

EFP系列 无盲区四级安全光栅



EFP系列安全光栅介绍

EFP系列光栅为无盲区安全光栅，按照欧盟四级安全标准，内部采用MCU冗余设计，光栅具备周期性自检功能、互检功能，采用冗余双独立双回路输出设计方式，具备较高的安全性。

产品特点

- 按照IEC61496四级标准设计。
- 采用自检交叉互检设计：周期性的双重互检提高安全性。
- 独立冗余双输出：防止单个回路失效引起安全隐患。
- 采用线同步技术：可有效避免外界红外光干扰。

产品参数

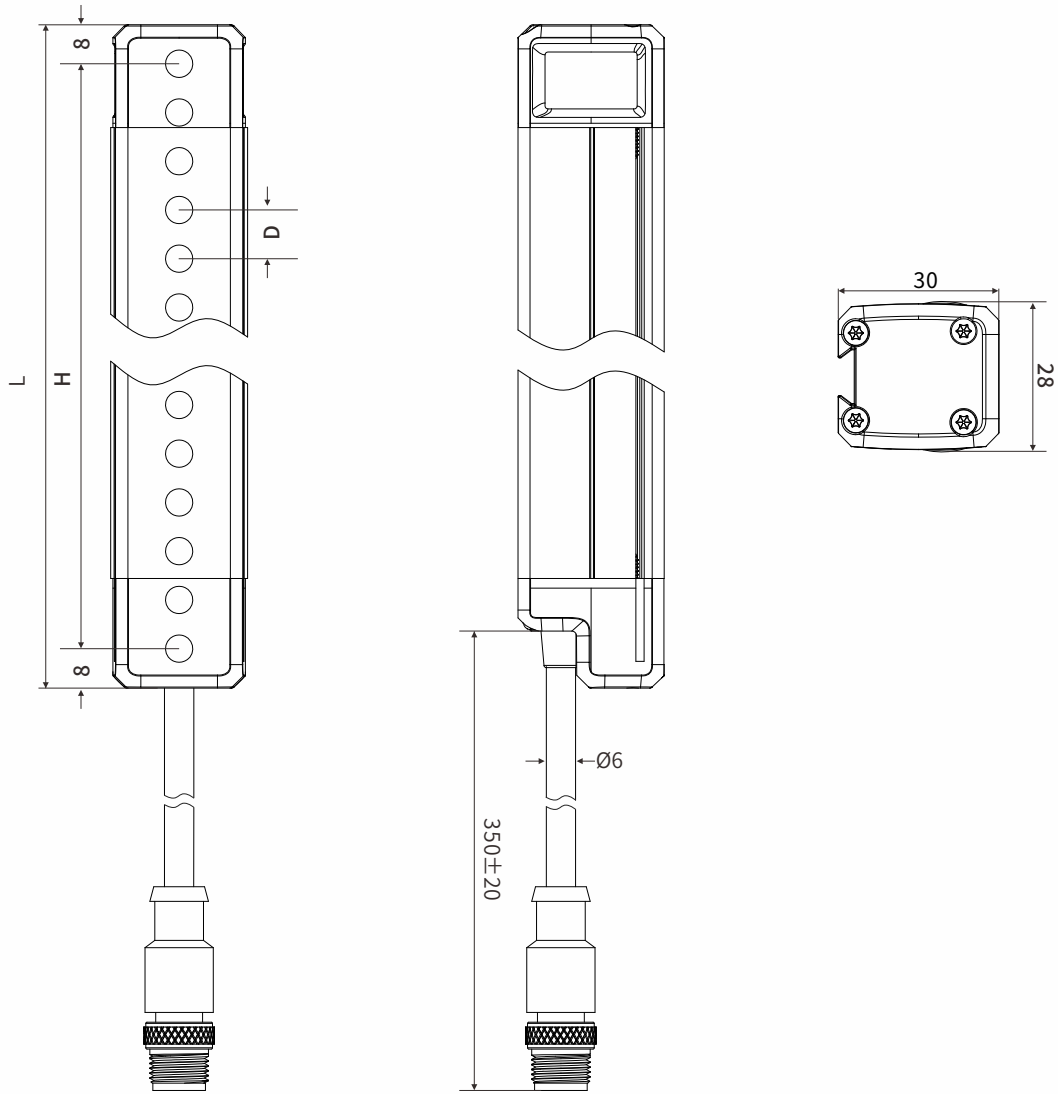
| | |
|-------------|--|
| 安全等级 | Type 4 (IEC 61496-1/-2) Cat. 4、PL e (ISO 13849-1) |
| 工作电源 | DC24V±20% |
| 功率 | <5W |
| 光轴间距 | 10mm、20mm |
| 分辨率 | 15mm、25mm |
| 光轴数量 | 10mm间距:16、20.....160 |
| | 20mm间距:8、10.....80 |
| 保护高度 | 保护高度H = (N-1) * 光轴间距, N为光轴数 |
| 发射光源 | 940nm |
| 响应时间 | 响应时间 = ((N+1) * 0.1ms) + 0.4ms (N为光轴数) |
| 安全输出 (OSSD) | PNP晶体管输出, 负载电流200mA以下, 残余电压1V以下 (因电缆延长导致的电压降除外), 漏电流1mA以下; |
| | NPN晶体管输出, 负载电流200mA以下, 残余电压1V以下 (因电缆延长导致的电压降除外), 漏电流1mA以下。 |
| 防护电路 | 电源过压保护、反极性保护和输出过流保护 |
| 对射距离 | 0.1~2m、0.5~5m (注:有反光情况需特殊备注) |
| 抗光干扰 | 10000Lux (入射角 > 2.5°) |
| 光幕形式 | 对射式 |
| 同步方式 | 线同步 |
| 外壳材质 | 铝合金 |
| 外壳防护等级 | IP65 |
| 截面尺寸 | 28*30mm |
| 抗振动能力 | 频率10Hz~55Hz, 振幅0.35±0.05mm, X、Y及Z方向各20次 |
| 工作环境温度 | -10°C~55°C (无凝结) |
| 储存环境温度 | -30°C~70°C (无凝结) |
| 工作环境湿度 | 温度20°C时, 空气相对湿度<85% |

光栅型号说明(例如:EFP1620NEL-2)

| 产品系列 | 光束数量 | 光轴间距 | 输出方式 | 功能选择 | 安装支架 | 对射距离 |
|------------|---------------|--------------|----------------------|--|------------------------|--|
| EFP | 16 | 20 | N | E | L | - 2 |
| | 08、10、12..... | 10mm 20mm | N: NPN*2 P: PNP*2 | 无: 无EDM和复位 E: 增加EDM功能 R: 增加复位功能 A: 增加EDM和复位功能 | L: 侧装支架 LD1: 上下旋转支架 | 2: 0.1~2m 5: 0.5~5m (注:有反光情况需特殊备注) |

四级安全光栅

产品尺寸图



D:光轴间距

H:光栅保护高度

L:光栅总高度

L为光栅总高度: $L = \text{上下盲区} + \text{保护高度}$

H为光栅的保护高度: $H = (\text{光轴数量} - 1) * \text{光轴间距}$

☞ EFP系列选型表

• 光轴间距10mm、分辨率15mm

| 形状 (mm) | 光束数量 (n) | 保护高度 (mm) | 光栅总高度 (mm) | 规格型号 |
|------------|-------------|--------------|---------------|---------|
| | 16 | 150 | 166 | EFP1610 |
| | 20 | 190 | 206 | EFP2010 |
| | 24 | 230 | 246 | EFP2410 |
| | 28 | 270 | 286 | EFP2810 |
| | 32 | 310 | 326 | EFP3210 |
| | 36 | 350 | 366 | EFP3610 |
| | 40 | 390 | 406 | EFP4010 |
| | 44 | 430 | 446 | EFP4410 |
| | 48 | 470 | 486 | EFP4810 |
| | 52 | 510 | 526 | EFP5210 |
| | 56 | 550 | 566 | EFP5610 |
| | 60 | 590 | 606 | EFP6010 |
| | 64 | 630 | 646 | EFP6410 |
| | 68 | 670 | 686 | EFP6810 |
| | 72 | 710 | 726 | EFP7210 |
| | 76 | 750 | 766 | EFP7610 |
| | 80 | 790 | 806 | EFP8010 |
| | 84 | 830 | 846 | EFP8410 |
| | 88 | 870 | 886 | EFP8810 |
| | 92 | 910 | 926 | EFP9210 |
| 96 | 950 | 966 | EFP9610 | |
| 100 | 990 | 1006 | EFP10010 | |
| 104 | 1030 | 1046 | EFP10410 | |
| 108 | 1070 | 1086 | EFP10810 | |
| 112 | 1110 | 1126 | EFP11210 | |
| 116 | 1150 | 1166 | EFP11610 | |
| 120 | 1190 | 1206 | EFP12010 | |
| 124 | 1230 | 1246 | EFP12410 | |
| 128 | 1270 | 1286 | EFP12810 | |
| 132 | 1310 | 1326 | EFP13210 | |
| 136 | 1350 | 1366 | EFP13610 | |
| | | | | |
| 160 | 1590 | 1606 | EFP16010 | |

正视图

俯视图

H为光栅的保护高度： $H = (\text{光束数量} - 1) \times \text{光轴间距}$

L为光栅总高度： $L = \text{上下盲区} + \text{保护高度}$

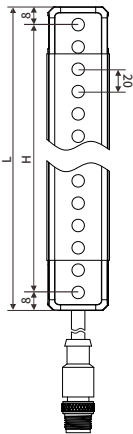
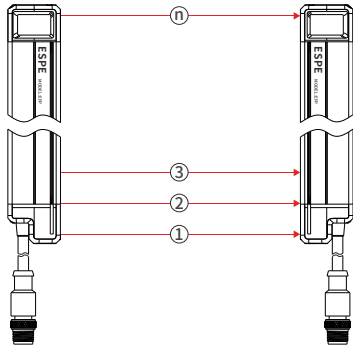
注：除以上规格型号外，可根据客户需求定制相对应保护高度的光栅。

四级安全光栅

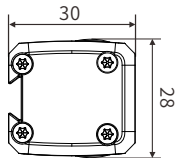
☞ EFP系列选型表

• 光轴间距20mm、分辨率25mm

| 形状 (mm) | 光束数量 (n) | 保护高度 (mm) | 光栅总高度 (mm) | 规格型号 |
|------------|-------------|--------------|---------------|---------|
| | 8 | 140 | 156 | EFP0820 |
| | 10 | 180 | 196 | EFP1020 |
| | 12 | 220 | 236 | EFP1220 |
| | 14 | 260 | 276 | EFP1420 |
| | 16 | 300 | 316 | EFP1620 |
| | 18 | 340 | 356 | EFP1820 |
| | 20 | 380 | 396 | EFP2020 |
| | 22 | 420 | 436 | EFP2220 |
| | 24 | 460 | 476 | EFP2420 |
| | 26 | 500 | 516 | EFP2620 |
| | 28 | 540 | 556 | EFP2820 |
| | 30 | 580 | 596 | EFP3020 |
| | 32 | 620 | 636 | EFP3220 |
| | 34 | 660 | 676 | EFP3420 |
| | 36 | 700 | 716 | EFP3620 |
| | 38 | 740 | 756 | EFP3820 |
| | 40 | 780 | 796 | EFP4020 |
| | 42 | 820 | 836 | EFP4220 |
| | 44 | 860 | 876 | EFP4420 |
| | 46 | 900 | 916 | EFP4620 |
| | 48 | 940 | 956 | EFP4820 |
| | 50 | 980 | 996 | EFP5020 |
| | 52 | 1020 | 1036 | EFP5220 |
| | 54 | 1060 | 1076 | EFP5420 |
| | 56 | 1100 | 1116 | EFP5620 |
| | 58 | 1140 | 1156 | EFP5820 |
| | 60 | 1180 | 1196 | EFP6020 |
| | 62 | 1220 | 1236 | EFP6220 |
| | 64 | 1260 | 1276 | EFP6420 |
| | 66 | 1300 | 1316 | EFP6620 |
| | 68 | 1340 | 1356 | EFP6820 |
| | | | | |
| | 80 | 1580 | 1596 | EFP8020 |



正视图



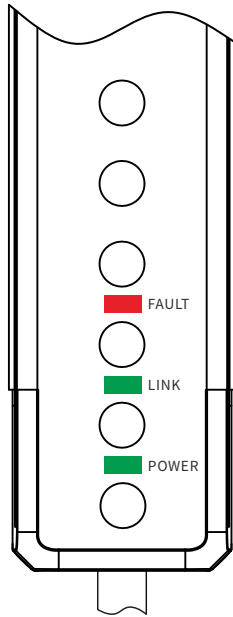
俯视图

H为光栅的保护高度： $H = (\text{光束数量} - 1) \times \text{光轴间距}$

L为光栅总高度： $L = \text{上下盲区} + \text{保护高度}$

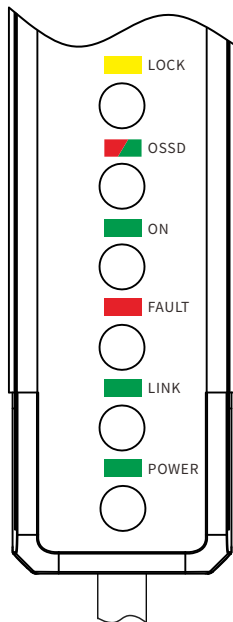
注：除以上规格型号外，可根据客户需求定制相对应保护高度的光栅。

指示灯说明



发射器

| 发射器指示说明 | | |
|---------------|-------|-----------|
| 指示灯 | 指示灯状态 | 功能说明 |
| POWER (绿色) | 点亮 | 电源指示灯正常工作 |
| | 熄灭 | 内部检测异常 |
| | 闪烁1Hz | 欠压 |
| | 闪烁2Hz | 过压 |
| LINK (绿色) | 熄灭 | 正常工作 |
| | 闪烁2Hz | 内部检测异常 |
| FAULT (红色) | 点亮 | 内部检测异常 |
| | 熄灭 | 正常工作 |
| | 闪烁2Hz | 内部检测异常 |



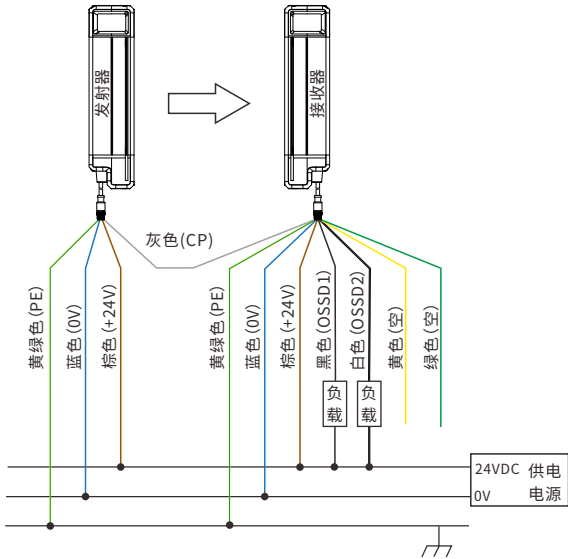
接收器

| 接收器指示说明 | | |
|---------------|-------|--------|
| 指示灯 | 指示灯状态 | 功能说明 |
| POWER (绿色) | 点亮 | 正常工作 |
| | 熄灭 | 内部检测异常 |
| | 闪烁1Hz | 欠压 |
| | 闪烁2Hz | 过压 |
| LINK (绿色) | 熄灭 | 正常工作 |
| | 闪烁2Hz | 内部检测异常 |
| FAULT (红色) | 点亮 | 内部检测异常 |
| | 熄灭 | 正常工作 |
| | 闪烁2Hz | 内部检测异常 |
| ON (绿色) | 点亮 | 通光 |
| | 1HZ闪烁 | EDM故障 |
| | 熄灭 | 挡光 |
| OSSD (红绿) | 绿灯亮 | 输出打开 |
| | 红灯亮 | 输出关闭 |
| LOCK (黄色) | 点亮 | 等待复位 |
| | 1HZ闪烁 | 接线故障 |
| | 熄灭 | 正常工作 |

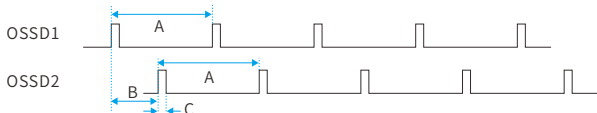
四级安全光栅

接线示意图

NPN接线图(无输出监视、无复位)

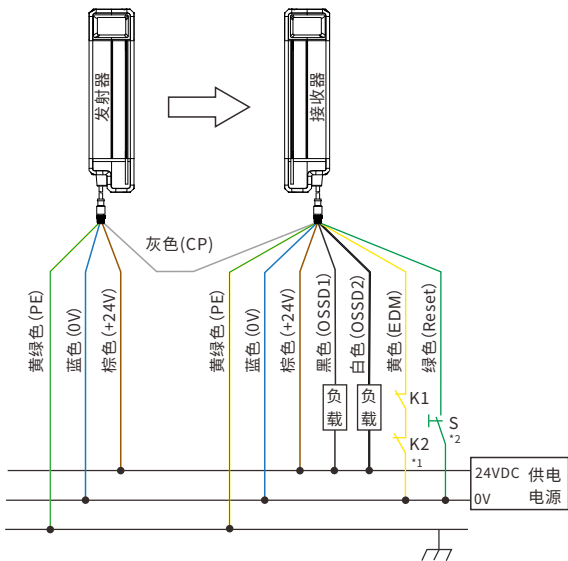


NPN输出诊断时序图:



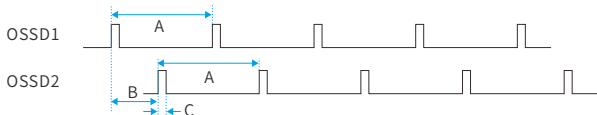
A:470ms; B: 235ms C: 256us

NPN接线图(监视、复位功能)



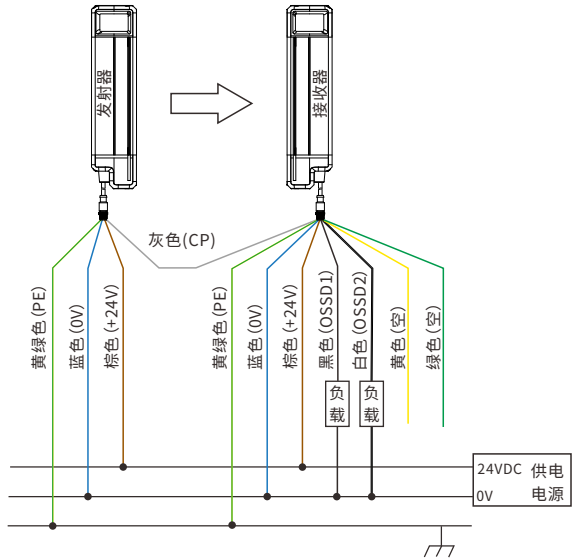
*1 无输出监视功能时,该信号悬空不接。
*2 无复位功能时,该信号悬空不接。

NPN输出诊断时序图:

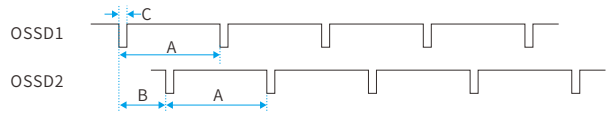


A:470ms; B: 235ms C: 256us

PNP接线图(无输出监视、无复位)

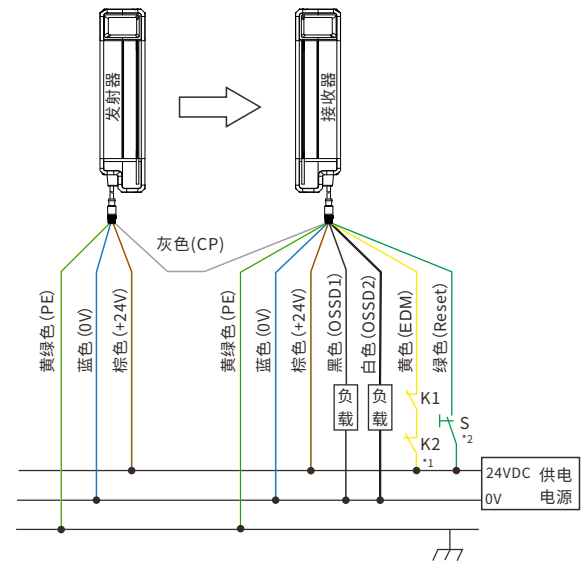


PNP输出诊断时序图:



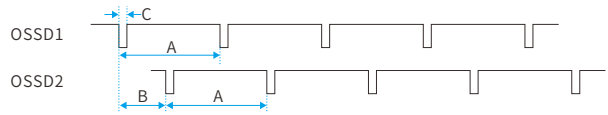
A:470ms; B: 235ms C: 256us

PNP接线图(监视、复位功能)



*1 无输出监视功能时,该信号悬空不接。
*2 无复位功能时,该信号悬空不接。

PNP输出诊断时序图:

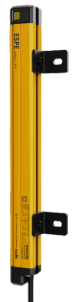
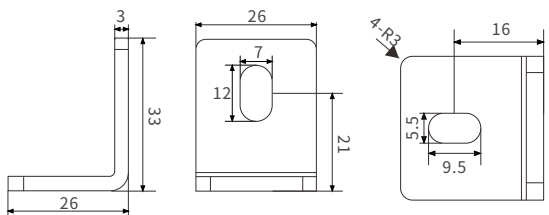

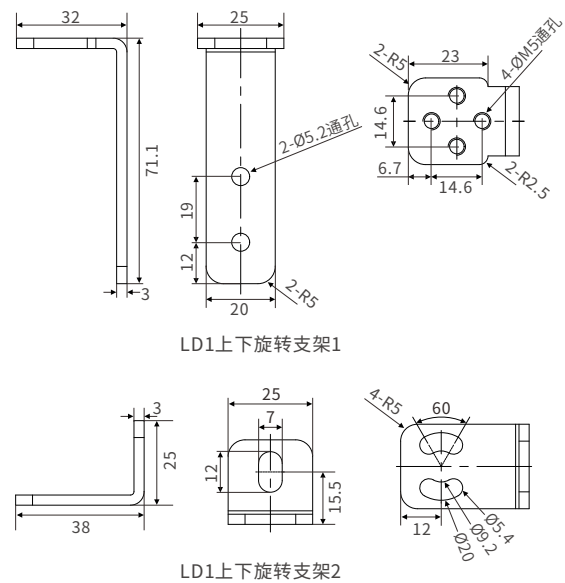


A:470ms; B: 235ms C: 256us

线缆说明

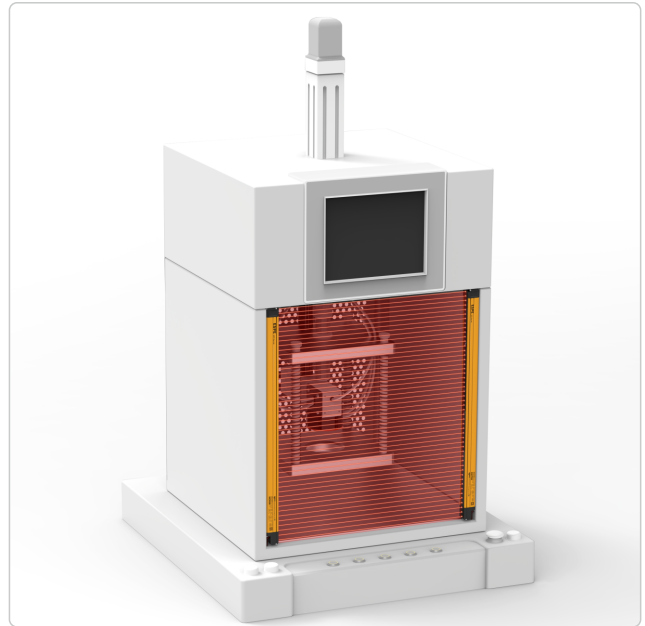
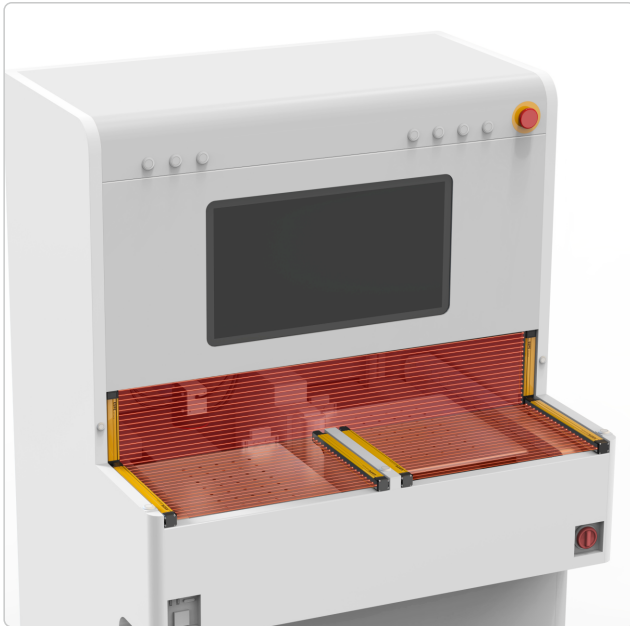
| 光栅 | 线色 | 线标 | 功能 | 接线说明 |
|-----|----|-------|--------|--------------------|
| 发射器 | 棕色 | 24V | 电源正极 | 连接直流电源24V正极 |
| | 蓝色 | 0V | 电源负极 | 连接直流电源0V负极 |
| | 灰色 | CP | 同步线 | 连接接收器CP |
| | 黄绿 | PE | 屏蔽线 | 接地/接GND |
| 接收器 | 棕色 | 24V | 电源正极 | 连接直流电源24V正极 |
| | 蓝色 | 0V | 电源负极 | 连接直流电源0V负极 |
| | 灰色 | CP | 同步线 | 连接发射器CP |
| | 黄绿 | PE | 屏蔽线 | 接地/接GND |
| | 黑色 | OSSD1 | 输出信号1 | 连接安全输入接口1 |
| | 白色 | OSSD2 | 输出信号2 | 连接安全输入接口2 |
| | 黄色 | EDM | 外部装置监控 | 连接外部常闭监控触点(无功能时悬空) |
| | 绿色 | Reset | 复位 | 连接复位按钮(无功能时悬空) |

安装支架选配

| 图片 | 名称 | 配件 | 支架尺寸图 |
|---|-----------|---|--|
|  | L侧装安装支架 | L26支架 (4PCS) ESM-M5滑块 (4PCS) M6平垫 (4PCS) M6弹垫 (4PCS) M6*16螺丝 (4PCS) M5*6螺丝 (4PCS) |  |
|  | LD1上下旋转支架 | LD1上下旋转支架1 (4PCS) LD1上下旋转支架2 (4PCS) M5滑块 (8PCS) M6平垫 (4PCS) M6弹垫 (4PCS) M6*16螺丝 (4PCS) M5*6螺丝 (16PCS) |  |

四级安全光栅

应用 场景



产品 证书

Safenet Certification Services Ltd.
 Ducart Suite, Castletry Park Commercial Campus, Limerick, V94 YFD, Ireland
 Tel: +353 81 50 2040 | e-mail: office@safenet.ie | Website: www.safenet.ie
 European Notified Body 2805

EU Type Examination Certificate
 This is to certify that

Shenzhen ESPE Technology Co., Ltd.
 401, 501, 502 Building 2, Hongxin Industrial Park, Guangguang Road,
 Xinlan Community, Gunlan, Longhua, Shenzhen, Guangdong, China

Has had a range of EFP Safety Light Curtains examined with regard to the Electromagnetic Compatibility Directive 2014/30/EU.

With reference to model **EFP3210P**

Manufactured by:

Shenzhen ESPE Technology Co., Ltd.
 401, 501, 502 Building 2, Hongxin Industrial Park, Guangguang Road,
 Xinlan Community, Gunlan, Longhua, Shenzhen, Guangdong, China

- The technical construction file contains all the relevant information.
- Having verified that the appropriate tests have been conducted, with regard to the EFP3210P representing the range.
 - The example has been manufactured in accordance with the technical construction file and may be used under the intended conditions.
 - The standards and transposed standards as the case may be, have been applied correctly.
 - The example has conformity with the protection requirements of Electromagnetic Compatibility Directive 2014/30/EU.
 - The technical file contains all the information required to include the models listed in the attached annex to this certificate.

Certificate Number: 5448080324b
 Date: 14/03/2024 Expiry Date: 08/03/2029

Signed for Safenet Certification Services Ltd.


 Peter McNicol
 Technical Manager





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Safenet Certification Services Ltd.
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 Tel: +353 81 50 2040 | e-mail: office@safenet.ie | Website: www.safenet.ie
 European Notified Body 2805

EC Type Examination Certificate
 This is to certify that

Shenzhen ESPE Technology Co., Ltd.
 401, 501, 502 Building 2, Hongxin Industrial Park, Guangguang Road,
 Xinlan Community, Gunlan, Longhua, Shenzhen, Guangdong, China

Has had a range of EFP Safety Light Curtains examined with regard to the Directive 2006/42/EC as amended.

In respect of the **EFP3210P**

Manufactured by:

Shenzhen ESPE Technology Co., Ltd.
 401, 501, 502 Building 2, Hongxin Industrial Park, Guangguang Road,
 Xinlan Community, Gunlan, Longhua, Shenzhen, Guangdong, China

- The technical file contains all the relevant information.
- Having verified that the appropriate tests have been conducted.
 - The standards and transposed standards EN IEC 61496-1:2020 and EN IEC 61496-2:2020 have been applied correctly.
 - The example representing series production of the item, complies with the essential health and safety requirements of the Directive 2006/42/EC as amended.
 - The technical file contains all the information required to include the models listed in the attached annex to this certificate.
 - The technical file also contains evidence of compliance with EN IEC 61496-1:2020 TYPE 4 and EN IEC 61496-2:2020 TYPE 4, and is suitable for applications regarding EN ISO 13849-1:2023 PL e.

Certificate Number: 5448080324b
 Date: 14/03/2024 Expiry Date: 08/03/2029

Signed for Safenet Certification Services Ltd.


 Peter McNicol
 Technical Manager





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