



# OMRON

## Smart Laser Head(CMOS)

# Model E3NC-SH□□Series

### INSTRUCTION SHEET

Thank you for selecting OMRON product. This sheet primarily describes precautions required in installing and operating the product. Before operating the product, read the sheet thoroughly to acquire sufficient knowledge of the product. For your convenience, keep the sheet at your disposal. Refer to the user's manual for details.

#### TRACEABILITY INFORMATION:

Representative in EU: OMRON Europe B.V. Wegalaan 67-69, 2132 JD Hoofddorp, The Netherlands  
Manufacturer: OMRON Corporation, Shiohkoji Horikawa, Shimogyo-ku, Kyoto 600-8530 JAPAN Ayabe Factory, 3-2 Narutani, Nakayama-cho, Ayabe-shi, Kyoto 623-0105 JAPAN

Notice: In a residential environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

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### PRECAUTIONS ON SAFETY

#### Keys to Warning Symbols

**WARNING** Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

#### Explanation of signs

- Laser beam** Cautions to indicate potential Laser beam hazard
- Resolution prohibition** Indicates prohibition when there is a risk of minor injury from electrical shock or other source if the product is disassembled.

### SAFETY PRECAUTIONS FOR USING LASER EQUIPMENT

Laser safety measures for laser devices are stipulated both in Japan and overseas. Here, four cases are described: Application in Japan and Application in a device to be shipped overseas.

- Usage in Japan The JIS C6802:2014 standard stipulates the safety precautions that users must take according to the class of the laser product. The E3NC-SH□□ and E3NC-SH□□H are classified into class 1 defined by this standard.

#### Alert Statements

- E3NC-SH□□ Sensor Head: Class 1 / E3NC-SH□□H Sensor Head: Class 1

#### WARNING

Do not expose your eyes to the laser radiation either directly (i.e., after reflection from a mirror or shiny surface). Loss of sight may possibly occur in case of the exposure to laser high power density.

Do not disassemble the product. Doing so may cause the laser beam to leak, resulting in the danger of visual impairment.

The E3NC-SH has the following WARNING label or explanatory label on the side of the sensors.

#### 2. USA

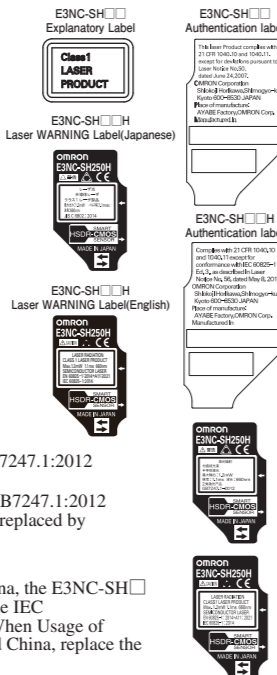
This product is subjected to the U.S. FDA (Food and Drug Administration) laser regulations. This product is already reported to CDRH (Center for Devices and Radiological Health).

- Accession Number: 1220691
- The E3NC-SH□□ is classified into Class 1 by the IEC 60825-1:2007 standard according to the regulations of Laser Notice No.50 of the FDA standard. An authentication label and explanatory label are attached on the sensor the E3NC-SH□□.
- The E3NC-SH□□H is classified into Class 1 by the IEC 60825-1:2014 standard according to the regulations of Laser Notice No.56 of the FDA standard. An authentication label is attached on the sensor the E3NC-SH□□H. Replace the warning label with corresponding English label.

#### 3. China

- The E3NC-SH□□ is classified into Class 1 by the GB7247.1:2012 standard. (1类激光产品)
- The E3NC-SH□□H is classified into Class 2 by the GB7247.1:2012 standard. When using in China, warning labels must be replaced by Chinese ones supplied with the product.

- Usage in countries other than Japan, U.S. and China When Usage in countries other than Japan, U.S. and China, the E3NC-SH□□ and E3NC-SH□□H are classified into Class 1 by the IEC 60825-1:2014 / EN 60825-1:2014+A11:2021 standard. When Usage of E3NC-SH□□H in countries other than Japan, U.S. and China, replace the warning label with corresponding English label.



### PRECAUTIONS FOR SAFE USE

Please observe the following precautions for safe use of the products.

- Installation Environment
  - Do not use the product in environments where it can be exposed to inflammable/explosive gas.
  - To secure the safety of operation and maintenance, do not install the product close to high-voltage devices and power devices.
- Power Supply and Wiring
  - Be sure to use a dedicated amplifier unit (E3NC-SA□□/E3NC-SA0). Connecting the sensor to other amplifier unit may cause damage or fire.
  - When short circuiting the cable, be sure to connect wires correctly according to the specification. Improper connection may cause damage or fire.
  - High-voltage lines and power lines must be wired separately from this product. Wiring them together or placing them in the same duct may cause induction, resulting in malfunction or damage.
  - Always turn off the power of the unit before connecting or disconnecting cables.
- Installation
  - Use screws for mounting and be sure to tighten screws with a specified torque. (tightening torque: M3, 0.5N·m)
- Other Rules
  - Do not attempt to disassemble, deform by pressure, incinerate, repair, or modify this product.
  - When disposing of the product, treat as industrial waste.
  - If you notice an abnormal condition such as a strange odor, extreme heating of the unit, or smoke, immediately stop using the product, turn off the power, and consult your dealer.

### PRECAUTIONS FOR CORRECT USE

Please observe the following precautions to prevent failure to operate, malfunctions, or undesirable effects on product performance.

- Do not install the product in locations subjected to the following conditions:
  - Surrounding air temperature outside the rating
  - Rapid temperature fluctuations (causing condensation)
  - Relative humidity outside the range of 35 to 85%
  - Presence of corrosive or flammable gases
  - Presence of dust, salt, or iron particles
  - Direct vibration or shock
  - Reflection of intense light (such as other laser beams, electric arc-welding machines, or ultra-violet light)
  - Direct sunlight or near heaters
  - Water, oil, or chemical fumes or spray, or mist atmospheres
  - Strong magnetic or electric field
- Warming Up
  - The circuitry is not stable immediately after turning the power ON, and the values gradually change until the Sensor Head is completely warmed up.
- Maintenance and inspection
  - Always turn off the power of the unit before connecting or disconnecting cables.
  - Do not use thinner, alcohol, benzene, acetone, or kerosene to clean the sensor.
  - If considerable foreign matter or dust collects on the front of sensor, use a blower brush (for camera lenses) to blow off the foreign matter. Avoid blowing it off with your breath. For a small amount of foreign matter or dust, gently wipe with a soft cloth. Do not wipe hard. If the surface is damaged, object detection may result.
- Sensing Object For Reflective Type Sensor Head
  - The product cannot accurately measure the following types of objects: Transparent objects, objects with an extremely low reflective sensor ratio, objects smaller than the spot diameter, objects with a large curvature, excessively inclined objects, etc.

### Checking the package contents

- Sensor head x1
- Manual (this paper) x1
- Laser WARNING label : (English, Chinese) 1 each (The WARNING label is attached to E3NC-SH□□H)

#### Shortening the connection cable for use

#### Shortening the connection cable for use

Push the operation lever at the operation slot with the slotted screwdriver and pull out the wire to adjust the cable length. The tip of the screwdriver must be 2 mm or less. The type of screwdriver whose tip width becomes broaden toward its root cannot be used.

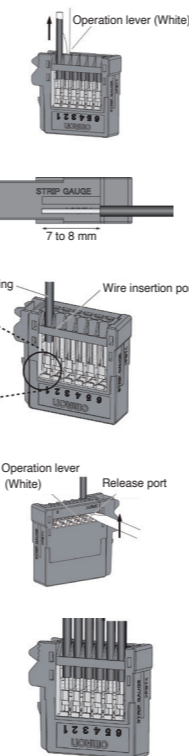
#### Procedure to connect the connector

- According to "STRIP GAUGE" shown on the side of the product, strip the coating of the shield for 20 mm or less, strip the coating of the core wire for 7 to 8 mm, and twist the wire for several times.

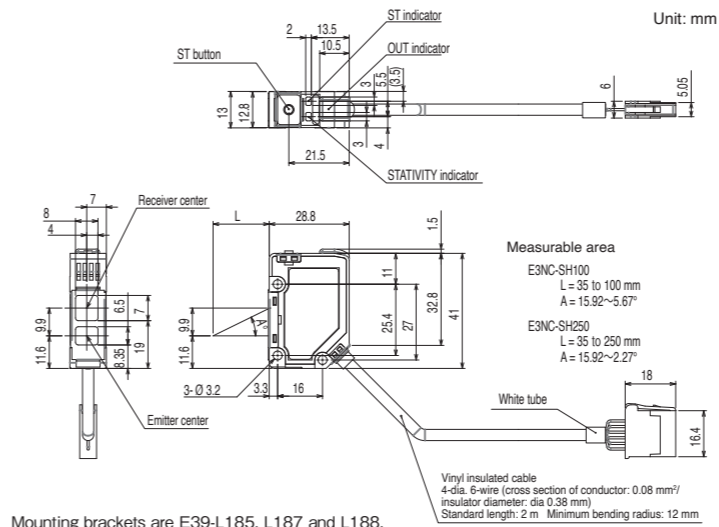
- Insert the wire all the way to the wire insertion slot. Make sure that the wire coating is located inside the wire inserting slot and the tip of the conductor passes through the connection part. Connect wires as follows. Terminal No.1: Shield (Red, White sides), No.2: White, No.3: Red, No.4: Brown, No.5: Blue, No.6: Shield (Brown, Blue side).

- Push the slotted screwdriver all the way to the releasing slot and pry the slotted screwdriver up and down lightly. When you feel a click on the slotted screwdriver, pry it to the reverse direction of the wire insertion direction. The operation lever will recover with a click sound.

- Check that the operation lever recovers and the wire coating enters into the wire insertion slot. The shield wire cover must not be shorted circuited. (The wires are connected when you pull the wire and feel a resistance.)

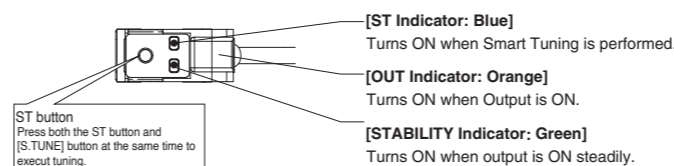


### 1. Dimensions



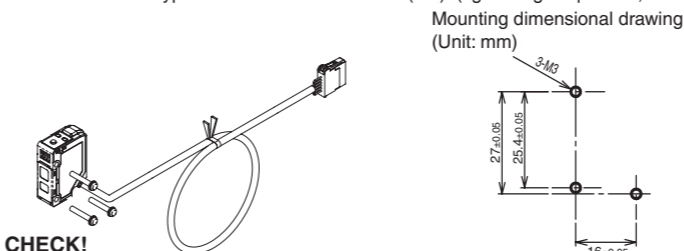
Mounting brackets are E39-L185, L187 and L188.

### 2. Sensor Head Display



### 3. Installing Sensor Heads

Fix the Reflective type sensor head with screws (M3). (tightening torque: M3, 0.3 N·m)

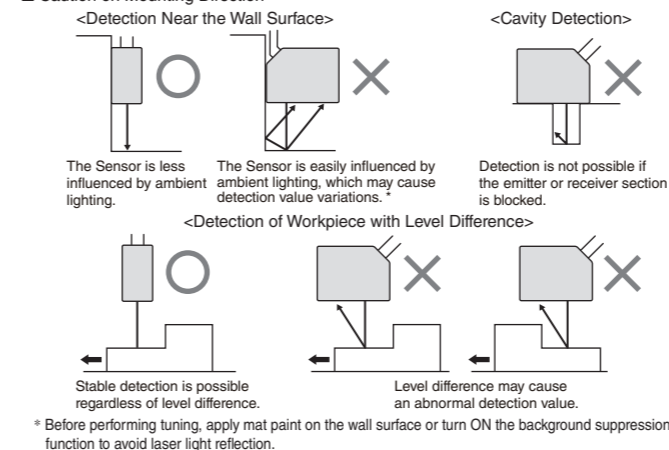


#### CHECK!

When mounting a Sensor Head, take care not to touch the emitter and receiver. Adhesion of finger marks may hinder correct measurements. If you have touched them, wipe them with a clean soft cloth.

- Secure the connector to avoid vibration or shocks.

#### Caution on Mounting Direction

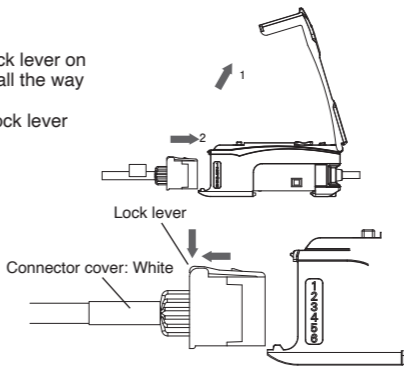


\* Before performing tuning, apply mat paint on the wall surface or turn ON the background suppression function to avoid laser light reflection.

### 4. Mounting the sensor head

- Open the protection cover.
- Insert the sensor head, with the lock lever on its connector area facing upward, all the way into the connector port. To remove it, press and hold the lock lever then pull the sensor head out.

The connector cover of E3NC-SH is white. Connect the cable correctly.



### 5. Specifications

Item	Detection method	Distance configuration model		
	Model	E3NC-SH100	E3NC-SH250	E3NC-SH250H
Light source (wavelength)* 1	Visible-light semiconductor laser (660nm)			
FDA class *1	class 1 (0.5mW max.)		class 1 (1.2mW max.)	
JIS IEC/EN class	class 1 (0.5mW max.)		class 1 (1.2mW max.)	
Measurement range	35 to 100 mm		35 to 250 mm	
Standard measurement gap*2	35 to 50 mm: 1.5 mm 50 to 100mm: 3 mm		35 to 180 mm: 9 mm 180 to 250 mm: 25 mm	
Spot size *3	Approx. 0.5 mm (distance at 100 mm)		Approx. 1 mm (distance at 250 mm)	
Indicator	OUT indicator (Orange), STABILITY indicator (Green), ST indicator (Blue)			
Ambient illumination	Illuminance on receiving optical side 4,000 lx max. (incandescent light) Sunlight: 8,000lx max.	Illuminance on receiving optical side 2,000 lx max. (incandescent light) Sunlight: 4,000lx max.	Illuminance on receiving optical side 4,000 lx max. (incandescent light) Sunlight: 8,000lx max.	
Ambient temperature	Operating: -10 to 55°C, storage: -25 to 70°C (with no icing or condensation)			
Ambient humidity	Operating and storage: 35% to 85% (with no condensation)			
Insulation resistance	20 MΩ min. (500 VDC)			
Dielectric strength	1000 VAC 50/60 Hz 1min			
Vibration resistance	10 to 55 Hz. 1.5-mm double amplitude 2 hours each in X, Y, and Z directions			
Shock resistance	500m/s <sup>2</sup> 3 times each in X, Y, and Z directions			
Degree of protection	IEC standard, IP67			
Connection method	Connector joint model (standard cable length: 2 m)			
Material	Case	Polybutylene terephthalate		
	Lens	Methacrylate resin		
	Cable	PVC		
Weight (packed state/main unit only)	Cable length 2m: Approx. 125g/ approx. 75g		Cable length 5m: Approx. 200g/ approx. 150g	
Accessories	Instruchin Sheet		Instruchin Sheet, Laser WARNING label	

\*1. The E3NC-SH□□ is classified into Class 1 by the standard of IEC 60825-1:2007 according to deviations of Laser Notice No.50 of FDA standard, and is already reported to CDRH(Center for Devices and Radiological Health). The E3NC-SH□□H is classified into Class 1 by the standard of IEC 60825-1:2014 according to deviations of Laser Notice No.56 of FDA standard, and is already reported to CDRH(Center for Devices and Radiological Health). Accession Number 1220691

\*2. Measured using OMRON's reference sensing object (white paper).

\*3. Defined at the 1/e<sup>2</sup> (13.5%) of the central intensity at the measurement distance. Measurement may be influenced if there is light leakage outside the defined region and the surroundings of the target object have a high reflectance in comparison to the target object. Also, when detecting a workpiece that is smaller than the spot size, a correct value may not be obtained.

### Suitability for Use

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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**OMRON**

智能激光传感器探头(CMOS型)

型号 **E3NC-SH□□** 系列

使用说明书

感谢您购买本产品，谨致谢意。  
使用时请务必遵守以下内容。

- 请具备电气知识的专业人员实施操作。
- 请在阅读并理解本说明书的基础上正确使用。
- 请妥善保管本说明书，以备随时查阅。

**欧姆龙公司**

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## 安全注意事项

### 警告标示的含义

<b>警告</b>	若使用不当，则可能会造成轻伤、中等程度伤害，有时甚至可能导致重伤或死亡。 此外，还可能带来重大的经济损失。
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### 图标符号的含义

	<ul style="list-style-type: none"> <li>● 激光射线</li> </ul> 表示激光射线可能会造成危害。
	<ul style="list-style-type: none"> <li>● 禁止拆卸</li> </ul> 表示拆卸设备可能会导致触电等危害发生。

## 为了确保激光产品的安全使用，

日本国内外均对激光设备制定了激光安全对策。以下将就在日本国内使用时、由日本国内组装时、以及出口海外时的四种状况进行说明。

- 日本  
JIS C6802: 2014标准中规定了使用者应根据激光产品等级执行的安全预防对策。型号E3NC-SH□□、型号E3NC-SH□□H被分类为本标准中定位的等级1。

### 警告标示

- 型号E3NC-SH□□传感器探头：1级 / 型号E3NC-SH□□H传感器探头：1级

## 警告

请注意，激光不得直射或反射到镜面物体后射入眼睛。由激光放射出的激光射线能量密度高，射入眼睛后可能导致失明危险。

请勿拆卸。一旦拆卸，则可能导致激光射线泄漏而造成视力障碍危险。

· 激光相关的警告标签，或说明标签张贴在传感器侧面

### 2. 美国

将本产品装载于设备出口美国时，将会受到美国FDA (Food and Drug Administration) 的激光章程限制。本产品已向CDRH(Center for Devices and Radiological Health)申报完毕。  
登录号：1220691

- 型号E3NC-SH□□基于FDA标准Laser Notice No.50的规定，按IEC 60825-1:2007标准被分类为等级1。证明标签粘贴于传感器主机上。
- 型号E3NC-SH□□H基于FDA标准Laser Notice No.56的规定，按IEC 60825-1:2014标准被分类为等级1。证明标签粘贴于传感器主机上。出口美国时，请将警告标签换贴为附带的英文标签。

### 3. 中国

- 型号E3NC-SH□□被分类为GB7247.1:2012标准中定位的Class1。(1类激光产品)
- 型号E3NC-SH□□H被分类为GB7247.1:2012标准中定位的Class2。在中国使用时，请换贴为附带的中文标签。

### 4. 日本、美国、中国以外的其他国家

如果是日本、美国及中国以外的地区，型号E3NC-SH□□、型号E3NC-SH□□H则按IEC 60825-1:2014 / EN 60825-1:2014+A11:2021标准被分类为等级1。将型号E3NC-SH□□H出口日本、美国、中国以外的其他国家时，请将警告标签换贴为附带的英文标签。



## 安全要领

在确保安全的前提下，请务必遵守以下所示项目。

- 环境条件
  - 请勿在有易燃、易爆气体的环境下使用。
  - 为了确保操作及维护保养的安全，请务必设置于远离高压设备或输电设备的场所。
- 电源及排线
  - 请务必使用专用的放大器单元（型号E3NC-SA□□/型号E3NC-SA0）。若连接其他放大器单元，则可能导致损坏、起火危险。
  - 执行电缆短路加工时，请按规定操作重新连线后再使用。连线误解后可能会导致损坏、起火危险。
  - 高压线、输电线路请与本产品排线分离且另行排线。若进行同一排线或同一管道中排线则可能相互感应，从而导致误操作或产品损坏。
  - 装卸连接器时，请务必先切断电源。
- 设置
  - 安装时请使用螺钉、并在规定的扭力值范围内紧固螺钉。规定扭力值 M3: 0.5N·m
- 其他
  - 请绝对对主机进行拆卸、修理、改造、加压变形、焚烧等操作。
  - 废弃时，请作为工业废弃物处理。
  - 万一感觉到异常时，请立即停止使用并切断电源，然后联系本公司的分公司或营业所。

## 使用注意事项

为了防止产品不能操作、操作失误、或对性能·设备带来不利影响，请务必遵守以下事项。

- 设置场所
  - 请勿设置于以下场所
  - 环境温度超出额定范围的场所
  - 因急剧的温度变化而导致结露的场所
  - 相对湿度超出35~85%RH范围的场所
  - 有腐蚀性、易燃性气体的场所
  - 有灰尘、盐分、铁粉的场所
  - 会直接振动或碰撞的场所
  - 有强烈环境光线(激光、电弧焊光等)的场所
  - 阳光直射或暖气设备附近场所
  - 有水、油、化学药品飞溅的场所
  - 有强磁场、强电场的场所
- 预热
  - 执行精密测定时，请接通电源后等待10分钟以上再使用。
  - 刚接通电源时电路尚未稳定，故测定值会逐渐发生变化。
- 维护保养检查
  - 执行调整或装卸时，请务必切断电源后再执行操作。
  - 请勿使用稀释剂、汽油、丙酮、煤油类溶剂进行清理。
  - 传感器探头前面的滤镜上附着了大面积垃圾或灰尘时，请使用气刷(相机镜头专用)吹去。请勿用嘴吹气清除。对于小面积垃圾或灰尘，请使用沾有少量酒精的软布仔细擦拭(镜头清洁剂等)。请勿用力擦拭。如果滤镜受损则可能导致测定出现误差。
- 目标物体
  - 根据目标物体的材质形状，可能会出现无法测定或无法测出精度的情况。（透明构件、反射率极小的材质。比光束点直径还小的目标物体、曲率较大的目标物体、倾斜严重的目标物体等）
  - 虽然是IP67，但请勿在水中、雨中、及室外使用。

## 包装内容确认

- 传感器探头 1台
- 使用说明书（这个文件）一本
- 激光警告标签（英语、中文）各一枚（附属于型号E3NC-SH□□H）

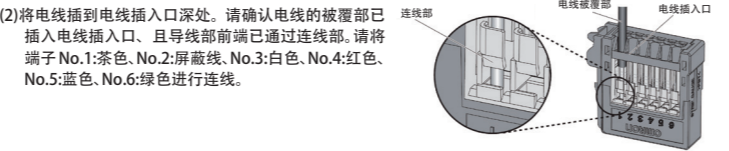
### 缩短连接线使用时

#### ■ 连接器连接的解除步骤

请使用一字型螺丝刀将位于操作口的操作杆推入，拔出电线后调整电线长度。请使用前端尺寸在2mm以下、前端向根部非扩大型的螺丝刀。

#### ■ 连接器连线步骤

(1) 请按产品主机侧面所显示的 [STRIP GAUGE]将屏蔽线的被覆剥去 20mm以下长度、芯线的被覆剥去 7~8mm，并将多股线多捻几次。

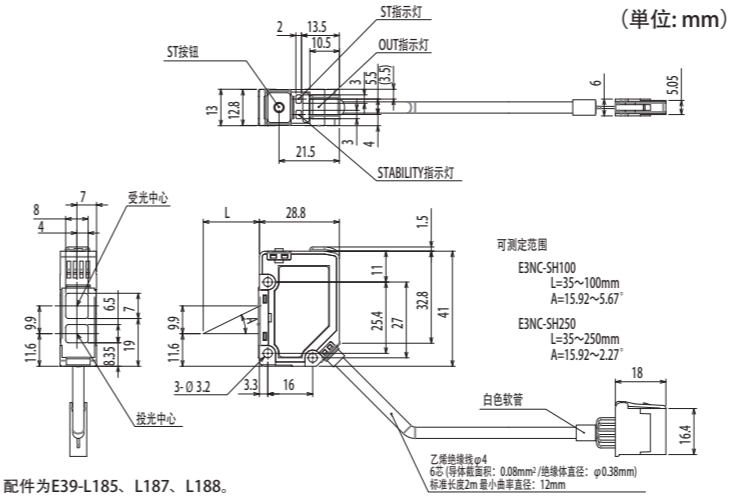


(2) 将电线插到电线插入口深处。请确认电线的被覆部已插入电线插入口、且导线部前端已通过连线部。请将端子 No.1:茶色、No.2:屏蔽线、No.3:白色、No.4:红色、No.5:蓝色、No.6:绿色进行连线。

(3) 在解除口将一字型螺丝刀推入深处，然后将一字型螺丝刀上下轻撬。感觉一字型螺丝刀好像有点被卡住时，请直接再向电线插入方向的反方向轻撬。听到“啞啞”声的同时操作杆复位。

(4) 请确认操作杆已复位、被覆部已进入电线插入口内。此外，请注意避免屏蔽线之间发生短路。(轻轻拉电线，若有电阻则表示已连线。)

## 1. 外形尺寸图



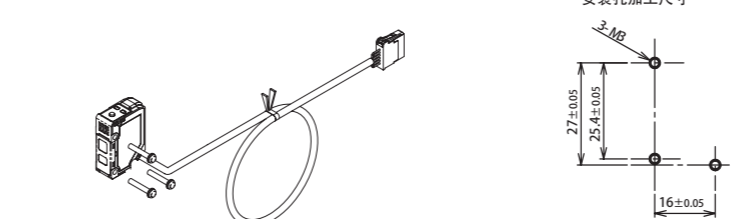
配件为E39-L185、L187、L188。

## 2. 探头的表示一览表

[ST 指示灯: 蓝色]	执行 SmartTuning 时亮灯。
[OUT 指示灯: 橙色]	输出为 ON 时亮灯。
[STABILITY 指示灯: 绿色]	在稳定且开启输出功能的状态下亮灯。检测物体在可检测范围时亮灯。

## 3. 传感器探头的设置

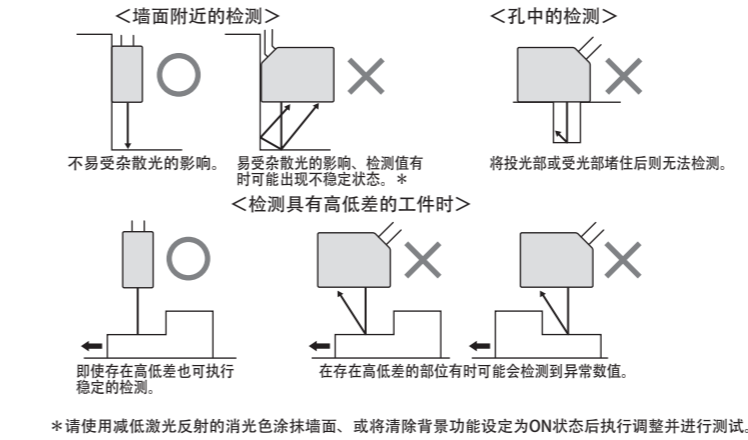
使用M3螺钉固定传感器探头。请以0.5N·m的紧固扭力值牢固安装。



### 重要

- 请勿触碰传感器探头的投光部、受光部。一旦留下指纹等则无法正确测定。不小心触碰时，请使用清洁的软布将污垢擦净。
- 请固定连接器部以防发生振动或碰撞。

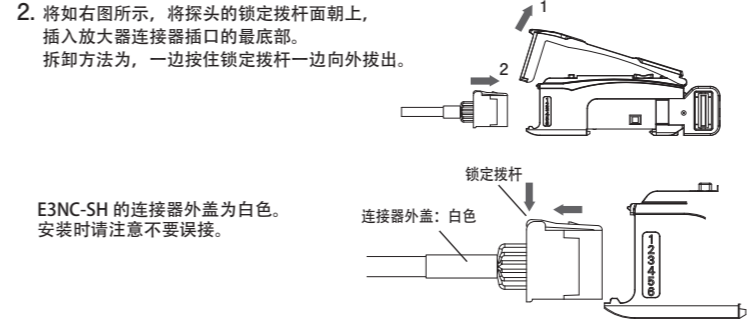
#### ■ 安装时的朝向注意要领



## 4. 探头的安装

1. 打开保护罩。
2. 将如右图所示，将探头的锁定拨杆面朝上，插入放大器连接器插口的最底部。拆卸方法为，一边按住锁定拨杆一边向外拔出。

E3NC-SH 的连接器外盖为白色。安装时请注意不要误接。



## 5. 额定值/规格

项目	检测方式	距离设定型号		
	型号	形E3NC-SH100	形E3NC-SH250	形E3NC-SH250H
光源 (发光波长) *1	可视半导体激光 (660nm)			
FDA class *1	class 1(最大0.5mW)		class1(最大1.2mW)	
JIS IEC/EN class	class 1(最大0.5mW)		class1(最大1.2mW)	
测定范围	35~100mm	35~250mm		
标准检测高低差 *2	35~50mm : 1.5mm	35~180mm : 9mm		
	50~100mm : 3mm	180~250mm : 25mm		
光束点尺寸 *3	约0.5mm (距离100mm时)	约1mm (距离250mm时)		
指示灯	OUT指示灯 (橙色)、STABILITY指示灯 (绿色)、ST指示灯 (蓝色)			
使用环境光度	受光面光度 白炽灯: 4,000lx以下 太阳光 8,000lx以下	受光面光度 白炽灯: 2,000lx以下 太阳光 4,000lx以下	受光面光度 白炽灯: 4,000lx以下 太阳光 8,000lx以下	
环境温度范围	运行时: -10~+50°C、保存时: -25~+70°C (但是, 不得有结冰、凝露)			
环境湿度范围	运行·保存时: 各35~85%RH (但是, 不得有结冰、凝露)			
绝缘电阻	20MΩ以上 (用DC500V兆欧表)			
耐电压	AC1000V 50/60Hz 1min			
振动 (耐久)	10~55Hz 双振幅1.5mm X、Y、Z各方向 2h			
冲击性 (耐久)	500m/s <sup>2</sup> X、Y、Z各方向 3回			
防护结构	IEC规格 IP67			
连接方式	连接器转接型(标准电线长度2m)			
材质	外壳	聚对苯二甲酸丁二醇酯		
	透镜	异丁烯树脂		
	电缆	PVC		
重量 (打包状态/主机净重)	电线长度2m: 约125g/约75g 电线长度5m: 约200g/约150g			
附件	使用说明书			使用说明书、激光警告标签

\*1. 型号E3NC-SH□□基于FDA标准Laser Notice No.50规定，按IEC 60825-1:2007基准被分类为Class1。  
型号E3NC-SH□□H基于FDA标准Laser Notice No.56规定，按IEC 60825-1:2014基准被分类为Class1。  
已向CDRH(Center for Devices and Radiological Health)申报完毕。 Accession Number 1220691

\*2. 通过检测距离中心测定本公司标准检测物体(白色陶瓷)

\*3. 光束点尺寸: 通过测定距离中心光强度的1/e2(13.5%)进行定义。定义范围以外也有漏光，若工件周围的光反射率高于工件本身，则可能带来不良影响。此外，检测出比光束点直径还小的工件时，可能无法获得正确的测定值。

## 承诺事项

本公司产品是作为工业通用品而设计制造的。因此，不适用于以下用途，当本公司产品被使用于以下用途时，本公司不做任何保证。但若是本公司特意以为以下用途而设计、或有过特别协商的情况下，可以用于以下用途。

- 需要高度安全性的用途(例: 用于原子能控制设备、焚烧设备、航空·宇宙设备、铁道设备、升降设备、娱乐设备、医用器、安全装置、或其他可能危及到生命·人身安全的用途)
- 需要高可靠性的用途(例: 煤气·水力·电力等的供给系统、24小时连续运转系统、裁决系统、或其他牵涉到权利·财产的用途)
- 苛刻条件或环境下的用途(例: 室外设备、易受化学污染的设备、易受电磁干扰的设备、易受震动·冲击的设备等)
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