

# Mitutoyo

## Line Laser Sensor SurfaceMeasure-S

### SurfaceMeasure1008S

### SurfaceMeasure0303S

### SurfaceMeasure2929S

### Instruction Manual

- Instructions for use -



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Read this document thoroughly before operating the product. After reading, retain it close at hand for future reference.

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Date of publication:  
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Product name	Model number
Line Laser Sensor SurfaceMeasure	SurfaceMeasure1008S, SurfaceMeasure0303S, SurfaceMeasure2929S

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- Mitutoyo Corporation assumes no responsibilities for any damage to the product, caused by its use not conforming to the procedure described in this document.
- Upon loan or transfer of this product, be sure to attach this document to the product.
- In the event of loss or damage to this document, immediately contact the agent where you purchased the product or a Mitutoyo sales office.
- Read this document thoroughly before operating the product. In particular, be sure to fully understand "Safety Precautions" on page 9 and "Precautions for Use" on page 13.
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## Mitutoyo Corporation

20-1, Sakado 1-Chome, Takatsu-ku, Kawasaki-shi, Kanagawa 213-8533, Japan  
Tel: +81 (0)44 813-8230 Fax: +81 (0)44 813-8231  
Home page: <https://www.mitutoyo.co.jp/global.html>  
For the EU Directive, Authorized representative and importer in the EU:  
Mitutoyo Europe GmbH

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Customer assumes all responsibility for all results arising out of its selection of the Software Product to achieve its intended results.

**WARNING**  
Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

**CAUTION**  
If the product is going to be used in the following places, adequately implement shielding countermeasures.  
In conjunction with the causes of injuries, if the product is used beyond the conditions that are indicated in the specifications, its functions and performance can no longer be guaranteed.  
• Where noise is generated due to static electricity, etc.  
• Where there is strong electrical field intensity  
• Where power cables and power transmission lines are running through nearby  
• Where there are risks of radiation being irradiated  
• Where there are risks of being exposed to corrosive gases, etc.

**CAUTION**  
This product uses a visible light laser beam. Any procedures other than the procedures described herein may result in hazardous radiation exposure. As for the laser product safety standards, this product conforms to the following standards.

Applicable standards	Laser class
IEC 60825-1:2014 EN 60825-1:2014+A11:2021 JIS C 6802:2014	Class 2 laser product

Class 2 laser product:  
This product is a laser product which emits visible light in the 400 nm to 700 nm wavelength spectrum, and it is dangerous if you intentionally look into the laser beam. Even if the beam hits your skin, it will not particularly be a problem. Protective equipment such as protective eyewear, etc., is not necessary, but if protective eyewear is purchased for use, refer to the wavelengths contained in Users' Manual "Specifications".  
Laser Safety:  
SurfaceMeasure-S is referred to as components, indicating that they are sold only to qualified customers for incorporation into their own equipment. These sensors do not incorporate safety items that the customer may be required to provide in their own equipment (e.g., refer to the references below for detailed information).

● If the product is used beyond the conditions indicated in the specifications (Users' Manual "4 Specifications" on page 28 and Users' Manual "14 Specifications"), be aware that the functions and performance cannot be guaranteed.

### Environment for placement

For usage environment explanations, see "Environment and Lighting" on page 12.

## Electromagnetic Compatibility (EMC)

This product complies with the EMC Directive and the UK Electromagnetic Compatibility Regulations. However, if it is exposed to electromagnetic interference that exceeds the limits specified in these directives and regulations, the warranty will be invalidated and appropriate measures will be required.

This product is an industrial product, and is not intended to be used in residential environment. If this product is used in residential environment, this product may cause electromagnetic interference with other instruments. In such a case, it is required to take appropriate measures for preventing such electromagnetic interference.

## Export Control Compliance

This product falls into the Catch-All-Controlled Goods and/or Catch-All-Controlled Technologies (including Programs) under Category 16 of Appendix Table 1 of Export Trade Control Order or under Category 16 of Appendix Table of Foreign Exchange Control Order, based on Foreign Exchange and Foreign Trade Act of Japan.

If you intend re-export of the product from a country other than Japan, re-sale of the product in a country other than Japan, or re-providing of the technology (including Programs), you shall observe the regulations of your country.

Also, if an option is added or modified to add a function to this product, this product may fall under the category of List-Control Goods, List-Control Technology (including Programs) under Category 1 - 15 of Appendix Table 1 of Export Trade Control Order or under Category 1 - 15 of Appendix Table of Foreign Exchange Control Order, based on Foreign Exchange and Foreign Trade Act of Japan. In that case, if you intend re-export of the product from a country other than Japan, re-sale of the product in a country other than Japan, or re-providing of the technology (including Programs), you shall observe the regulations of your country. Please contact Mitutoyo in advance.

## Conventions Used in This Document

### Safety reminder conventions warning against potential hazards

<b>DANGER</b>	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
<b>WARNING</b>	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
<b>CAUTION</b>	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
<b>NOTICE</b>	Indicates a situation which, if not avoided, may result in property damage.
<b>Electricity</b>	Alerts the user to a specific hazardous situation that means "Caution, risk of electric shock".

### Conventions indicating prohibited and mandatory actions

	Indicates concrete information about prohibited actions.
	Indicates concrete information about mandatory actions.
	Indicates that grounding needs to be implemented.

### Conventions indicating referential information or reference location

<b>IMPORTANT</b>	Indicates information that must be known when using the product.
<b>Tips</b>	Indicates further information and details relevant for the operating methods and procedures that are explained in that section.
	Indicates reference location if there is information that should be referred to in this document or an extraneous User's Manual. Example: For details about XX, see "1 Overview" on page 18.

### Other conventions

	Represent a paraphrase of an immediately preceding phrase or a supplementary explanation.
	Represent a highlighted phrase. They also indicate an index where information to be referenced is described.

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### Disclaimer

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The foregoing limitations shall apply even if the above-stated warranty fails of its essential purpose.

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The license of Customer under this EULA is effective until terminated. Customer may terminate this EULA at any time by destroying all copies of the Software Product including all media and documentation. This EULA will terminate immediately without notice from Mitutoyo if Customer fails to comply with any provision of this EULA. Upon termination, Customer must destroy all copies of Software Product including all media and documentation.

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The Software Product is subject to Japanese export control laws as well as any other applicable export or import control laws and regulations in other countries. Customer agrees to comply strictly with all such applicable regulations and acknowledges that it has the responsibility to obtain licenses to export, re-export, or import the Software Product.

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**WARNING**  
Absolutely do not peel off the following laser class label which is applied to the main unit of the Line Laser Probe SurfaceMeasure for precautions.  
■ "Locations of labels" on page 8

- Do not look into the laser emitter. Absolutely do not look into it even if the beam is not emitted.
- Do not look directly at the laser beam with optical equipment (things which converge light such as magnifying glasses, etc.). In addition, do not allow the light reflected from the flat surfaces to enter into your eyes, when measuring flat surfaces such as mirror surface. Even if the beam hits your skin, it will not particularly be a problem.

### Electrical Safety

**WARNING**  
Failure to follow the guidelines described in this section may result in electrical shock or equipment damage.

- Sensors should be connected to earth ground.
- All sensors should be connected to earth ground through their housing. All sensors should be mounted on an earth grounded frame using electrically conductive hardware to ensure the housing of the sensor is connected to earth ground. Use a multi-meter to check the continuity between the sensor connector and earth ground to ensure a proper connection.
- Minimize voltage potential between system ground and sensor ground. Care should be taken to minimize the voltage potential between system ground (ground reference for I/O signals) and sensor ground. This voltage potential can be determined by measuring the voltage between Analog\_out and system ground. The maximum permissible voltage potential is 12 V but should be kept below 10 V to avoid damage to the serial and encoder connections.
- For a description of the connector pins, see Users' Manual "14.2.2 SurfaceMeasure-S I/O Connector".
- Use a suitable power supply.
- The power supply used with sensors should be an isolated supply with inrush current protection or be able to handle a high capacitive load. Verify the voltage input requirements for your sensor in the sensor's specifications; for specifications, see Users' Manual "14.2 Sensor Connectors".

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## Notes on Export to European Countries

When you intend exporting of this product to any of the European countries, it may be required to provide User's Manual(s) in English and Declaration of Conformity in English (in some cases, the official language of the country to be exported). For detailed information, please contact Mitutoyo in advance.

## Disposal of Products outside the European Countries

Please follow the official instruction in each community and country.

## Disposal of Old Electrical & Electronic Equipment (Applicable in the European Countries with Separate Collection Systems)

This symbol on the product or on its packaging is based on WEEE Directive (Directive on Waste Electrical and Electronic Equipment), and this symbol indicates that this product shall not be treated as household waste.

To reduce the environmental impact and minimize the volume of landfills, please cooperate in reuse and recycle.

For how to dispose of the product, please contact the agent where you purchased the product or a Mitutoyo sales office.

## China RoHS Compliance Information

This product meets China RoHS requirements. See the table below.

产品名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
本体	×	○	○	○	○	○
配件	○	○	○	○	○	○

产品名称	有害物质			
	邻苯二甲酸二正丁酯 (DBP)	邻苯二甲酸二异丁酯 (DIBP)	邻苯二甲酸二叔丁酯 (BBP)	邻苯二甲酸二(2-乙基己)酯 (DEHP)
本体	○	○	○	○
配件	○	○	○	○

[ ] Square brackets	Represents items displayed on the screen (menus, dialogs, buttons, tabs, etc.) and keys on the controller or keyboard. They also indicate an item to be purposely entered or selected by the customer. Furthermore, they indicate key switches on JSBOX (joystick box).
1, 2, 3, ...	Indicates the order and the contents of tasks.
1, 2, 3, ...	Indicates main tasks, 1: indicates detailed tasks
▶	Indicates the action resulted from some operation(s).

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### Miscellaneous

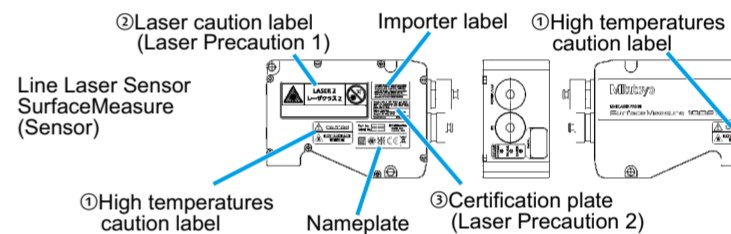
This EULA shall be governed by and construed in accordance with the laws of Japan, without giving effect to the principles of conflict of law. Customer agrees to submit to the exclusive jurisdiction of the district courts in Tokyo, Japan with respect to any dispute, controversy or claim arising out of or relating to this EULA and the parties respective rights and obligations hereunder. This EULA shall not be governed by the United Nations Convention on Contracts for the International Sale of Goods, the application which is expressly excluded. If any portion hereof is found to be void or unenforceable, the remaining provisions of this EULA shall remain in full force and effect. This EULA constitutes the entire agreement between Customer and Mitutoyo with respect to the subject matter hereof. Customer shall indemnify, defend and hold harmless Mitutoyo, its affiliated and related companies and its suppliers from and against any and all claims and liability of any nature whatsoever arising out of or in connection with Customer's breach of this EULA. The governing language of this EULA shall be English. English version will prevail to the extent that there is any inconsistency between English version and any version translated into another language.

## Labels on Product

### Product safety labels

This product has been designed and manufactured with human safety as a priority. In order to use it more safely, product safety labels have been applied to the main body and all peripheral devices. This section explains the meaning and the contents of each safety label on the product. Before operating this product, be sure to carefully read this section to use this product safely and for a long time.

### Locations of labels



**CAUTION**  
Use care when handling powered devices.  
Wires connecting to the sensor should not be handled while the sensor is powered. Doing so may cause electrical shock to the user or damage to the equipment.

### Heat Warning

**CAUTION**  
If a sensor is not adequately heat-sunk, the housing may get hot enough to cause injury.  
Sensors should be properly heat-sunk.  
To avoid injury and to ensure that a sensor functions properly, mount the sensor to a thermally conductive material for good heat-sinking. See also, "Environment and Lighting" on page 12.

## Handling, Cleaning, and Maintenance

### IMPORTANT

Dirty or damaged sensor windows (emitter or camera) can affect accuracy. Use caution when handling the sensor or cleaning the sensor's windows.  
• Keep sensor windows clean  
Use dry, clean air to remove dust or other dirt particles. If dirt remains, clean the windows carefully with a soft, lint-free cloth and non-streaking glass cleaner or volatility alcohol. Ensure that no residue is left on the windows after cleaning.  
• Turn off lasers when not in use  
Mitutoyo uses semiconductor lasers in SurfaceMeasure-S. To maximize the lifespan of the sensor, turn off the laser when not in use.  
• Avoid excessive modifications to files stored on the sensor  
Sensor settings are stored in flash memory inside the sensor. Flash memory has an expected lifetime of 100,000 writes. To maximize lifetime, avoid frequent or unnecessary file save operations.

## Environment and Lighting

### IMPORTANT

Avoid strong ambient light sources.  
The imager used in this product is highly sensitive to ambient light. Do not operate this device near windows or lighting fixtures that could influence measurement or data acquisition. If the unit must be installed in an environment with high ambient light levels, a lighting shield or similar device may need to be installed to prevent light from affecting measurement.

本表格依据 SJ/T 11364 的规定编制。  
○: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。  
×: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

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另外,此期限不同于质量/功能的保证期限。

## Warranty

This product has been manufactured under strict quality management, but should it develop problems within one year of the date of purchase in normal use, repair shall be performed free of charge. Please contact the agent where you purchased the product or Mitutoyo sales office (Users' Manual "SERVICE NETWORK"). This warranty, however, shall not affect any provisions of the Mitutoyo Software End User License Agreement. If this product fails or is damaged for any of the following reasons, it will be subject to a repair charge, even if it is still under warranty.

- Failure or damage owing to fair wear and tear
- Failure or damage owing to inappropriate handling, maintenance or repair, or to unauthorized modification
- Failure or damage owing to transport, dropping, or relocation of the product after purchase
- Failure or damage owing to fire, salt, gas, abnormal voltage, lightning surge, or natural disaster
- Failure or damage owing to use in combination with hardware or software other than those designated or permitted by Mitutoyo
- Failure or damage owing to use in ultra-hazardous activities

This warranty is effective only where the product is properly installed and operated in conformance with the instructions in this document within the original country of the installation.

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You assume responsibility for all results due to the selection of this product to achieve your intended results.

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The foregoing limitations shall apply even if the above-stated warranty fails of its essential purpose. BECAUSE SOME COUNTRIES, STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR THE LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, IN SUCH COUNTRIES, STATES OR JURISDICTIONS, MITUTOYO'S LIABILITY SHALL BE LIMITED TO THE EXTENT PERMITTED BY LAW.

## 1 Overview

The Line Laser Sensor SurfaceMeasure-S is a laser sensor system that uses a line laser to enable non-contact form measurement. The Line Laser Sensor SurfaceMeasure-S (hereinafter referred to as the sensor, or sensor's main unit) is mounted onto various transport devices and industrial robots for use.

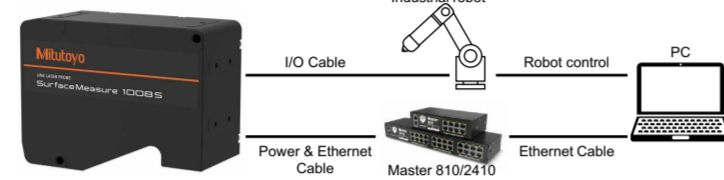
The mounted sensor irradiates the target to be measured with a laser beam, detects the reflected light, and measures the form of the targets in a non-contact manner.

The product has the following features.

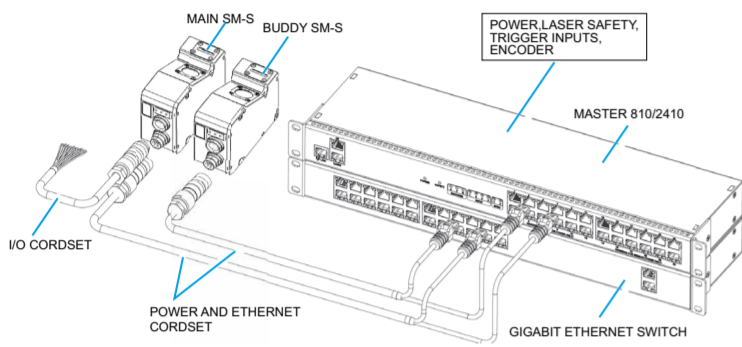
- Enables high-precision non-contact form measuring.
- Enables data acquisition in various applications, and can be used as a simple measuring tool.
- Application examples: total inspections, 3D data acquisition applications
- Enables measuring via high environmental resistance (IP67) even in poor environmental conditions.
- Enables various kinds of measuring, and GO/NG judgment via the advanced processing functions built into the sensor's main unit.
- Enables setups of the sensor using Internet browsers.
- Enables data check and analysis off line using the supplied emulator.
- Enables supporting various input and output devices using the supplied software development kit (SDK).

In addition, multiple sensors can be connected to configure a measuring system by using the Master810/2410 network controller.

Example of a system configuration whereby the sensor main unit or body and Master network controller are used.



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### 2.2.3 Accessories

In this product, the following accessories are included. If there is a shortage, see [Users' Manual "SERVICE NETWORK"], and contact Mitutoyo, or the agent where you purchased the product.

Name	Part Number	Amount	Remarks
Calibration Disk φ40	02AQL299	1	Only SM1008S
Calibration Disk φ22	02AQL749	1	Only SM0303S
Calibration Disk φ100	02AQL849	1	Only SM2929S
Instruction Manual [Japanese Version]	99MCA914J	1	
Instruction Manual [English Version]	99MCA914A	1	
USB memory for electronic file distribution	02AQL350	1	
- User's Manual [Japanese Version]	99MCA912J	-	
- User's Manual [English Version]	99MCA912A	-	

## 2.3 Installation

### 2.3.1 Mounting

Sensors should be mounted using a model-dependent number of screws. Some models also provide the option to mount using bolts in through-body holes. Refer to the dimension drawings of the sensors in [Users' Manual

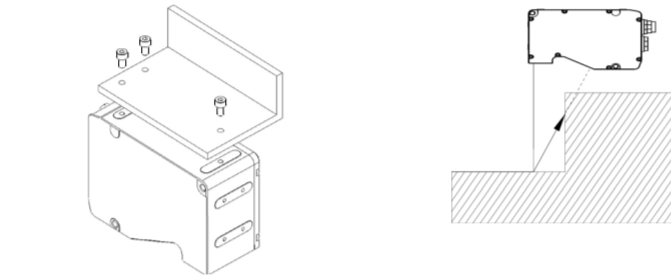
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"14 Specifications" for the appropriate screw diameter, pitch, and length, and bolt hole diameter.

#### NOTICE

Proper care should be taken in order to ensure that the internal threads are not damaged from cross-threading or improper insertion of screws.

Sensors should not be installed near objects that might occlude a camera's view of the projected light.



Sensors should not be installed near surfaces that might create unanticipated laser reflections.

**IMPORTANT**  
The sensor must be heat sunk through the frame it is mounted to. If the heat dissipation is obstructed, that might cause malfunctions. When a sensor is properly heat sunk, the difference between ambient temperature and the temperature reported in the sensor's health channel is less than 15° C.

#### IMPORTANT

The SurfaceMeasure-S sensor is a precision device. The temperature of all of its components must be in equilibrium. After powering on the sensor, it should take at least an hour to warm up before the temperature inside the sensor stabilizes.

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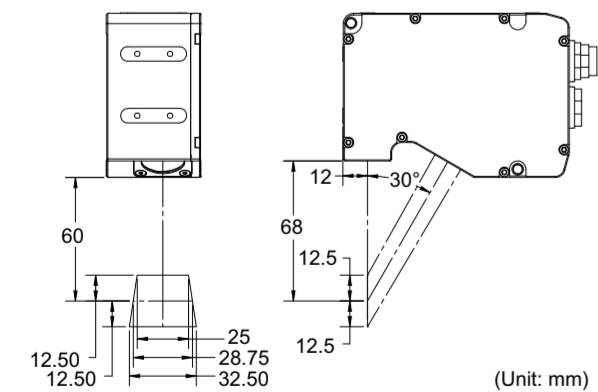
### 2.4.2 SurfaceMeasure-S Setup

The following describes how to set up a sensor system for operation. After you have completed the setup, you can perform a scan to verify basic sensor operation.

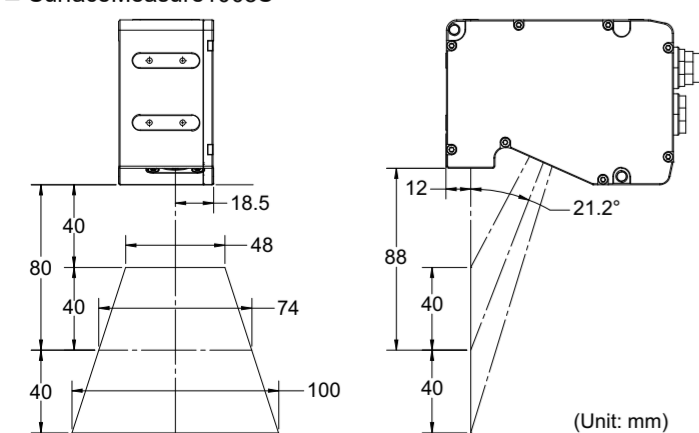
- 1 Power up the sensor.
  - » The power indicator (blue) should turn on immediately.
- 2 Enter the sensor's IP address (192.168.1.10) in a web browser.
  - » The sensor interface loads.
  - » If a password has been set, you will be prompted to provide it and then log in.
- 3 Go to the [Manage] page.
- 4 Ensure that Replay mode is off (the slider is set to the left).
- 5 Ensure that the Laser Safety Switch is enabled or the Laser Safety input is high.
- 6 Go to the [Scan] page.
- 7 Observe the profile in the data viewer
- 8 Press the [Start] button or the [Snapshot] on the [Toolbar] to start the sensor.
  - » The [Start] button is used to run sensors continuously.
  - » The [Snapshot] button is used to trigger the capture of a single frame.
- 9 Move a target into the sensor's projected light.
  - » If a target object is within the sensor's measurement range, the data viewer will display scan data, and the sensor's range indicator will illuminate.

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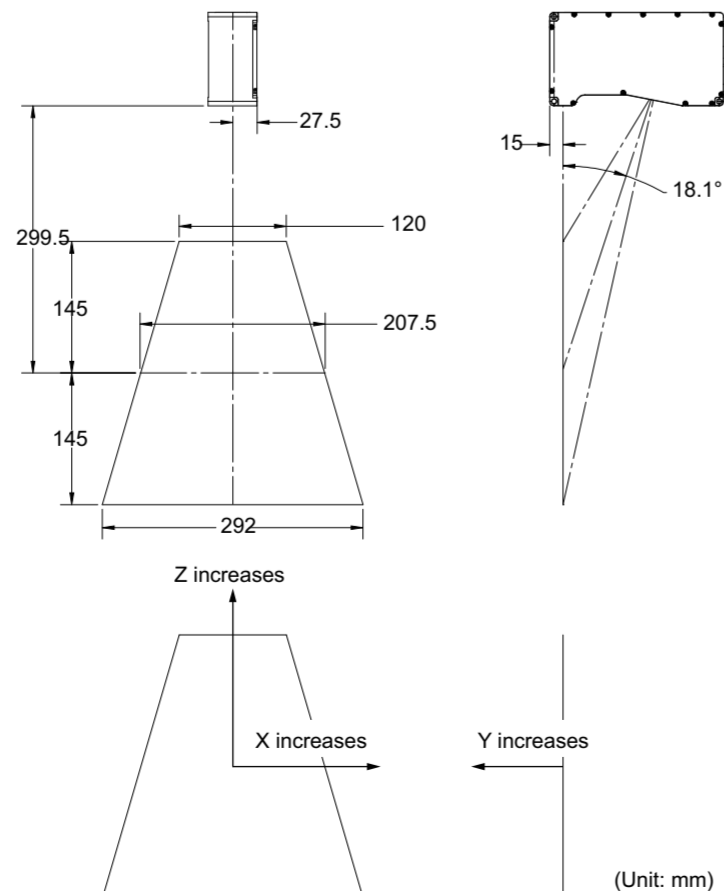
#### SurfaceMeasure0303S



#### SurfaceMeasure1008S



#### SurfaceMeasure2929S

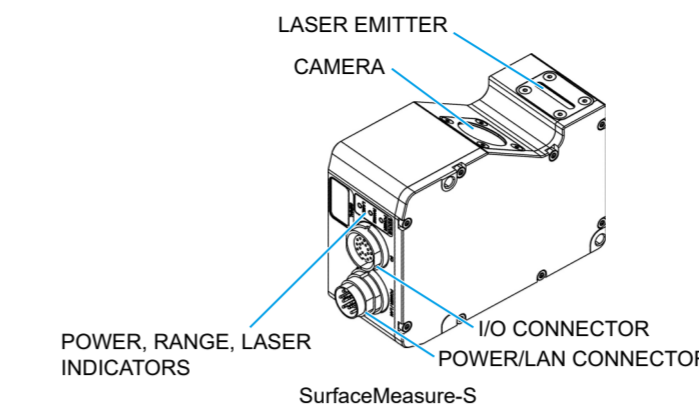


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## 2 Getting Started

### 2.1 Hardware Overview

The following sections describe SurfaceMeasure-S and its associated hardware.



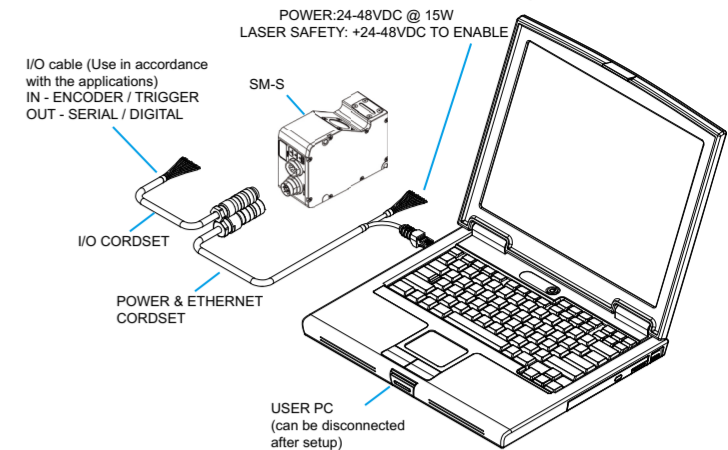
Item	Description
Camera	Observes laser light reflected from target surfaces.
Laser Emitter	Emits structured light for laser profiling.
I/O Connector	Accepts input and output signals.
Power / LAN Connector	Accepts power and laser safety signals and connects to 1000 Mbit/s Ethernet network.
Power Indicator	Illuminates when power is applied (blue).
Range Indicator	Illuminates when camera detects laser light and is within the sensor's measurement range (green).
Laser Indicator	Illuminates when laser safety input is active (amber).

## 2.2 System Overview

The SurfaceMeasure-S can be configured into systems according to the various measuring environments (situations). Sensors can be connected in the forms of standalone devices, dual-sensor systems, or multi-sensor systems.

### 2.2.1 Standalone System

Standalone systems are typically used when only a single sensor is required. The device can be connected to a computer's Ethernet port for setup and can also be connected to devices such as encoders, photocells, or PLCs.



### 2.2.2 Dual-Sensor System

In a dual-sensor system, the two sensors work in tandem to acquire measuring data, and the combined results are output. The main sensor is called the Control sensor, and the other sensor is called the Buddy sensor. The sensors' software recognizes three installation orientations: Opposite, Wide, and Reverse. A Master network controller (excluding Master 100) must be used to connect two sensors in a dual-sensor system. Power and Ethernet to Master cordsets are used to connect sensors to the Master.

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### 2.4.1 Client Setup

To connect to a sensor from a client PC, you must ensure the client's network card is properly configured. Sensors are shipped with the following default network configuration:

Setting	Default
DHCP	Disabled
IP Address	192.168.1.10
Subnet Mask	255.255.255.0
Gateway	0.0.0.0

#### Tips

All sensors are configured to 192.168.1.10 as the default IP address. For a dual-sensor system, the Main and Buddy sensors must be assigned unique addresses before they can be used on the same network.

- 1 Connect cables and apply power.
- 2 Change the client PC's network settings.

#### Windows 7

- 1 Open the Control Panel, select [Network and Sharing Center], and then click [Change Adapter Settings].
- 2 Right-click the network connection you want to modify, and then click [Properties].
- 3 On the [Networking] tab, click [Internet Protocol Version 4 (TCP/IPv4)], and then click [Properties].
- 4 Select the [Use the following IP address] option.
- 5 Enter IP Address "192.168.1.5" and Subnet Mask "255.255.255.0", then click [OK].

#### Mac OS X v10.6

- 1 Open the Network pane in [System Preferences] and select [Ethernet].
- 2 Set [Configure] to [Manually].
- 3 Enter IP Address "192.168.1.5" and Subnet Mask "255.255.255.0", then click [Apply].

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### 2.3.2 Grounding

#### WARNING

Make sure that the sensor system components are properly grounded. There is a risk of electric shock.

#### Grounding SurfaceMeasure-S

This product should be grounded to the earth/chassis through their housings and through the grounding shield of the Power I/O cordset. Sensors have been designed to provide adequate grounding through their mounting screws. Always check grounding with a multi-meter to ensure electrical continuity between the mounting frame and the sensor's connectors.

#### Tips

The frame that the sensor is mounted to must be connected to earth ground.

#### Recommended practices for cordsets

If you need to minimize interference with other equipment, you can ground the Power & Ethernet or the Power & Ethernet to Master cordset by terminating the shield of the cordset before the split. The most effective grounding method is to use a 360-degree clamp. For more instructions, see [Users' Manual "2.4.4 Grounding"].

## 2.4 Network Setup

The sensor is set by connecting with a web browser.

#### Tips

DHCP is not recommended for sensors. If you choose to use DHCP, the DHCP server should try to preserve IP addresses. Ideally, you should use static IP address assignment (by MAC address) to do this.

#### Tips

The following sections refer to using the sensor's web interface. For important information on browser compatibility, see [Users' Manual "4.1 Browser Compatibility and Performance"].

## 4 Specifications

### 4.1 Sensors

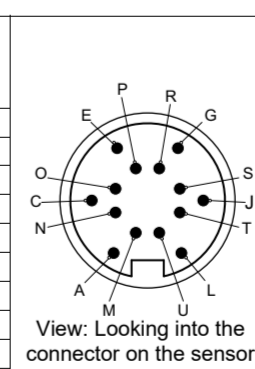
Model number	SurfaceMeasure0303S	SurfaceMeasure1008S	SurfaceMeasure2929S
Data Points / Profile	1920	1920	1920
Resolution X (Profile Data Interval) (μm)	13.0-17.0	28.0-54.0	64.0-160.0
Linearity Z (+/- % of MR)	0.006	0.01	0.05
Repeatability Z (μm)	0.4	0.5	1.2
Working Distance (WD) (mm)	60	80	299.5
Measurement Range (MR) (mm)	25	80	290
Field of View (FOV) (mm)	25-32.5(diffuse)	48-100(diffuse)	120-292(diffuse)
Scan Rate	1.6 kHz to 10 kHz	2 kHz to 10 kHz	1.8 kHz to 10 kHz
Laser Classes	2 (blue, 405 nm)	2 (blue, 405 nm)	2 (blue, 405 nm)
Interface	Gigabit Ethernet		
Inputs	Differential Encoder, Laser Safety Enable, Trigger		
Outputs	2x Digital output, RS-485 Serial (115 kBaud)		
Housing	Gasketed aluminum enclosure, IP67		
Input Voltage (Power)	+24 to +48 VDC (15 W); Ripple +/- 10%		
Operating Temp.	0 to 40° C		
Storage Temp.	-30 to 70° C		
Dimensions (mm)	46x80x110	46x80x110	55x105x195
Weight (kg)	0.65	0.65	1.48

Point of the sensor's housing, not the laser window. Specifications stated are based on standard laser classes. Linearity Z and Repeatability Z may vary for other laser classes. All specification measurements are performed on Mitutoyo's standard calibration target (a diffuse, painted white surface).  
- Linearity Z is the worst case difference in average height measured, compared to the actual position over the measurement range.  
- Resolution X is the distance between data points along the laser line.  
- Repeatability Z is measured with a flat target at the middle of the measurement range. It is the 95% confidence variation of the average height over 4096 frames. Height values are averaged over the full FOV. See [Users' Manual "3.1.2 Resolution and Accuracy"] for more information.

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### 4.2 SurfaceMeasure-S Power/LAN Connector

Function	Pin	Lead Color on Cordsets
GND_24-48V	L	Orange/Red
GND_24-48V	L	Orange/Black
DC_24-48V	A	Green/Red
DC_24-48V	A	Green/Black
Safety-	G	Blue/Black
Safety+	J	Blue/Red
Sync+ (*)	E	Brown/Red
Sync- (*)	C	Brown/Black
Ethernet MX1+	M	White/Orange
Ethernet MX1-	N	Orange
Ethernet MX2+	O	White/Green
Ethernet MX2-	P	Green
Ethernet MX3-	S	White/Blue
Ethernet MX3+	R	Blue
Ethernet MX4+	T	White/Brown
Ethernet MX4-	U	Brown

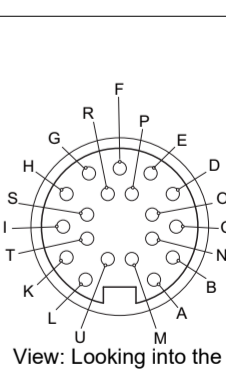


Two wires are connected to the ground and power pins.

\*: The Sync leads are not connected in the open wire versions of the Power/LAN cordsets.

### 4.3 SurfaceMeasure-S I/O Connector

Function	Pin	Lead Color on Cordset
Trigger_in+	D	Blue / Red
Trigger_in-	H	Blue / Black
Out_1+ (Digital Output 0)	N	Brown / Red
Out_1- (Digital Output 0)	O	Brown / Black
Out_2+ (Digital Output 1)	S	Green / Red
Out_2- (Digital Output 1)	T	Green / Black
Encoder_A+	M	Pink / Red
Encoder_A-	U	Pink / Black
Encoder_B+	I	Yellow / Red
Encoder_B-	K	Yellow / Black
Encoder_Z+	A	White / Red
Encoder_Z-	L	White / Black
Serial_out+	B	Purple / Red
Serial_out-	C	Purple / Black
Serial_out2+	E	Red
Serial_out2-	G	Black
Analog_out+ (Reserved on SurfaceMeasure-S)	P	Gray / Red
Analog_out- (Reserved on SurfaceMeasure-S)	F	Gray / Black & Orange / Black
Reserved	R	Orange / Red (not connected)



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