Safety Laser Scanner

OS3101

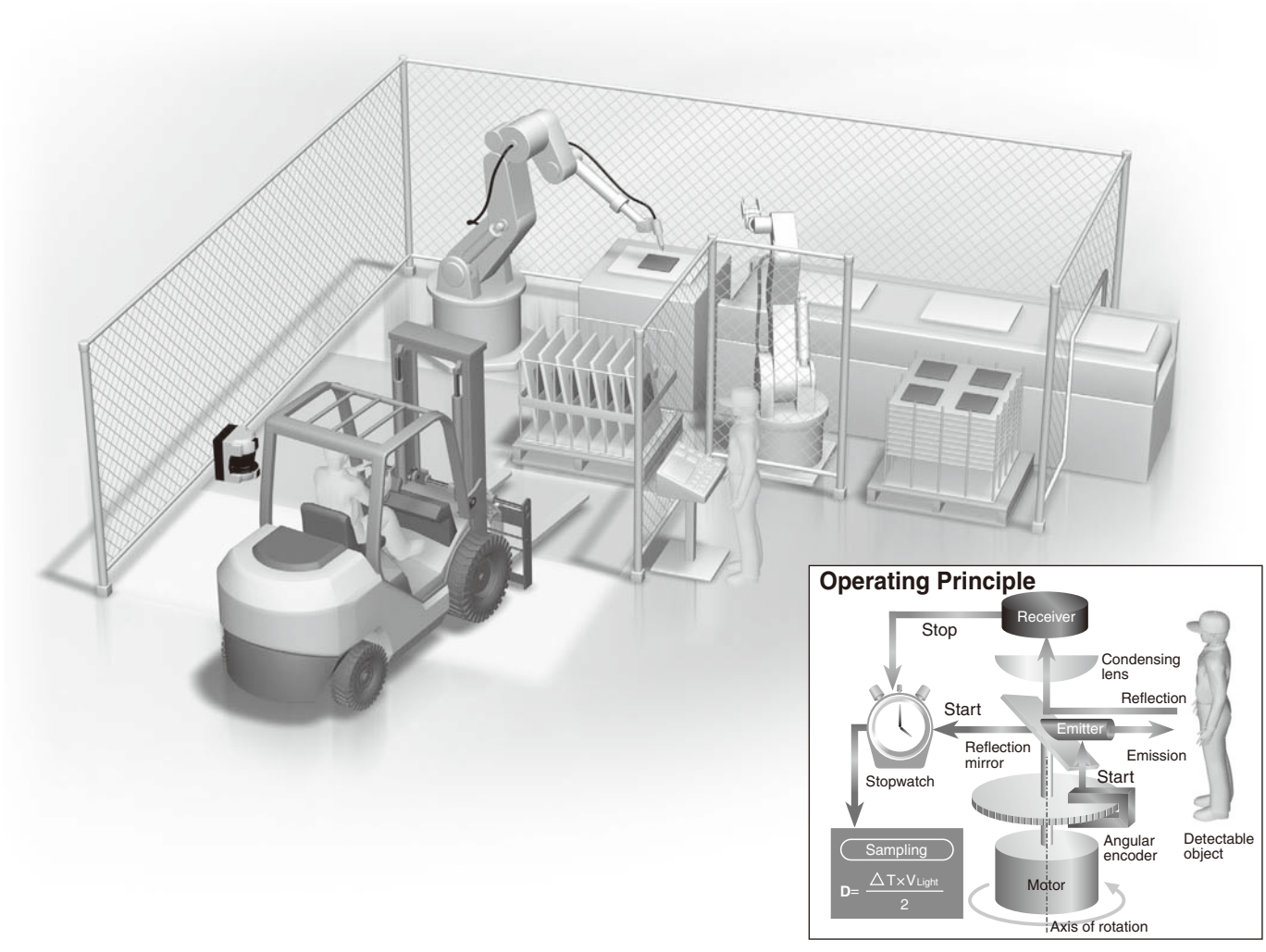
Operator Presence Detection in Work Areas with Complex Shapes

■ A Type 3 Safety Laser Scanner in compliance with IEC 61496-1/-3.

⚠ Be sure to read the *"Safety Precautions"* on page 13.

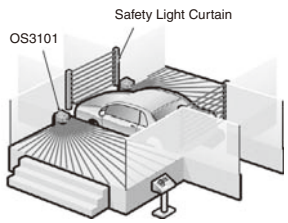
Features

The OS3101 Safety Laser Scanner is designed for use in hazardous zones that change irregularly.
Parameters for even highly complex areas can be easily set using personal computer software.
In addition to protecting operators on conveyor lines and at robot stations, the OS3101 can be mounted onto automated guided vehicles (AGVs) and other mobile objects for which the monitoring area must be frequently switched, during obstacle detection.

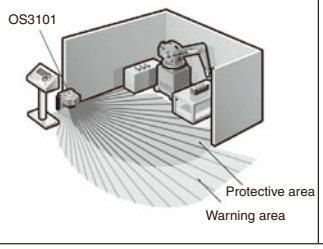


Applications

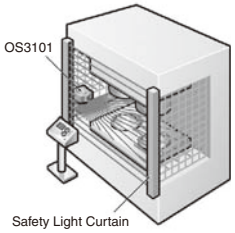
Automated production equipment



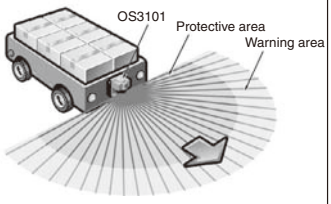
Station for conveying materials



Large press



Automated guided vehicle (AGV)



Features

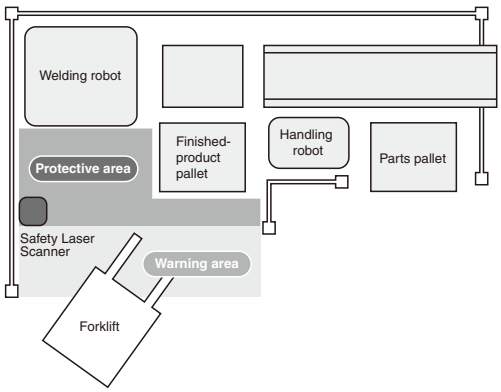
Laser Beams Scan in 2-Dimensional Space to Constantly Monitor the Presence of Operators in the Monitoring Area

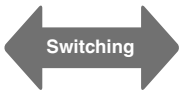
The guiding principle in providing safety for operators is to prevent machines from operating whenever a person is inside the working area of a robot or other machine.
The OS3101 Safety Laser Scanner uses 2-dimensional laser-beam scanning to detect whether an operator is present in the preset area by monitoring reflected beams, in order to maintain operator safety.

Depending on Work Details, Two Patterns Can Be Set for Two Different Area Combinations

Two different protective area and warning area combinations can be preset, allowing the OS3101 to respond to even complex changes in the work environment.
The patterns can be switched using only the OS3101, without having to use the special Controller, to quickly meet the needs of various work steps.

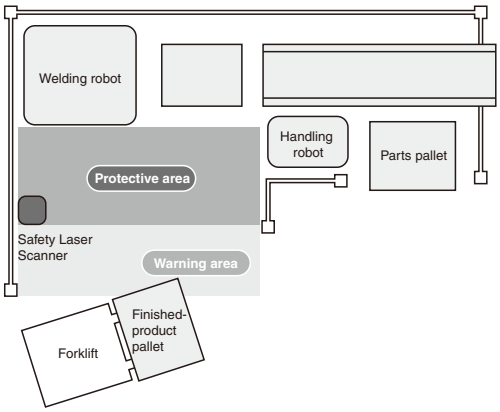
Monitoring Pattern 1





The protective area is switched depending on whether or not a finished-product pallet is present.

Monitoring Pattern 2

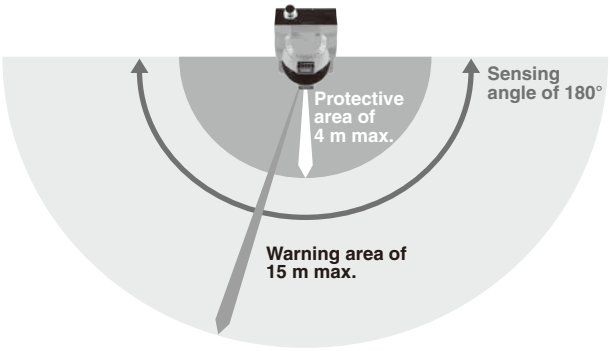


Features

A Wide Range of Functions Allow Flexible Setting of the Monitoring Area.

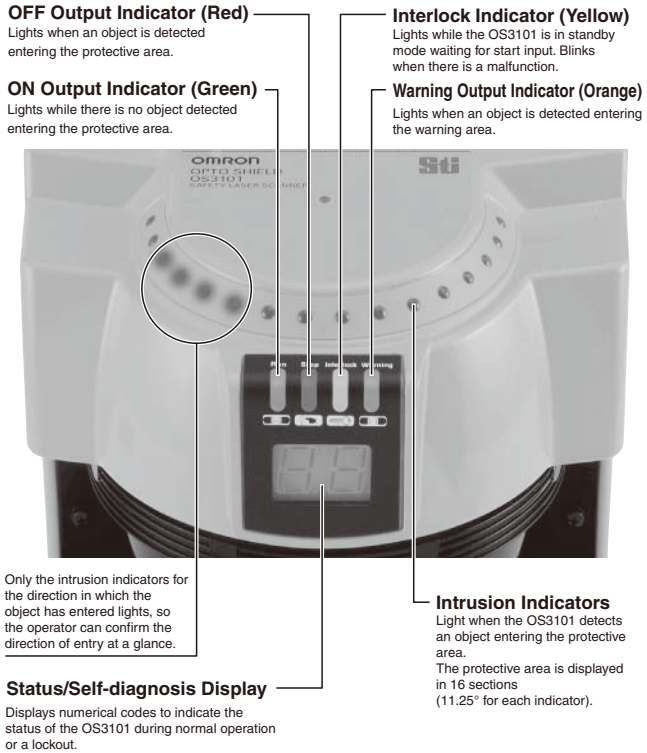
Allows the Setting of a Protective Area with a Radius of 4 Meters and a Warning Area with a Radius of 15 Meters.

It is possible to set both a protective area with a maximum radius of 4 meters, which prevents the machine from operating when entry is detected, and a warning area with a maximum radius of 15 meters, which monitors and warns of people approaching the machine. Because the OS3101 warns with indicators, sirens, and other means that something has entered the warning area, it makes it possible to prevent unintended stops. Two patterns of protective and warning area combinations can also be set to meet various needs.



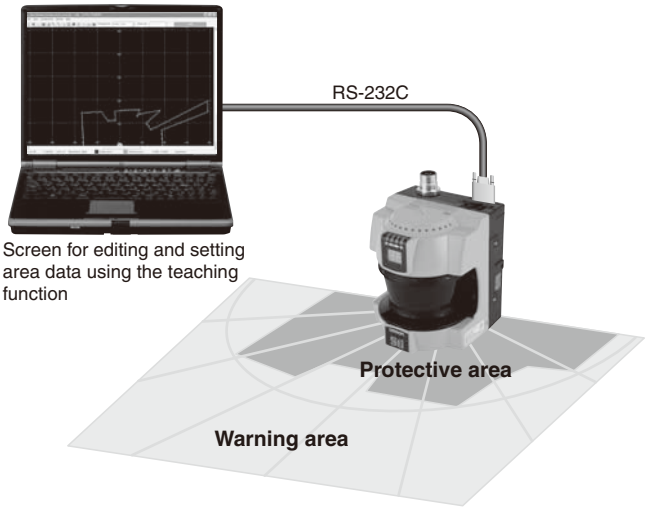
An Array of 16 Intrusion Indicators and an LED Display Show the OS3101 Condition at a Glance.

When the OS3101 detects an object entering the protective area, the intrusion indicators immediately light in red. The positions of the lit indicators from among the total of 16 indicators show the direction of the intrusion. The LED status indicators and 2-digit numerical, self-diagnostic display show the condition of the OS3101 with a single glance.

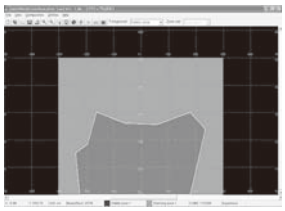


Even Complicated Areas Can Be Easily Set with Software

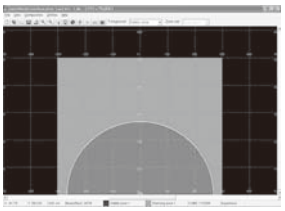
Highly flexible protective and warning areas can be set to match the shape of the work area, allowing for the presence of machines and other equipment. Area parameters are selected from semicircular, rectangular, or polygonal.
A teaching function also allows the OS3101's scanning data to be edited and registered as area setting data. These functions bring considerable flexibility and ease to area setting.



Area Setting Screens



A protective area set with a polygonal shape, and a warning area set with a rectangular shape



A protective area set with a semicircular shape, and a warning area set with a rectangular shape

Category 3 Safety Circuits Can Be Set without Using the Controller

Two high-capacity PNP transistor control outputs allow direct connection of output equipment such as safety relays and contactors with rated current up to 625 mA at 24 VDC.
The OS3101 also features an external device monitor (EDM) that makes it possible to configure safety circuits to the Category 3 level without having to use the Controller.

Response Time from 80 ms to a Maximum of 680 ms

The response time can be set for use in locations subject to special conditions, such as spattering in welding stations. This reduces the chances of the spattering material being mistakenly detected and stopping the machine, thus helping to improve productivity.

Ordering Information

OS3101 Safety Laser Scanner (Cable should be purchased separately.)

Appearance	Model	Remarks
	**OS3101-2-PN-S**	CD-ROM containing setting software included. Applicable OS: Windows 2000, Windows XP Professional, Windows XP Home Edition

Note: There is no cable included with the OS3101 Safety Laser Scanner.

Power Cables

Appearance	Specification	Model	Remarks
	Cable length: 10 m	**OS3101-CBL-10PT**	The Safety Laser Scanner requires one cable.
	Cable length: 20 m	**OS3101-CBL-20PT**	
	Cable length: 30 m	**OS3101-CBL-30PT**	

Communications Cables

Appearance	Specification	Model	Remarks
	Cable length: 2 m	**F39-RS2-C2**	An RS-232C 9-pin straight cable is necessary only when making settings for the Safety Laser Scanner.
	Cable length: 4 m	**F39-RS2-C4**	

Mounting Brackets

Appearance	Specification	Model	Remarks
	L-shaped Mounting Brackets	**OS3101-BKT**	Includes two L-shaped Mounting Brackets, two positioning brackets, and screws to mount the Safety Laser Scanner to the L-shaped Mounting Brackets.
	Rear Surface Mounting Brackets	**OS3101-BPT**	Includes Rear Surface Mounting Brackets and screws to mount the L-shaped Mounting Brackets to the Rear Surface Mounting Bracket. L-shaped Mounting Brackets should be purchased separately to use the Rear Surface Mounting Bracket.
	Mounting Stand	**OS3101-MT**	L-shaped Mounting Brackets should be purchased separately to use the Mounting Stand.

Accessories

Appearance	Specification	Model	Remarks
	Window	**OS3101-WIN-KT**	Provided for replacement in case the original is broken.
	Dust Ring	**OS3101-DST-KT**	Provided for replacement in case the original is broken.
	USB-Serial Conversion Cable	**CS1W-CIF31**	Necessary for communications via the USB port on personal computers that are not equipped with an RS-232C interface.

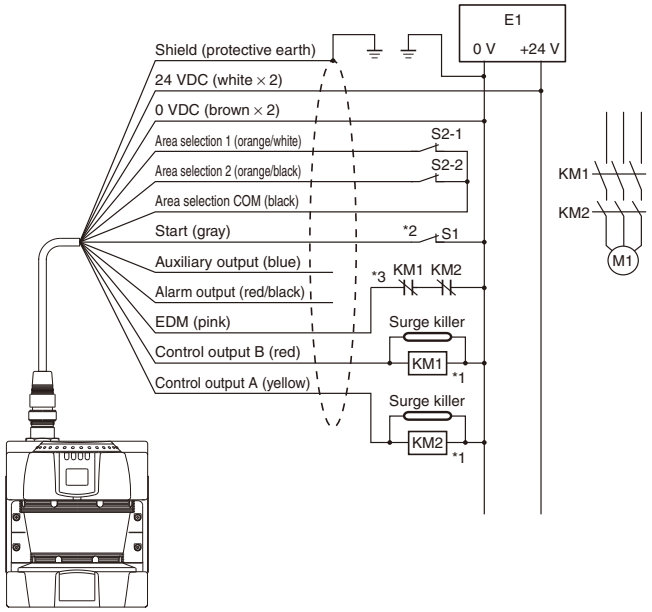
Specificatons

Sensor type		Type 3 Safety Laser Scanner
Safety category		Category 3, 2, 1, or B safety applications
Detection capability		Opaque objects: 62-mm diameter (1.8% min. reflection factor)
Monitoring area		Number of settable monitoring areas: Two sets of protective and warning areas
Operating range		Protective area: 4-m radius max., warning area: 15-m radius max.
Maximum measurement error		135 mm *1
Detection angle		180°
Response time		ON to OFF response time: 80 ms max. (2 scans) to 680 ms max. (17 scans max.) OFF to ON response time: ON to OFF response time plus 400 ms
Power supply voltage		24 VDC±20% (ripple p-p 2.5 V max.) *2
Power consumption		20 W (with no output load) *3
Light source (wavelength)		Infrared laser diode (905 nm)
Laser protection class		Class 1: IEC/EN 60825-1 (2001) Class 1: JIS 6802 (2005) Class I: CFR21 1040.10, 1040.11
Control outputs (OSSD)		PNP transistor output × 2, load current 625 mA max. *4 *5
Auxiliary output (non-safety output)		PNP transistor output × 1, load current 100 mA max. *4 *5
Alarm output (non-safety output)		PNP transistor output × 1, load current 100 mA max. *4 *5
Output operation modes		Auto start, start interlock, start/restart interlock
Inputs	**EDM**	ON: Short-circuit current of 0 V (input current: 50 mA), OFF: open
	Start	ON: Short-circuit current of 0 V (input current: 20 mA), OFF: open
	Area selection	ON: Connected to area selection COM (input current: 20 mA), OFF: open
Connection type		Power cable: 14-pin special round connector Communications cable: RS-232C 9-pin D-sub connector, straight cable
Connection with a personal computer *6		Communications: RS-232C, baud rate: 9600, 19200, 38400, 115200 bps Applicable OS: Windows 2000, Windows XP Professional, Windows XP Home Edition
Indications		ON output indicator (green), OFF output indicator (red), interlock indicator (yellow), alarm output indicator (orange) Status/self-diagnosis display (2-digit, 7-segment indicator), intrusion indicator (red LED × 16)
Protective circuits		Output load short-circuit protection, power supply reverse-connection protection
Ambient temperature		Operating: 0 to 50°C, storage: −25 to 70°C
Ambient humidity		Operating and storage: 95% max. (with no condensation)
Ambient operating light intensity		Incandescent lamp: receiving-surface light intensity of 1,500 lx max. (The angle between the laser scanning surface and the disturbance light should be ±8° min.)
Degree of protection		IP65 (IEC 60529)
Casing material		Aluminum die-cast
Dimensions		115 × 177 × 156 mm
Dielectric strength		350 VAC, 50/60 Hz for 1 min.
Insulation resistance		100 kΩ min. at 500 VDC
Shock resistance		98 m/s^2, 1,000 times each in X, Y, and Z directions (IEC 60028-2-29)
Vibration resistance		10 to 55 Hz, double amplitude of 0.7 mm, 20 sweeps in X, Y, and Z directions (IEC 60028-2-6)
Weight (Safety Laser Scanner only)		3.7 kg
Power cable		Maximum cable length: 30 m
Communications cable		Maximum cable length: 15 m
Accessories		Instruction manual, CD-ROM (setting software), two surge killers
Applicable standards		Certification institutes: TÜV Rheinland, UL, CSA Applicable standards: IEC 61496-1/-3 type 3, EN 954-1 category 3, UL 508

*1. An additional tolerance for measurement error may be necessary due to background effects.
*2. For details on power supply specifications, refer to "*Safety Precautions*" on page 13.
*3. The maximum rated current for the OS3101 is 2.3 A (850 mA for the OS3101 plus the load for control output A, the load for control output B, the auxiliary output load, and the alarm output load).
*4. The output voltage is the input voltage minus 2.0 VDC.
*5. Current consumption (the total of the two control outputs, the auxiliary output, and the alarm output) should not exceed 1.45 A.
*6. A USB-serial Conversion Cable is required for USB connection.

Connections

Basic Connection Example (Using Only the OS3101, Category 3)

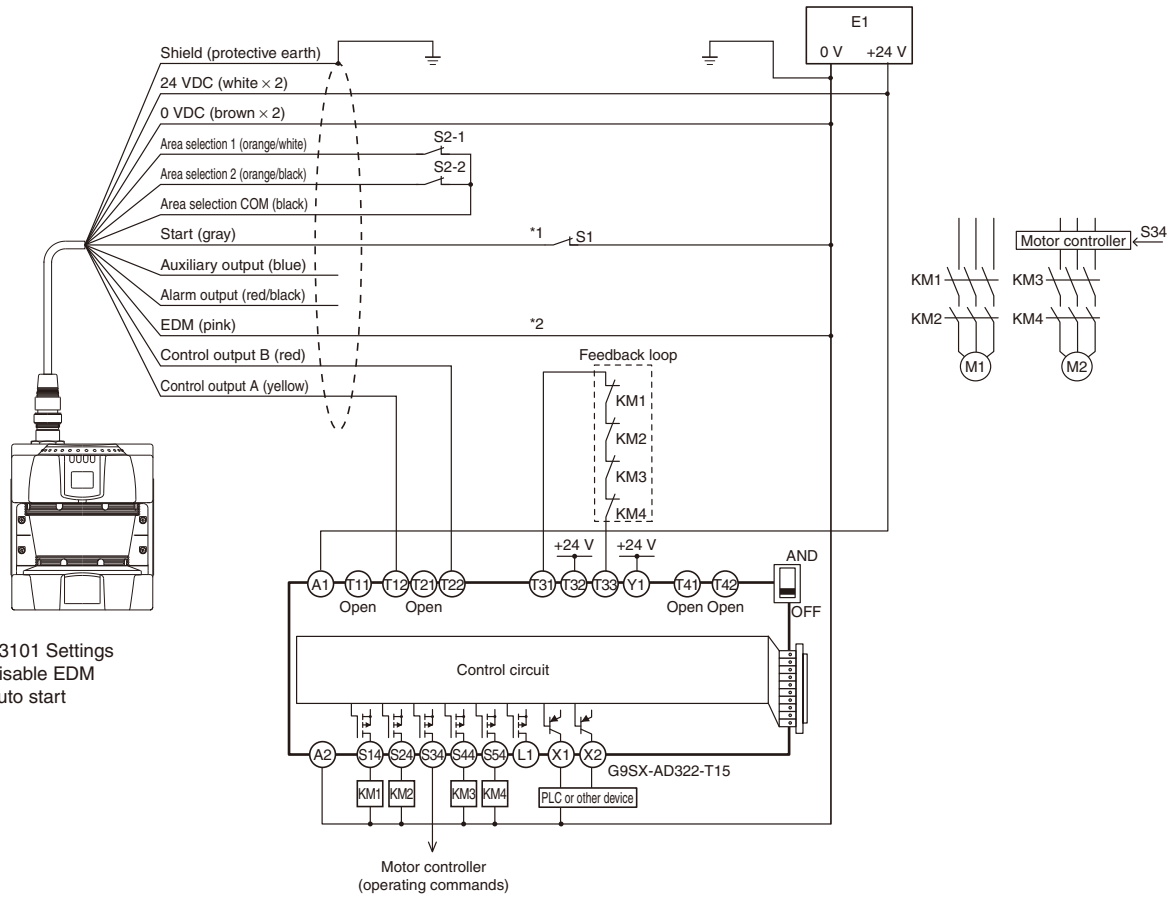


S1: Start input
S2-1/S2-2: Area setting selector
When area setting 1 is selected: S2-1 is short-circuited, S2-2 is open
When area setting 2 is selected: S2-1 is open, S2-2 is short-circuited
(For details, refer to the *Instruction Manual*.)
KM1, KM2: Safety relays with forcibly guided contacts
M1: 3-phase motor
E1: 24-VDC power supply

OS3101 Settings
- EDM
- Start/restart interlock

*1. Connect the surge killer that is included with the Safety Laser Scanner in parallel with KM1, KM2.
*2. Use NC contacts for the start input.
*3. If the EDM is not used, use the setting software to set the EDM to OFF, and then connect the EDM wire (pink) to 0 VDC.

Wiring for Connection to the G9SX-AD322-T15 Controller (Category 3)

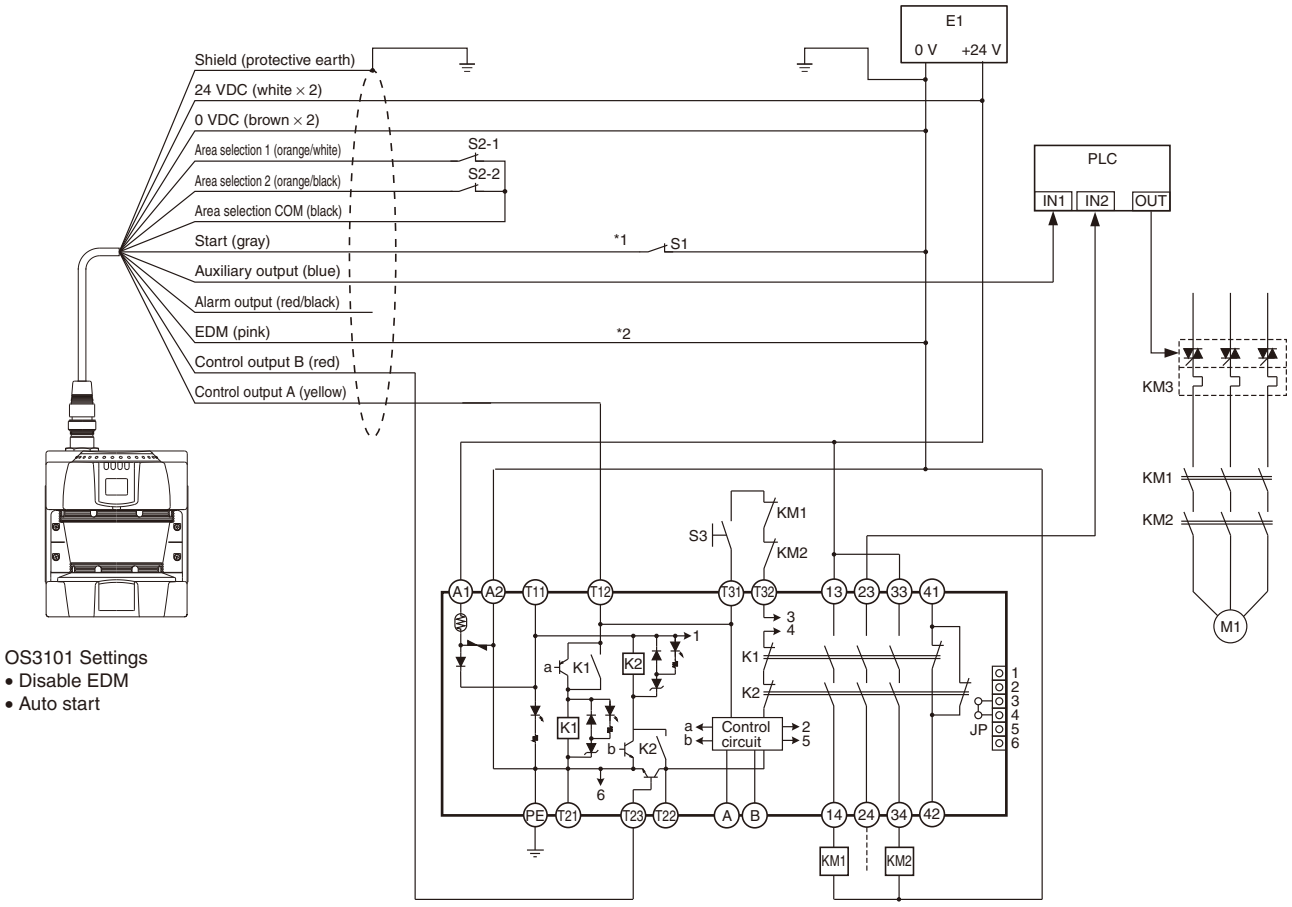


OS3101 Settings
- Disable EDM
- Auto start

S1: Start input
S2-1/S2-2: Area setting selector
When area setting 1 is selected: S2-1 is short-circuited, S2-2 is open
When area setting 2 is selected: S2-1 is open, S2-2 is short-circuited
(For details, refer to the *Instruction Manual*.)
KM1 to KM4: Safety relays with forcibly guided contacts
M1, M2: 3-phase motors
E1: 24-VDC power supply
PLC: Programmable Controller
(For monitoring use. Not related to the safety system.)

*1. Use NC contacts for the start input.
*2. If the EDM is not used, use the setting software to set the EDM to OFF, and then connect the EDM monitor wire (pink) to 0 VDC.

Wiring for Connection to the G9SA-301 Controller (Category 3)

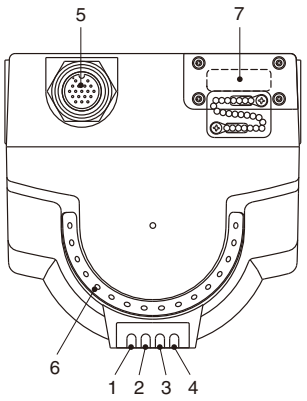


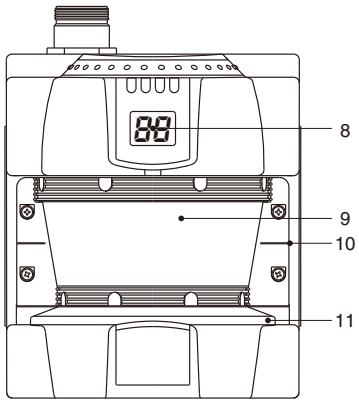
OS3101 Settings
- Disable EDM
- Auto start

S1: Start input (used to cancel lockout)
S2-1/S2-2: Area setting selector
When area setting 1 is selected: S2-1 is short-circuited, S2-2 is open
When area setting 2 is selected: S2-1 is open, S2-2 is short-circuited
(For details, refer to the *Instruction Manual*.)
S3: Reset switch
KM1, KM2: Safety relays with forcibly guided contacts
M1: 3-phase motor
E1: 24-VDC power supply
PLC: Programmable Controller (For monitoring use. Not related to the safety system.)

*1. Use NC contacts for the start input.
*2. If the EDM is not used, use the setting software to set the EDM to OFF, and then connect the EDM monitor wire (pink) to 0 VDC.

Names and Functions of Parts





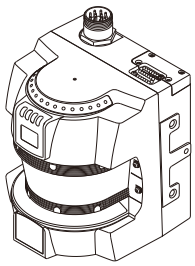
No.	Name	Function
1	ON output indicator (green)	Lit when control output is in ON-state.
2	OFF output indicator (red)	Lit when control output is in OFF-state.
3	Interlock indicator (yellow)	Lit when during start input standby, flashing during malfunction.
4	Alarm output indicator (orange)	Lit when an object entering the warning area is detected.
5	Power supply connector	14-pin power supply connector.
6	Intrusion indicators	Lit when an object entering the protective area is detected. Protective area is displayed in 16 sections (11.25° for each indicator).
7	Communications connector	Allows connection of an RS-232C D-sub straight cable for communication with a personal computer.
8	Status/self-diagnosis display	Displays numerical codes to indicate status of the OS3101 during normal operation or a lockout.
9	Window	Allows laser beam emission/reception.
10	Laser scanning plane indicator	A mark showing the laser scanning plane.
11	Dust ring	Detects dust and other foreign matter on the Window.

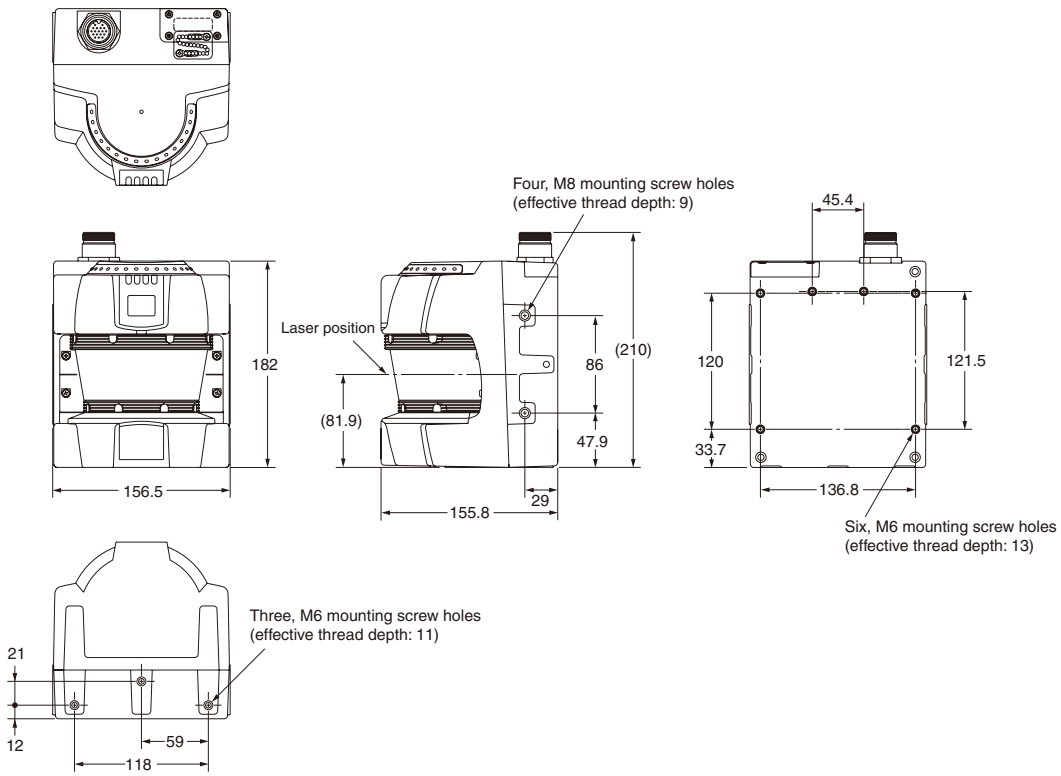
Dimensions

(Unit: mm)

Safety Laser Scanner

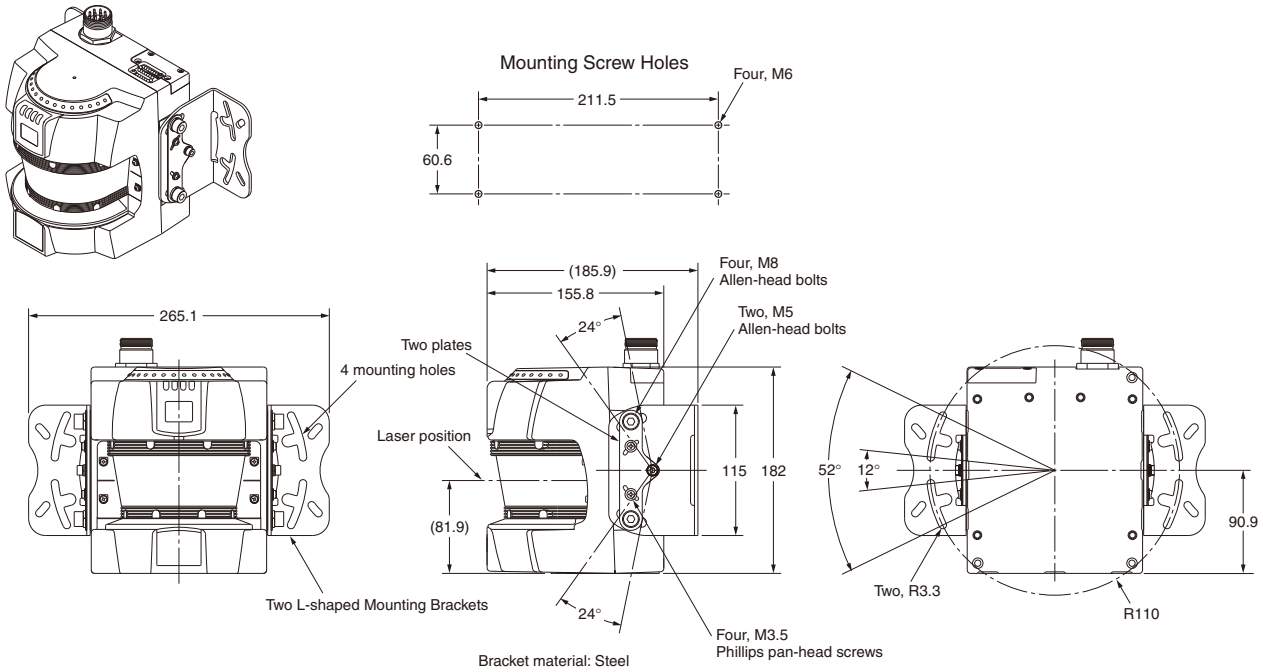
OS3101-2-PN-S





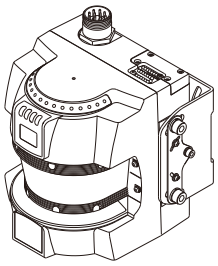
Safety Laser Scanner with L-shaped Mounting Brackets (Outward Bracket Mounting)

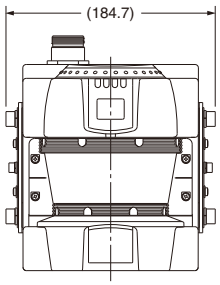
OS3101-2-PN-S + OS3101-BKT

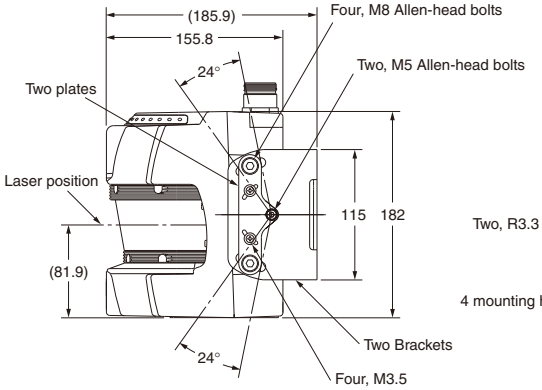


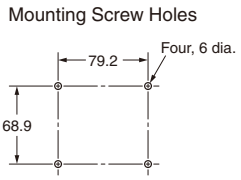
Safety Laser Scanner with L-shaped Mounting Brackets (Inward Bracket Mounting)

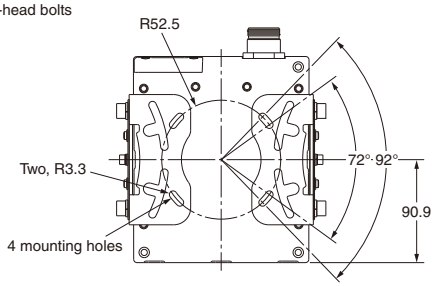
OS3101-2-PN-S + OS3101-BKT







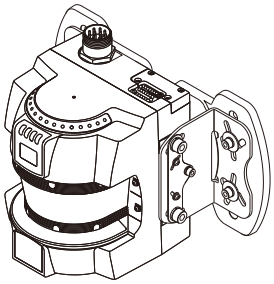


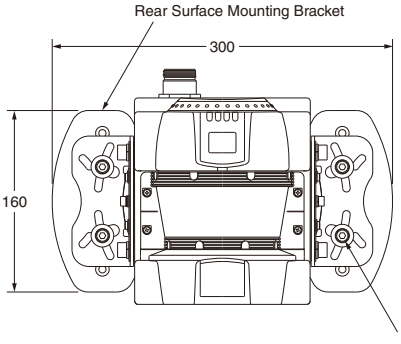


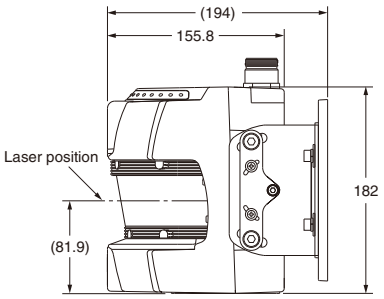
Bracket material: Steel

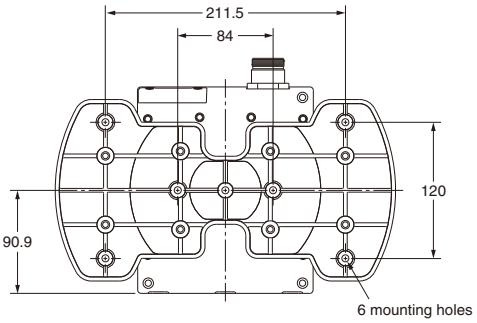
Safety Laser Scanner with L-shaped Mounting Brackets and Rear Surface Mounting Bracket

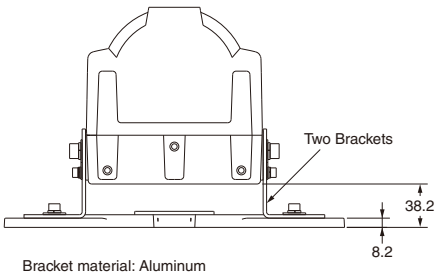
OS3101-2-PN-S + OS3101-BKT + OS3101-BPT



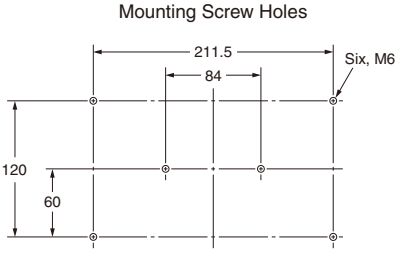






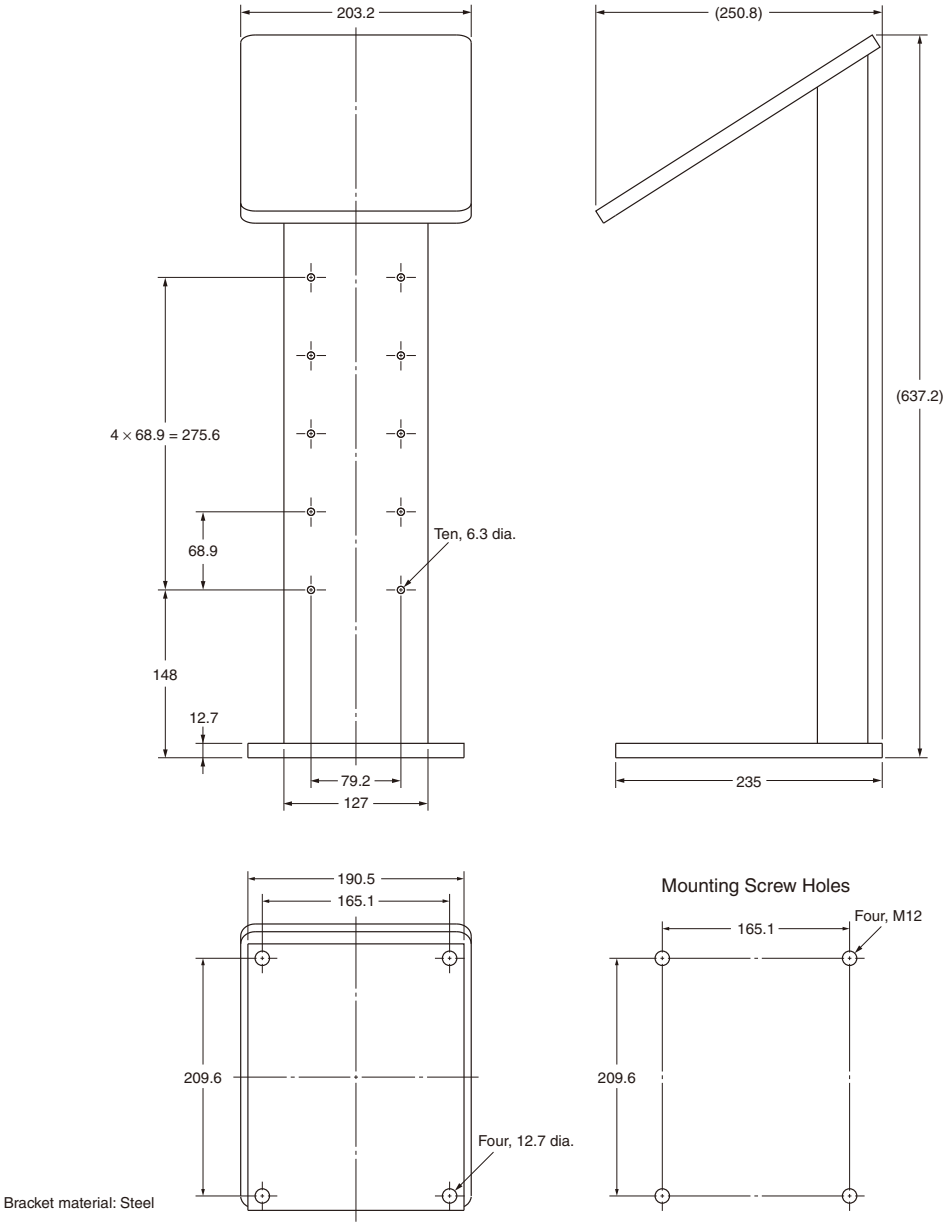


Bracket material: Aluminum



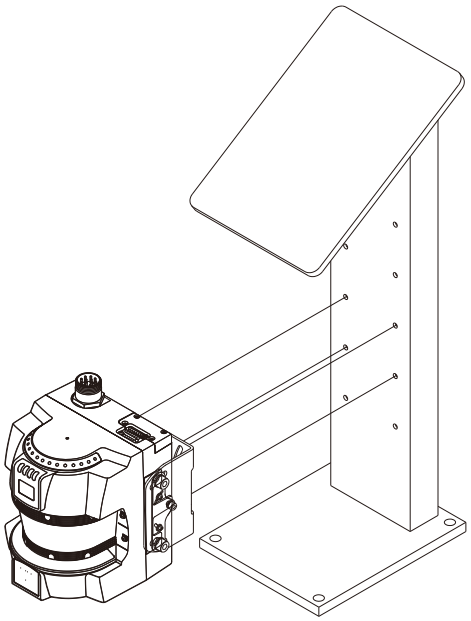
Mounting Stand

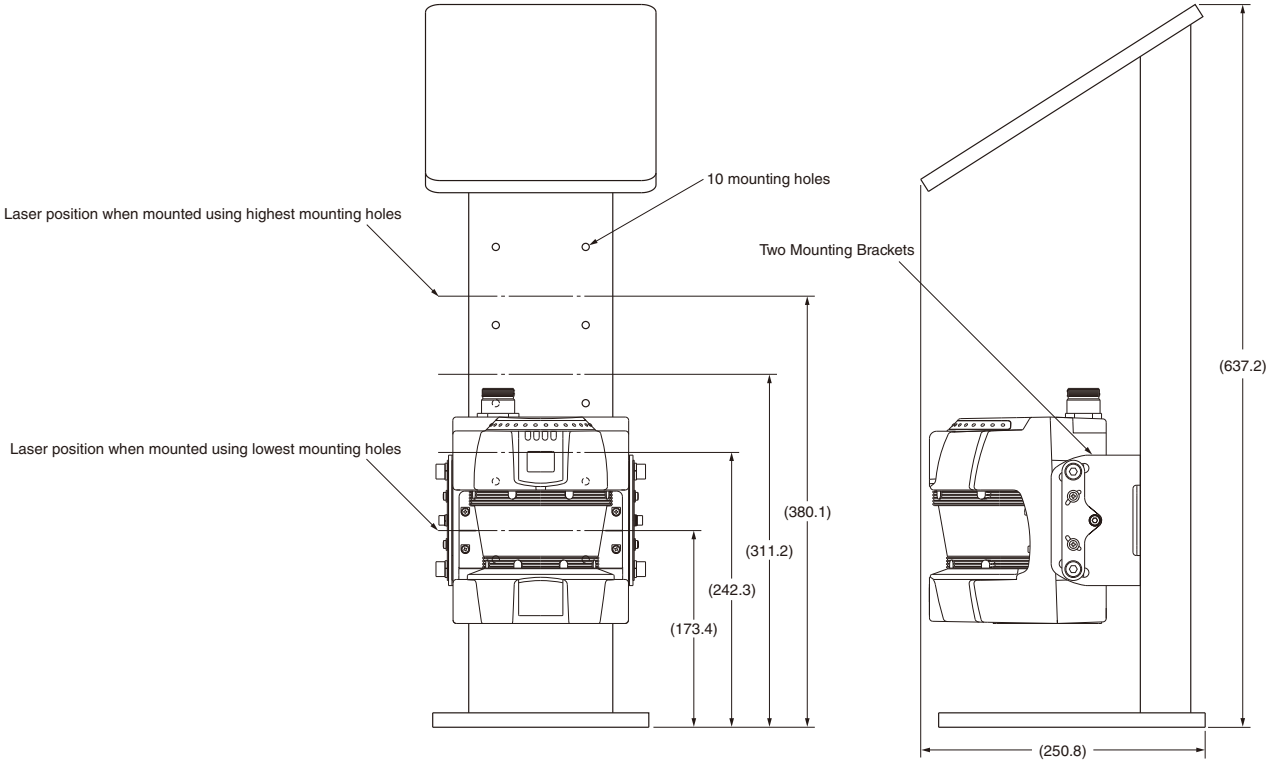
OS3101-MT



Safety Laser Scanner with L-shaped Mounting Brackets and Mounting Stand

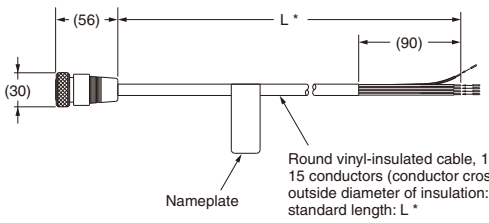
OS3101-2-PN-S + OS3101-BKT + OS3101-MT





Power Cable

OS3101-CBL-□□PT



* The length depends on the model, as shown in the following table.

Model	L
OS3101-CBL-10PT	$1{,}000^{+300}_{0}$
OS3101-CBL-20PT	$2{,}000^{+300}_{0}$
OS3101-CBL-30PT	$3{,}000^{+300}_{0}$

Safety Precautions

This catalog is intended as a guide for selecting the appropriate Safety Laser Scanner.
Be sure to use the *Instruction Manual* provided with the product for actual operation.

Regulations and Standards

1. Application of an OS3101 Safety Laser Scanner alone cannot receive type certification provided by Article 44-2 of the Labor Safety and Health Law of Japan. It is necessary to apply it in a system. Therefore, when using the OS3101 in Japan as a "safety system for pressing or shearing machines" prescribed in Article 42 of that law, the system should receive type certification.
2. (1)The OS3101 is electro-sensitive protective equipment (ESPE) in accordance with European Union (EU) Machinery Directive Index Annex IV, B, Safety Components, Item 1.
   (2)The OS3101 complies with the following legislation and standards:
   1. EU Regulations
      - Machinery Directive: 98/37/EC
      - EMC Directive: 2004/108/EC
   2. European Standards: EN 61496-1:2004 (Type 3 ESPE), EN 61496-3:2001 (Type 3 AOPDDR)
   3. International Standards: IEC 61496-1:2004 (Type 3 ESPE), IEC 61496-3:2001 (Type 3 AOPDDR)
   4. North American Standards: UL 508, UL 1998, CAN/CSA 22.2 No.14, CAN/CSA 22.2 No.0.8, CAN/CSA 22.2 No.205
   5. JIS Standards: JIS B 9704-1:2006, JIS B9704-3:2004 (Type 3 ESPE)

   (3)The OS3101 received the following certification from TÜV Rheinland, an EU-accredited body:
      - EC type test based on the Machinery Directive
        Type 3 ESPE (IEC 61496-1),
        Type 3 AOPDDR (IEC 61496-3)
      - TÜV Rheinland Type Certification
        Type 3 ESPE (IEC 61496-1)
        Type 3 AOPDDR (IEC 61496-3)

   (4)The OS3101 received the following approvals from the Third Party Assessment Body UL:
      - Certificate of UL listing for US and Canadian safety standards:
        Type 3 ESPE (IEC 61496-1)
        Type 3 AOPDDR (IEC 61496-3)

Precautions for Safe Use

Indication and Meaning of Safe Use

This catalog contains safety-related instructions to ensure safe use of the OS3101 Safety Laser Scanner. Because these instructions describe details very important to your safety, it is extremely important that you understand and follow the instructions.

Do not drop the OS3101.

⚠ WARNING

The system administrator should select and train qualified persons to be responsible for the correct installation, operation, and maintenance of all machinery and protective devices.

The OS3101 should only be installed, checked out, and maintained by a qualified person. A qualified person is defined by ANSI B30.2-1983 as a person or persons who, by possession of a recognized degree or certificate of professional training, or who, by extensive knowledge, training and experience, has successfully demonstrated the ability to solve problems relating to the subject matter and work.

Compliance with the safety standards for the OS3101's specific application and installation is possible only when it is used, installed, maintained, and operated safely. Each of these steps should be fully confirmed by the customer who purchases the OS3101, the person or persons who install it, and the employer of the operator of the OS3101.

After the OS3101 parameters have been set, test the protective area and warning area to confirm that they have been set correctly before operating any hazardous parts of the machinery.

Do not try to disassemble the OS3101. Doing so may cause the safety functions to stop working properly.

Be sure to observe the following conditions when using the OS3101.

- The machine for which protection is being provided should be capable of being stopped at any time within its operating cycle. Do not use the OS3101 for presses that are equipped with a full-revolution clutch.
- The OS3101 cannot protect a person from an object flying from a hazardous area. Install protective covers or fences.
- The machine for which protection is being provided should be stoppable within a constant length of time, and should be equipped with appropriate control mechanisms.
- The OS3101 is not capable of accurate detection in smoky or dusty environments. Using the OS3101 in these environments may cause the machine to suddenly stop.
- Do not use mirror-like objects on surfaces in the protective area. Their use may make it impossible to detect parts of the protective area.
- Comply with all laws and regulations of the country or region where the OS3101 is used. This is the employer's responsibility.
- Design all safety-related machine control elements so that a hazardous condition will not result from control circuit failures or similar problems.
- Additional protective measures should be taken if it is possible for a person to approach the hazardous area without being detected by the OS3101.
- Conduct the test described in the Instruction Manual when installing the OS3101, when a change is made to the machine for which protection is being provided, or when a change is made to the OS3101 parameters.
- Follow the procedures given in the Instruction Manual for tests and repairs.
- Be sure to thoroughly read the Instruction Manual and understand the procedures for installation, operation, and maintenance before use.
- An additional tolerance for measurement error may be necessary due to the type of background with which the OS3101 is used.

The employer is responsible for observing all requirements described herein, as well as the procedures and requirements for each machine and device that is used.

The OS3101 is designed to be used with a 24-VDC, negative (protective) ground electrical system. Do not connect it to a positive (protective) ground electrical system. Connecting the OS3101 to a positive (protective) ground electrical system may cause the machine that is being controlled to fail to stop, resulting in serious injury.

Do not connect any of the OS3101 lines to a DC power supply higher than 24 V+20%. Also, do not connect to an AC power supply. Failure to do so may result in electric shock.

For the OS3101 to comply with IEC 61496-1 and UL 508, the DC power supply unit should satisfy all of the following conditions:

- Should be within rated power voltage (24 VDC±20%).
- Should comply with EMC Directives (industrial environment)
- Double or enhanced insulation should be applied between the primary and secondary circuits.
- Automatic recovery of overcurrent protection characteristics
- Output holding time should be 20 ms or longer.
- Should satisfy output characteristic requirements for class 2 circuit or limited voltage current circuit defined by UL508.
- Should comply with the EMC, laws, and regulations of the country or region where the OS3101 is used. (Example: In the EU, the power supply should comply with the EMC Low Voltage Directive.)

Double or enhanced insulation should be applied between the OS3101 and hazardous voltage sources (such as 230 VAC) to protect against electric shock.

The cable extension length should be no greater than the specified length. Otherwise, the safety functions may fail to work properly, resulting in danger.

When the OS3101 is used in a category 3 safety system, use both control outputs to build the safety system. Using only one control output may result in serious injury due to a malfunction in the output circuit.

The protective area should be correctly defined and the parameters related to the protective area should be correctly set in order to use the protective functions of the OS3101.

When changing the response time of the OS3101, the safety distance should be recalculated and the OS3101 should be re-installed to match the recalculated safety distance. Failure to do so may cause the machine to fail to stop before an operator reaches the dangerous area and may result in serious injury.

Do not allow the following types of light to shine directly on the OS3101.

- Incandescent light
- Strobe light
- Light from optical sensors using infrared light

If the Window is cracked, broken, or otherwise damaged, replace it immediately. Failure to do so may lower the degree of protection. Also, when replacing the Window, take the necessary steps to prevent dust or other particles from entering the OS3101.

If the Dust Ring is damaged, replace it immediately. Failure to do so may lower the degree of protection. Also, when replacing the Dust Ring, take the necessary steps to prevent dust or other particles from entering the OS3101.

To maintain the IP65 enclosure rating, make sure that there is no foreign matter adhering to the seals of the connectors, Window, or Dust Ring, and that all screws are properly tightened.

Install the OS3101 securely.

When disposing of the OS3101, do so in accordance with the laws and regulations for waste disposal in the country where it is used.

⚠ WARNING

This catalog is a guide to help customers select the proper safety products. Observe the following items when choosing products, select the right products for your devices or equipment, and develop a safety-related system to fully utilize product functions.

Setting Up a Risk Assessment System

The items listed in this catalog must be used properly in terms of product location as well as product performance and functionality. Part of the process of selecting and using these products should include the introduction and development of a risk assessment system early in the design development stage to help identify potential dangers in your equipment that will optimize safety product selection. A badly designed risk assessment system often results in poor choices when it comes to safety products.

- Related International Standards:
  ISO 14121 Principles of Risk Assessment

Safety Policy

When developing a safety system for the devices and equipment that use safety products, make every effort to understand and conform to the entire series of international and industrial standards available, such as the examples given below.

- Related International Standards:
  ISO 12100 Basic Concepts, General Principles for Design
  IEC 61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems

Role of Safety Products

Safety products have functions and mechanisms that ensure safety as defined by standards. These functions and mechanisms are designed to attain their full potential within safety-related systems. Make sure you fully understand all functions and mechanisms, and use that understanding to develop systems that will ensure optimal usage.

- Related International Standards:
  ISO 14119 Interlocking Devices Associated with Guards-Principles for Design and Selection

Installing Safety Products

Make sure that properly educated and trained engineers are selected to develop your safety-related system and to install safety products in devices and equipment.

- Related International Standards:
  ISO 12100 Basic Concepts, General Principles for Design
  IEC 61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems

Observing Laws and Regulations

Safety products should conform to pertinent laws, regulations, and standards, but make sure that they are used in accordance with the laws, regulations, and standards of the country where the devices and equipment incorporating these products are distributed.

- Related International Standards:
  IEC 60204 Electrical Equipment of Machines

Observing Usage Precautions

Carefully read the specifications and precautions listed in this catalog for your product as well as all items in the Operating Manual packed with the product to learn usage procedures that will optimize your choice. Any deviation from precautions will lead to unexpected device or equipment failure not anticipated by safety-related systems or fire originating from equipment failure.

Transferring Devices and Equipment

When transferring devices and equipment, be sure to keep one copy of the Operating Manual and pack another copy with the device or equipment so the person receiving it will have no problem operating it.

- Related International Standards:
  ISO 12100 Basic Concepts, General Principles for Design
  IEC 61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ERRORS AND OMISSIONS

The information in this catalog has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

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2007.11

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