

台達 MSR 線性編碼器系統

安裝說明書

(1) 注意事項

- 此包裝中之內容物包含：0.5 mm 墊片一片、M3 螺絲兩個、讀頭一個以及本說明書。
- 請勿使用易刮傷光學尺及讀頭的工具進行安裝。
- 請勿在具爆炸性、易燃性或具其他危險的區域使用本產品。
- 請勿以手指直接觸碰讀頭及線纜。
- 請使用清潔劑(正庚烷、丙二醇或乙醇)清潔光學尺與讀頭光學視窗，並保持乾燥、無殘留水漬。
- 請勿讓清潔劑浸透讀頭，否則會造成內部構造產生無法清洗的污染物。
- 此線性編碼器系統不適用於線性切割等高污染的應用環境。
- 安裝治具需另行購買，型號為 MSR-LEH-KSAS1。

如果您在使用上仍有問題，請洽詢經銷商或者本公司客服中心。

(2) 型號說明

MSR - LEH - SD E 4N 3 Q 5 S1

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

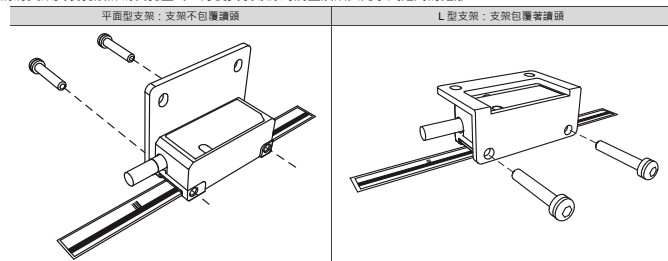
代碼	項目	說明
(1)	產品名稱	MSR = 運動控制感測器
(2)	產品種類	LE = 線性編碼器
(3)	產品類別	H = 讀頭
(4)	產品系列	SD = 標準品系列
(5)	應用型態	E = 增量型
(6)	解析度	4N = 4 nm
(7)	支援的驅動器	3 = A3 驅動器
(8)	出線型式	Q = 九宮格快速接頭
(9)	電纜長度	5 = 0.5 m
(10)	特別碼	S1 = 標準品

(3) 產品規格

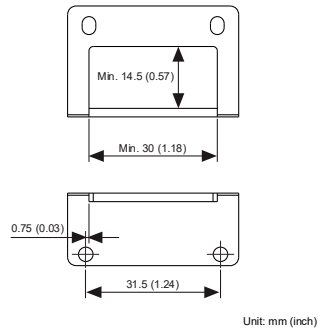
電氣規格	
輸入電壓	5 V _{DC} (±5%)
輸入電流	浪波 200 mVpp (max.)
輸出型態	170 mA (max.)
輸出型態	台達通訊模式 (適用於 A3 驅動器)
機械規格	
讀頭尺寸	長 36.4 mm；寬 14.2 mm；高 15.2 mm
重量	讀頭：9.3 g 纜線：21.3 g/m
最高速度	10 m/s
加速度	400 m/s ² · 3 軸
環境規格	
防護等級	IP40
工作溫度	0 ~ 70°C
儲存溫度	-20 ~ +70°C
工作濕度	95%RH (不結露及不結冰)
耐震動	100 m/s ² (max.) @ 55 Hz to 2 kHz · 3 軸
耐衝擊	500 m/s ² · 11 ms · ½ 正弦 · 3 軸
安規認證	

(4) 可調式支架安裝說明與建議

請將支架安裝孔設計為長孔型式，方便安裝螺絲時調整讀頭與光學尺之間的距離。

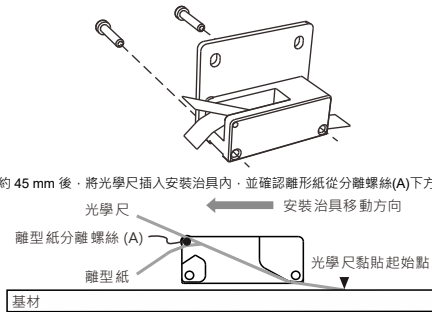


注意：支架預留開孔，以利於辨識讀頭的型號與燈號狀態。開孔規格建議如下圖。



(5) 光學尺安裝步驟與注意事項

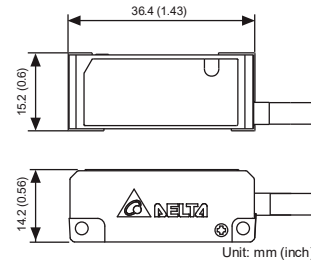
1. 在黏貼光學尺前，需先確認支架與基材的表面是否平整，建議在基材上標示光學尺的安裝起始點。
2. 使用清潔劑(正庚烷、丙乙醇或乙醇)去除基材表面油污並保持乾燥，無殘留水漬。
3. 使用 M3 螺絲將安裝治具安裝在欲安裝讀頭的支架上(安裝治具側邊 M3 螺絲孔的間距與讀頭相同)。



4. 離形紙剝開約 45 mm 後，將光學尺插入安裝治具內，並確認離形紙從分離螺絲(A)下方穿過。
5. 使用手指透過乾淨無塵擦拭布將光學尺的前端按壓並貼附在基材上所標示的起始點。
6. 一手壓住光學尺，一手拉住離形紙，沿著上圖箭頭方向，平穩的移動安裝治具，直到撕除全部的離形紙，才算貼附完成。
7. 將光學尺完整貼附在基材上後，撕除光學尺上的保護膜即可完成安裝。

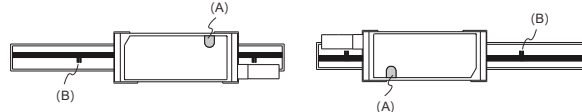
(6) 讀頭安裝說明

■ 讀頭尺寸圖



■ 讀頭安裝步驟

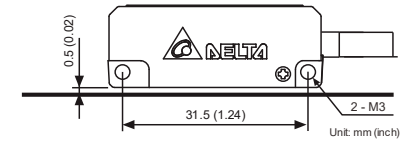
1. 安裝前，請先確認欲安裝讀頭的支架表面是否平整。
2. 確認讀頭的安裝方向，如下圖所示，光學尺的 Z 圖紋(B)朝下時，讀頭的 LED 燈號(A)應位於上方；光學尺的 Z 圖紋(B)朝上時，讀頭的 LED 燈號(A)應位於下方。



3. 請將 0.5 mm 的墊片放置於光學尺與讀頭之間，以調整兩者之間的距離。

4. 以 M3 螺絲將讀頭固定於支架上，微調讀頭與墊片之間的距離，以避免讀頭與墊片之間的接觸力過過緊或過鬆。

注意：M3 固定螺絲長度必須大於 8 mm。

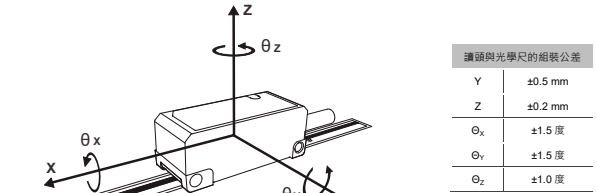


5. 移除墊片。
6. 供電並確認燈號狀態：當讀頭位於 Z 圖紋以外的區域，診斷 LED 皆需為綠燈以確保訊號品質最佳化。

燈號	P0.002 = -213	定義	燈號	P0.002 = -213	定義
綠燈	60 ~ 140	訊號良好	滅燈	-	讀頭位於尺上的 Z 點
黃燈	40 ~ 60	訊號較弱	紅燈	< 40	訊號太弱
	140 ~ 160	訊號較強		> 160	訊號太強

註：參數 P2.125 [Bit 11] 設為 1 後，將驅動器重新上電，即可透過 P0.002 = -213 監控台達光學尺訊號強度。完成安裝後，若有使用壓力感測器(Load cell)時，需再將 P2.125 [Bit 11] 設為 0，僅 A3 驅動器韌體 V2120x sub6422 或更新的版本支援此監視變數。

■ 讀頭與光學尺的組裝公差



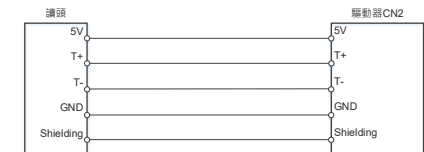
(7) 配線說明

進行編碼器配線時，請根據下表確認輸出訊號，並搭配合適標準線材以確保輸出訊號的品質。此九宮格接頭並不能防止油或水的侵入，請勿在可能接觸油或水的場所使用本產品。

九宮格接頭腳位	腳子定義	說明
1	T+	串列通訊訊號(+)
4	T-	串列通訊訊號(-)
7	5V	電源
8	GND	電源
9	Shielding	屏蔽
2 · 3 · 5 · 6	保留	-

(8) 線材建議接法

- 請使用台達編碼器線，以確保訊號無衰減且避免訊號被干擾。
- 不支援延長擴充線，不可擅自延長編碼器線。
- Shielding 腳子需連接至所有連接的設備的接地端。



(9) 故障排除

故障情形	可能的處置方式
LED 燈號無顯示	檢查 5V 腳子的電源配線是否正確。
LED 燈號顯示黃燈、紅燈或過 Z 點 無滅燈	1. 檢查尺與讀頭相對方向是否正確。 2. 檢查尺或讀頭光學視窗是否有油污或刮傷。 3. 檢查尺與讀頭間組裝偏擺是否超過系統規格。



台达 MSR 直线编码器系统

安装说明书

(1) 注意事项

- 此包装中之内容物包含：0.5 mm 垫片一片、M3 螺丝两个、读数头一个以及本说明书。
- 请勿使用易刮伤光学尺及读数头的工具进行安装。
- 请勿在具爆炸性、易燃性或具其他危险的区域使用本产品。
- 请勿以手指直接接触读数头及缆线。
- 请使用清洁剂(正庚烷、丙二醇或乙醇)清洁光学尺与读数头光学窗口，并保持干燥，无残留水渍。
- 请勿让清洁剂渗透读数头，否则会造成内部构造产生无法清洗的污染物。
- 此直线编码器系统不适用于直线切割等高污染的应用环境。
- 安装治具需另行购买，型号为 MSR-LEH-KSAS1。

如果您在使用上仍有问题，请洽询经销商或者本公司客服中心。

(2) 型号说明

MSR - LEH - SD E 4N 3 Q 5 S1

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

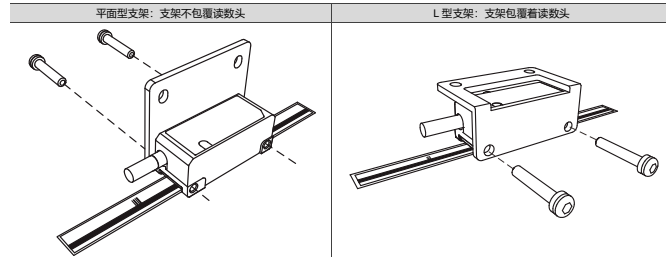
代码	项目	说明
(1)	产品名称	MSR = 运动控制传感器
(2)	产品种类	LE = 直线编码器
(3)	产品类别	H = 读数头
(4)	产品系列	SD = 标准品系列
(5)	应用型态	E = 增量型
(6)	分辨率	4N = 4 nm
(7)	支持的驱动器	3 = A3 驱动器
(8)	出线型式	Q = 九宫格快速接头
(9)	电缆长度	5 = 0.5 m
(10)	特别码	S1 = 标准品

(3) 产品规格

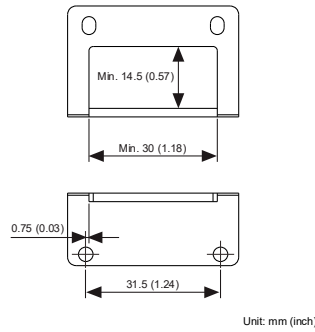
电气规格	
输入电压	5 V _{DC} (±5%)
输入电流	波动 200 mVpp (max.)
输出型态	170 mA (max.)
	台达通讯模式 (适用于 A3 驱动器)
机械规格	
读数头尺寸	长 36.4 mm; 宽 14.2 mm; 高 15.2 mm
重量	读数头: 9.3 g 缆线: 21.3 g/m
最高速度	10 m/s
加速度	400 m/s ² , 3 轴
环境规格	
防护等级	IP40
工作温度	0 ~ 70°C
储存温度	-20 ~ +70°C
工作湿度	95%RH (不结露及不结冰)
耐震动	100 m/s ² (max.) @ 55 Hz to 2 kHz, 3 轴
耐冲击	500 m/s ² , 11 ms, 1/4 正弦波, 3 轴
安规认证	

(4) 可调式支架安装与建议

请将支架安装孔设计为长孔型式，方便安装螺丝时调整读数头与光学尺之间的距离。

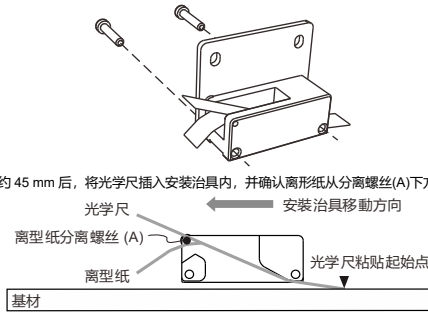


注意：支架须预留开孔，以利于辨识读数头的型号与灯号状态，开孔规格建议如下图。



(5) 光学尺安装步骤与注意事项

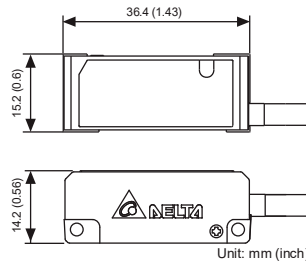
1. 在安装光学尺前，需先确认支架与基材的表面是否平整，建议在基材上标示光学尺的安装起始点。
2. 使用清洁剂(正庚烷、丙二醇或乙醇)去除基材表面脏污并保持干燥，无残留水渍。
3. 使用 M3 螺丝将安装治具安装在欲安装读数头的支架上(安装治具侧边 M3 螺丝孔的间距与读数头相同)。



4. 离形纸剥开约 45 mm 后，将光学尺插入安装治具内，并确认离形纸从分离螺丝(A)下方穿过。
5. 使用手指通过干净无尘擦拭布将光学尺的前端按压并贴附在基材上所标示的起始点。
6. 一手压住光学尺，一手拉住离形纸，沿着上图箭头方向，平稳的移动安装治具，直到撕除全部的离形纸，才算贴附完成。
7. 将光学尺完整贴附在基材上后，撕除光学尺上的保护膜即可完成安装。

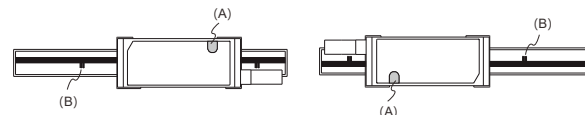
(6) 读数头安装说明

■ 读数头尺寸图



■ 读数头安装步骤

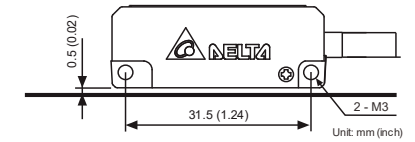
1. 安装前，请先确认欲安装读数头的支架表面是否平整。
2. 确认读数头的安装方向。如下图所示，光学尺的 Z 图纹(B)向下安装时，读数头的 LED 灯号(A)应位于上方；光学尺的 Z 图纹(B)向上安装时，读数头的 LED 灯号(A)应位于下方。



3. 请将 0.5 mm 的垫片放置于光学尺和读数头之间，以调整两者之间的距离。

4. 以 M3 螺丝将读数头固定于支架上，微调读数头与垫片之间的距离，以避免读数头与垫片之间的接触力通过紧或过松。

注意：M3 固定螺丝长度必须大于 8 mm。



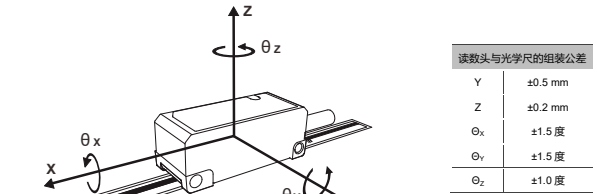
5. 移除垫片。

6. 供电并确认灯号状态：当读数头位于 Z 图纹以外的区域，诊断 LED 皆需为绿灯以确保信号质量优化。

灯号	P0.002 = -213	定义	灯号	P0.002 = -213	定义
绿灯	60 ~ 140	信号良好	灭灯	-	读数头位于尺上的 Z 点
黄灯	40 ~ 60	信号较弱	红灯	< 40	信号太弱
	140 ~ 160	信号较强		> 160	信号太强

注：参数 P2.125 [Bit 11] 设为 1 后，将驱动器重新上电，即可通过 P0.002 = -213 查看台达光学尺信号强度。完成安装后，若有使用压力传感器(Load cell)时，需将 P2.125 [Bit 11] 设为 0。仅 A3 驱动器本体 v2120x sub6422 或更新的版本支持此监控变量。

■ 读数头与光学尺的组装公差



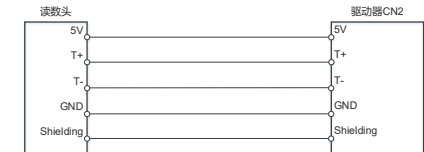
(7) 配线说明

进行编码器配线时，请根据下表确认输出信号，并搭配台达标准线材以确保输出信号的质量。此九宫格接头并不能防止油或水的侵入，请勿在可能接触油或水的场所使用本产品。

九宫格接头脚位	端子定义	说明
1	T+	串行通讯信号(+)
4	T-	串行通讯信号(-)
7	5V	电源
8	GND	电源
9	Shielding	屏蔽
2, 3, 5, 6	保留	-

(8) 线材建议接法

- 请使用台达编码器线，以确保信号无衰减且避免信号被干扰。
- 不支持延长扩充线，不可擅自延长编码器线。
- Shielding 端子需连接至所有连接的设备的接地端。



(9) 故障排除

故障情形	可能的处置方式
LED 灯号无显示	检查 5V 端子的电源配线是否正确。
LED 灯号显示黄灯、红灯或过 Z 点无灭灯	1. 检查尺与读数头相对方向是否正确。 2. 检查尺或读数头光学窗口是否有脏污或刮伤。 3. 检查尺与读数头间组装偏摆是否超过系统规格。



Delta MSR Series Linear Encoder System Instruction Sheet

(1) Precautions

- One gasket (with a thickness of 0.5 mm), two M3 screws, one read head, and this instruction sheet are included in this package.
 - Do not use tools which are likely to scratch the linear scale and read head for installation.
 - Do not use this product in an environment which involves risks of explosion, combustion, or other dangers.
 - Do not touch the read head and cable with your finger.
 - Clean the linear scale and the optical window of read head with the cleaning fluid (heptane, propylene glycol, or ethanol), and keep the linear scale and read head dry without water stains.
 - Prevent the cleaning fluid from entering the read head because the substances inside the read head cannot be removed.
 - This linear encoder system is not applicable in highly-polluted environment such as the linear cutting application.
 - You need to purchase the installation jig additionally. The model name is MSR-LEH-KSAS1.
- If you encounter any problems when using this product, contact the distributor of Delta Customer Service Center.

(2) Model explanation

MSR - LEH - SD E 4N 3 Q 5 S1

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

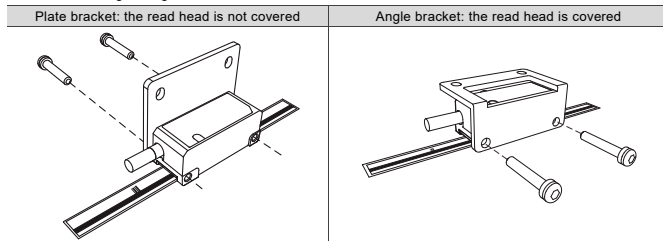
Code	Item	Description
(1)	Product name	MSR: motion control sensor
(2)	Product category	LE: linear encoder
(3)	Product type	H: read head
(4)	Product series	SD: standard
(5)	Application type	E: incremental
(6)	Resolution	4N: 4 nm
(7)	Supported servo drive	3: A3 servo drive
(8)	Connection type	Q: 9-pin quick connector
(9)	Cable length	5: 0.5 m (1.6 ft)
(10)	Special code	S1: standard product

(3) Product specification

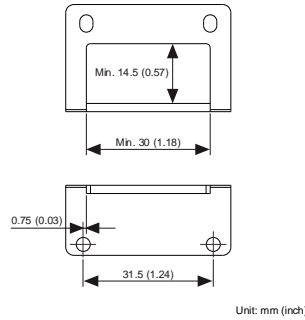
Electrical specification	
Input voltage	5 VDC (±5%) Ripple 200 mVpp (max.)
Input current	170 mA (max.)
Output type	Delta communication mode (applicable to A3 servo drives)
Mechanical specification	
Read head size	Length: 36.4 mm (1.43 in.); width 14.2 mm (0.56 in.); height 15.2 mm (0.6 in.)
Weight	Read head: 9.3 g (0.33 oz)
	Cable: 21.3 g/m
Max. speed	10 m/s
Acceleration	400 m/s ² , 3 axes
Environment specification	
IP rating	IP40
Operating temperature	0 to 70°C (32 to 158°F)
Storage temperature	-20 to +70°C (-4 to +158°F)
Humidity	95%RH (with no condensation or icing)
Shock resistance	100 m/s ² (max.) @ 55 Hz to 2 kHz, 3 axes
Vibration resistance	500 m/s ² , 11 ms, ½ sine wave, 3 axes
Approvals	

(4) Installation instruction and suggestion for the adjustable bracket

Cut slotted holes on the installation bracket, which allow you to adjust the distance between the read head and linear scale when tightening the screws.

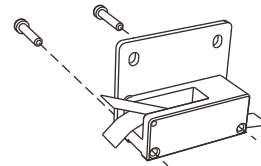


Note: allow an opening on the bracket so you can identify the model name and LED indicator on the read head. The suggested dimensions are as follows.

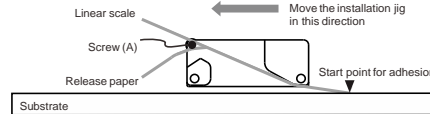


(5) Steps and precautions for installing the linear scale

- Check if the surfaces of the bracket and substrate are flat before adhering the linear scale. Marking the start point on the substrate for installation is recommended.
- Clean the dirt on the surface of the substrate with the cleaning fluid (heptane, propylene glycol, or ethanol), and keep the surface dry without water stains.
- Use M3 screws to install the installation jig on the bracket where the read head is to be mounted. The interval between the mounting holes for M3 screws on the side of the installation jig is the same as that on the read head.



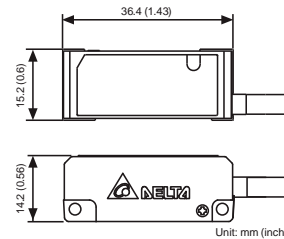
- Remove the release paper for about 45 mm (1.8 in.), then insert the linear scale through the installation jig, and pull out the release paper and make sure it is routed under the screw (A) shown as follows.



- Use a clean lint-free cloth and apply finger pressure to adhere the front end of the linear scale aligning to the start point marked on the substrate.
- Press the linear scale with one hand, and pull the release paper with the other hand in the direction shown in the preceding figure to move the installation jig smoothly. The adhesion is complete after the release paper is totally removed.
- After the linear scale is completely adhered to the substrate, remove the protective film from the linear scale, and the installation is complete.

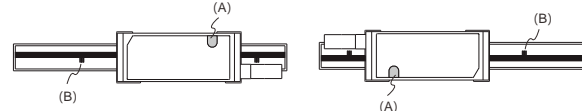
(6) Installation instruction for the read head

■ Dimensions of the read head



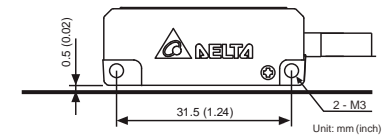
■ Steps to install the read head

- Before installation, ensure the surface of the bracket to install the read head is flat.
- Check the installation direction for the read head. As shown in the following figure, the LED indicator (A) of the read head is on the upper side when the Z positions (B) on the linear scale are on the bottom side, and vice versa.



- Insert a gasket with a thickness of 0.5 mm between the linear scale and read head to adjust the distance between the linear scale and read head.
- Secure the read head to the bracket with M3 screws. Fine-adjust the distance between the read head and gasket, so the contact force between the read head and gasket is moderate.

Note: the length of the M3 screws has to be greater than 8 mm (0.3 in.).

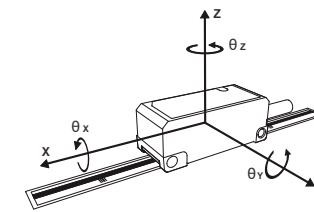


- Remove the gasket.
- Supply power to the read head and check the LED indicator. When the read head is not above the Z position, the diagnostic LED indicator light must be green which ensures the signal quality is excellent.

LED indicator	P0.002 = -213	Definition	LED indicator	P0.002 = -213	Definition
Green	60 to 140	Excellent	Off	-	Read head is above the Z position of the scale.
Yellow	40 to 60	Below average	Red	< 40	Too weak
	140 to 160	Above average		> 160	Too strong

Note: set P2.125 [Bit 11] to 1, then cycle power on the servo drive, and you can monitor the signal strength of Delta linear scale by setting P0.002 to -213. After the installation is complete, if a load cell is used, you need to set P2.125 [Bit 11] to 0. Only the firmware versions of v2120x sub6422 or later for the A3 servo drive support this monitoring variable.

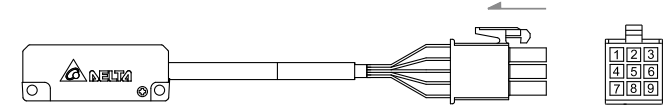
■ Assembly tolerance for the read head and linear scale



Assembly tolerance for the read head and linear scale	
Y	±0.5 mm (±0.02 in.)
Z	±0.2 mm (±0.01 in.)
θ _x	±1.5 degrees
θ _y	±1.5 degrees
θ _z	±1.0 degrees

(7) Wiring

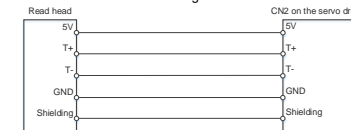
When wiring the encoder, check the output signals according to the following table. Use a standard Delta encoder cable to ensure the quality of signals. This 9-pin connector is not waterproof or oil-resistant. Do not use this product in an environment where the product may have contact with oil or water.



Pin of the 9-pin connector	Pin definition	Description
1	T+	Serial communication signal (+)
4	T-	Serial communication signal (-)
7	5V	Power
8	GND	
9	Shielding	Shielding
2, 3, 5, 6	Reserved	-

(8) Wiring suggestions

- Use Delta's encoder cable to ensure the signals do not attenuate and prevent the signals from interference.
- An extension cable is not supported. Do not extend the encoder cable.
- The Shielding terminal must be connected to the ground terminals of all connecting devices.



(9) Troubleshooting

Condition	Possible corrective action
LED indicator light does not work	Check if the power wiring of the 5V terminal is correct.
LED indicator light turns yellow or red, or the LED indicator light does not go off when the read head is above the Z position of the scale	<ol style="list-style-type: none"> Check if the direction of the read head relative to the linear scale orientation is correct. Check if there are stains or scratches on the scale or the optical window of the read head. Check if the assembly misalignment between the scale and read head exceeds the specification.

有毒物质表

部件名称 Part Name	有毒物质+Hazardous Substances					
	铅(Pb)	汞(Hg)	镉(Cd)	六价铬(Cr VI)	多溴联苯(PBB)	多溴联苯醚(PBDE)
金属部件 Metal Part	✘	○	○	○	○	○
塑料部件 Plastic Part	○	○	○	○	○	○
电子件 Electronic	✘	○	○	○	○	○
触点 Contacts	○	○	✘	○	○	○
线缆和线缆附件 Cable & Cabling accessories	✘	○	○	○	○	○
电池 Battery	○	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。

○: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。

✘: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

This table is made according to SJ/T 11364.

○: indicates that the concentration of hazardous substance in all of the homogeneous materials for this part is below the limit as stipulated in GB/T 26572.

✘: indicates that the concentration of hazardous substance in at least one of the homogeneous materials used for this part is above the limit as stipulated in GB/T 26572.

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