



Programmable Controller

MELSEC iQ-R series **MELSENSOR**

MELSEC iQ-R Laser Displacement Sensor Control Module User's Manual (Sensor Head)

-MH11H01A0SNA	-MH11H01A0LNA
-MH11H01A1SNA	-MH11H01A1LNA
-MH11H01A2SNA	-MH11H01A2LNA
-MH11H03B0SNA	-MH11H03B0LNA
-MH11H05B0SNA	-MH11H05B0LNA
-MH11H05C0SNA	-MH11H05C0LNA
-MH11H08B0SNA	-MH11H08B0LNA
-MH11H08C0SNA	-MH11H08C0LNA
-MH11H11B0SNA	-MH11H11B0LNA
-MH11H11C0SNA	-MH11H11C0LNA
-MH11H35C3SNA	-MH11H35B0LNA
-MH11H11C0SNA	-MH11H35C0LNA
-MH11H35B0SNA	-MH11H35C0LNA
-MH11H35C0SNA	-MH11H35C3LNA

SAFETY PRECAUTIONS

(Read these precautions before using this product.)

This product is intended to detect an object and does not have the control function to ensure safety such as accident prevention.

Do not use this product as a safeguard that senses the presence of a person. Doing so may result in an accident due to an incorrect output or malfunction.

To protect the human body, use a product that complies with local laws and standards such as OSHA, ANSI, and IEC.

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the MELSEC iQ-R Module Configuration Manual.

In this manual, the safety precautions are classified into two levels: "⚠️ WARNING" and "⚠️ CAUTION".

 WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
 CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠️ CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Precautions for Using Laser Products]

WARNING

- The laser products use semiconductor laser light sources. When handling laser products, observe the following because human access to laser radiation may result in injury.
 - (1) Do not disassemble the laser products. Doing so may result in exposure to laser radiation.
 - (2) Shut off the external power supply (all phases) to stop laser emission before replacing a failed laser product or changing the layout.
 - Observe the following handling precautions for the laser products in each class.
 - (1) Class 3R laser products
 - Do not aim the laser beam at people.
 - Do not directly look at or come in contact with the laser beam and its reflection from a specular surface (such as a mirror). In addition, never look at the beam and its reflection through optical instruments (such as a microscope and a telescope).
 - Shorten the beam paths as much as possible to prevent diffusion of laser beams. Terminate the laser beams at the end of their paths by diffusely reflecting materials of appropriate reflectivity and thermal properties or by absorbers.
 - Locate the beam path above or below the eye level. Wearing protective eyewear is recommended when handling the laser products.
 - Install the laser products carefully so that the laser beam is not unintentionally reflected from specular surfaces.
 - (2) Class 2 laser products
 - Do not aim the laser beam at people.
 - Do not stare into the laser beam and its reflection from specular surfaces.
 - To prevent exposure to laser radiation (specularly or diffusely reflected laser beams), install a protective enclosure with an appropriate reflectance.
 - Locate the beam path above or below the eye level.
 - (3) Class 1 laser products
 - Do not stare into the laser beam and its reflection from specular surfaces.
-

[Design Precautions]

WARNING

- Provide safety measures such as a dual safety mechanism when the module is used for applications that have the possibility of causing physical injury or serious damage.
 - If a communication cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Incorrect output or malfunction due to a communication failure may result in an accident.
-

[Design Precautions]

CAUTION

- Do not use the laser displacement sensor outside of its specifications (such as ratings or environments). Doing so may result in overheating or smoke.
 - Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
 - Do not power off the programmable controller or reset the CPU module while the settings are being written. Doing so will make the data in the flash ROM and SD memory card undefined. The values need to be set in the buffer memory and written to the flash ROM and SD memory card again. Doing so also may cause malfunction or failure of the module.
 - Do not disassemble or modify this product. Doing so may cause failure, malfunction, injury, or a fire.
 - Clamp cables securely with the terminal screws. Incomplete connections may cause overheating or smoke.
 - Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
 - Do not open the covers on the back and the bottom of the product. Doing so may cause malfunction or failure.
-

[Installation Precautions]

WARNING

- Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may result in electric shock or cause the module to fail or malfunction.
-

[Installation Precautions]

CAUTION

- Use this product in an environment that meets the general specifications in this manual. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
 - When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
 - Do not directly touch any conductive parts of connectors on the modules. Doing so can cause malfunction or failure of the module.
-

[Wiring Precautions]

WARNING

- Shut off the external power supply (all phases) used in the system before installation and wiring. Failure to do so may result in electric shock or cause the module to fail or malfunction.
-

[Wiring Precautions]

CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.
 - Check the rated voltage and signal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause fire or failure.
 - Securely connect the connector to the module. Poor contact may cause malfunction.
 - Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
 - Place the cables in a duct or clamp them. If not, dangling cables may swing or inadvertently be pulled, resulting in malfunction or damage to modules or cables.
In addition, the weight of the cables may put stress on modules in an environment of strong vibrations and shocks.
Do not clamp the extension cables with the jacket stripped. Doing so may change the characteristics of the cables, resulting in malfunction.
 - Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the module and external device.
 - When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable.
 - Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.
 - Do not apply the 24VDC power before connecting a sensor head. If the power is applied before wiring, normal data transmission is not guaranteed.
-

[Startup and Maintenance Precautions]

WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
 - Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the connector screws or module fixing screws. Failure to do so may result in electric shock.
 - For the operating status of each station after a communication failure, refer to manuals relevant to the network. Incorrect output or malfunction due to a communication failure may result in an accident.
-

[Startup and Maintenance Precautions]

CAUTION

- Do not disassemble or modify the modules. Doing so may cause failure, malfunction, injury, or a fire.
 - Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm away in all directions from the programmable controller. Failure to do so may cause malfunction.
 - Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may cause the module to fail or malfunction.
 - Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.
 - Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.
-

[Operating Precautions]

CAUTION

- When using the product to control the system, read relevant manuals carefully and ensure the safety before operation. Incorrect change or modification may cause system malfunction, damage to the machines, or accidents.
 - Do not power off the control module while the settings are being written. Doing so will make the data in the flash ROM undefined. The values need to be written to the flash ROM again. Doing so can cause malfunction or failure of the module.
-

[Disposal Precautions]

CAUTION

- When disposing of this product, treat it as industrial waste.
-

[Transportation Precautions]

CAUTION

- The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the product. Prevent the entry of fumigant residues into the product or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.
-

CONDITIONS OF USE FOR THE PRODUCT

- (1) Mitsubishi's laser displacement sensor must be used in applications which do not lead to serious accidents even in cases where failure/nonconformity was unlikely to occur in the laser displacement sensor, as well as, application which execute backup and failsafe functions in systems through external devices when a failure or defect has occurred.
- (2) Mitsubishi's laser displacement sensor was designed/manufactured as a general-purpose product which was designed for use in general industries, etc. Accordingly, the applications of Mitsubishi's laser displacement sensor shall be exempt for usage in special applications such as devices and systems as stated below. In the unlikely event that it is used, we bare no responsibility (includes, but is not limited to debt defaults, defective warranty, QA, illegal acts, and product liabilities) for the quality performance, and safety of Mitsubishi's laser displacement sensor.
 - Large applications which greatly affect the public such as, nuclear power plants operated by each power company and other nuclear power plants
 - Application which request Mitsubishi to construct special QA structures such as railway companies and government offices.
 - Application such as aerospace, medicine, railway, combustion-fuel system, passenger cars, manned transfer equipment, entertainment devices, and safety devices that are expected to greatly affect lives, the body and properties

Mitsubishi's information desk should be contacted for more information as the laser displacement sensor may be applicable at the discretion of Mitsubishi, on the condition that the application is strictly limited and special qualities (exceeding the general specifications, etc.) are not required even in the above applications.

INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC iQ-R series programmable controllers.

This manual describes the installation methods, specifications, and maintenance and inspection of the relevant products listed below.

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the MELSEC iQ-R series programmable controller to handle the product correctly.

Please make sure that the end users read this manual.

Relevant products

■Sensor head

MH11H01A0SNA, MH11H01A1SNA, MH11H01A2SNA, MH11H03B0SNA, MH11H05B0SNA, MH11H05C0SNA, MH11H08B0SNA, MH11H08C0SNA, MH11H11B0SNA, MH11H11C0SNA, MH11H35B0SNA, MH11H35C0SNA, MH11H35C3SNA, MH11H01A0LNA, MH11H01A1LNA, MH11H01A2LNA, MH11H03B0LNA, MH11H05B0LNA, MH11H05C0LNA, MH11H08B0LNA, MH11H08C0LNA, MH11H11B0LNA, MH11H11C0LNA, MH11H35B0LNA, MH11H35C0LNA, MH11H35C3LNA

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RELEVANT MANUALS

Manual name [manual number]	Description	Available form
MELSEC iQ-R Laser Displacement Sensor Control Module User's Manual (Sensor Head) [SH-082023ENG] (this manual)	Precautions for using the sensor head, installation methods, specifications, and maintenance and inspection	Print book e-Manual PDF
MELSEC iQ-R Laser Displacement Sensor Control Module User's Manual (Startup) [SH-082017ENG]	Specifications, procedures before operation, system configuration, wiring, and operation examples of the laser displacement sensor control module	Print book e-Manual PDF
MELSEC iQ-R Laser Displacement Sensor Control Module User's Manual (Application) [SH-082019ENG]	Functions, parameter settings, timing charts, troubleshooting, I/O signals, and buffer memory of the laser displacement sensor control module	Print book e-Manual PDF



e-Manual refers to the Mitsubishi Electric FA electronic book manuals that can be browsed using a dedicated tool.

e-Manual has the following features:

- Required information can be cross-searched in multiple manuals.
- Other manuals can be accessed from the links in the manual.
- The hardware specifications of each part can be found from the product figures.
- Pages that users often browse can be bookmarked.
- Sample programs can be copied to an engineering tool.

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Engineering tool	A tool used for setting up programmable controllers, programming, debugging, and maintenance
Measurement center distance	The distance from the light emitting part of the sensor head to the center of the measurement range.
Measurement range	The range where the resolution and linearity are guaranteed, and the displacement can be measured.

GENERIC TERMS AND ABBREVIATIONS

Unless otherwise specified, this manual uses the following generic terms and abbreviations.

Generic term/abbreviation	Description
Control module	An abbreviation for the MELSEC iQ-R laser displacement sensor control module
Laser displacement sensor	The generic term for the sensor head and the control module
F.S.	An abbreviation for Full Scale. When the measurement range is $\pm 5\text{mm}$, F.S. becomes 10mm.
Sensor head	An abbreviation for the laser displacement sensor MH11 sensor head
Setting tool	An abbreviation for the laser displacement sensor MH11 SettingTool Version 2

1 BEFORE USING THE PRODUCT

This chapter describes the installing method and connection method of the sensor head.

1.1 Correct Usage Method

Regarding execution and use of the sensor head, be aware of the following.

Installation environment

Do not install the product in the following conditions.

- Where the ambient temperature, ambient humidity, or ambient illuminance of light receiving surface is beyond the range of specifications (☞ Page 12 Usage environment)
- Where dew condensation occurs due to rapid temperature change
- In an atmosphere of corrosive gas or flammable gas
- Where the product is exposed to dust, iron powder, and salt
- In an atmosphere which is likely to be exposed to organic solvent such as benzene, thinner, or alcohol, or to strong alkaline materials such as ammonia or sodium hydroxide
- Where heavy vibration or impact is applied
- Where direct sunlight is received
- Where water, oil, or chemicals splashes
- Where load is applied to the product

Usage environment

■Ambient temperature

Use the sensor head within the specifications range of 0 to 45°C. (☞ Page 38 SPECIFICATIONS)

Store the product within the ambient temperature range of -20 to 70°C.

The life of the semiconductor laser depends on the ambient temperature during use. When using the product near a heat source, take measures to lower the ambient temperature of the sensor head as possible. Install the sensor head on a device having good heat radiation because the sensor head itself emits heat.

Precautions

For MH11H11□□□NA, when installing two sensor heads in parallel at a 20mm or less interval, install each sensor head on an aluminum or iron plate having a 200cm² or more surface area.

■Ambient humidity

Use the controller within a range of 35% to 85% (RH).

Do not, however, use the controller in places where a drastic temperature change may result in dew condensation.

■Light receiving surface ambient illuminance

Use the system with illuminance of 3000lx or less at light receiving surface using an incandescent lamp.

■Environment

- Water, oil, or fingerprints on the light emitting part and light receiving part of a sensor head refracts light. Dust and dirt on them block light. Keep them clean at all times. When cleaning these parts, wipe them off using a soft lint-free cloth or lens cleaning paper.
- Install the sensor head so that ambient light such as sunlight or light with the same wavelength as laser beam does not enter the light receiver. If high accuracy is required, install a light shielding plate or the like on the sensor head.
- Do not use the product in dusty places or that exposed to flammable or corrosive gases, droplet, direct sunlight, severe vibration, or impact.

Protective structure

Although the sensor head is waterproof, the control module and connectors are not structurally dustproof, waterproof, or corrosion-resistant. Therefore, measurement underwater or in the rain is not allowed. Be aware of the usage environment.

Warming up time

Allow at least 30 minutes of warming up after emitted laser beam from a sensor head to ensure the performance of the sensor head.

Measures to reduce noise

- Install the product as far away as possible from noise source such as high-voltage lines, high-voltage device, power lines, power device, machines which generate a large starting and stopping surge, welding machines, and inverter motor.
- Install the product as far away as possible from a wireless device that has a transmitter, such as an amateur radio device.
- Do not run the sensor head cable along (bundled in parallel) with other wirings. Keep it at least 100mm away from other wires. Run the cable so that it is separate from high voltage and power circuit lines. If it is necessary to run the cable in parallel with them, shield the cable by running it through a grounded electrical conduit.

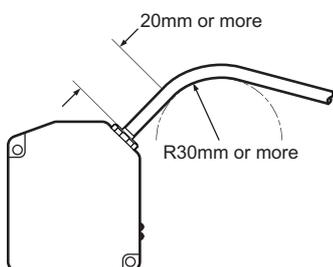
Connecting

■Connector

- Turn off the power of the programmable controller before connecting or disconnecting the connectors and any other connections.
- When connecting or disconnecting the sensor head, be sure to hold the connector part of the sensor head cable not to apply extra force to the cable.
- Be careful not to touch the terminals of disconnected connectors or to let foreign objects get in disconnected connectors.
- Be careful not to apply force to around the connectors of sensor head cable and extension cable for sensor head. Do not bend the cables near connectors of the sensor head. Doing so causes disconnection of the cables.
- Fit the connector of the sensor head cable to the plug-in side of the connector.

■Sensor head cable

- Do not pull the cable using a force 29.4N or more when routing the cable with the sensor head and control module fixed. Doing so may cause disconnection of the cable. At least 20mm is required from the cable connection to the bend. The bending radius must be 30mm or more.



- When moving the sensor head during operation, make sure that the cable is not bent while moving it.

■Extension cable for sensor head

- Use only one extension cable for sensor head for connection between one sensor head and a controller.
- When moving the sensor head during operation, use the replaceable extension cable for the bending part and movable part. The bending radius of the extension cable must be 30mm or more for the fixed part, and 60mm or more for the movable part. Do not apply tensile stress to the cable.
- When a 30m extension cable is used, an automatic head adjustment error, a head system failure, a measurement alarm, or a measurement value destabilization may occur due to noise or ambient light. In such a case, check that the following items and take actions. When using the 30m extension cable, do not use the received light intensity data and received light intensity waveform data for the judgment processing.

Item	Action	Reference
Automatic head adjustment error	<ul style="list-style-type: none"> • Use the protective equipment such as a laser protective window to prevent the ambient light from coming into the light receiving part. • Take measures to reduce noise to use the sensor head. 	—
Head system failure	<ul style="list-style-type: none"> • Take measures to reduce noise to use the sensor head. 	
Measurement alarm	<ul style="list-style-type: none"> • Turn on "Alarm output delay" and increase the number of the alarm output delay times. • Take measures to reduce noise to use the sensor head. 	For details on the "Alarm output delay" and "Alarm delay times", refer to the following. MELSEC iQ-R Laser Displacement Sensor Control Module User's Manual (Application)
Measurement value destabilization	<ul style="list-style-type: none"> • Increase the number of the moving average times. • Use the median filter. • Set the "Measurement value output at alarm" to "Hold last value". • Take measures to reduce noise to use the sensor head. 	For details on the number of moving average times, median filter, and measurement value output at alarm, refer to the following. MELSEC iQ-R Laser Displacement Sensor Control Module User's Manual (Application)

1.2 Handling of Laser Products

JIS/IEC/GB

A semiconductor laser is used as the beam source of the sensor.

The laser class is classified based on the JIS (JIS C 6802: 2014), IEC (IEC 60825-1: 2014), and GB standards (GB 7247.1: 2012).

Class	Maximum output	Wavelength	Model name
1	0.1mW*1	658nm	MH11H01A□□NA
2	1mW	658nm	MH11H03B0□□NA, MH11H05B0□□NA, MH11H08B0□□NA, MH11H11B0□□NA, MH11H35B0□□NA
3R	5mW	658nm	MH11H05C0□□NA, MH11H08C0□□NA, MH11H11C0□□NA, MH11H35C□□NA

*1 MH11H01A2□□NA: 0.3mW



Before handling laser products, read "Precautions for using laser products" in safety precautions carefully.

■Caution

- Please consult your local Mitsubishi representative if the product breaks down.
- Do not use the product in a way other than specified in this manual. Users may be exposed to hazardous laser radiation if the device is controlled or adjusted in procedures not specified in this manual.
- Before use, carefully read the content of the warning labels shown below. The warning label is posted on the side surface of the sensor head. Use the warning label including in the sensor head packaging as needed.

■Warning label

- 10mm type (MH11H01A0SNA, MH11H01A0LNA)

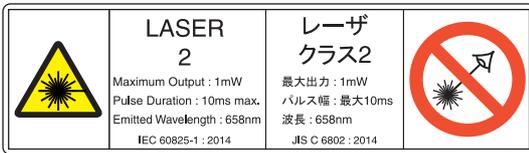


[Label position]



- 30mm type (MH11H03B0SNA, MH11H03B0LNA)

Japanese/English



Korean/Chinese



[Label position]



- 50mm type (MH11H05B0SNA, MH11H05B0LNA)

Japanese/English

	LASER 2 Maximum Output : 1mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	レーザ クラス2 最大出力 : 1mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	
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Korean/Chinese

	激光辐射 勿直视光束 最大输出: 1mW 脉宽: 最大10ms 波长: 658nm 2类激光产品 GB7247.1 : 2012	레이저 방사 빔을 주시하지 마시오. (최대 출력) 1mW (펄스 지속 시간) 최대10ms (파장) 658nm 2등급 레이저 제품 IEC60825-1 : 2007
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[Label position]



- 50mm type (MH11H05C0SNA, MH11H05C0LNA)

Japanese/English

	CAUTION	注意	
	LASER 3R	レーザ クラス3R	
	Maximum Output : 5mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	最大出力 : 5mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	

	注意	CAUTION	
	レーザ クラス3R	LASER 3R	
	最大出力 : 5mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	Maximum Output : 5mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	

Korean/Chinese

	激光辐射 避免眼睛受到直接照射	레이저 방사 직접 눈 노출을 피하십시오.
	最大输出 : 5mW 脉宽 : 最大10ms 波长 : 658nm 3R类激光产品 GB7247.1 : 2012	(최대 출력) 5mW (펄스 지속 시간) 최대10ms (파장) 658nm 3R등급 레이저 제품 IEC60825-1 : 2007
	激光窗口	레이저 개구

레이저 방사 직접 눈 노출을 피하십시오.	激光辐射 避免眼睛受到直接照射	
(최대 출력) 5mW (펄스 지속 시간) 최대10ms (파장) 658nm 3R등급 레이저 제품 IEC60825-1 : 2007	最大输出 : 5mW 脉宽 : 最大10ms 波长 : 658nm 3R类激光产品 GB7247.1 : 2012	
레이저 개구	激光窗口	

[Label position]



- 85mm type (MH11H08B0SNA, MH11H08B0LNA)

Japanese/English

	LASER 2 Maximum Output : 1mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	レーザ クラス2 最大出力 : 1mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	

Korean/Chinese

	激光辐射 勿直视光束 最大输出 : 1mW 脉宽 : 最大10ms 波长 : 658nm 2类激光产品 GB7247.1 : 2012	레이저 방사 빔을 주시하지 마시오. (최대 출력) 1mW (펄스 지속 시간) 최대 10ms (파장) 658nm 2등급 레이저 제품 IEC60825-1 : 2007

[Label position]



- 85mm type (MH11H08C0SNA, MH11H08C0LNA)

Japanese/English

	CAUTION LASER 3R Maximum Output : 5mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	注意 レーザ クラス3R 最大出力 : 5mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	
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	注意 レーザ クラス3R 最大出力 : 5mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	CAUTION LASER 3R Maximum Output : 5mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	
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Korean/Chinese

	激光辐射 避免眼睛受到直接照射 最大输出 : 5mW 脉宽 : 最大10ms 波长 : 658nm 3R类激光产品 GB7247.1 : 2012	레이저 방사 직접 눈 노출을 피하십시오. (최대 출력) 5mW (펄스 지속 시간) 최대10ms (파장) 658nm 3R등급 레이저 제품 IEC60825-1 : 2007	
	激光窗口	레이저 개구	

	레이저 방사 직접 눈 노출을 피하십시오. (최대 출력) 5mW (펄스 지속 시간) 최대10ms (파장) 658nm 3R등급 레이저 제품 IEC60825-1 : 2007	激光辐射 避免眼睛受到直接照射 最大输出 : 5mW 脉宽 : 最大10ms 波长 : 658nm 3R类激光产品 GB7247.1 : 2012	
	레이저 개구	激光窗口	

[Label position]



- 110mm type (MH11H11B0SNA, MH11H11B0LNA)

Japanese/English

	LASER 2 Maximum Output : 1mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	レーザ クラス2 最大出力 : 1mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	
-----------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------

Korean/Chinese

	激光辐射 勿直视光束 最大输出: 1mW 脉宽: 最大10ms 波长: 658nm 2类激光产品 GB7247.1 : 2012	레이저 방사 빔을 주시하지 마시오. (최대 출력) 1mW (펄스 지속 시간) 최대 10ms (파장) 658nm 2등급 레이저 제품 IEC60825-1 : 2007
-----------------------------------------------------------------------------------	------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------

[Label position]



- 110mm type (MH11H11C0SNA, MH11H11C0LNA)

Japanese/English

	CAUTION LASER 3R Maximum Output : 5mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	注意 レーザ クラス3R 最大出力 : 5mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	

	注意 レーザ クラス3R 最大出力 : 5mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	CAUTION LASER 3R Maximum Output : 5mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	

Korean/Chinese

	激光辐射 避免眼睛受到直接照射 最大输出 : 5mW 脉宽 : 最大10ms 波长 : 658nm 3R类激光产品 GB7247.1 : 2012	레이저 방사 직접 눈 노출을 피하십시오. (최대 출력) 5mW (펄스 지속 시간) 최대10ms (파장) 658nm 3R등급 레이저 제품 IEC60825-1 : 2007	
	激光窗口	레이저 개구	

	레이저 방사 직접 눈 노출을 피하십시오. (최대 출력) 5mW (펄스 지속 시간) 최대10ms (파장) 658nm 3R등급 레이저 제품 IEC60825-1 : 2007	激光辐射 避免眼睛受到直接照射 最大输出 : 5mW 脉宽 : 最大10ms 波长 : 658nm 3R类激光产品 GB7247.1 : 2012	
	레이저 개구	激光窗口	

[Label position]



- 350mm type (MH11H35B0SNA, MH11H35B0LNA)

Japanese/English

	LASER 2 Maximum Output : 1mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	レーザ クラス2 最大出力 : 1mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	
-----------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------

Korean/Chinese

	激光辐射 勿直视光束 最大输出: 1mW 脉宽: 最大10ms 波长: 658nm 2类激光产品 GB7247.1 : 2012	레이저 방사 빔을 주시하지 마시오. (최대 출력) 1mW (펄스 지속 시간) 최대 10ms (파장) 658nm 2등급 레이저 제품 IEC60825-1 : 2007
-----------------------------------------------------------------------------------	------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------

[Label position]



- 350mm type (MH11H35C0SNA, MH11H35C0LNA)

Japanese/English

	CAUTION	注意	
	LASER 3R	レーザ クラス3R	
	Maximum Output : 5mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	最大出力 : 5mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	

	注意	CAUTION	
	レーザ クラス3R	LASER 3R	
	最大出力 : 5mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	Maximum Output : 5mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	

Korean/Chinese

	激光辐射 避免眼睛受到直接照射	레이저 방사 직접 눈 노출을 피하십시오.
	最大输出 : 5mW 脉宽 : 最大10ms 波长 : 658nm 3R类激光产品 GB7247.1 : 2012	(최대 출력) 5mW (펄스 지속 시간) 최대10ms (파장) 658nm 3R등급 레이저 제품 IEC60825-1 : 2007
	激光窗口	레이저 개구

레이저 방사 직접 눈 노출을 피하십시오.	激光辐射 避免眼睛受到直接照射	
(최대 출력) 5mW (펄스 지속 시간) 최대10ms (파장) 658nm 3R등급 레이저 제품 IEC60825-1 : 2007	最大输出 : 5mW 脉宽 : 最大10ms 波长 : 658nm 3R类激光产品 GB7247.1 : 2012	
레이저 개구	激光窗口	

[Label position]



- 350mm type (MH11H35C3SNA, MH11H35C3LNA)

Japanese/English

	CAUTION	注意	
	LASER 3R	レーザ クラス3R	
	Maximum Output : 5mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	最大出力 : 5mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	

	注意	CAUTION	
	レーザ クラス3R	LASER 3R	
	最大出力 : 5mW パルス幅 : 最大10ms 波長 : 658nm JIS C 6802 : 2014	Maximum Output : 5mW Pulse Duration : 10ms max. Emitted Wavelength : 658nm IEC 60825-1 : 2014	

Korean/Chinese

	激光辐射 避免眼睛受到直接照射	레이저 방사 직접 눈 노출을 피하십시오.
	最大输出 : 5mW 脉宽 : 最大10ms 波长 : 658nm 3R类激光产品 GB7247.1 : 2012	(최대 출력) 5mW (펄스 지속 시간) 최대10ms (파장) 658nm 3R등급 레이저 제품 IEC60825-1 : 2007
	激光窗口	레이저 개구

레이저 방사 직접 눈 노출을 피하십시오.	激光辐射 避免眼睛受到直接照射	
(최대 출력) 5mW (펄스 지속 시간) 최대10ms (파장) 658nm 3R등급 레이저 제품 IEC60825-1 : 2007	最大输出 : 5mW 脉宽 : 最大10ms 波长 : 658nm 3R类激光产品 GB7247.1 : 2012	
레이저 개구	激光窗口	

[Label position]



- 8mm type (MH11H01A1SNA, MH11H01A1LNA)



- 15mm type (MH11H01A2SNA, MH11H01A2LNA)



[Label position]

MH11H01A1SNA, MH11H01A1LNA



MH11H01A2SNA, MH11H01A2LNA



■ Preventive measures against damage caused by laser light

When using this product, each country should observe related laws and regulations of its own country to prevent damage caused by laser light. For Japan, under the Industrial Safety and Health Act, the detailed safety preventive measures for operations handling laser equipment other than that of class 1 and 2 and operations that are exposed to laser light are established in "Preventive measures against damage caused by laser light". The following lists the measure standards for each class of laser equipment.

○: Required, ×: Optional

Measure			Description	Class of laser equipment				
				4	3B	3R*1		2M, 1M
						Invisible	Visible	
Appointment of administrators of laser equipment			Appoint controllers of laser equipment from the workers who have sufficient knowledge and experience with laser equipment handling and laser light prevention.	○	○	○	×	×
Controlled area (off-limits area with a sign)			Separate the off-limits areas from other areas and indicate them with signs. Allow only authorized personnel to enter there.	○	○	×	×	×
Laser equipment	Laser light path	Position of light path	Set the light path avoiding the eye height of the workers.	○	○	○	○	○
		Appropriate design of light path and light blocking	Make the optical path as short as possible to minimize the number of bend times and block the light as much as possible without crossing the optical path and walking path.	○	○	○	×	×
		Appropriate termination of light	Terminate the light path with a diffuse reflector or an absorber with appropriate reflectance and heat resistance.	○	○	○	×	○*2
	Key control		A structure activated by using a key or others	○	○	×	×	×
	Emergency stop switch or other devices	Emergency stop switch	An emergency stop switch which immediately stops laser light emission	○	○	×	×	×
		Warning device	A warning device, such as an automatic indicator, which enables prompt check of laser light	○	○	○	×	×
		Shutter	A shutter which avoids accidental laser emission from a laser emission aperture	○	○	×	×	×
	Interlock system or other systems		Stop laser emission automatically when a controlled area is open or a light path is unblocked.	○	○	×	×	×
	Indication of laser emission aperture		Display the indication at the laser light emission aperture.	○	○	○	○	×
	Work management, health management, and other managements	Operating position		Position which is as far as possible from laser light	○	×	×	×
Measures in adjusting the optical system		Minimalize the laser light output when adjusting the optical system.	○	○	○	○	○	
Protective gear		Safety goggles	Wear effective safety goggles depending on the type of the laser light.	○	○	○	×	×
		Work clothes with little skin exposure	Wear work clothes with as little skin exposure as possible.	○	○	×	×	×
		Use of flame-retardant materials	Wear clothes made of flame-retardant materials (in particular, chemical fibers which melt and turn into beads are not suitable).	○	×	×	×	×
Inspection and maintenance		Perform start-up inspection, periodic inspection, and maintenance.	○	○	○	○	○	
Safety and health education		Perform education when hiring workers, reassigning workers, and changing laser equipment.	○	○	○	○	○	
Healthcare		Examination of anterior eye part (cornea and crystalline lens)	Perform examination of anterior eye part along with a visual acuity examination when hiring or reassigning workers.	○	○	○	×	×
	Examination of the ocular fundus	Perform examination of ocular fundus along with a visual acuity examination when hiring or reassigning workers.	○	×	×	×	×	

Measure			Description	Class of laser equipment				
				4	3B	3R ^{*1}		2M, 1M
						Invisible	Visible	
Others	Indication	Administrator of laser equipment	Put the name of the laser equipment administrator to an easily viewable place.	○	○	○	×	×
		Hazardous nature and harmful effects, and precautions	Put the indications of hazardous nature, harmful effects, and precautions of laser light to an easily viewable place.	○	○	○	○	○
		Installation of laser equipment	Put a sign of laser equipment to an easily viewable place.	○	○	×	×	×
	Indication of high-voltage parts of laser equipment	Put a sign of high-voltage parts and take measures for electrical shock prevention.	○	○	○	○	○	
	Prohibition of bringing hazardous materials	Prohibit the bringing of explosive or flammable materials.	○	○	×	×	×	
	Measures against hazardous gases and dust	Measures established by the Japanese Industrial Safety and Health Act	○	○	×	×	×	
	Medical examination and treatment of workers who may have been affected by laser light	Prompt medical examination and treatment	○	○	○	○	○	

*1 Visible light indicates the light with wavelength of 400 to 700nm. Invisible light indicates the light with a wavelength range outside the wavelength range of visible light.

*2 Measures need to be taken at the termination of the light path for the products from which laser lights are output in parallel.



For details on "Preventive measures against damage caused by laser light", refer to the website of the Ministry of Health, Labour and Welfare.

FDA

■Export to the United States

When mounting the product on equipment and machinery, and exporting to the United States, it is subject to the laser regulation standards at the U.S. FDA (Food and Drug Administration). The FDA standard PART1040 (Performance Standards for Light-Emitting Products) was established to prevent beforehand the occurrence of damage to users of laser products. In this standard, the regulation classifies laser products according to the level of hazard, and provides the safety measures for classes. Refer to the sensor head specifications (light source). (☞ Page 39 Sensor Head Specifications)

■FDA-compliant product

The laser displacement sensor MH11 sensor heads are all FDA-compliant products.

Laser classes are classified according to the FDA Laser Notice No.50 and complied with IEC 60825-1.

■Label display

A warning label based on FDA standards is attached on this product.

For the warning label and label position, refer to the following.

(☞ Page 16 Warning label)

1.3 Accessories and Products Sold Separately

Accessory

In the sensor head packaging, the following items are included. Before using the product, check that all items are included.

■MH11H01A□□NA

Item	Quantity
Sensor head	1
Laser warning label (written in Japanese, English, Chinese, and Korean)	1
"Before Using the Product" (document)	1

■MH11H□□B0□NA

Item	Quantity
Sensor head	1
Laser warning label (written in Japanese and English)	1
Laser warning label (written in Chinese and Korean)	2
"Before Using the Product" (document)	1

■MH11H□□C□□NA

Item	Quantity
Sensor head	1
Laser warning label (written in Japanese and English)	2
Laser warning label (written in Chinese and Korean)	2
"Before Using the Product" (document)	1

Point

- If the attached label is hidden when the sensor head is installed in the device, attach the enclosed laser warning label near the light emitting part.
- When MH11H□□B0□NA or MH11H□□C□□NA is used in a Chinese- or Korean-speaking region, attach the Chinese/Korean laser warning label.

ND filter (sold separately)

The following shows the recommended ND filter.

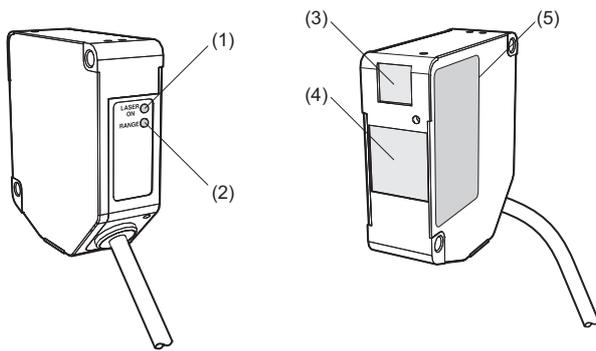
- MH11F98 ( Page 53 ND Filter Specifications)

Extension cable for sensor head (sold separately)

Extension cable for sensor head includes the following products. (All the cables are bending resistant.)

Model name	Remarks
MH11C20EX	Length: 2m, Weight: Approx. 0.2kg
MH11C50EX	Length: 5m, Weight: Approx. 0.4kg
MH11C100EX	Length: 10m, Weight: Approx. 0.7kg
MH11C200EX	Length: 20m, Weight: Approx. 1.4kg
MH11C300EX	Length: 30m, Weight: Approx. 2.0kg

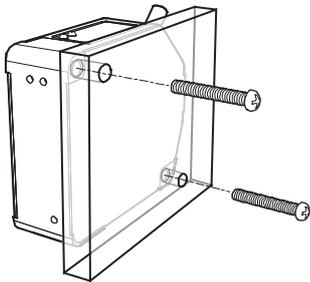
1.4 Part Names



No.	Item	Description
(1)	Laser radiation indicator (LASER ON)	Laser emission status is displayed. <ul style="list-style-type: none"> • On: Laser emission (green) • Off: Laser stop Take safety measures according to the laser classes. A laser beam is emitting when the laser radiation indicator is on. (☞ Page 27 Preventive measures against damage caused by laser light)
(2)	Measurement range indicator (RANGE)	Measurement value status is displayed. <ul style="list-style-type: none"> • On: Around the measurement center (yellow) • Flashing: Within the measurement range (yellow) • Off: Outside the measurement range A measurement range indicator (RANGE) of the sensor head that is not specified in output selection turns off.
(3)	Light emitting part	Emits a laser beam.
(4)	Light receiving part	Receives light reflected from the measurement object.
(5)	Warning label	Shows the laser radiation position. Be aware of the description.

1.5 Installation Method

Before installing the sensor head, check the installation environment. (☞ Page 12 Correct Usage Method)
With screw holes in two locations on the sensor head, use M5 screws to firmly fix the head in place.
The user is asked to provide M5 screws for installing.



Precautions

- Set the tightening torque to 1.2N·m or less.
- The two screw holes are both 10mm deep and not through holes. Select screws with awareness of the screw length.

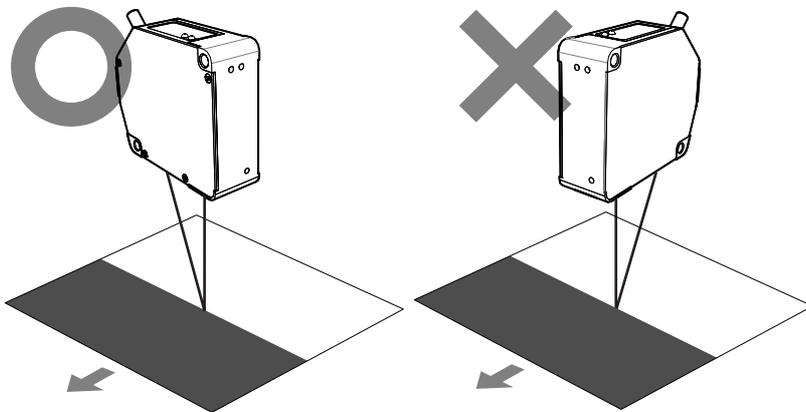
Installation direction

For more accurate measurement, and for more stable measurement, install the sensor head in the directions shown below in relation to the measurement object.

■Direction in relation to a moving object

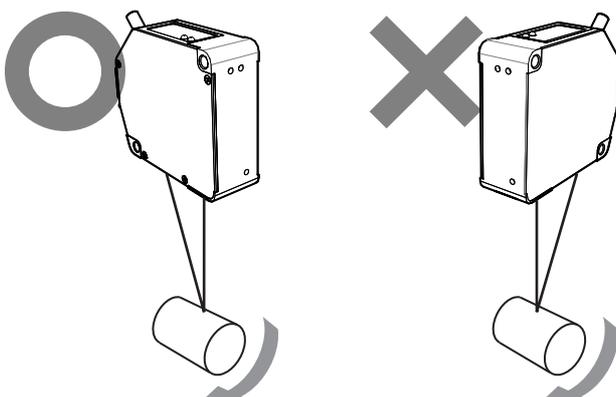
- When there are differences in materials or color

When performing measurement of a moving measurement target object with extremely different materials and colors, the sensor head can be installed in the direction shown below to hold the measurement errors to a minimum.



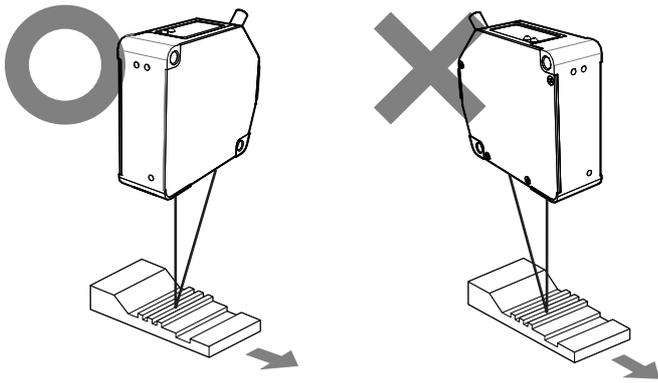
- Measurement of a rotating target object

When performing measurement of a rotating target object, the sensor head can be installed as shown below to perform measurement while suppressing the effects of up and down shaking or position drift of the target object.



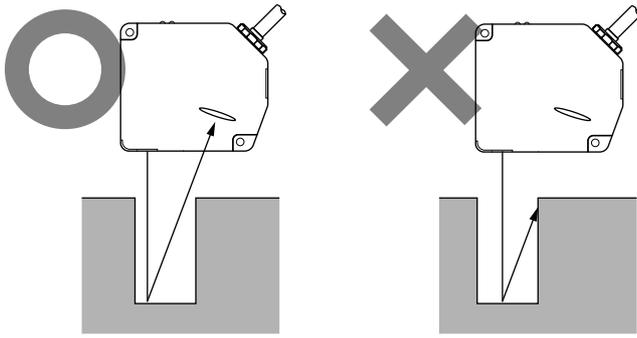
- When there are step differences

When there are step differences in a moving target object measurement, the sensor head can be installed as shown below to perform measurement while suppressing the effects of step edges.



■Measurement in narrow space or concave area

When performing measurement in a narrow space or hole, install the sensor head so that the light path from the light emitting part to the light receiving part is not blocked.

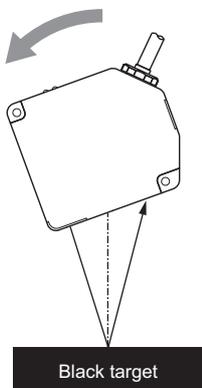


■When the measurement object is black, or when light intensity is insufficient

When performing measurement of black target object with low reflectance, the light intensity entering the light receiving part reduces, and the signal obtained from the linear image sensor becomes small, resulting in a decline in resolution.

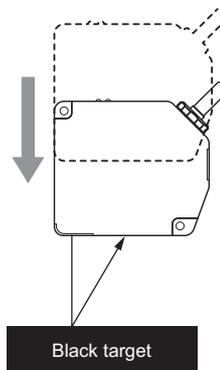
In this case, perform installing as follows to boost the received light intensity.

■Specular reflection installing



A specular reflection component with a large reflected light amount is received, for improved accuracy.

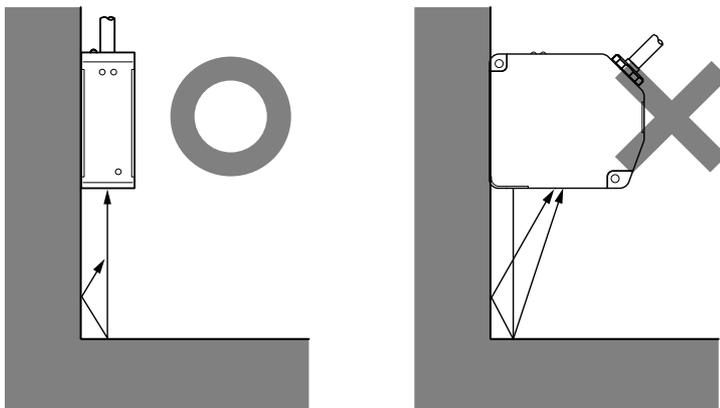
■Approaching the measurement object



The received light intensity is in inverse proportion to the square of the distance from the measurement object. When the distance to the measurement object is shortened, the received light intensity increases.

■When installing the sensor head on a wall surface

To avoid multiple reflected lights on a wall surface from entering the light receiving part, install the sensor head as shown below. In addition, when the reflectance of the wall surface is high, setting to a non-glossy black color can be effective.

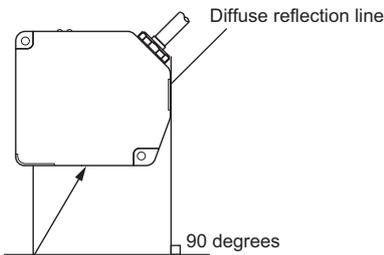


■ Center of measurement and sensor head angle

• Diffuse reflection measurement

As shown below, install the sensor head so that the surface of light emitting part and light receiving part is parallel to the measurement object.

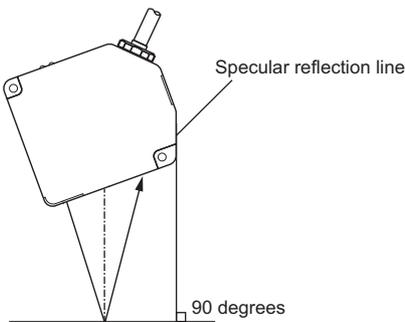
For the measurement center distance and measurement range, refer to the sensor head specifications. (☞ Page 39 Sensor Head Specifications)



• Specular reflection measurement

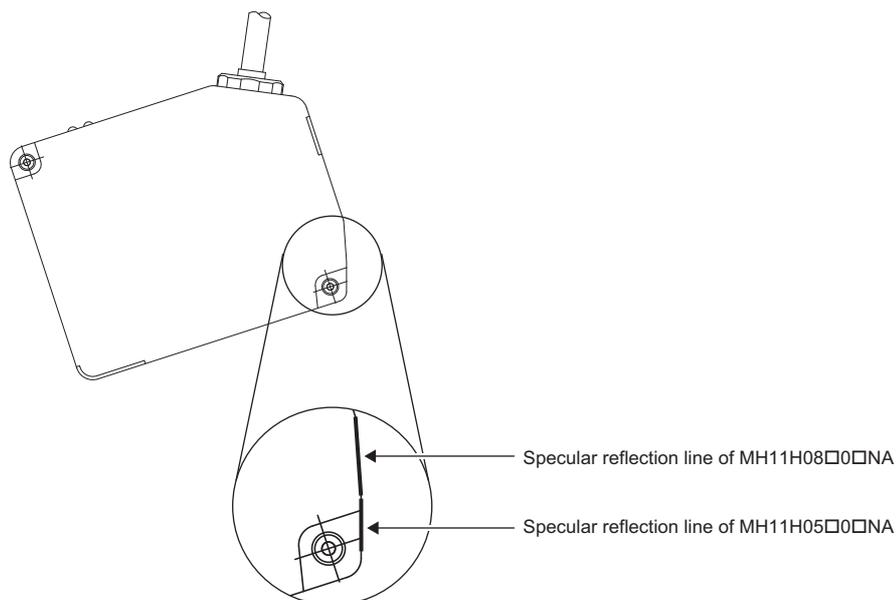
As shown below, install the sensor head so that the angles of the light emitting laser beam and light receiving laser beam to the measurement object is left-right symmetrical.

When positioned correctly, the measurement object and specular reflection line (slope of sensor head) are perpendicular to each other, as shown below. For the measurement center distance and measurement range, refer to the sensor head specifications. (☞ Page 39 Sensor Head Specifications)



Point

MH11H05□□□NA and MH11H08□□□NA have two installing surfaces. Note that the installing surfaces of the specular reflection lines differ between MH11H05□□□NA and MH11H08□□□NA.

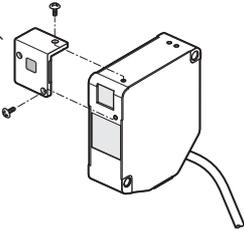


Attaching the ND filter

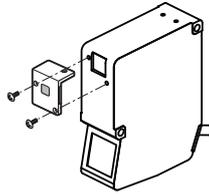
Attach the ND filter when the received light intensity is too large.

When attaching the ND filter, with screw holes in two locations on the sensor head, use the provided M2.6×4 bind screws to firmly fix the filter in place. Set the tightening torque to 0.3N·m or less.

ND filter



MH11H03B0□NA,
MH11H05□0□NA,
MH11H08□0□NA,
MH11H11□0□NA,
MH11H35C3□NA



MH11H35□0□NA

Precautions

Attach the ND filter with care to avoid leaving fingerprints or scratches on the glass area. In addition, if it gets contaminated with fingerprints or due to other reasons, use an optical cloth to wipe it down, so as to avoid scratching.

2 SPECIFICATIONS

This chapter describes the specifications for the sensor head and ND filter.

2.1 General Specifications

Item	Specifications
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed)
Storage ambient temperature	-20 to 70°C
Operating ambient humidity	35 to 85%RH, no dew condensation
Storage ambient humidity	35 to 85%RH, no dew condensation
Vibration resistance	Frequency: 10 to 55Hz Amplitude: 1.5mm Sweep: X, Y, Z directions (120 minutes each)
Shock resistance	196m/s ² , X, Y, Z directions, 3 times each
Operating atmosphere	No corrosive gas or flammable gas
Operating altitude	0 to 2000m
Installation location	Incandescent lamp: Light receiving surface illuminance of 3000lx or less Do not allow ambient light, such as sunlight or light with the same wavelength as laser beam, to enter the light receiving part.
Overvoltage category ^{*1}	II or less
Pollution degree ^{*2}	2 or less

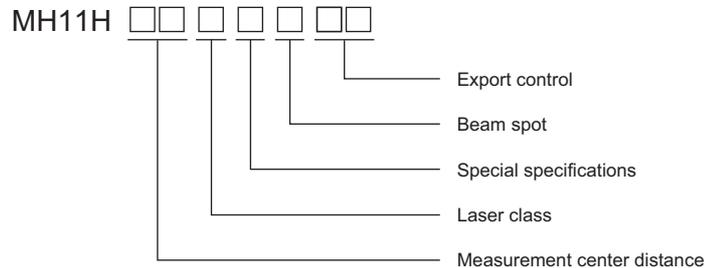
*1 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300V is 2500V.

*2 This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used. Pollution degree 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

2.2 Sensor Head Specifications

Sensor head model name

The sensor head displays the model name as shown below.



Item	Code	Description
Export regulation	NA	Products not subject to export regulations
Beam spot	S	Small spot
	L	Line spot
Special specifications	0	Normal product
	1	Special form product (8mm type)
	2	Special form product (15mm type)
	3	Wide measurement range product
Laser class	A	Class 1 (JIS/IEC/GB/FDA)
	B	Class 2 (JIS/IEC/GB/FDA)
	C	Class 3R (JIS/IEC/GB/FDA)
Measurement center distance	01	8mm/10mm/15mm type
	03	30mm type
	05	50mm type
	08	85mm type
	11	110mm type
	35	350mm type

Product specification notes

Measuring conditions are as follows unless otherwise specified: With the control module connected, power voltage of the control module: 24VDC, ambient temperature: 20°C, sampling cycle: 40μs, average times: 256, at measurement center distance, measurement object: white ceramic (8mm type and 10mm type are aluminum vapor deposition surface reflection mirror, and 15mm type is transparent glass), and digital measurement value.

10mm type

Item		MH11H01A0SNA	MH11H01A0LNA
Measurement method		Specular reflection	
Measurement center distance		10mm	
Measurement range*1		±1mm	
Beam source		Red semiconductor laser, Class 1 (JIS/IEC/GB/FDA) Max output: 0.1mW, Emission peak wavelength: 658nm	
Beam diameter*2		Approx. φ20μm	Approx. 20 × 700μm
Light receiving element		Linear image sensor	
Resolution		0.25μm/average times: 256	
Linearity		±0.02% F.S.	
Temperature characteristics		0.01% F.S./°C	
Safety distance (Normal ocular hazard distance: NOHD)*4		—	
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation	
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range	
Protective structure		IP67 (excluding the connector part)	
Pollution degree		2	
Insulation resistance		With 500VDC megger, 20MΩ or more (between all the terminals and case)	
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)	
	Impulse	±1000V, 1.2/50μs (between all the terminals and case)	
Vibration resistance		Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each	
Shock resistance		196m/s ² X, Y, Z directions, 3 times each	
Ambient illuminance		3000lx or less*3 (illuminance at light receiving surface using incandescent lamp)	
Operating ambient temperature		0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C	
Operating ambient humidity		35 to 85%RH At storage: 35 to 85%RH	
Operating altitude		0 to 2000m	
Material		Main body case, main body cover: Die-cast aluminum Front cover: Glass	
Cable length		0.5m	
Cable extension		The cable length can be extended to full length of 30m with the extension cable for sensor head.	
Weight		Approx. 250g (including the sensor head cable)	

For measuring conditions not specified, refer to the following.

 Page 39 Product specification notes

- *1 The measurement range is limited between 0.1 and 1.0mm (in case the sampling cycle is 20μs), or between 0.8 and 1.0mm (in case the sampling cycle is 10μs).
- *2 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *3 The variation in ambient illuminance is ±0.02% F.S. or less.
- *4 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

30mm type

Item	MH11H03B0SNA		MH11H03B0LNA	
	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection
Measurement method*1	Diffuse reflection/specular reflection			
Measurement center distance	30mm	26.4mm	30mm	26.4mm
Measurement range*2	±5mm	±4.6mm	±5mm	±4.6mm
Beam source	Red semiconductor laser, Class 2 (JIS/IEC/GB/FDA) Max output: 1mW, Emission peak wavelength: 658nm			
Beam diameter*3	Approx. ϕ 30 μ m		Approx. 30 × 1200 μ m	
Light receiving element	Linear image sensor			
Resolution	0.25 μ m/average times: 256			
Linearity	±0.03% F.S.			
Temperature characteristics	0.01% F.S./°C			
Safety distance (Normal ocular hazard distance: NOHD)*5	0.4m			
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation		
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range		
Protective structure	IP67 (excluding the connector part)			
Pollution degree	2			
Insulation resistance	With 500VDC megger, 20M Ω or more (between all the terminals and case)			
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)		
	Impulse	±1000V, 1.2/50 μ s (between all the terminals and case)		
Vibration resistance	Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each			
Shock resistance	196m/s ² X, Y, Z directions, 3 times each			
Ambient illuminance	3000lx or less*4 (illuminance at light receiving surface using incandescent lamp)			
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C			
Operating ambient humidity	35 to 85%RH At storage: 35 to 85%RH			
Operating altitude	0 to 2000m			
Material	Main body case, main body cover: Die-cast aluminum Front cover: Glass			
Cable length	0.5m			
Cable extension	The cable length can be extended to full length of 30m with the extension cable for sensor head.			
Weight	Approx. 250g (including the sensor head cable)			

For measuring conditions not specified, refer to the following.

☞ Page 39 Product specification notes

- *1 Use the ND filter in case the amount of reflected beam is too large.
- *2 The measurement range is limited between 0 and 5.0mm (in case the sampling cycle is 20 μ s at diffuse reflection), between 0 and 4.6mm (in case the sampling cycle is 20 μ s at specular reflection), between 3.8 and 5.0mm (in case the sampling cycle is 10 μ s at diffuse reflection), or between 3.6 and 4.6mm (in case the sampling cycle is 10 μ s at specular reflection).
- *3 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *4 The variation in ambient illuminance is ±0.03% F.S. or less.
- *5 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

50mm type (Class 2)

Item	MH11H05B0SNA		MH11H05B0LNA	
	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection
Measurement method* ¹	Diffuse reflection/specular reflection			
Measurement center distance	50mm	46mm	50mm	46mm
Measurement range* ²	±5mm			
Beam source	Red semiconductor laser, Class 2 (JIS/IEC/GB/FDA) Max output: 1mW, Emission peak wavelength: 658nm			
Beam diameter* ³	Approx. ϕ 70 μ m		Approx. 70 × 1000 μ m	
Light receiving element	Linear image sensor			
Resolution	0.25 μ m/average times: 256			
Linearity	±0.03% F.S.			
Temperature characteristics	0.01% F.S./°C			
Safety distance (Normal ocular hazard distance: NOHD)* ⁵	0.4m			
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation		
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range		
Protective structure	IP67 (excluding the connector part)			
Pollution degree	2			
Insulation resistance	With 500VDC megger, 20M Ω or more (between all the terminals and case)			
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)		
	Impulse	±1000V, 1.2/50 μ s (between all the terminals and case)		
Vibration resistance	Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each			
Shock resistance	196m/s ² X, Y, Z directions, 3 times each			
Ambient illuminance	3000lx or less* ⁴ (illuminance at light receiving surface using incandescent lamp)			
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C			
Operating ambient humidity	35 to 85%RH At storage: 35 to 85%RH			
Operating altitude	0 to 2000m			
Material	Main body case, main body cover: Die-cast aluminum Front cover: Glass			
Cable length	0.5m			
Cable extension	The cable length can be extended to full length of 30m with the extension cable for sensor head.			
Weight	Approx. 300g (including the sensor head cable)			

For measuring conditions not specified, refer to the following.

 Page 39 Product specification notes

- *1 Use the ND filter in case the amount of reflected beam is too large.
- *2 The measurement range is limited between 0.5 and 5.0mm (in case the sampling cycle is 20 μ s at diffuse reflection), between 0.5 and 5.0mm (in case the sampling cycle is 20 μ s at specular reflection), between 4.7 and 5.0mm (in case the sampling cycle is 10 μ s at diffuse reflection), or between 4.6 and 5.0mm (in case the sampling cycle is 10 μ s at specular reflection).
- *3 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *4 The variation in ambient illuminance is ±0.03% F.S. or less.
- *5 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

50mm type (Class 3R)

Item	MH11H05C0SNA		MH11H05C0LNA	
	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection
Measurement method*1	Diffuse reflection/specular reflection			
Measurement center distance	50mm	46mm	50mm	46mm
Measurement range*2	±5mm			
Beam source	Red semiconductor laser, Class 3R (JIS/IEC/GB/FDA) Max output: 5mW, Emission peak wavelength: 658nm			
Beam diameter*3	Approx. ϕ 70 μ m		Approx. 70 × 1000 μ m	
Light receiving element	Linear image sensor			
Resolution	0.25 μ m/average times: 256			
Linearity	±0.03% F.S.			
Temperature characteristics	0.01% F.S./°C			
Safety distance (Normal ocular hazard distance: NOHD)*5	0.4m			
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation		
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range		
Protective structure	IP67 (excluding the connector part)			
Pollution degree	2			
Insulation resistance	With 500VDC megger, 20M Ω or more (between all the terminals and case)			
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)		
	Impulse	±1000V, 1.2/50 μ s (between all the terminals and case)		
Vibration resistance	Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each			
Shock resistance	196m/s ² X, Y, Z directions, 3 times each			
Ambient illuminance	3000lx or less*4 (illuminance at light receiving surface using incandescent lamp)			
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C			
Operating ambient humidity	35 to 85%RH At storage: 35 to 85%RH			
Operating altitude	0 to 2000m			
Material	Main body case, main body cover: Die-cast aluminum Front cover: Glass			
Cable length	0.5m			
Cable extension	The cable length can be extended to full length of 30m with the extension cable for sensor head.			
Weight	Approx. 300g (including the sensor head cable)			

For measuring conditions not specified, refer to the following.

 Page 39 Product specification notes

- *1 Use the ND filter in case the amount of reflected beam is too large.
- *2 The measurement range is limited between 0.5 and 5.0mm (in case the sampling cycle is 20 μ s at diffuse reflection), between 0.5 and 5.0mm (in case the sampling cycle is 20 μ s at specular reflection), between 4.7 and 5.0mm (in case the sampling cycle is 10 μ s at diffuse reflection), or between 4.6 and 5.0mm (in case the sampling cycle is 10 μ s at specular reflection).
- *3 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *4 The variation in ambient illuminance is ±0.03% F.S. or less.
- *5 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

85mm type (Class 2)

Item	MH11H08B0SNA		MH11H08B0LNA	
	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection
Measurement method* ¹	Diffuse reflection/specular reflection			
Measurement center distance	85mm	81.4mm	85mm	81.4mm
Measurement range* ²	±20mm	±6mm	±20mm	±6mm
Beam source	Red semiconductor laser, Class 2 (JIS/IEC/GB/FDA) Max output: 1mW, Emission peak wavelength: 658nm			
Beam diameter* ³	Approx. ϕ 100 μ m		Approx. 100 × 1200 μ m	
Light receiving element	Linear image sensor			
Resolution	0.6 μ m/average times 256, 0.25 μ m/average times: 4096			
Linearity	±0.03% F.S.	±0.1% F.S.	±0.03% F.S.	±0.1% F.S.
Temperature characteristics	0.01% F.S./°C			
Safety distance (Normal ocular hazard distance: NOHD)* ⁵	0.5m			
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation		
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range		
Protective structure	IP67 (excluding the connector part)			
Pollution degree	2			
Insulation resistance	With 500VDC megger, 20M Ω or more (between all the terminals and case)			
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)		
	Impulse	±1000V, 1.2/50 μ s (between all the terminals and case)		
Vibration resistance	Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each			
Shock resistance	196m/s ² X, Y, Z directions, 3 times each			
Ambient illuminance	3000lx or less* ⁴ (illuminance at light receiving surface using incandescent lamp)			
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C			
Operating ambient humidity	35 to 85%RH At storage: 35 to 85%RH			
Operating altitude	0 to 2000m			
Material	Main body case, main body cover: Die-cast aluminum Front cover: Glass			
Cable length	0.5m			
Cable extension	The cable length can be extended to full length of 30m with the extension cable for sensor head.			
Weight	Approx. 300g (including the sensor head cable)			

For measuring conditions not specified, refer to the following.

 Page 39 Product specification notes

- *1 Use the ND filter in case the amount of reflected beam is too large.
- *2 The measurement range is limited between 0 and 20mm (in case the sampling cycle is 20 μ s at diffuse reflection), between 0 and 6mm (in case the sampling cycle is 20 μ s at specular reflection), between 18 and 20mm (in case the sampling cycle is 10 μ s at diffuse reflection), or unmeasurable (in case the sampling cycle is 10 μ s at specular reflection).
- *3 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *4 The variation in ambient illuminance is ±0.03% F.S. or less.
- *5 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

85mm type (Class 3R)

Item	MH11H08C0SNA		MH11H08C0LNA	
	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection
Measurement method*1	Diffuse reflection/specular reflection			
Measurement center distance	85mm	81.4mm	85mm	81.4mm
Measurement range*2	±20mm	±6mm	±20mm	±6mm
Beam source	Red semiconductor laser, Class 3R (JIS/IEC/GB/FDA) Max output: 5mW, Emission peak wavelength: 658nm			
Beam diameter*3	Approx. ϕ 100 μ m		Approx. 100 × 1200 μ m	
Light receiving element	Linear image sensor			
Resolution	0.6 μ m/average times 256, 0.25 μ m/average times: 4096			
Linearity	±0.03% F.S.	±0.1% F.S.	±0.03% F.S.	±0.1% F.S.
Temperature characteristics	0.01% F.S./°C			
Safety distance (Normal ocular hazard distance: NOHD)*5	0.5m			
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation		
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range		
Protective structure	IP67 (excluding the connector part)			
Pollution degree	2			
Insulation resistance	With 500VDC megger, 20M Ω or more (between all the terminals and case)			
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)		
	Impulse	±1000V, 1.2/50 μ s (between all the terminals and case)		
Vibration resistance	Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each			
Shock resistance	196m/s ² X, Y, Z directions, 3 times each			
Ambient illuminance	3000lx or less*4 (illuminance at light receiving surface using incandescent lamp)			
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C			
Operating ambient humidity	35 to 85%RH At storage: 35 to 85%RH			
Operating altitude	0 to 2000m			
Material	Main body case, main body cover: Die-cast aluminum Front cover: Glass			
Cable length	0.5m			
Cable extension	The cable length can be extended to full length of 30m with the extension cable for sensor head.			
Weight	Approx. 300g (including the sensor head cable)			

For measuring conditions not specified, refer to the following.

 Page 39 Product specification notes

- *1 Use the ND filter in case the amount of reflected beam is too large.
- *2 The measurement range is limited between 0 and 20mm (in case the sampling cycle is 20 μ s at diffuse reflection), between 0 and 6mm (in case the sampling cycle is 20 μ s at specular reflection), between 18 and 20mm (in case the sampling cycle is 10 μ s at diffuse reflection), or unmeasurable (in case the sampling cycle is 10 μ s at specular reflection).
- *3 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *4 The variation in ambient illuminance is ±0.03% F.S. or less.
- *5 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

110mm type (Class 2)

Item	MH11H11B0SNA		MH11H11B0LNA	
	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection
Measurement method* ¹	Diffuse reflection/specular reflection			
Measurement center distance	110mm	106.7mm	110mm	106.7mm
Measurement range* ²	±15mm	±14.5mm	±15mm	±14.5mm
Beam source	Red semiconductor laser, Class 2 (JIS/IEC/GB/FDA) Max output: 1mW, Emission peak wavelength: 658nm			
Beam diameter* ³	Approx. $\phi 80\mu\text{m}$		Approx. $80 \times 1700\mu\text{m}$	
Light receiving element	Linear image sensor			
Resolution	0.25 μm /average times: 4096			
Linearity	±0.03% F.S.			
Temperature characteristics	0.01% F.S./°C			
Safety distance (Normal ocular hazard distance: NOHD)* ⁵	0.5m			
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation		
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range		
Protective structure	IP67 (excluding the connector part)			
Pollution degree	2			
Insulation resistance	With 500VDC megger, 20M Ω or more (between all the terminals and case)			
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)		
	Impulse	±1000V, 1.2/50 μs (between all the terminals and case)		
Vibration resistance	Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each			
Shock resistance	196m/s ² X, Y, Z directions, 3 times each			
Ambient illuminance	3000lx or less* ⁴ (illuminance at light receiving surface using incandescent lamp)			
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C			
Operating ambient humidity	35 to 85%RH At storage: 35 to 85%RH			
Operating altitude	0 to 2000m			
Material	Main body case, main body cover: Die-cast aluminum Front cover: Glass			
Cable length	0.5m			
Cable extension	The cable length can be extended to full length of 30m with the extension cable for sensor head.			
Weight	Approx. 300g (including the sensor head cable)			

For measuring conditions not specified, refer to the following.

 Page 39 Product specification notes

- *1 Use the ND filter in case the amount of reflected beam is too large.
- *2 The measurement range is limited between 0.5 and 15.0mm (in case the sampling cycle is 20 μs at diffuse reflection), between 0.5 and 14.5mm (in case the sampling cycle is 20 μs at specular reflection), between 12.5 and 15.0mm (in case the sampling cycle is 10 μs at diffuse reflection), or between 12.5 and 14.5mm (in case the sampling cycle is 10 μs at specular reflection).
- *3 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *4 The variation in ambient illuminance is ±0.03% F.S. or less.
- *5 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

110mm type (Class 3R)

Item	MH11H11C0SNA		MH11H11C0LNA	
	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection
Measurement method*1	Diffuse reflection/specular reflection			
Measurement center distance	110mm	106.7mm	110mm	106.7mm
Measurement range*2	±15mm	±14.5mm	±15mm	±14.5mm
Beam source	Red semiconductor laser, Class 3R (JIS/IEC/GB/FDA) Max output: 5mW, Emission peak wavelength: 658nm			
Beam diameter*3	Approx. $\phi 80\mu\text{m}$		Approx. $80 \times 1700\mu\text{m}$	
Light receiving element	Linear image sensor			
Resolution	0.25 μm /average times: 4096			
Linearity	±0.03% F.S.			
Temperature characteristics	0.01% F.S./°C			
Safety distance (Normal ocular hazard distance: NOHD)*5	0.5m			
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation		
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range		
Protective structure	IP67 (excluding the connector part)			
Pollution degree	2			
Insulation resistance	With 500VDC megger, 20M Ω or more (between all the terminals and case)			
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)		
	Impulse	±1000V, 1.2/50 μs (between all the terminals and case)		
Vibration resistance	Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each			
Shock resistance	196m/s ² X, Y, Z directions, 3 times each			
Ambient illuminance	3000lx or less*4 (illuminance at light receiving surface using incandescent lamp)			
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C			
Operating ambient humidity	35 to 85%RH At storage: 35 to 85%RH			
Operating altitude	0 to 2000m			
Material	Main body case, main body cover: Die-cast aluminum Front cover: Glass			
Cable length	0.5m			
Cable extension	The cable length can be extended to full length of 30m with the extension cable for sensor head.			
Weight	Approx. 300g (including the sensor head cable)			

For measuring conditions not specified, refer to the following.

☞ Page 39 Product specification notes

- *1 Use the ND filter in case the amount of reflected beam is too large.
- *2 The measurement range is limited between 0.5 and 15.0mm (in case the sampling cycle is 20 μs at diffuse reflection), between 0.5 and 14.5mm (in case the sampling cycle is 20 μs at specular reflection), between 12.5 and 15.0mm (in case the sampling cycle is 10 μs at diffuse reflection), or between 12.5 and 14.5mm (in case the sampling cycle is 10 μs at specular reflection).
- *3 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *4 The variation in ambient illuminance is ±0.03% F.S. or less.
- *5 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

350mm type (Class 2)

Item	MH11H35B0SNA		MH11H35B0LNA	
	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection
Measurement method*1	Diffuse reflection/specular reflection			
Measurement center distance	350mm	348mm	350mm	348mm
Measurement range*2	±50mm	±42mm	±50mm	±42mm
Beam source	Red semiconductor laser, Class 2 (JIS/IEC/GB/FDA) Max output: 1mW, Emission peak wavelength: 658nm			
Beam diameter*3	Approx. $\phi 250\mu\text{m}$		Approx. $250 \times 3500\mu\text{m}$	
Light receiving element	Linear image sensor			
Resolution	2.0 μm /average times: 256, 0.5 μm /average times: 4096			
Linearity	±0.03% F.S.			
Temperature characteristics	0.01% F.S./°C			
Safety distance (Normal ocular hazard distance: NOHD)*5	1.4m			
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation		
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range		
Protective structure	IP67 (excluding the connector part)			
Pollution degree	2			
Insulation resistance	With 500VDC megger, 20M Ω or more (between all the terminals and case)			
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)		
	Impulse	±1000V, 1.2/50 μs (between all the terminals and case)		
Vibration resistance	Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each			
Shock resistance	196m/s ² X, Y, Z directions, 3 times each			
Ambient illuminance	3000lx or less*4 (illuminance at light receiving surface using incandescent lamp)			
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C			
Operating ambient humidity	35 to 85%RH At storage: 35 to 85%RH			
Operating altitude	0 to 2000m			
Material	Main body case, main body cover: Die-cast aluminum Front cover: Glass			
Cable length	0.5m			
Cable extension	The cable length can be extended to full length of 30m with the extension cable for sensor head.			
Weight	Approx. 450g (including the sensor head cable)			

For measuring conditions not specified, refer to the following.

 Page 39 Product specification notes

- *1 Use the ND filter in case the amount of reflected beam is too large.
- *2 The measurement range is limited between 0.0 and 50mm (in case the sampling cycle is 20 μs at diffuse reflection), between 0.0 and 42mm (in case the sampling cycle is 20 μs at specular reflection), between 36 and 50mm (in case the sampling cycle is 10 μs at diffuse reflection), or between 36 and 42mm (in case the sampling cycle is 10 μs at specular reflection).
- *3 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *4 The variation in ambient illuminance is ±0.03% F.S. or less.
- *5 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

350mm type (Class 3R)

MH11H35C0SNA, MH11H35C0LNA

Item	MH11H35C0SNA		MH11H35C0LNA	
	Diffuse reflection	Specular reflection	Diffuse reflection	Specular reflection
Measurement method* ¹	Diffuse reflection/specular reflection			
Measurement center distance	350mm	348mm	350mm	348mm
Measurement range* ²	±50mm	±42mm	±50mm	±42mm
Beam source	Red semiconductor laser, Class 3R (JIS/IEC/GB/FDA) Max output: 5mW, Emission peak wavelength: 658nm			
Beam diameter* ³	Approx. ϕ 250 μ m		Approx. 250 × 3500 μ m	
Light receiving element	Linear image sensor			
Resolution	2.0 μ m/average times: 256, 0.5 μ m/average times: 4096			
Linearity	±0.03% F.S.			
Temperature characteristics	0.01% F.S./°C			
Safety distance (Normal ocular hazard distance: NOHD)* ⁵	1.4m			
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation		
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range		
Protective structure	IP67 (excluding the connector part)			
Pollution degree	2			
Insulation resistance	With 500VDC megger, 20M Ω or more (between all the terminals and case)			
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)		
	Impulse	±1000V, 1.2/50 μ s (between all the terminals and case)		
Vibration resistance	Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each			
Shock resistance	196m/s ² X, Y, Z directions, 3 times each			
Ambient illuminance	3000lx or less* ⁴ (illuminance at light receiving surface using incandescent lamp)			
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C			
Operating ambient humidity	35 to 85%RH At storage: 35 to 85%RH			
Operating altitude	0 to 2000m			
Material	Main body case, main body cover: Die-cast aluminum Front cover: Glass			
Cable length	0.5m			
Cable extension	The cable length can be extended to full length of 30m with the extension cable for sensor head.			
Weight	Approx. 450g (including the sensor head cable)			

For measuring conditions not specified, refer to the following.

 Page 39 Product specification notes

- *1 Use the ND filter in case the amount of reflected beam is too large.
- *2 The measurement range is limited between 0.0 and 50mm (in case the sampling cycle is 20 μ s at diffuse reflection), between 0.0 and 42mm (in case the sampling cycle is 20 μ s at specular reflection), between 36 and 50mm (in case the sampling cycle is 10 μ s at diffuse reflection), or between 36 and 42mm (in case the sampling cycle is 10 μ s at specular reflection).
- *3 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *4 The variation in ambient illuminance is ±0.03% F.S. or less.
- *5 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

MH11H35C3SNA, MH11H35C3LNA

Item	MH11H35C3SNA	MH11H35C3LNA
Measurement method* ¹	Diffuse reflection	
Measurement center distance	350mm	
Measurement range* ²	±200mm	
Beam source	Red semiconductor laser, Class 3R (JIS/IEC/GB/FDA) Max output: 5mW, Emission peak wavelength: 658nm	
Beam diameter* ³	Approx. φ400μm	Approx. 400 × 6500μm
Light receiving element	Linear image sensor	
Resolution	8μm/average times: 256, 2μm/average times: 4096	
Linearity	±0.04%F.S. (-200 to 0mm), ±0.08%F.S. (0 to 200mm) (F.S. = ±200mm)	
Temperature characteristics	0.01% F.S./°C	
Safety distance (Normal ocular hazard distance: NOHD)* ⁵	1.4m	
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range
Protective structure	IP67 (excluding the connector part)	
Pollution degree	2	
Insulation resistance	With 500VDC megger, 20MΩ or more (between all the terminals and case)	
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)
	Impulse	±1000V, 1.2/50μs (between all the terminals and case)
Vibration resistance	Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each	
Shock resistance	196m/s ² X, Y, Z directions, 3 times each	
Ambient illuminance	3000lx or less* ⁴ (illuminance at light receiving surface using incandescent lamp)	
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C	
Operating ambient humidity	35 to 85%RH At storage: 35 to 85%RH	
Operating altitude	0 to 2000m	
Material	Main body case, main body cover: Die-cast aluminum Front cover: Glass	
Cable length	0.5m	
Cable extension	The cable length can be extended to full length of 30m with the extension cable for sensor head.	
Weight	Approx. 300g (including the sensor head cable)	

For measuring conditions not specified, refer to the following.

 Page 39 Product specification notes

- *1 Use the ND filter in case the amount of reflected beam is too large.
- *2 The measurement range is limited between -70 and 200mm (in case the sampling cycle is 20μs), or between 100 and 200mm (in case the sampling cycle is 10μs).
- *3 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *4 The variation in ambient illuminance is ±0.08% F.S. or less.
- *5 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

8mm type (Class 1)

Item		MH11H01A1SNA	MH11H01A1LNA
Measurement method		Specular reflection	
Measurement center distance		8mm	
Measurement range*1		±0.8mm	
Beam source		Red semiconductor laser, Class 1 (JIS/IEC/GB/FDA) Max output: 0.1mW, Emission peak wavelength: 658nm	
Beam diameter*2		Approx. φ20μm	Approx. 20 × 700μm
Light receiving element		Linear image sensor	
Resolution		0.25μm/average times: 256	
Linearity		±0.02% F.S.	
Temperature characteristics		0.02% F.S./°C	
Safety distance (Normal ocular hazard distance: NOHD)*4		—	
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation	
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range	
Protective structure		IP67 (excluding the connector part)	
Pollution degree		2	
Insulation resistance		With 500VDC megger, 20MΩ or more (between all the terminals and case)	
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)	
	Impulse	±1000V, 1.2/50μs (between all the terminals and case)	
Vibration resistance		Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each	
Shock resistance		196m/s ² X, Y, Z directions, 3 times each	
Ambient illuminance		3000lx or less*3 (illuminance at light receiving surface using incandescent lamp)	
Operating ambient temperature		0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C	
Operating ambient humidity		35 to 85%RH At storage: 35 to 85%RH	
Operating altitude		0 to 2000m	
Material		Main body case, main body cover: Aluminum Front cover: Glass	
Cable length		0.08m	
Cable extension		The cable length can be extended to full length of 30m with the extension cable for sensor head.	
Weight		Approx. 300g (including the sensor head cable)	

For measuring conditions not specified, refer to the following.

 Page 39 Product specification notes

- *1 The measurement range is limited between 0.1 and 0.8mm (in case the sampling cycle is 20μs), or between 0.7 and 0.8mm (in case the sampling cycle is 10μs).
- *2 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *3 The variation in ambient illuminance is ±0.02% F.S. or less.
- *4 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

15mm type (Class 1)

Item		MH11H01A2SNA	MH11H01A2LNA
Measurement method		Specular reflection	
Measurement center distance		15mm	
Measurement range*1		±1mm	
Beam source		Red semiconductor laser, Class 1 (JIS/IEC/GB/FDA) Max output: 0.3mW, Emission peak wavelength: 658nm	
Beam diameter*2		Approx. φ30μm	Approx. 30 × 1400μm
Light receiving element		Linear image sensor	
Resolution		0.25μm/average times: 256	
Linearity		±0.02% F.S.	
Temperature characteristics		0.02% F.S./°C	
Safety distance (Normal ocular hazard distance: NOHD)*4		—	
Indicator	Laser radiation indicator	Green light-emitting diode ON during laser radiation	
	Measurement range indicator	Yellow light-emitting diode ON near the measurement center/Flashes within the measurement range/OFF outside the measurement range	
Protective structure		IP67 (excluding the connector part)	
Pollution degree		2	
Insulation resistance		With 500VDC megger, 20MΩ or more (between all the terminals and case)	
Withstand voltage	Commercial frequency	500VAC, 1 minute (between all the terminals and case)	
	Impulse	±1000V, 1.2/50μs (between all the terminals and case)	
Vibration resistance		Endurance: 10 to 55Hz (cycle: 1 minute), double amplitude: 1.5mm X, Y, Z directions, 2 hours each	
Shock resistance		196m/s ² X, Y, Z directions, 3 times each	
Ambient illuminance		3000lx or less*3 (illuminance at light receiving surface using incandescent lamp)	
Operating ambient temperature		0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C	
Operating ambient humidity		35 to 85%RH At storage: 35 to 85%RH	
Operating altitude		0 to 2000m	
Material		Main body case, main body cover: Aluminum Front cover: Glass	
Cable length		0.5m	
Cable extension		The cable length can be extended to full length of 30m with the extension cable for sensor head.	
Weight		Approx. 400g (including the sensor head cable)	

For measuring conditions not specified, refer to the following.

 Page 39 Product specification notes

- *1 The measurement range is limited between 0.1 and 1.0mm (in case the sampling cycle is 20μs), or between 0.8 and 1.0mm (in case the sampling cycle is 10μs).
- *2 The figure shows the value at measurement center distance. It is determined by $1/e^2$ (approximately 13.5%) of center beam intensity. Due to leak light outside the specified area, the reflectance around the detecting point may be higher than at the point and this may affect the measurement value.
- *3 The variation in ambient illuminance is ±0.02% F.S. or less.
- *4 Terminate a laser beam using a diffusely reflecting material or by an absorber regardless of the safety distance.

2.3 ND Filter Specifications

Item	MH11F98
Applicable sensor head	MH11H03B0SNA, MH11H03B0LNA, MH11H05□0SNA, MH11H05□0LNA, MH11H08□0SNA, MH11H08□0LNA, MH11H11□0SNA, MH11H11□0LNA, MH11H35□0SNA, MH11H35□0LNA, MH11H35C3SNA, MH11H35C3LNA
Reduced intensity rate	98%*1
Shock resistance	196m/s ² or more X, Y, Z directions, 3 times each
Operating ambient temperature	0 to 45°C (No dew condensation or icing allowed) At storage: -20 to 70°C
Operating ambient humidity	35 to 85%RH At storage: 35 to 85%RH
Material	Mounting support area: Aluminum ND area: Glass
Weight	Approx. 20g
Accessory	Two mounting screws

*1 Attach and use the ND filter in case the amount of reflected beam from the measurement object is too large.

3 MAINTENANCE AND INSPECTION

3.1 Maintenance

Maintenance instructions

■ Sensor head cleaning

- Before cleaning the sensor head, always disconnect the power supply and stop laser emission.
- Errors may occur if the substance that refracts light such as oil and fingerprints, or the substance that blocks light such as dust and dirt exists on the light emitting or receiving parts at the sensor head. Inspect the surfaces regularly and always keep them clean.
- To remove large particles of dust, blow them away using a camera lens blower.
- To remove small particles of dust and fingerprints, use soft lens cleaning cloth or lens cleaner paper to lightly wipe them out.
- Use cloth moistened with a small amount of alcohol to wipe out tough dirt carefully.
- Molded resin is used in some parts of the sensor head. Do not use organic solvents such as thinner and benzene to wipe dirt on it. Otherwise, molded resin may be dissolved.
- Do not wipe the glass portion of laser aperture too hard. Scratches on the glass may cause errors.

3.2 Inspection

Inspect the sensor head regularly to ensure performance and to use it under optimum conditions.

Major inspection items

- Check that the glass surface on the laser aperture is free from dust, dirt, or fingerprints.
- Check that the operating ambient temperature is within the range of 0 to 45°C.
- Check that the operating ambient humidity is within the range of 35 to 85%RH.

4 TROUBLESHOOTING

For details on occurring errors and troubleshooting when using a sensor head, refer to the following.

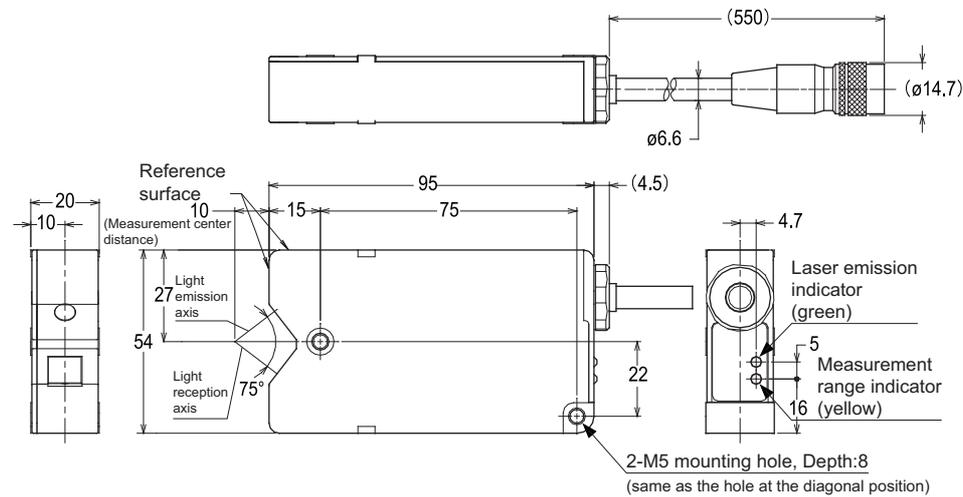
 MELSEC iQ-R Laser Displacement Sensor Control Module User's Manual (Application)

APPENDICES

Appendix 1 External Dimensions

Sensor head

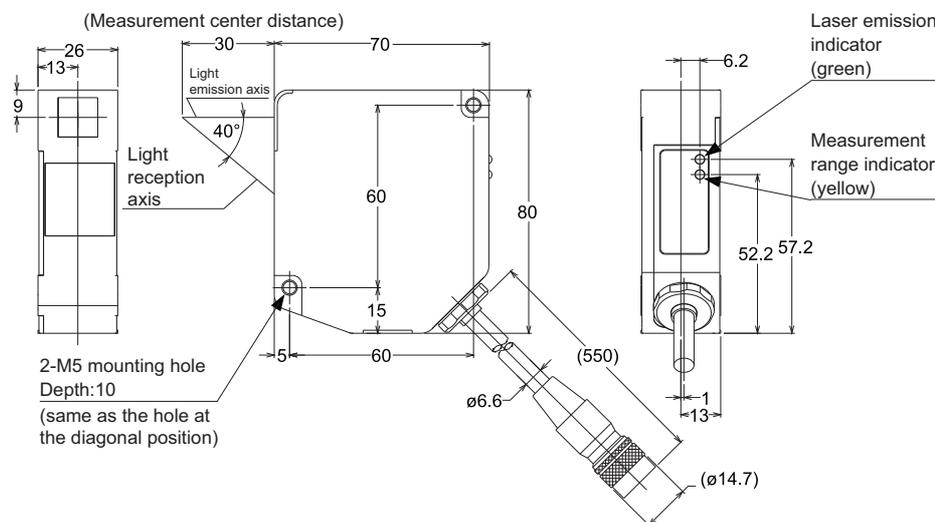
■10mm type (MH11H01A0SNA, MH11H01A0LNA)



(Unit: mm)

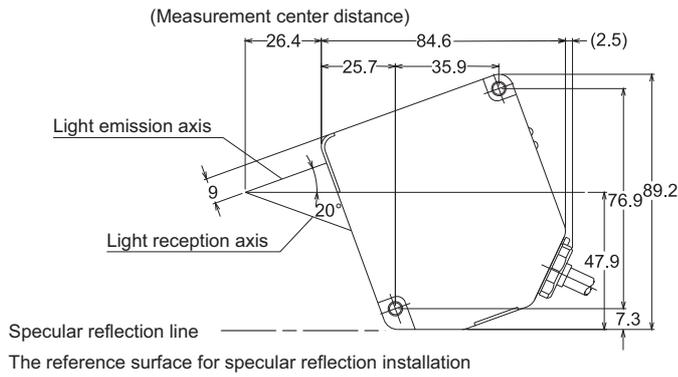
■30mm type (MH11H03B0SNA, MH11H03B0LNA)

- Diffuse reflection installation



(Unit: mm)

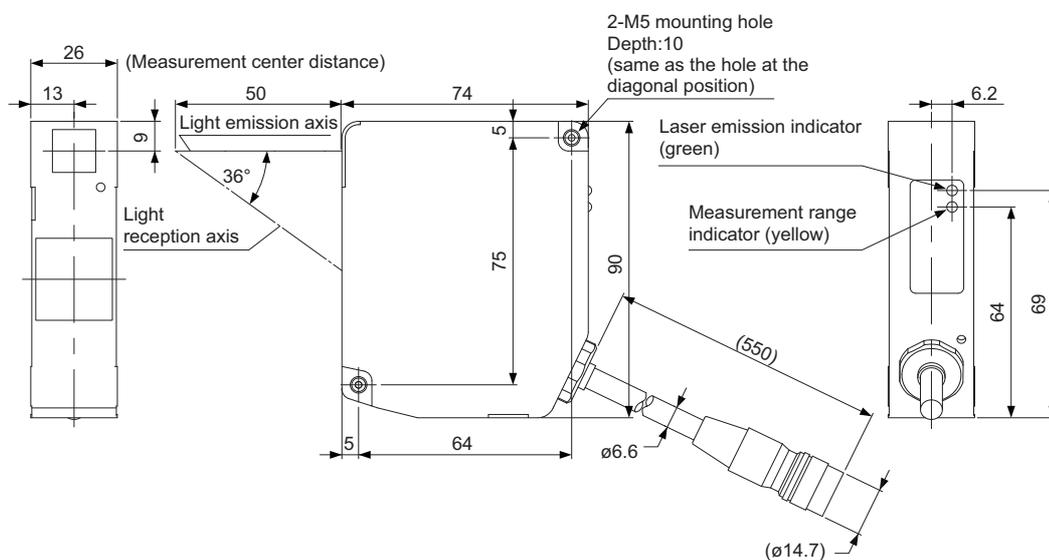
- Specular reflection installation



(Unit: mm)

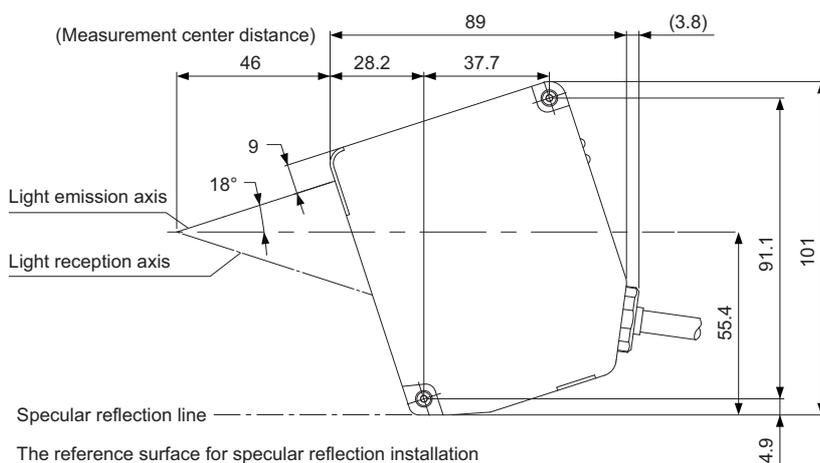
■50mm type (MH11H05B0SNA, MH11H05B0LNA, MH11H05C0SNA, MH11H05C0LNA)

- Diffuse reflection installation



(Unit: mm)

- Specular reflection installation

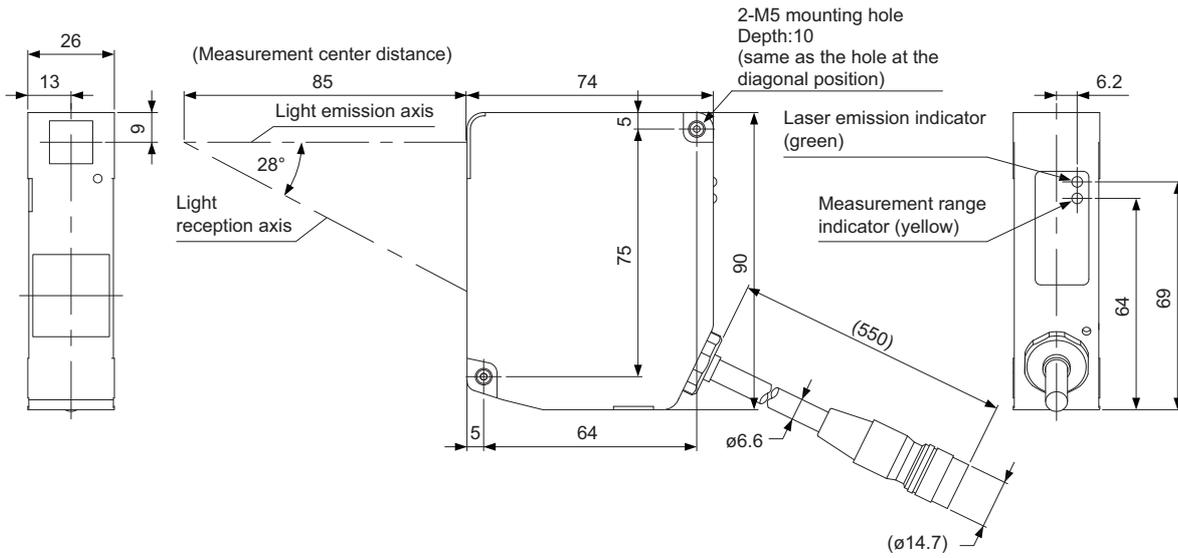


(Unit: mm)

A

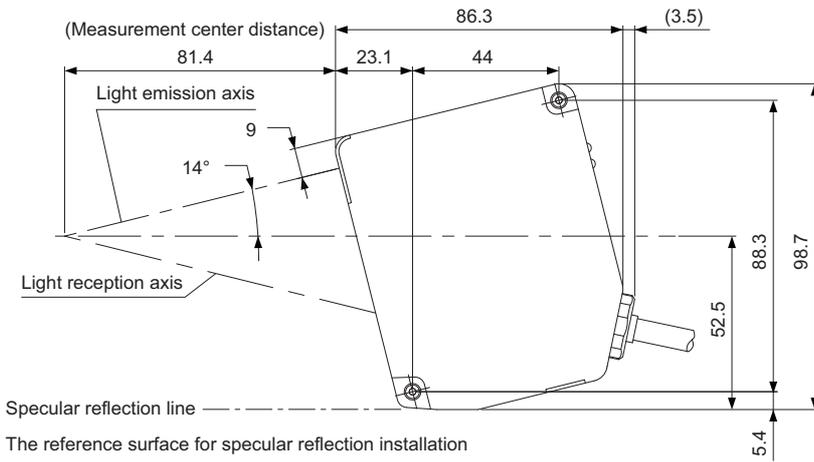
■85mm type (MH11H08B0SNA, MH11H08B0LNA, MH11H08C0SNA, MH11H08C0LNA)

- Diffuse reflection installation



(Unit: mm)

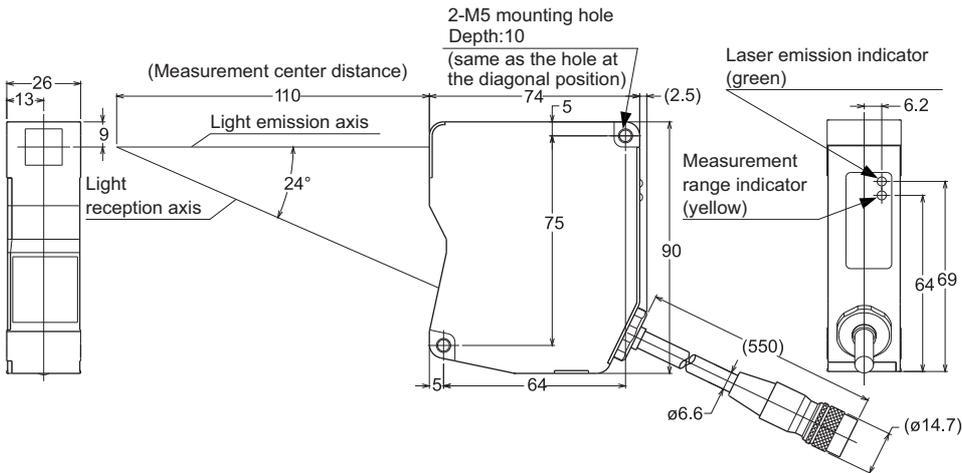
- Specular reflection installation



(Unit: mm)

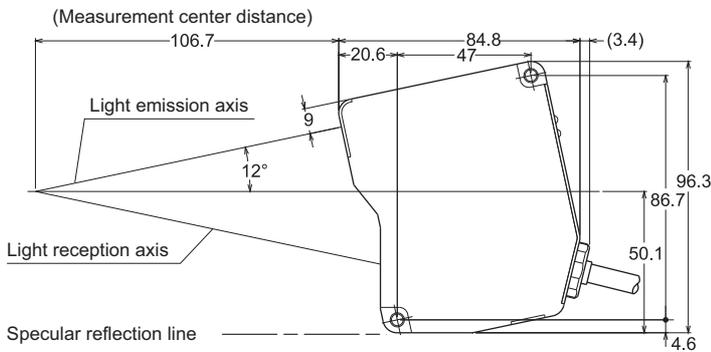
■110mm type (MH11H11B0SNA, MH11H11B0LNA, MH11H11C0SNA, MH11H11C0LNA)

- Diffuse reflection installation



(Unit: mm)

- Specular reflection installation

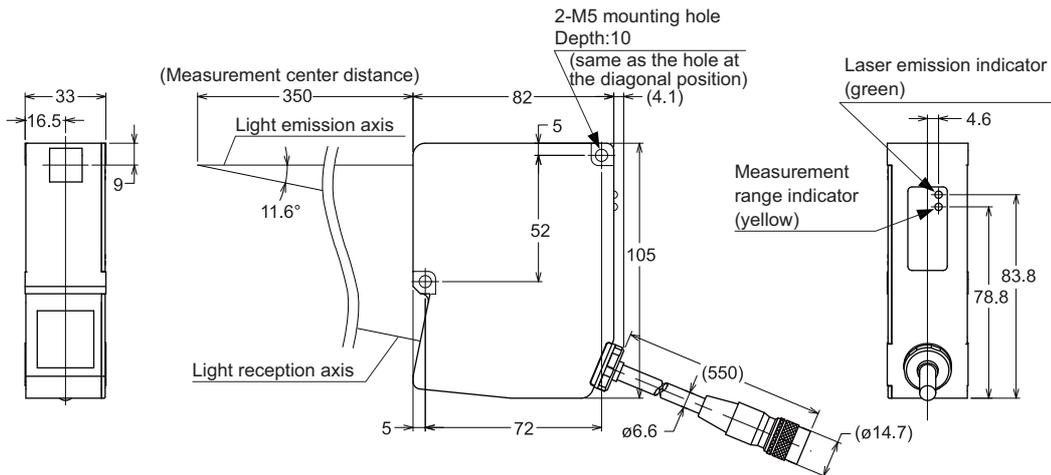


The reference surface for specular reflection installation

(Unit: mm)

■350mm type (MH11H35B0SNA, MH11H35B0LNA, MH11H35C0SNA, MH11H35C0LNA)

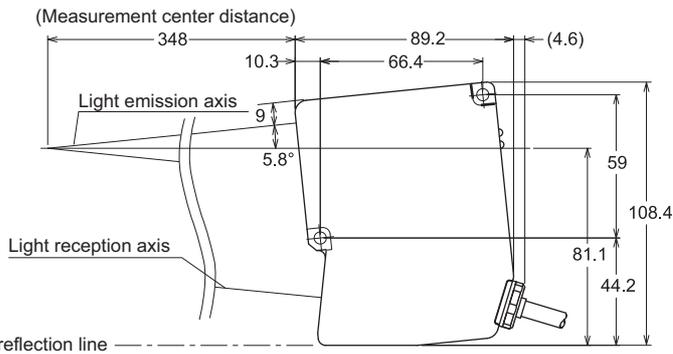
- Diffuse reflection installation



(Unit: mm)



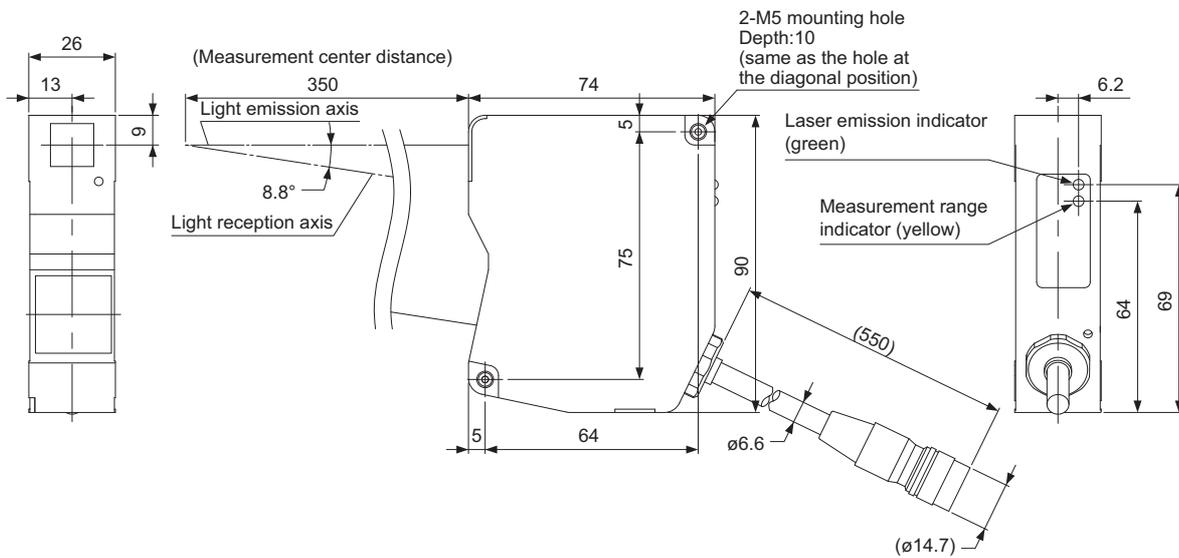
• Specular reflection installation



The reference surface for specular reflection installation

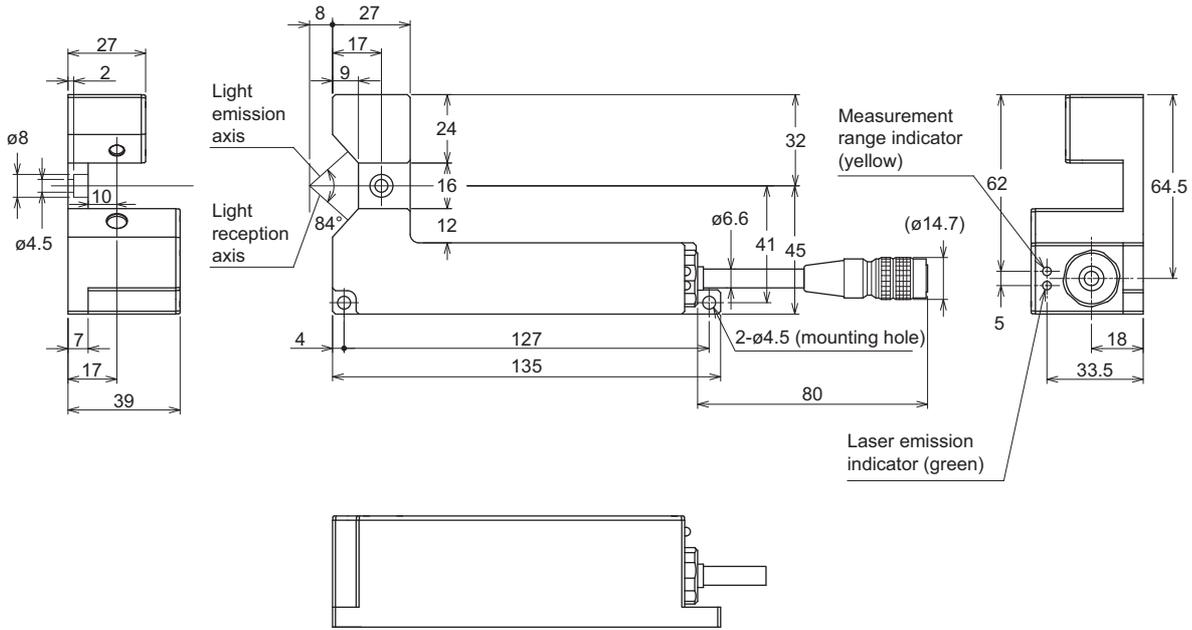
(Unit: mm)

■350mm type (MH11H35C3SNA, MH11H35C3LNA)



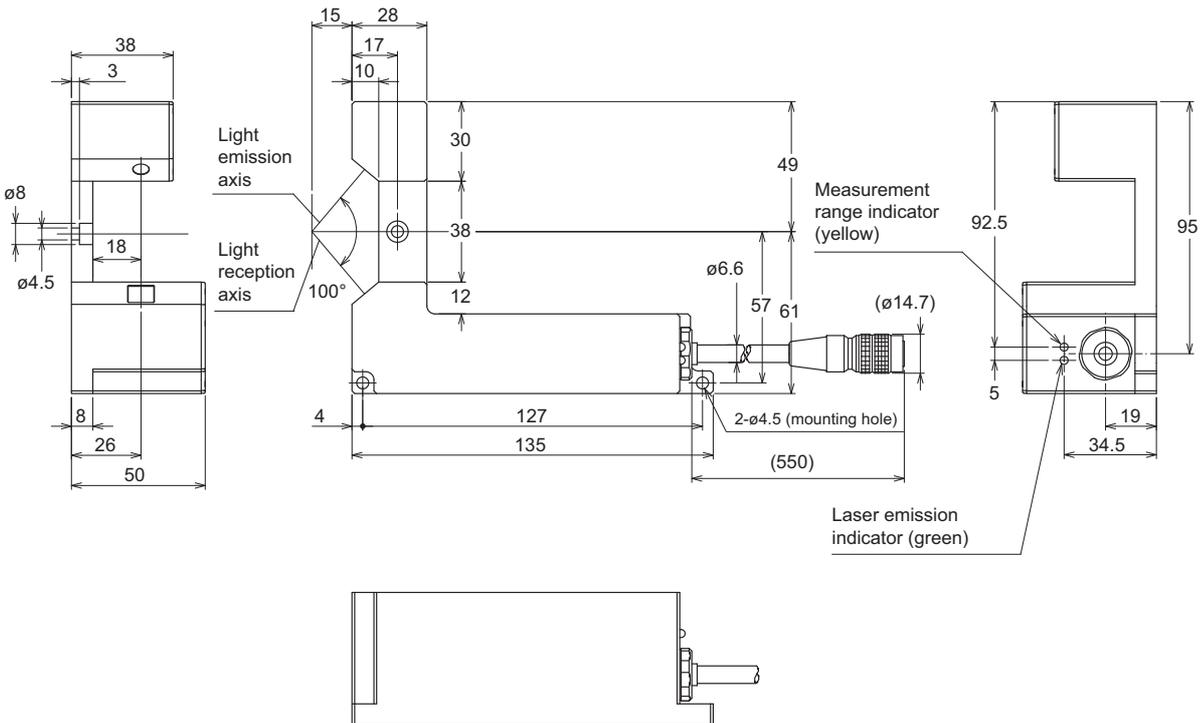
(Unit: mm)

■8mm type (MH11H01A1SNA, MH11H01A1LNA)



(Unit: mm)

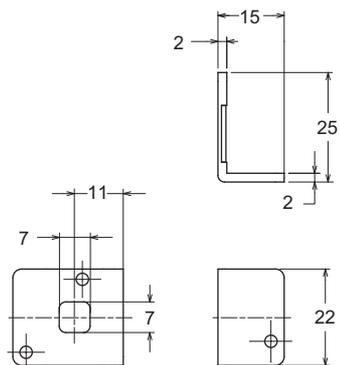
■15mm type (MH11H01A2SNA, MH11H01A2LNA)



(Unit: mm)

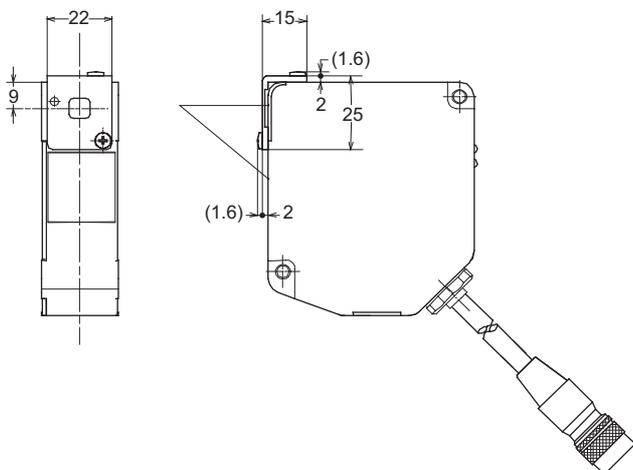


ND filter (MH11F98)



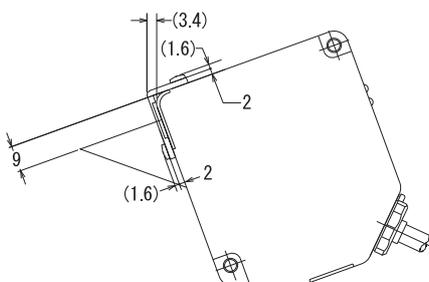
(Unit: mm)

- Diffuse reflection installation (ND filter attached) (MH11H03B0SNA, MH11H03B0LNA)



(Unit: mm)

- Specular reflection installation (ND filter attached) (MH11H03B0SNA, MH11H03B0LNA)



(Unit: mm)

Point

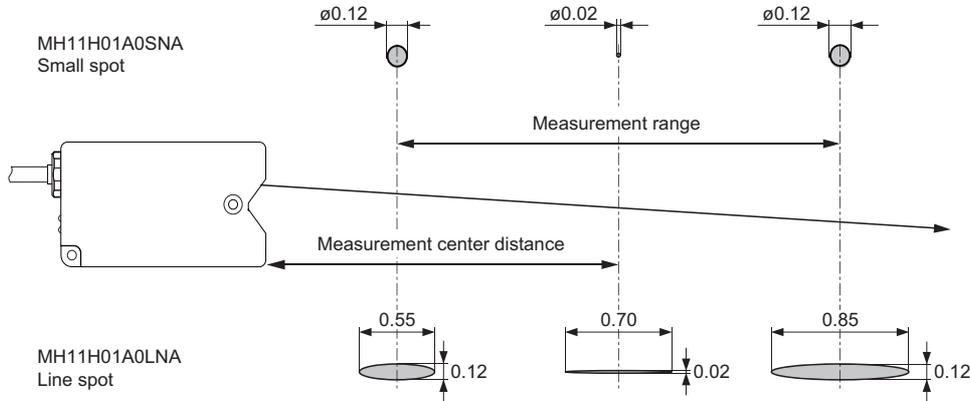
Installing dimensions are also the same in the applicable sensor heads other than the MH11H03B0SNA and MH11H03B0LNA.

Appendix 2 Characteristics

Beam diameter

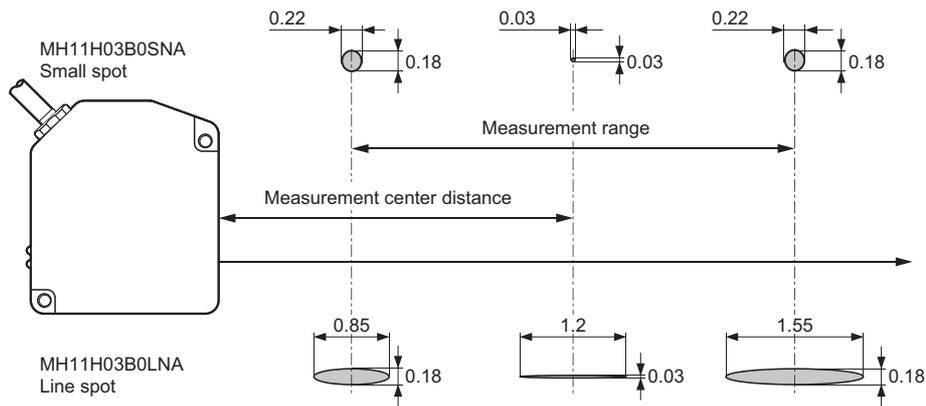
The following figures show the beam diameter of each sensor head type.

■10mm type



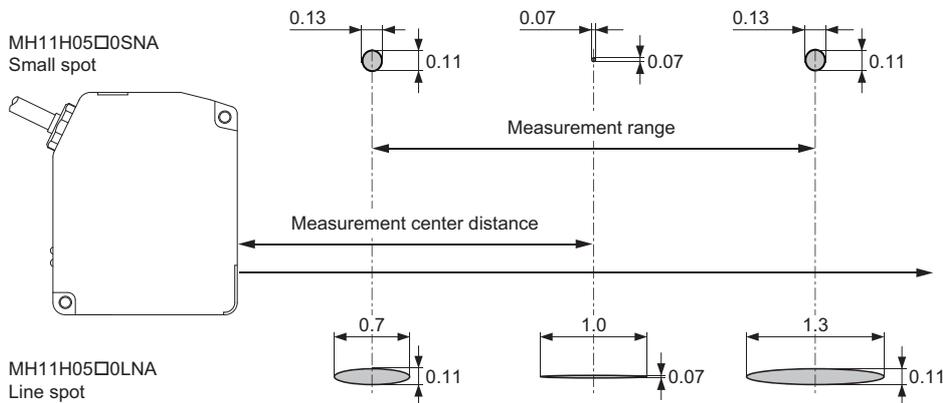
(Unit: mm)

■30mm type



(Unit: mm)

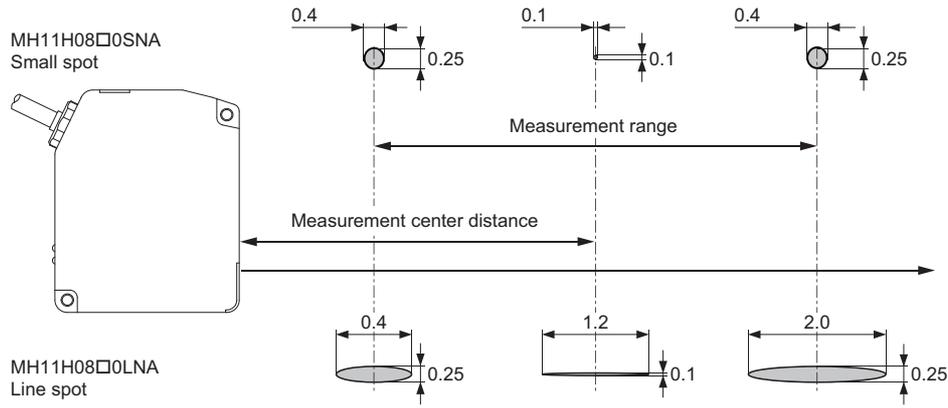
■50mm type



(Unit: mm)

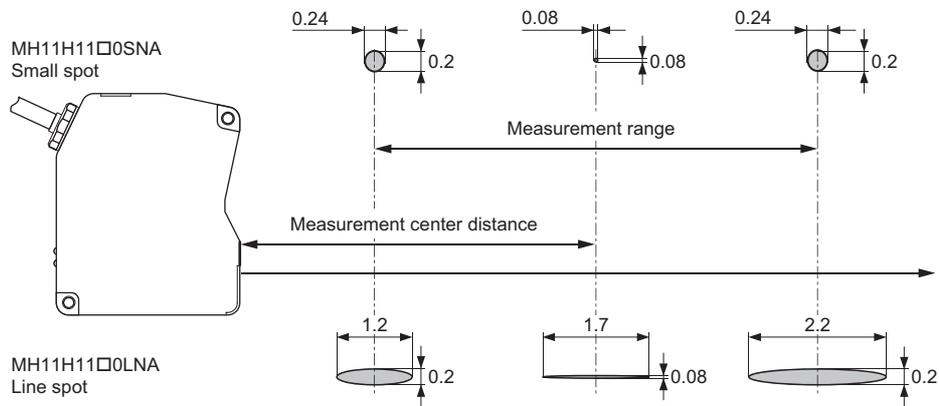
A

■85mm type



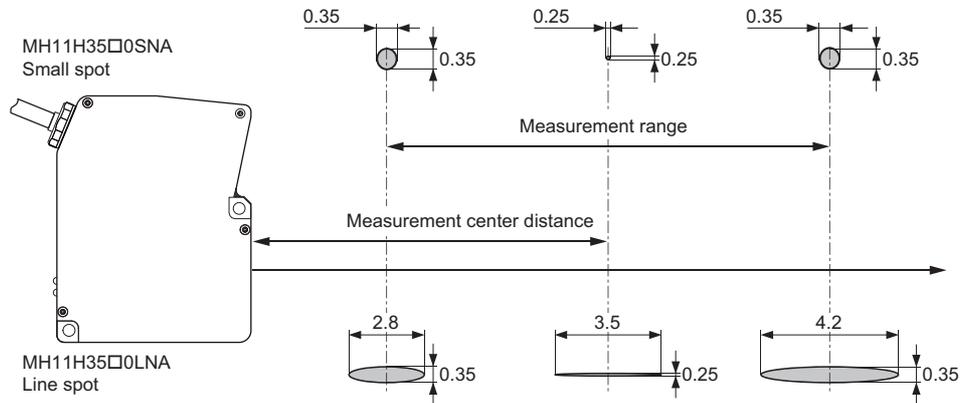
(Unit: mm)

■110mm type



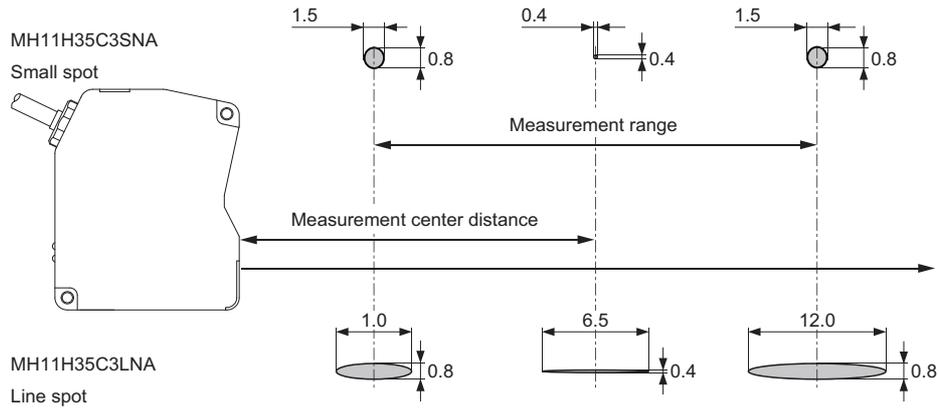
(Unit: mm)

■350mm type (MH11H35B0SNA, MH11H35B0LNA, MH11H35C0SNA, MH11H35C0LNA)

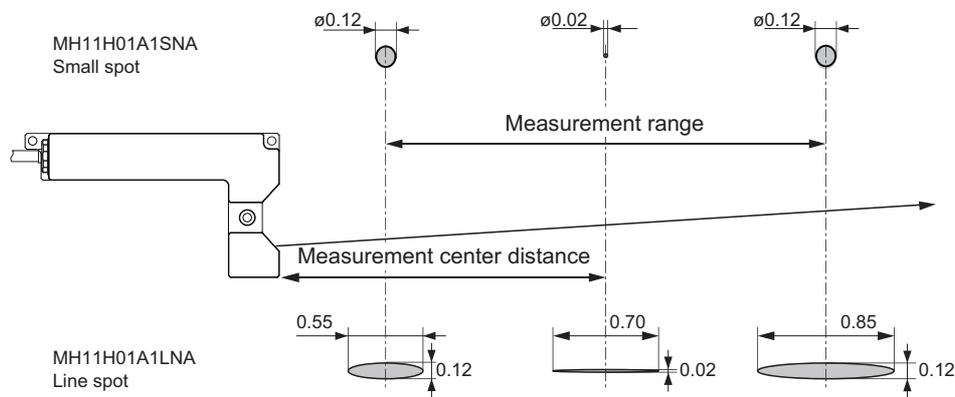


(Unit: mm)

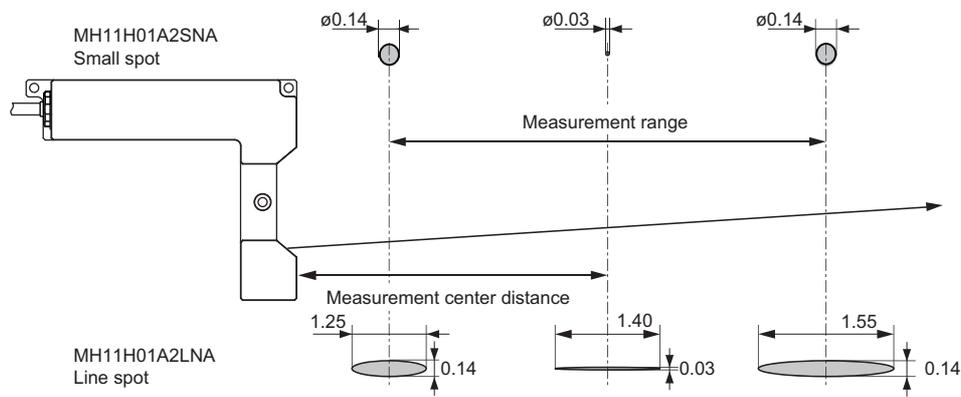
■350mm type (MH11H35C3SNA, MH11H35C3LNA)



■8mm type



■15mm type

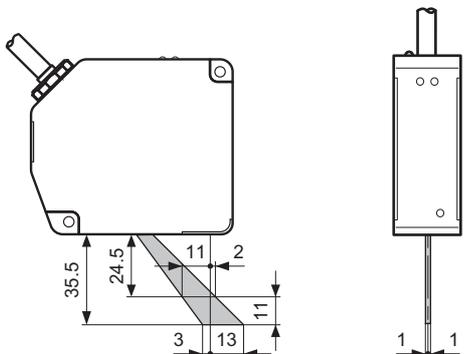


A

Mutual interference area

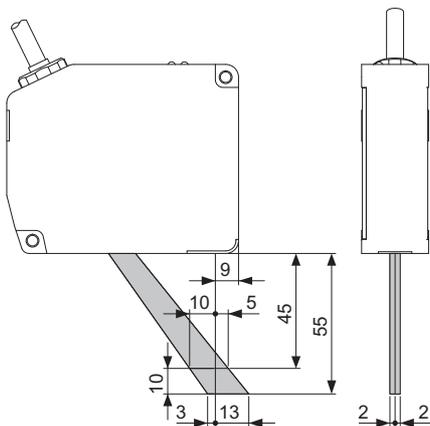
When two or more diffuse reflection sensor heads are installed side by side, mutual interference occurs if the laser spots from other sensor heads fall within the shaded areas in the following figures. Install sensor heads so that the laser spots from other sensor heads fall outside the shaded areas.

■30mm type (MH11H03B0SNA, MH11H03B0LNA)



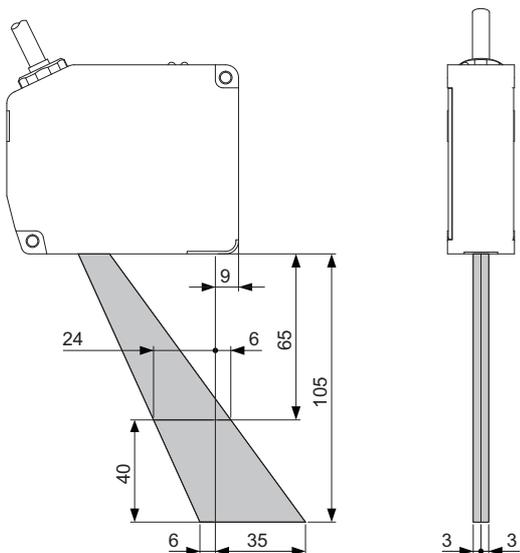
(Unit: mm)

■50mm type (MH11H05B0SNA, MH11H05B0LNA, MH11H05C0SNA, MH11H05C0LNA)



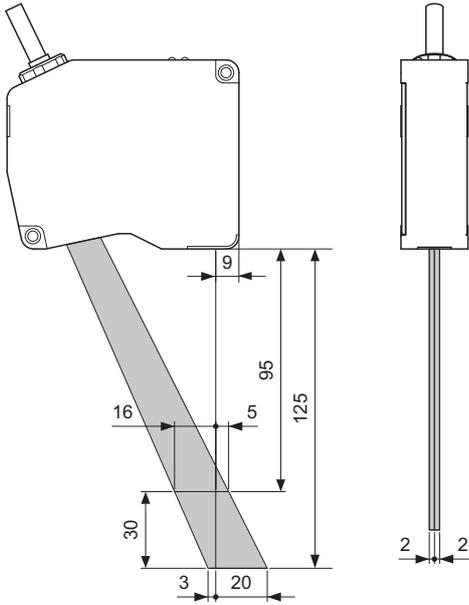
(Unit: mm)

■85mm type (MH11H08B0SNA, MH11H08B0LNA, MH11H08C0SNA, MH11H08C0LNA)



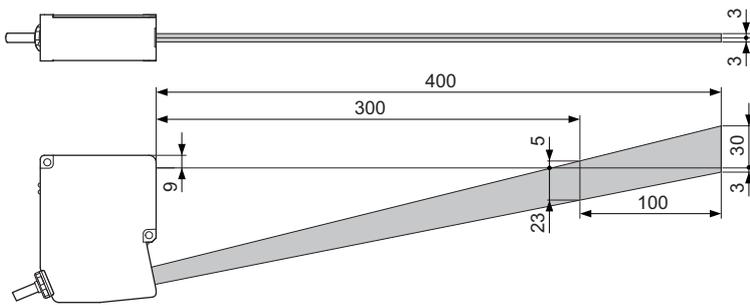
(Unit: mm)

■110mm type (MH11H11B0SNA, MH11H11B0LNA, MH11H11C0SNA, MH11H11C0LNA)



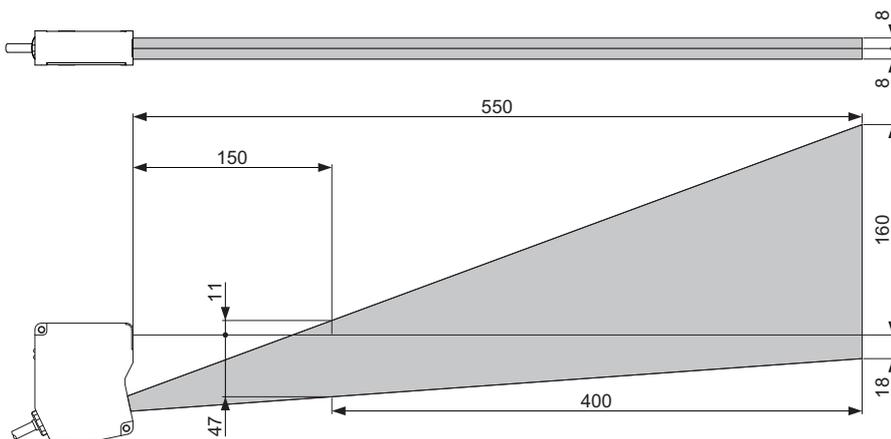
(Unit: mm)

■350mm type (MH11H35B0SNA, MH11H35B0LNA, MH11H35C0SNA, MH11H35C0LNA)



(Unit: mm)

■350mm type (MH11H35C3SNA, MH11H35C3LNA)



(Unit: mm)

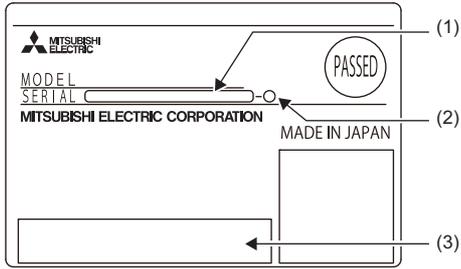
A

Point

If beam from the other sensor head enters the mutual interference area when two sensor heads are connected, turn on the interference prevention function.

Appendix 3 How to Confirm Serial Number and Function Version

The serial number and function version of the sensor head can be confirmed by the rating plate on the side of the product.



- (1) Serial number
- (2) Function version
- (3) Applicable standard symbol

Appendix 4 Export Regulations by Japanese Government

The products have specifications not subject to export regulations by the Foreign Exchange and Foreign Trade Law.



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REVISIONS

*The manual number is given on the bottom left of the back cover.

Revision date	*Manual number	Description
June 2019	SH(NA)-082023ENG-A	First edition
April 2020	SH(NA)-082023ENG-B	■Added or modified parts TERMS, GENERIC TERMS AND ABBREVIATIONS, Section 1.1

Japanese manual number: SH-082022-B

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WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place. Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

- (1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
- (2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
 1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
 2. Failure caused by unapproved modifications, etc., to the product by the user.
 3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
 4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
 5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
 6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
 7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

- (1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
- (2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

- (1) Damages caused by any cause found not to be the responsibility of Mitsubishi.
- (2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
- (3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
- (4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

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SH(NA)-082023ENG-B(2004)MEE

MODEL: MH11-U-SH-E

MODEL CODE: 13JX93

mitsubishi electric corporation

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Specifications subject to change without notice.