Safety Laser Scanner OS33C Series
OS33C-CS-5M

Expanding the possibilities of safety automation with stable operation and high accuracy

- Stable operation even in dusty conditions and harsh environments
- High measurement accuracy to improve your efficiency
- Easy to maintain and expert-free troubleshooting
- Compact design combined with advanced features

⚠ Refer to *Safety Precautions* on page 17.

Ordering Information

List of Models

Safety Laser Scanner (Accessory sold separately)

Appearance	Description	Items supplied	Model
	Max 5 m safety range, 40 m warning range, 8 Simultaneous Zones,128 Zone Sets, CIP Safety™, Status display and 14 Individual Sector Indicators	Instruction sheet (x2) Ferrite core (TDK ZCAT2035-0930A) for Power cable (x1) for Ethernet cable (x2) Cap for Ethernet connector (x1) (attached to Safety laser scanner)	**OS33C-CS-5M**

Software

Type	Application/Specifications
OS33C Configuration Tool	The Configuration Tool is an OMRON software application that is used to communicate with the OS33C Safety Laser Scanner. This tool can configure and monitor OS33C remotely via Ethernet.

Accessory (Sold separately)

Power Cables (Power and I/O cable)

Appearance	Description	Length	Model
	Connectors with Cables, Socket on one cable end, 4 poles, Fire-retardant, PVC Robot Cable	3 m	**XS5F-D421-E80-F**
		5 m	**XS5F-D421-G80-F**
		10 m	**XS5F-D421-J80-F**

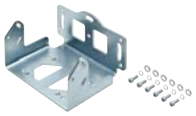
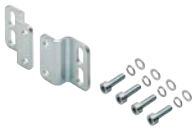
Note: Please refer to the OMRON website to find Power Cables (Connectors with Cables, Socket on One Cable End).

Ethernet Cables (Communication cable)

Appearance	Description	Length	Model
	Ethernet Cable, Shield Strengthening model Cable with Plugs on Both Ends (M12 Smartclick Straight/RJ45)	2 m	**XS5W-T421-DMC-SS**
		5 m	**XS5W-T421-GMC-SS**
		10 m	**XS5W-T421-JMC-SS**
	Ethernet Cable, Shield Strengthening model Cable with Plugs on Both Ends (M12 Smartclick Straight/M12 Smartclick Straight)	2 m	**XS5W-T421-DM2-SS**
		5 m	**XS5W-T421-GM2-SS**
		10 m	**XS5W-T421-JM2-SS**

Note: These are the representative cables. Please refer to the OMRON website to find other Ethernet Cables.

Mounting Brackets

Appearance	Description	Comments	Model
	Bottom mounting bracket	Bottom/mounting bracket (x 1) Screw M5 x 16 (x 4) Washer M5 (x 4) Spring washer M5 (x 4)	**OS33C-BKT1**
	XY axis rotation mounting bracket	XY axis rotation mounting bracket (x 1) Screws M4 x 10 (x 6) Washer M4 (x 6) Spring washer M4 (x 6)	**OS33C-BKT2**
	Simple mounting bracket	Simple mounting brackets (x 2) Screw M5 x 16 (x 4) Washer M5 (x 4) Spring washer M5 (x 4)	**OS33C-BKT3**
	Top guard	Top guard (x 1)	**OS33C-BKT4**

Maintenance parts

Appearance	Description	Comments	Model
	Scan window	Scan window (x 1) Screw M3 x 10 (x 3)	**OS33C-WIN-KT**
—	Window cleaning kit	Window cleaning kit (x 1)	**WIN-CLN-KT**

Legislation and Standards Compliance

Legislation	Standards
EU legislation	Machinery Directive 2006/42/EC EMC Directive 2014/30/EU RoHS Directive 2011/65/EC
European & International Standards	IEC 61496-1 (Type 3 ESPE) EN ISO 13849-1: 2015 (PL d/Category 3) IEC 61496-3 (Type 3 AOPDDR) IEC 61508, Parts 1-7 (SIL 2)
North American Standards	UL File E241445, US and C-UL approvals (CCN: NIPM/NIPM7). • ANSI/UL 508 (Industrial Control Equipment) • IEC 61496-1 (Type 3 ESPE) • IEC 61496-3 (Type 3 AOPDDR) • IEC 61508 (Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems) • IEC 61508-3 (Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems - Part 3: Software Requirements) • CAN/CSA-C22.2 No. 14 (Industrial Control Equipment)

OS33C-CS-5M

Ratings and Performance

Item		OS33C-CS-5M
Sensor type		Type 3 safety laser scanner
Performance Level (PL)/ Category (EN ISO 13849-1: 2015)		PL d, Category 3
Functional safety of electrical/electronic/programmable electronic safety-related systems (IEC 61508)		SIL 2, PFH= 2.6 x 10^{-8} Proof test interval = 20 years Type B
Detection capability		Configurable via OS33C Configuration Tool. Non-transparent with a diameter of 30, 40, 50 or 70 mm (1.8% reflectivity or greater)
Operating range	Protection zone	1.75 m (min. obj. resolution of 30 mm) 2.5 m (min. obj. resolution of 40 mm) 4.0 m (min. obj. resolution of 50 mm) 5.0 m (min. obj. resolution of 70 mm)
	Warning zone	40.0 m
Maximum measurement error		180 mm
Additional measurement error		950 mm (min. obj. resolution of 50 mm or less) 550 mm (min. obj. resolution of 70 mm) Please refer to *OS33C Series Safety Laser Scanner User's Manual* (Cat. No. Z450) for details.
Detection angle		270°
Angular resolution		0.1°
Laser beam diameter		8 mm at scan window, 27 mm at 5 m (typical)
Scan plane height		65.4 mm
Startup waiting time		40 s max. ✻1
Response time		From zone clear to intrusion: From 150 to 1,050 ms (4 or less simultaneous zones) From 170 to 1,220 ms (5 or more simultaneous zones) From zone intrusion to clear: Response time from zone clear to intrusion + Restart Delay time (0 to 60,000 ms) Please refer to *OS33C Series Safety Laser Scanner User's Manual* (Cat. No. Z450) for details.
Zone set switching delay		Network response + 70 or 80 ms ✻2 70 ms (4 or less simultaneous zones) 80 ms (5 or more simultaneous zones)
Zone setting	Simultaneous zones	8 (Configurable, protection or warning zone)
	Max. zone sets	128
	Max. individually definable zones	256
Power supply voltage	For battery	SELV/PELV 24 VDC +25%/-30% (ripple p-p 1.2 V max.) ✻3
	For commercial power supply	SELV/PELV 24 VDC +25%/-20% (ripple p-p 1.2 V max.) ✻3
Power consumption	Normal operation	Max. 11 W (Typ. 7.2 W) ✻4
	Standby mode	Typ. 7 W
Emission source (wavelength)		Infrared diode (905 nm)
Laser protection class ✻5		Class 1 Laser Product: IEC 60825-1:2014, EN60825-1:2014+A11:2021 Class 1 Laser Product: JIS C 6802: 2014 Class I: 21 CFR 1040.10, 1040.11 1类激光产品: GB7247.1:2012
Applicable network		Ethernet EtherNet/IP CIP Safety on EtherNet/IP
Available information via Ethernet		Data handled in the Configuration Tool
Available information via EtherNet/IP		Range profile for navigation (0.1° with time-stamp), reflectivity profile, scanner status, etc. ✻6
Operating mode		Automatic start, Standby
Standby input		ON: 24 V short (input current of 5 mA max.), OFF: Open
Connection type	Power and I/O cable	M12, 4-pin connector x 1
	Communication cable	M12, 4-pin connector x 2
Connection with PC	OS supported	Windows 10 Pro 64 bit
	Communication	Ethernet ✻7

Item		OS33C-CS-5M
Indicators	LED indicator	OSSD Green/Red INTERLOCK Yellow MS Green/Red NS Green/Red
	Status display	160 x 128 pixels, Color
		Intuitive icons and 2D code for troubleshooting
	Individual Sector Indicator (ISI)	14 LEDs, 14 sections, Green/Red/Yellow
Protective circuit		Protection against reverse power connection
Ambient temperature		Operation: -10 to 50 °C, Storage: -25 to 70 °C
Ambient humidity		Operation and Storage: 95% max., non-condensing
Ambient operation illumination		Incandescent lamp: Illumination on receiving surface 1,500 lx max. (an angle of laser scan plane and disturbance light must be ±5° or more)
Insulation resistance		20 MΩ or higher (500 VDC)
Dielectric withstand voltage		350 VAC, 1 minute
Enclosure rating		IP65 (IEC 60529)
Enclosure	Sensor block	Die-cast aluminum
	Scan window	Polycarbonate (PC)
	Dust module	Polybutylene terephthalate (PBT)
Dimensions (W x H x D)		104.0 mm x 100.0 mm x 111.3 mm (except cable and connectors)
Display switch reaction distance		1 mm from switch front
Shock resistance		100 m/s^2 1,000 times for each of X, Y, and Z directions (IEC 60068-2-27) 5g 3 times for each of X, Y, and Z directions (IEC TR 60721-4-5 Class 5M1)
Vibration resistance		10 to 55 Hz, double-amplitude of 0.7 mm, 20 sweepings for X, Y, and Z directions (IEC 60068-2-6) 5 to 200 Hz, double-amplitude of 1.5 mm, 10 sweepings for X, Y, and Z directions (IEC TR 60721-4-5 Class 5M1, Sinusoidal vibration test)
Weight (main unit only, excludes accessories and cables)		900 g
Cable length	Power and I/O cable	Up to 30 m (for commercial power supply) Up to 20 m (for battery)
	Communication cable	Up to 100 m for 100 BASE-TX cable

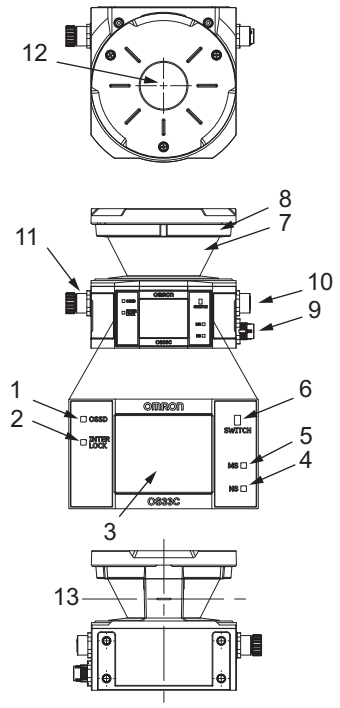
✻1. This time does not include the time required to establish EtherNet/IP connection.
✻2. About network response, please refer to *OS33C Series Safety Laser Scanner Series Safety Laser Scanner EtherNet/IP and CIP Safety Communications User's Manual* (Cat. No. Z454).
✻3. For power source specification, refer to *OS33C Series Safety Laser Scanner User's Manual* (Cat. No. Z450) for details.
✻4. Rated current of OS33C is 425 mA max. (OS33C 420 mA + Standby input 5 mA) at 24 V.
✻5. The rated life of the laser diode used for this product is 6 years.
✻6. Please refer to 7-1 of *OS33C Series Safety Laser Scanner EtherNet/IP and CIP Safety Communications User's Manual* (Cat. No. Z454).
✻7. An Ethernet cable with an M12, 4-pin connector is required.

Note: “Dust” refers to dust particles that float in the air. “Dust” used in this catalog does not include combustible dust and combustible suspended particles.
(In environments with extremely high dust density, suspended particles are continuously detected and cannot be distinguished from obstacles, which may cause false detection.)

Part Names and Functions

This section identifies the basic components of the OS33C Safety Laser Scanner.

OS33C-CS-5M



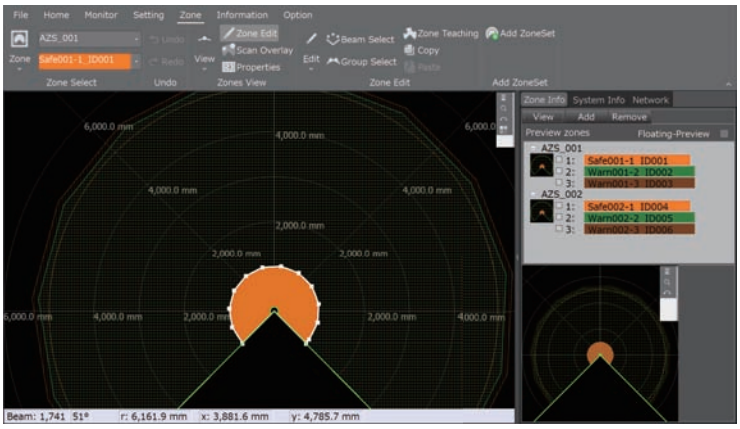
Number	Component	Function
1	OSSD indicator (green/red)	Green: Turns green when protection zone is clear. Red: Turns red when at least one intrusion is detected or a fault occurs.
2	Interlock indicator (yellow)	Flashed under Fault (at 1Hz) and Configuration mode (at 4Hz).
3	Status display	The OS33C's status, Configuration/Operation, or Failure is displayed.
4	Network status (NS) indicator (green/ red)	Shows the EtherNet/IP network connection status of OS33C. • Green: Normal operation • Red: Fault • OFF: Link down
5	Module status (MS) indicator (green/ red)	Shows the operation status of OS33C. • Green: Normal operation • Red: Fault
6	Display switch	Shows followings when the switch is turned ON. To turn it ON, block within 1 mm in front of this switch. • During normal operation: IP address • When a fault occurs: 2D bar code (Used to check the website for troubleshooting)
7	Scan window	Laser light is transmitted and received.
8	Individual Sector Indicators (ISI)	Shows the operation status of OS33C. • Green: Normal operation (neither intrusion nor fault) • Red: Intrusion to protection zone is detected or a fault which causes machine stop occurs. • Yellow: Intrusion to warning zones is detected or warnings which don't cause machine stop is signaled.
9	Power connector (M12, 4-pin connector)	Provided for power supply and input to OS33C.
10	Communication connector Port 1	Provided for M12 Ethernet interface.
11	Communication connector Port 2	
12	Center of rotation	Indicates the location of the axis around which the laser irradiates from.
13	Scan plane mark	Represents the scan plane height of the OS33C.

OS33C Configuration Tool

The Configuration Tool is an OMRON software application that is used to communicate with the OS33C Safety Laser Scanner.

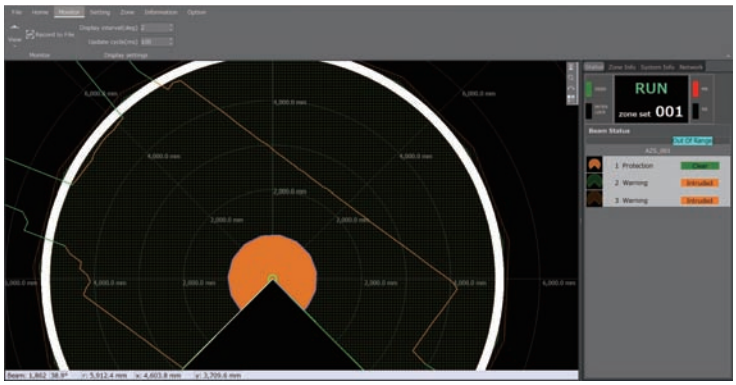
Configuration

The configuration Tool can define detection zones, object resolution, response time, and etc. for the OS33C Safety Laser Scanner.



Monitoring

The configuration tool can display scanning zone information and system status of the OS33C in real-time without stopping the machine.
The monitor mode can be used by logging on to the OS33C with either operator, maintenance, or supervisor access level.



Other functions

Configuration and monitoring via network	This tool can configure and monitor OS33C remotely via Ethernet.
Visual Scanner Identification (VSI)	Turn on OS33C LEDs to confirm which OS33C is connected to configuration tool. It will contribute to reduce the human error.
Configuration report	Output function of configuration report, such as detection zones, object resolution, response time, and etc.
System information	Showing the system information, such as the model name, serial numbers, firmware versions.
Event log and Fault log	OS33C will store the latest 50 Event and Fault logs for diagnostics in its body. Configuration tool can download and show the Event and Fault log.
Monitoring record and playback	Recording and playback function of the monitoring information. This function supports the longer time record than logs in OS33C body.
Window calibration	Calibration tool for the window replacement

System Requirements

Installation of the Configuration Tool for the OS33C requires the following computer capabilities:

- Intel Core i3-6006U 2.0GHz CPU or equivalent
- Windows 10 Pro 64bit
- 8 GB available RAM
- 10 GB available disk space
- Monitor with a resolution of 1920 x 1080 pixels or better

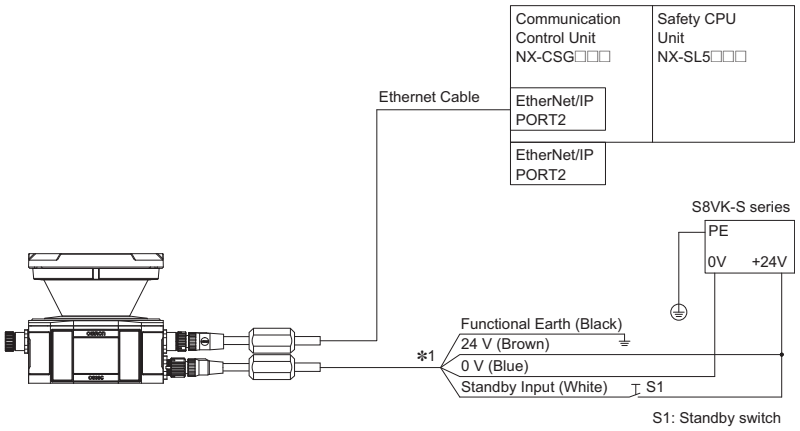
Note: You will require Administrator permissions for the computer where the Configuration Tool is installed.

OS33C-CS-5M

Connection (Wiring Example)

Basic Connection - Single OS33C

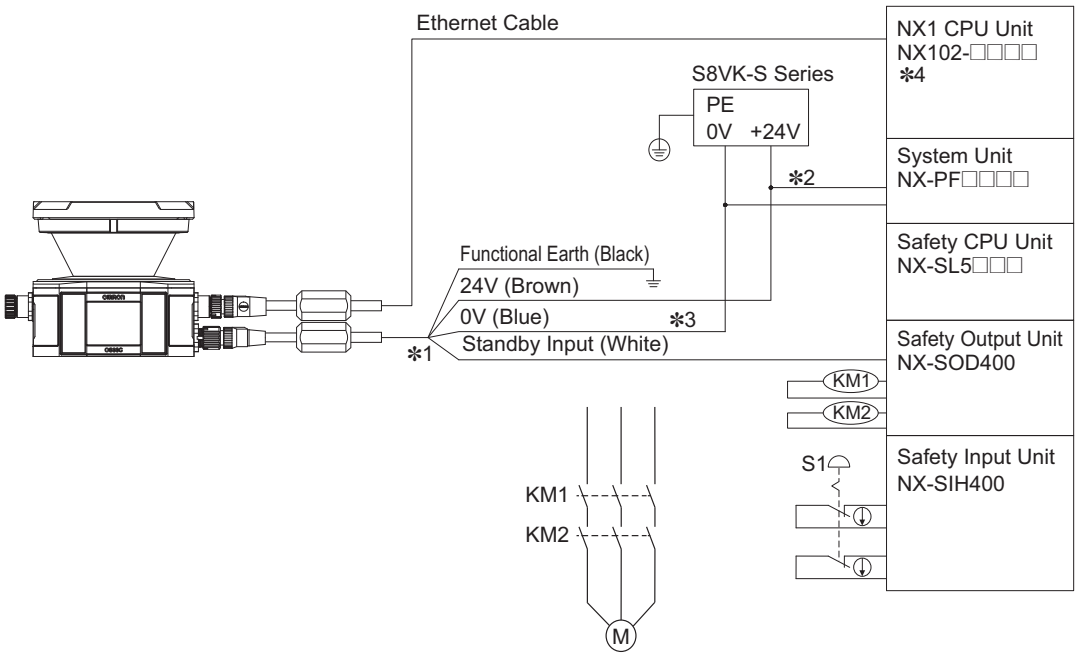
The following figure shows the basic connection.



∗1. The conductor colors are for the XS5F-D421-□80-F (Power cable).

Connecting to a Safety PLC

The following figure shows the connections to safety PLC's.



S1: Emergency stop switch
KM1, KM2: Forced guided relay (G7SA) or magnetic conductor
M : 3-phase motor

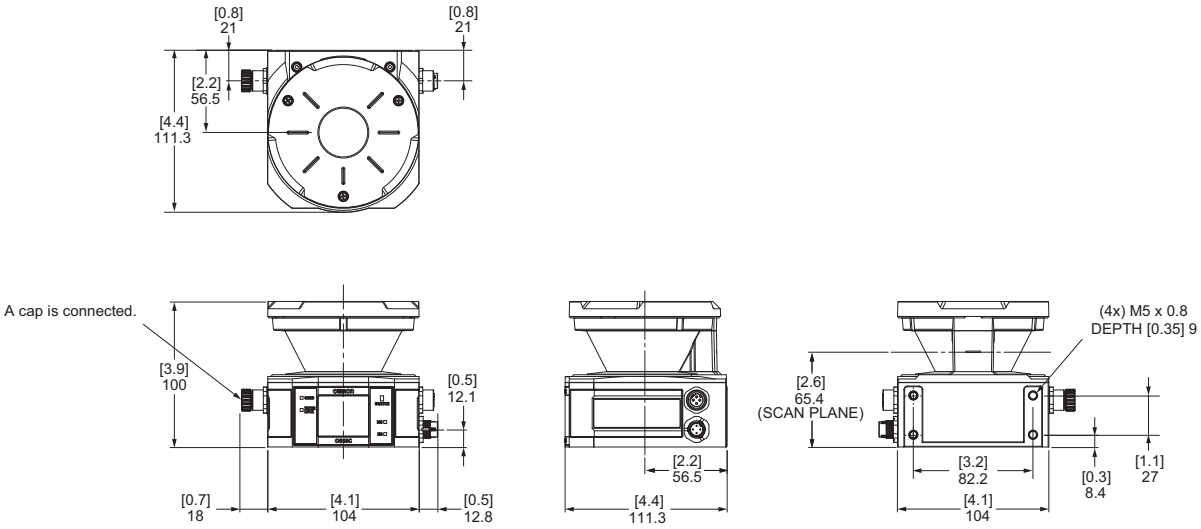
✻1. The conductor colors are of the XS5F-D421-□80-F Power Cable.
✻2. When using Standby Input, set it to GND common. Make the GND common common with the I/O power supply.
✻3. The Standby Input can be used as a fault reset input. Please refer to *OS33C Series Safety Laser Scanner User's Manual* for details.
✻4. The NX1 CPU Unit NX102-□□□□ can be replaced with the Communication Control Unit NX-CSG□□□.

Dimensions

(Unit: mm [inch])

Safety Laser Scanner

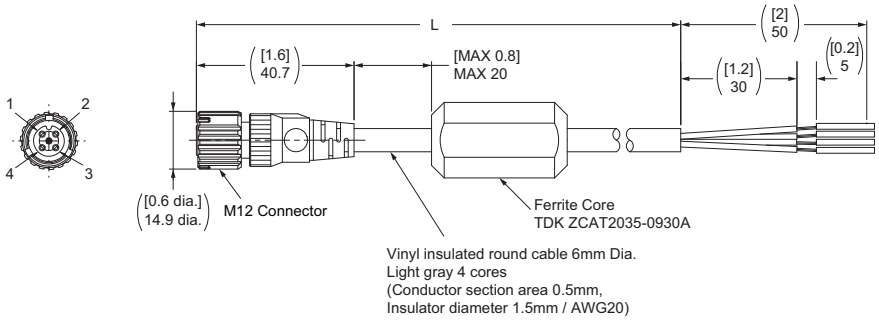
OS33C-CS-5M



Accessory (Sold separately)

Power Cables

XS5F-D421-□80-F



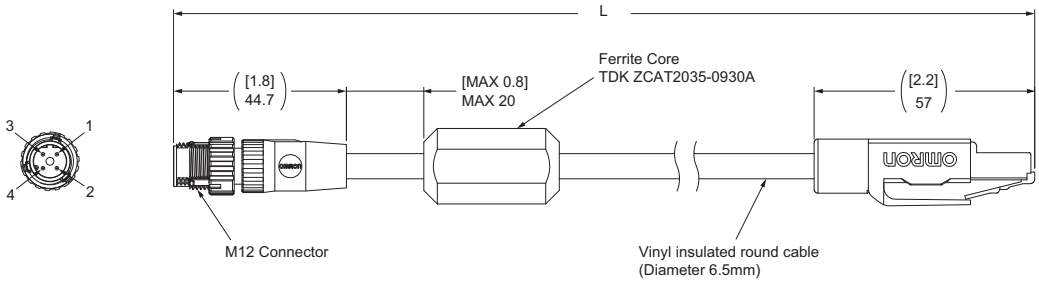
Model	Length (m)	Length (in)
XS5F-D421-E80-F	3	118
XS5F-D421-G80-F	5	197
XS5F-D421-J80-F	10	395

Pin	Color	Signal name / Type
1	Brown	+24V
2	White	Standby Input
3	Blue	0V
4	Black	Functional Earth

Ethernet Cables

M12 Smartclick Straight/RJ45

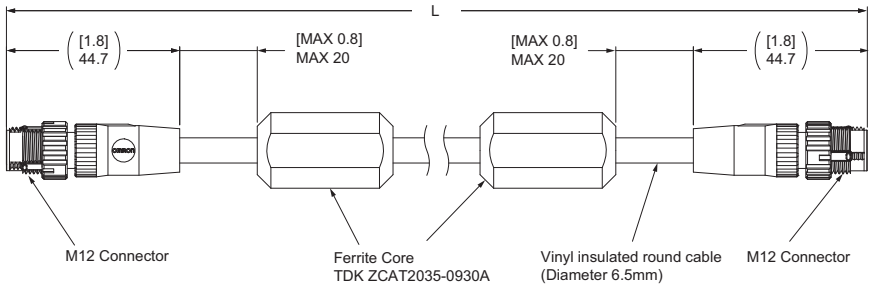
XS5W-T421-□MC-SS



Model	Length (m)	Length (in)
XS5W-T421-DMC-SS	2	79
XS5W-T421-GMC-SS	5	197
XS5W-T421-JMC-SS	10	394

M12 Screw Straight/M12 Screw Straight

XS5W-T421-□M2-SS



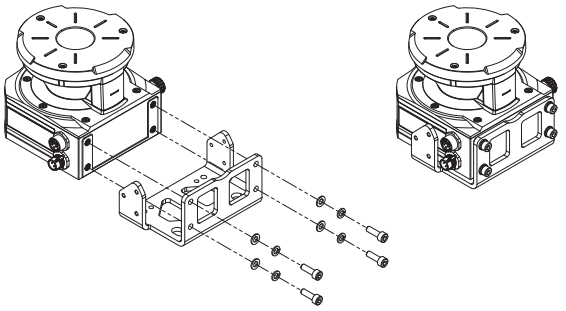
Model	Length (m)	Length (in)
XS5W-T421-DM2-SS	2	79
XS5W-T421-GM2-SS	5	197
XS5W-T421-JM2-SS	10	394

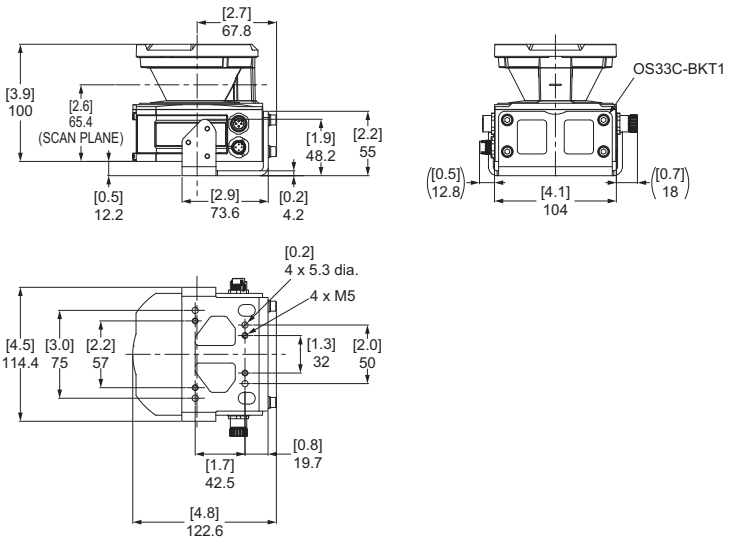
Note: These are the representative cables. Please refer to *Industrial Ethernet Cables Catalog* (Cat. No. G019) the OMRON website to find other Ethernet Cables.

Bottom mounting bracket OS33C-BKT1

OS33C + Bottom mounting bracket

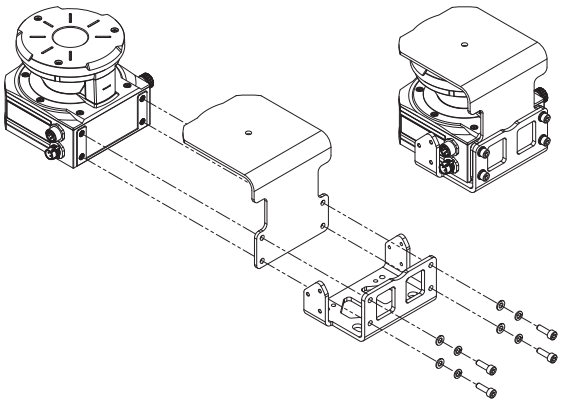
OS33C-CS-5M + OS33C-BKT1

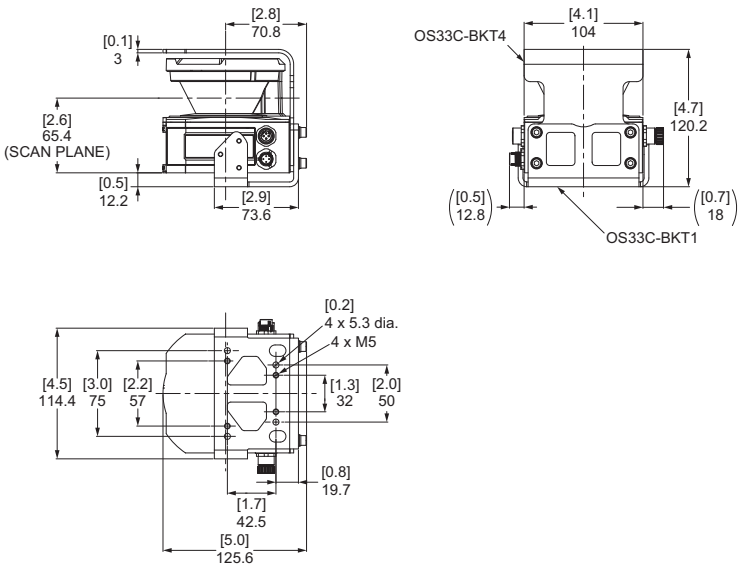




OS33C + Bottom mounting bracket + Top guard

OS33C-CS-5M + OS33C-BKT1 + OS33C-BKT4

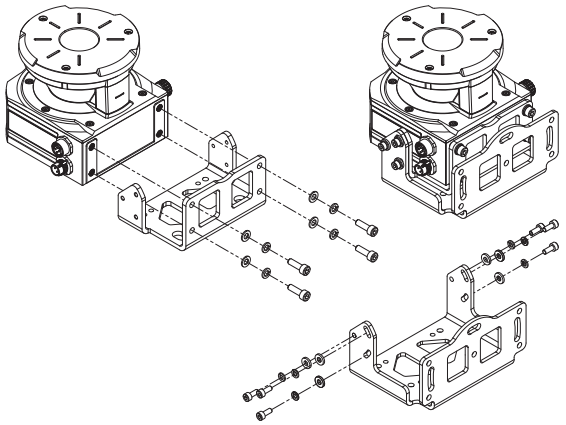


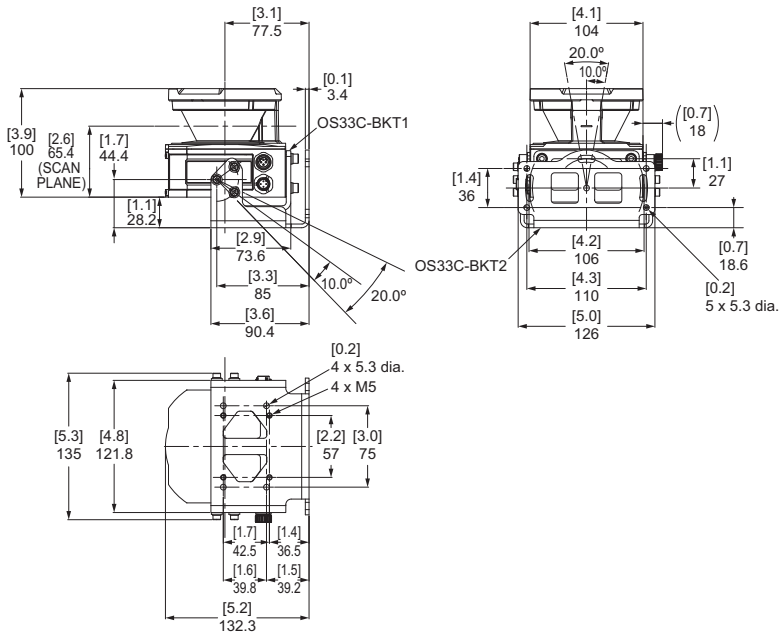


XY axis rotation mounting bracket OS33C-BKT2

OS33C + Bottom mounting bracket + XY axis rotation mounting bracket

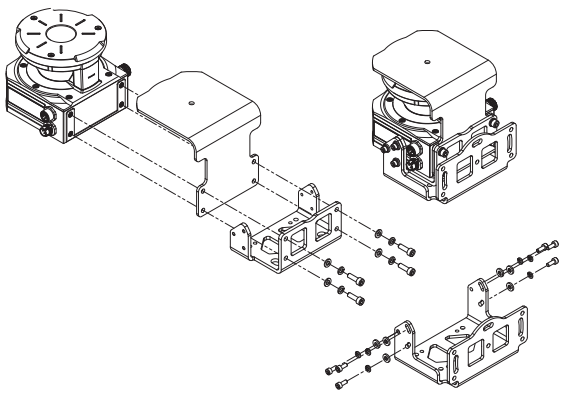
OS33C-CS-5M + OS33C-BKT1 + OS33C-BKT2

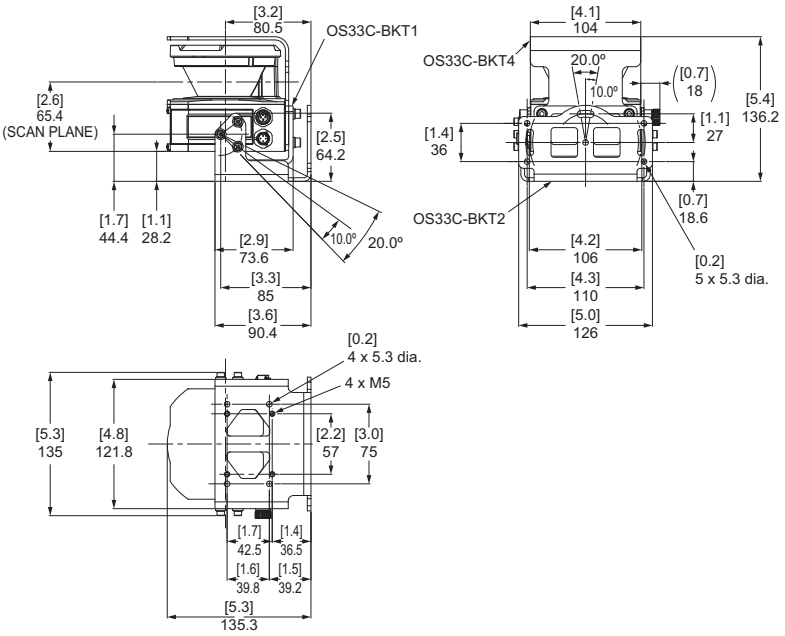




OS33C + Bottom mounting bracket + XY axis rotation mounting bracket + Top guard

**OS33C-CS-5M + OS33C-BKT1 +
OS33C-BKT2+ OS33C-BKT4**

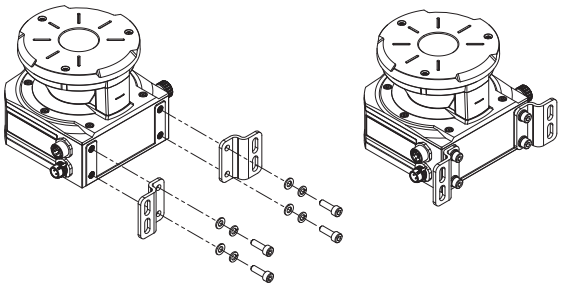


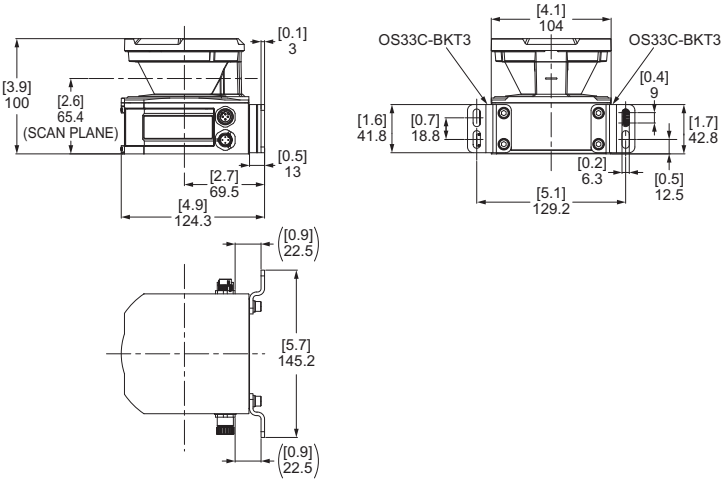


Simple mounting bracket OS33C-BKT3

OS33C + Simple mounting bracket

OS33C-CS-5M + OS33C-BKT3

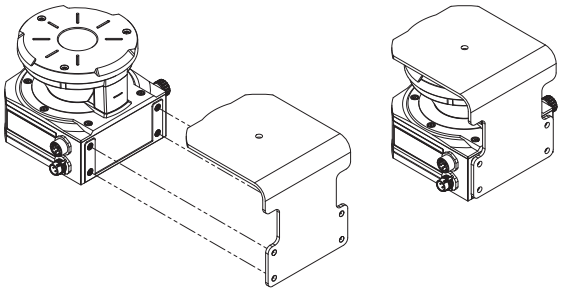


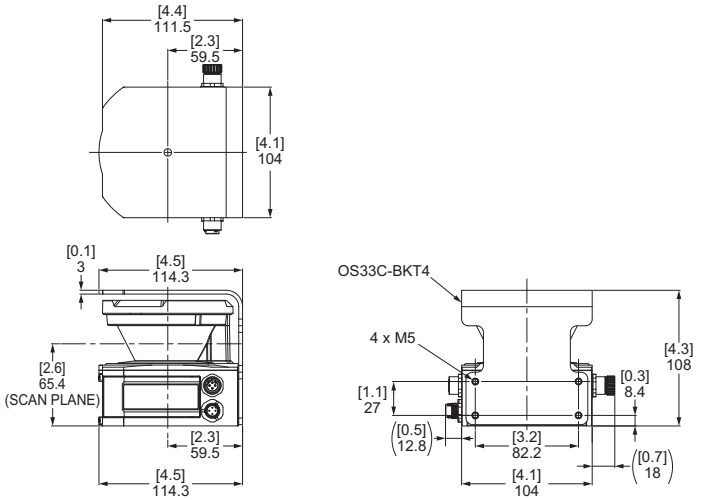


Top guard OS33C-BKT4

OS33C + Top guard

OS33C-CS-5M + OS33C-BKT4





Software Features and Compatibility

Omron Controller products

This section describes the combinations that can be used of the unit versions of OS33C Series Safety Laser Scanner, Safety CPU Units, Communication Control Units, and Machine Automation Controllers, and the version of the Sysmac Studio.
The combinations that can be used are available in the versions or later shown in the table below.

Safety CPU Unit:	This is the unit version of the Safety CPU Unit that supports OS33C Series Safety Laser Scanner.
Communication Control Unit:	This is the unit version of the Communication Control Unit that supports OS33C Series Safety Laser Scanner.
Machine Automation Controller:	This is the unit version of the Machine Automation Controller that supports OS33C Series Safety Laser Scanner.
Sysmac Studio:	This is the version of the Sysmac Studio that supports the Communication Control Unit, Machine Automation Controller, Safety CPU Unit, and OS33C Series Safety Laser Scanner.
Network Configurator:	Network Configurator version that supports OS33C Series Safety Laser Scanner.

Correspondence in version between safety laser scanner and connectable units

Safety Laser Scanner		Supported Version					
Model	**Unit Version**	**Safety CPU Unit NX-SL5700 NX-SL5500**	**Communication Control Unit NX-CSG320**	**Machine Automation Controller NX102-□□□□**	**Machine Automation Controller NX502-□□□□**	**Sysmac Studio**	**Network Configurator**
OS33C-CS-5M	Ver.1.0	Ver.1.3	Ver.1.01	Ver.1.31 or later	Ver.1.57 or later	Ver.1.49 or higher	Ver.3.72 or higher

Please refer to *OS33C Series Safety Laser Scanner User's Manual* (Cat. No. Z450) in detail.

OS32C Configuration Tool data import

OS33C Series Configuration Tool can read OS32C Series configuration file. OS33C Series Configuration Tool supports Configuration Tool version 2.2.8 for OS32C series.
Some parameters differ between OS33C and OS32C. Therefore, all OS32C configurations will not carry over to OS33C. OS33C Configuration Tool may set approximate values or the default values for OS33C are set automatically.
After importing, be sure to check that the OS33C is configured as intended.

Please refer to *OS33C Series Safety Laser Scanner User's Manual* (Cat. No. Z450) in detail.

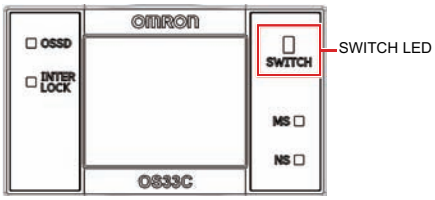
OS33C-CS-5M

Online Troubleshooting

By reading the 2D code ✻1 on the status display with your device and accessing online troubleshooting, you can check the cause and countermeasures in the event of an error condition.

How to access

1. When OS33C is in a fault, block the SWITCH LED of OS33C front.



2. After blocking the SWITCH LED, the 2D code (Data Matrix code) displayed in Status display.
3. Scan the 2D code (Data Matrix code) and access the OMRON home page. Check the meaning of the Fault and take corrective action.
For example, if Fault50 is displayed in Status display, the address would be
https://www.fa.omron.co.jp/trouble_shooting_os33c/?f=50&p=OS33C-CS-5M

OMRON Website
Online Troubleshooting for OS33C
English: https://www.fa.omron.co.jp/product/tool/trouble_shooting_os33c/en/
Japanese: https://www.fa.omron.co.jp/product/tool/trouble_shooting_os33c/ja/

✻1. Read the code with an application that supports Data Matrix ECC 200.
Note: For details, refer to the OS33C Series Safety Laser Scanner User's Manual (Cat.No.Z450).

Safety Precautions

Definition of Precautionary Information

The following notation is used in this manual to provide precautions required to ensure safe usage of the OS33C Safety Laser Scanner. The safety precautions that are provided are extremely important to safety.
Always read and follow the information provided in all safety precautions.
The following notations are used.

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

Meanings of Alert Symbols

This section shows the safety symbols and alerts used in this document.
In order to use the OS33C Safety Laser Scanner safely, the precautions are indicated by alert symbols. The descriptions associated with these symbols must be followed, failure to follow all precautions and alerts may result in an unsafe installation or operation. The following symbols are used in this document.

	**The filled circle symbol indicates operations that you must do. The specific operation is shown in the circle and explained in text. This example shows a general precaution for something that you must do.**
	**The open circle with a bar indicates operations you must NOT do. The specific operation is shown in the circle and explained in text. This example shows a general precaution for something that you must NOT do.**
	**The circle and slash symbol indicates operations that you must not do. The specific operation is shown in the circle and explained in text. This example indicates prohibiting disassembly.**
	**The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a precaution for electric shock.**
	**The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a general precaution.**

Warning and Caution Statements

Serious injury or death may possibly occur due to a loss of required safety functions. When building the system, observe the following warnings to ensure the integrity of the safety related components.
Qualified personnel is an individual who understands, is trained on, and demonstrates competence with the construction, operation or maintenance of the machinery and the hazards involved.

User Requirements

⚠ WARNING

The OS33C Safety Laser Scanner should only be installed, verified and maintained by qualified personnel.

The OS33C Safety Laser Scanner must be installed, configured, and incorporated into a machine control system by a sufficiently trained and qualified person. The entire configuration, including the proper sequencing of multiple zone configurations, must be Checked, Verified, and Tested, at installation, maintenance, adjustment, repair or modification. An unqualified person may not be able to perform these operations properly, which may cause a person to go undetected, resulting in serious injury.

Machine Requirements

⚠ WARNING

The guarded machine must be able to stop anywhere in its cycle, and it must have a consistent stopping time or have a known worst-case stopping time that can be used in the calculation of safety distance. Never use the OS33C Safety Laser Scanner for the machine systems whose outage time is indeterminate or that cannot stop immediately such as a press with a fullrevolution clutch. The machine may not be able to stop in time, and serious injury or death may possibly occur.

All safety-related machine control elements must be designed so that an alarm in the control logic or failure of the control circuit does not lead to a dangerous failure.

Installation Requirements

⚠ WARNING

Serious injury or death may possibly occur. The installer is responsible for assessing the risk and to ensure that the zone of limited detection does not create a safety hazard. If a hazard exists, additional countermeasure must be taken, which may require additional guarding measures.

Make sure to calculate the safety distance correctly when you set or modify the safety system.
Make sure to install the OS33C Safety Laser Scanner at the safety distance from the hazardous part of the machine. If multiple zone sets are used, be sure to calculate the time that includes the switching of the zone sets. Otherwise the machine may not stop before a person reaches the hazardous part, resulting in serious injury or death.

The OS33C Safety Laser Scanner cannot detect translucent objects or non-transparent objects with less than 1.8% reflectivity. A worker wearing clothes or tools with a reflectivity of less than 1.8% may go undetected, resulting in a dangerous condition.

The OS33C Safety Laser Scanner has a configurable minimum object resolution of 30 mm, 40 mm, 50 mm or 70 mm. Select an appropriate object resolution for the application, or serious injury or death may occur.

Never use the OS33C Safety Laser Scanner in applications for finger protection, or serious injury could result.

When a person drives a vehicle equipped with OS33C Safety Laser Scanner, do not use it as a safety device. If the OS33C Safety Laser Scanner fails to work properly, serious injury or death could result.

The OS33C Safety Laser Scanner must be securely mounted using genuine mounting brackets.
Its cables and connectors must be tightly attached to the OS33C Safety Laser Scanner.
The cables must be properly routed, protected and secured to ensure damage does not occur.
If the protection zone shifts or short circuit occurs between signals, the machine cannot stop correctly, resulting in serious injury or death.

Serious injury or death may possibly occur. A start switch to release interlock must be installed where an operator can observe the monitored zone as a whole and cannot operate the switch within the hazardous zone.

Never install the OS33C Safety Laser Scanner in areas in flammable, explosive or corrosive atmosphere.

The OS33C Safety Laser Scanner must not be mounted behind glass or within a secondary enclosure. Failure to follow this instruction will cause a reduction in detection capability, which can cause serious injury or death.

A protective mechanism must be installed to prevent a hazardous condition in the event of a subsequent machine component failure. The OS33C Safety Laser Scanner does not protect against ejected flying material.

Never install the OS33C Safety Laser Scanner more than 300 mm above the floor. Otherwise the OS33C Safety Laser Scanner cannot detect access of personnel underneath the protection zone, serious injury or death may possibly occur. Additional guarding may be required to prohibit access to dangerous areas that are not covered by the OS33C Safety Laser Scanner.

Never use mirrors or mirror-like objects in the protection plane as they can hide part of the area to be monitored. Otherwise the machine cannot stop correctly, and serious injury or death may possibly occur.

Additional measurement error, arising from reflective backgrounds, may need to be added to the measurement error of the OS33C Safety Laser Scanner to prevent a human hazard resulting in death.

Never allow fingerprints or dirt on the window of the OS33C Safety Laser Scanner. Make sure to clean the window as soon as possible if there is any dust or pollution on it.

If there is any damage to the window, replace it as soon as possible. Otherwise the OS33C Safety Laser Scanner may fail to work properly. Take preventive measures when performing replacement work so that dust does not enter the OS33C Safety Laser Scanner.

The Window Replacement Procedure must only be performed by qualified personnel, in a clean environment, and at ambient temperature (5 to 35°C), to prevent the internal optical surfaces from contamination. Make sure the inside and the outside of the replacement window is clean and free from scratches, dust, and fingerprints.

The Window Calibration Procedure must only be performed by qualified personnel at ambient temperature (5 to 35°C). Before performing the window calibration of the new scan window, make sure that the window is clean from scratches, dust and fingerprints. Failure to inspect the window or set the proper environmental conditions during the Window Calibration Procedure may cause a reduction in the detection capability of the OS33C Safety Laser Scanner.

Serious injury or death may possibly occur. Make sure to remove any retro-reflector from the field of view of the OS33C Safety Laser Scanner when in Reference Boundary Monitoring (RBM) mode.

If an insufficient Zone Set Switching Delay is used for the actual worst case switching time of the installation, the OS33C Safety Laser Scanner might start monitoring the wrong zone during the switching of the zone set and the machine cannot stop correctly, resulting in serious injury or death.

Zone parameters are subject to a number of constraints that include projective consistency, maximum radius, and angle limits. As a result, an imported zone may not correspond exactly to the zone defined in the file. The user must visually verify the imported zone when the zone coordinate import process is complete.

Wiring Requirements

⚠ WARNING

Never connect the OS33C Safety Laser Scanner to a power supply with more than 30 VDC (24 VDC +25%) or an AC voltage. Use double-insulation or reinforced insulation from hazardous voltage (such as 230 VAC). The OS33C Safety Laser Scanner may be damaged and result in electrical shock.

For the OS33C Safety Laser Scanner to meet IEC 61496-1 and UL 508, its DC power supply unit must satisfy all of the following conditions:

- **Within rated voltage (24 VDC +25% / -30%)**
- **Complying with EMC directives (industrial environments)**
- **Double-insulation or reinforced insulation between primary and secondary circuits**
- **Automatic return for overcurrent protection**
- **Output retention time of 20 ms or longer**
- **Satisfy output characteristics requirements of Class 2 circuit or limited voltage/current circuit defined in UL 508.**
- **Power supply complying with regulations and standards of EMC and safety of electrical equipment in a country or a region where the OS33C Safety Laser Scanner is used. (Example: In EU, a power supply must comply with the EMC and Low Voltage Directives.)**

Serious injury or death may possibly occur. Make sure to perform wiring while the power supply is OFF. Properly perform the wiring after confirming the signal names of all the terminals. When wiring the OS33C Safety Laser Scanner to external devices, make sure to follow the color and coding schemes per EN 60204-1.

Cable extensions must be within the specified lengths, otherwise it may result in a failure of the safety functions.

The OS33C Safety Laser Scanner requires a functional earth connection. Never connect Functional Earth to a positive ground system. If it is connected to positive ground, the guarded machine to be controlled may NOT stop, resulting in severe injury or death.

Never use the OS33C Safety Laser Scanner in environments where strong electromagnetic fields may be produced. Be sure to route the OS33C Safety Laser Scanner cable separate from high-potential power lines or route it through an exclusive conduit. Otherwise, it may cause the safety functions to stop working properly.

Security Measures Requirements

In this clause, "this software" means OS33C Configuration Tool.

⚠ WARNING

Anti-virus protection
Install the latest commercial-quality antivirus software on the computer connected to the control system and maintain to keep the software up-to-date.

Security measures to prevent unauthorized access
Take the following measures to prevent unauthorized access to our products.

- **Install physical controls so that only authorized personnel can access control systems and equipment.**
- **Reduce connections to control systems and equipment via networks to prevent access from untrusted devices.**
- **Install firewalls to shut down unused communications ports and limit communications hosts and isolate control systems and equipment from the IT network.**
- **Use a virtual private network (VPN) for remote access to control systems and equipment.**
- **Adopt multifactor authentication to devices with remote access to control systems and equipment.**
- **Set strong passwords and change them frequently.**
- **Scan virus to ensure safety of USB drives or other external storages before connecting them to control systems and equipment.**

Data input and output protection
Validate backups and ranges to cope with unintentional modification of input/output data to control systems and equipment.

- **Checking the scope of data**
- **Checking validity of backups and preparing data for restore in case of falsification and abnormalities**
- **Safety design, such as emergency shutdown and fail-soft operation in case of data tampering and abnormalities**

Data recovery
Backup data and keep the data up-to-date periodically to prepare for data loss.

When using an intranet environment through a global address, connecting to an unauthorized terminal such as a SCADA, HMI or to an unauthorized server may result in network security issues such as spoofing and tampering.
You must take sufficient measures such as restricting access to the terminal, using a terminal equipped with a secure function, and locking the installation area by yourself.

When constructing an intranet, communication failure may occur due to cable disconnection or the influence of unauthorized network equipment.
Take adequate measures, such as restricting physical access to network devices, by means such as locking the installation area.

To prevent computer viruses, install antivirus software on a computer where you use this software. Make sure to keep the antivirus software updated.

Keep your computer's OS updated to avoid security risks caused by a vulnerability in the OS.

Always use the highest version of this software to add new features, increase operability, and enhance security.

Manage usernames and passwords for this software carefully to protect them from unauthorized uses.

Set up a firewall (E.g., disabling unused communication ports, limiting communication hosts, etc.) on a network for a control system and devices to separate them from other IT networks.
Make sure to connect to the control system inside the firewall.

Use a virtual private network (VPN) for remote access to a control system and devices from this software.

Additional Warnings and Cautions

⚠ WARNING

Never modify the OS33C Safety Laser Scanner. Never replace or fix any component of the OS33C Safety Laser Scanner other than the ones specified in this document. Doing so may result in a failure of this device to function correctly, causing serious injury or death.

The tests outlined in this document must be performed at the time of installation, according to the employer's regular inspection program and after any maintenance, tooling change, set up, adjustment, or modification to the OS33C Safety Laser Scanner or the guarded machine. Where a guarded machine is used by multiple operators or shifts, it is suggested that the test procedure be performed at each shift or operation change and also if there is a change in the operating mode or defined zone sets of the OS33C Safety Laser Scanner. Testing ensures that the OS33C Safety Laser Scanner and the machine control system are working properly to stop the machine. Failure to test properly could result in serious injury or death.

Serious injury or death may possibly occur. If the OS33C Safety Laser Scanner is operated under automatic start, make sure that the machine stops and does not restart as long as an object is detected in a protection zone. Check the operation by placing a test piece into the protection zone. An example of the test piece is a white cylinder with a diameter equal to the minimum object resolution, a minimum length of 0.2 m and a minimum reflectivity of 80%. It is recommended to perform the test at least after a shift change or 24 hours of operation.

Serious injury or death may possibly occur. If the safety system or the machine fails any of these tests in the test procedure, never run the machine. Immediately tag or lock out the machine to prevent its use and notify the appropriate supervisor.

Serious injury or death may possibly occur. Make sure to set a suitable IP address, before connecting an OS33C Safety Laser Scanner to the network.

Serious injury or death may possibly occur. System parameters, zone status parameters and measurement data monitored over EtherNet/IP (non-safety CIP) are to be used for usability purposes only. Never use them in safety-critical functions.

Never use information of Floating dust, Standby and Warning Zone Status in Safety Input Assembly Data for control purposes including safety interlock purposes. These are nonsafety information and are data for monitoring during debugging.

Never use non-safety signals, including tag data links, explicit messages, and exposed variables, as safety signals. Serious injury may possibly occur due to the loss of required safety functions.

Serious injury or death may possibly occur. The safety reaction time must be calculated, including the network reaction time.

Serious injury or death may possibly occur. Before transferring data from the PC to the OS33C Safety Laser Scanner, make sure to verify the safety parameters are configured as intended for the application. When more than one OS33C Safety Laser Scanner is connected to the network, it is necessary to visually check the diagnostic code on the Status display.

For setting of CIP Safety, if you select "Open Only" for the Open Type setting, make sure to verify that the originator/target have the correct configurations. Serious injury may possibly occur due to the loss of required safety functions.

⚠ CAUTION

Keep the packaged product in a secured place to prevent it from dropping onto a person from a high place like a shelf. Do not drop the product with or without a package. Serious damage and injury may occur.

Precautions for Safe Use

This section identifies the proper precautions for the safe use of the OS33C Safety Laser Scanner.
Make sure to follow all the safety precautions that are necessary to ensure safe use of the product.

1. Do not install, use or store the OS33C in the following types of environments, or moderate/minor human hazard may possibly occur:
   - Areas exposed to water, oil or other liquids
   - Areas with a temperature or humidity out of the specified range
   - Areas with high humidity where condensation is likely to occur
   - Areas exposed to vibration or shock levels higher than in the specification provisions
   - Areas where the pollution degree is harsher than 3, such as outdoor environment
   - Areas where the OS33C may be exposed to intense interference light, such as direct sunlight
2. Environmental conditions such as smoke, fog and dust may affect the operation of the OS33C, causing it to unexpectedly enter a Machine Stop state.
3. Operation of the OS33C Safety Laser Scanner may be affected by light in the environment, such as sunlight, incandescent light, strobe light, flashing beacon and light from a photosensor using infrared light.
4. When using more than one OS33C, mutual interference should be minimized, or unintended Machine Stop state may occur. This may require different scanner positions or physical shields to be installed.
5. Do not install the product at a facility with an elevation higher than 2,000 m.
6. Sharing the power supply with other devices may cause the OS33C to be affected by noise or voltage drop. It is recommended that the safety-related devices use a dedicated power supply, not shared with other devices.
7. This is a class A product (for industrial environments). In residential areas it may cause radio interference, in which case the qualified personnel may be required to take adequate measures to reduce interference.
8. Before using the OS33C, inspect it for damage. If it is used in a damaged state, minor/moderate human hazard may possibly occur.
9. Do not use thinner, benzene, acetone or other organic solvents for cleaning. They will adversely affect the product's resin parts, paint on the case and labels containing identification information. The product may not operate normally.
10. Dispose of the product in accordance with the relevant rules and regulations of the country/region where the product is used.

Precautions for Correct Use

This section identifies the proper precautions for the correct use of the OS33C Safety Laser Scanner.
Observe the precautions described below to prevent operation failure, malfunctions, or undesirable effects on product performance.

1. If you remove a network cable from a cascaded OS33C or interrupt the power supply to it during maintenance, the operation of another OS33C coupled to it will be affected.
2. The OS33C cannot be connected to the EtherCAT port on the Machine Automation Controller (NX102-□□□□).
3. If multi-cast connections are used, use an Ethernet switch that has multi-cast filtering. Otherwise, the tag set is received by all nodes in the network.

Related Manuals

Use the following related manuals for reference.

Manual Name	Cat. No.	Model numbers	Description
OS33C Series Safety Laser Scanner User's Manual	Z450	OS33C-□□-□M	Describes the hardware, setup methods, and functions of the OS33C-series Safety Laser Scanner and the operating procedures of the Configuration Tool.
OS33C Series Safety Laser Scanner EtherNet/IP and CIP Safety Communications User's Manual	Z454	OS33C-□□-□M	Describes the EtherNet/IP communications and CIP Safety communications. Information is provided on the basic setup, tag data links, and other features.
NX-series Safety Control Unit/ Communication Control Unit User's Manual	Z395	NX-CSG□□□ NX-SL5□□□ NX-SI□□□□ NX-SO□□□□	Describes the hardware, setup methods, and functions of the NX-series Safety Control Units and Communication Control Units.
NX-series Safety Control Unit User's Manual	Z930	NX-SL□□□□ NX-SI□□□□ NX-SO□□□□	Describes the hardware, setup methods, and functions of the NX-series Safety Control Units.
NJ/NX-series CPU Unit Software User's Manual	W501	NX701-□□□□ NX502-□□□□ NX102-□□□□ NX1P2-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	The following information is provided on a Controller built with an NJ/NX-series CPU Unit. • CPU Unit operation • CPU Unit features • Initial settings • Programming language specifications and programming with the IEC 61131-3 standard.
Sysmac Studio Version 1 Operations Manual	W504	SYSMAC-SE2□□□	Describes the operating procedures of the Sysmac Studio.

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Note: Do not use this document to operate the Unit.

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