
连接后续电子设备的 <b>电缆长度</b>	Max. 30 m	<b>Cable length to subsequent electronics</b>	Max. 30 m

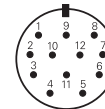
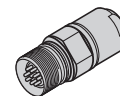
12针海德汉接头

12-pin HEIDENHAIN connector



12针海德汉连接器

12-pin HEIDENHAIN coupling

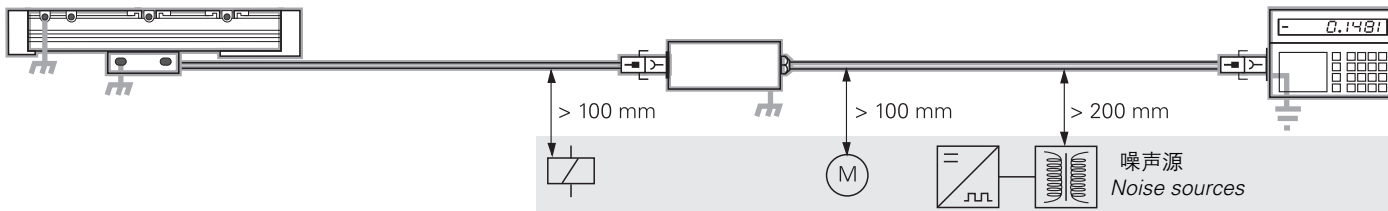


5	6	8	1	3	4	12	10	2	11	9	7	/	
A		B			R		5 V	0 V	5 V	0 V	空	空	空
+	-	+	-	+	-	U <sub>P</sub>	U <sub>N</sub>	传感器	传感器	Vacant	Vacant	Vacant	
棕色 Brown	绿色 Green	灰色 Gray	粉色 Pink	红色 Red	黑色 Black	棕色/ 绿色 Brown Green	白色 /绿色 White Green	蓝色 Blue	白色 White	/	紫色 Violet	黄色 Yellow	

EN 50 178;  
PELV  $\perp$ : EN 60 204-1

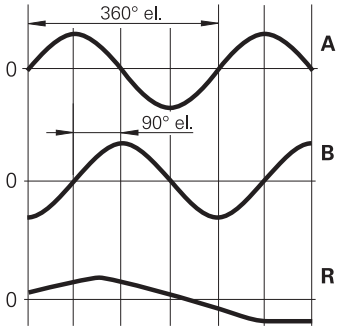
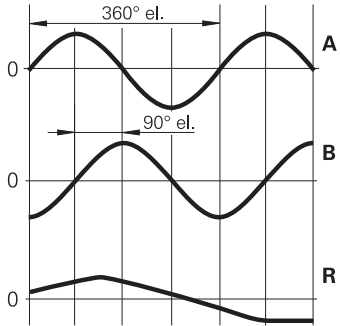
传感器线在内部连接电源线。  
外壳屏蔽。

The sensor line is internally connected to the supply line.  
**Shield** is on housing.



一般电气信息，参见海德汉样本

For general electrical information, refer to the HEIDENHAIN brochure

电气参数	LB 382/LB 382 C	Electrical Data	LB 382/LB 382 C
电源	5 V $\pm$ 5 %/150 mA ( 终端电阻 $Z_0 = 120 \Omega$ 时 )	<b>Power supply</b>	5 V $\pm$ 5 %/150 mA (with terminating resistor $Z_0 = 120 \Omega$ )
输出信号		<b>Output signals</b>	
增量信号	2路正弦信号A和B	<b>Incremental signals</b>	2 sinusoidal signals A and B
信号幅值	A约1 V <sub>PP</sub> , 终端电阻 $Z_0 = 120 \Omega$ 时 B约1 V <sub>PP</sub> , 终端电阻 $Z_0 = 120 \Omega$ 时	<b>Signal amplitude</b>	A approx. 1 V <sub>PP</sub> with terminating resistor $Z_0 = 120 \Omega$ B approx. 1 V <sub>PP</sub> with terminating resistor $Z_0 = 120 \Omega$
参考点信号	一个 ( LB 302 ) 或多个 ( LB 302 C ) 信号峰值R	<b>Reference mark signal</b>	One (LB 302) or several (LB 302 C) signal peaks R
信号幅值	R约0.4 V ( 可用分量 ), 终端电阻 $Z_0 = 120 \Omega$ 时	<b>Signal amplitude</b>	R approx. 0.4 V (usable component) with terminating resistor $Z_0 = 120 \Omega$
连接后续电子设备的 <b>电缆长度</b>	Max. 150 m	<b>Cable length to subsequent electronics</b>	Max. 150 m

**机械数据****测量基准**

钢带AURODUR光栅  
 栅距P = 40 μm  
 热膨胀系数  
 $\alpha_{\text{therm}} \approx 10 \text{ ppm/K}$

**参考点**

LB 302/LB 382 每50 mm一个, 用选择板可选  
 LB 302C/LB 382 C 距离编码2000 x P

**最高运动速度**

120 m/min (4724 ipm)

**最大允许加速度**

最大振动 ( 55至2000 Hz ) 300 m/s<sup>2</sup> (IEC 68-2-6)  
 最大冲击 ( 11 ms ) 300 m/s<sup>2</sup> (IEC 68-2-27)

**要求的移动力**

≤ 15 N

**防护级别**

(IEC 529)

IP 53, 按照安装说明安装后  
 IP 64, 用压缩空气后

**工作温度**

0至50 °C ( 32至122 °F )

**存放温度**

-20至70°C ( -4至158°F )

**连接电缆的允许弯曲半径**

用护管

电缆直径	反复弯曲	固定敷设
6 mm	R ≥ 75 mm	R ≥ 20 mm
8 mm	R ≥ 100 mm	R ≥ 40 mm
10 mm	R ≥ 75 mm	R ≥ 35 mm

**Mechanical Data****Measuring standard**

AURODUR graduation on steel tape  
 Grating period P = 40 μm  
 Thermal expansion coefficient  
 $\alpha_{\text{therm}} \approx 10 \text{ ppm/K}$

**Reference marks**

LB 302/LB 382 Every 50 mm, selectable with plates  
 LB 302 C/LB 382 C Distance-coded with 2000 x P

**Max. traversing speed**

120 m/min (4724 ipm)

**Permissible acceleration**

Max. vibration (55 to 2000 Hz) 300 m/s<sup>2</sup> (IEC 68-2-6)  
 Max. shock (11 ms) 300 m/s<sup>2</sup> (IEC 68-2-27)

**Required moving force**

≤ 15 N

**Protection type**

(IEC 529)

IP 53 when installed according to  
 mounting instructions  
 IP 64 with compressed air

**Operating temperature**

0 to 50 °C (32 to 122 °F)

**Storage temperature**

-20 to 70 °C (-4 to 158 °F)

**Permissible bending radii for connecting cable**

with armor tubing

Cable diameter	For frequent flexing	For rigid configuration
6 mm	R ≥ 75 mm	R ≥ 20 mm
8 mm	R ≥ 100 mm	R ≥ 40 mm
10 mm	R ≥ 75 mm	R ≥ 35 mm

# HEIDENHAIN

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