QUICK START GUIDE

Omron TM Collaborative Robot: Safety Laser Scanner Installation

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Revision History

Ver.	Date	Description
1	Jun 10, 2019	First edition (HW ver. 3.0, TMflow ver. 1.68.6800)

1. Introduction

This manual explains how to set up an Omron OS32C safety laser scanner with any Omron TM collaborative robot via Omron G9SE-221-T05 safety relay, using the OS32C Configuration Tool software.

For detailed information other aspects of using a TM robot, including but not limited to its hardware installation, TMflow software, and general safety information, please refer to their respective manuals and quick start guides.

This manual covers the simplest setting, 2 zones.

About Using the OS32C Safety Laser Scanner

Always take into account the following points when using the OS32C:

Make sure OS32C is handled by a "Responsible Person" who is well aware of and familiar with the machine to be installed. The term "Responsible Person" used means the person qualified, authorized, and responsible to secure "safety" in each process of the design, installation, operation, maintenance services, and disposition of the machine. It is assumed that the OS32C will be used properly according to the installation environment, performance and function of the machine. A Responsible Person should conduct a risk assessment of the machine and determine the suitability of this product before installation. Read this guide and “Safety Laser Scanner OS32C Series User’s Manual” thoroughly and understand its contents.

2. Related Manuals

To ensure system safety, make sure to always read the information provided in all safety precautions and precautions for safe use of manuals for each device that is used in the system.

Catalog No.	Model	Manual Name
I623-E-02	TM5-700, TM5M-700 TM5-900, TM5M-900	Collaborative Robot Hardware Installation Manual
I624-E-02	TM12, TM12M TM14, TM14M	Collaborative Robot Hardware Installation Manual
I625-E-02	TM5-700, TM5M-700 TM5-900, TM5M-900 TM12, TM12M TM14, TM14M	Collaborative Robot Safety Manual
I626-E-02	TM5-700, TM5M-700 TM5-900, TM5M-900 TM12, TM12M TM14, TM14M	Software Manual TMflow
Z296-E1-11	OS32C	Safety Laser Scanner OS32C Series User’s Manual

2. Hardware Connections

Gather the necessary equipment as follows, along with a laptop installed with TMflow and OS32C Configuration Tool.

Devices	Examples Used in This Guide
Omron TM Collaborative Robot	TM5-900
Omron Safety Laser Scanner	OS32C
Omron Safety Relay	G9SE-221-T05

Set up the TM robot as you normally would according to the Hardware Installation Manual. Be sure to turn the switch off at the back of the Control Box while you connect the laser scanner and relay.

2.1. Safety Dual Channels on the TM Control Box

The dual channels of the E-Stop, Safeguard A, or Safeguard B connect to the relay. The relay connectors are shown in Fig. A-1 in Appendix A. 13/14 and 23/24 react instantaneously, while 37/28 and 47/48 has an off-delay.

E-Stop *OR* Safeguard A *OR* Safeguard B	Connect to
Top Row 1	G9SE connection 13
Top Row 2	G9SE connection 23
Bottom Row 1	G9SE connection 14
Bottom Row 2	G9SE connection 24

Refer to the following sections to understand the differences between E-Stop, Safeguard A, and Safeguard B. A photo of these connectors are shown in Fig. A-2 in Appendix A.

2.1.1. E-Stop

When E-Stop (Emergency Stop) is triggered (opened),

- The robot will stop movement within 610 ms
- The system will lower the upper limit of the total drive current from 20 to 3 A
- Category 1 safety function is triggered

2.1.2. Safeguard A

When Safeguard A is triggered (opened), the system goes into the Safeguard Pause state. For example, if an object crosses a safety curtain that is connected to Safeguard A, then the system will:

1. Come to a controlled stop with power still going to the machine actuators.
2. Pause the project.

2.1.3. Safeguard B

When Safeguard B is triggered, the system goes into the Safeguard Collaborative mode. For example, if a person steps onto a safety mat that is connected to Safeguard B, then the system will enter a collaborative mode

2.2. G9SE Relay Power and Reset/Feedback

Next, connect power and ground to the relay, and set up an auto reset by connecting T31 and T33 to each other and connecting power to T32. Refer to Figs. A-1 and A-2 in Appendix A for the connection points.

G9SE Connections	Connect to
A1	24 V from the TM Control Box
A2	GND from the TM Control Box
T31	G9SE T33
T32	24 V from the TM Control Box
T33	G9SE T31

2.3. OS32C Laser Scanner Connections

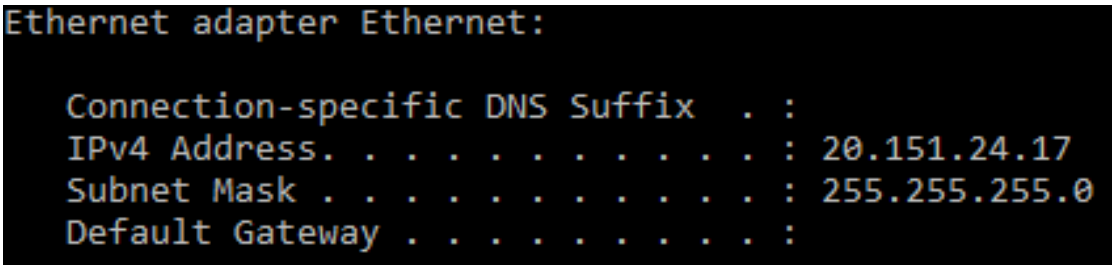
Finally, connect the power, ground, and signals to and from the laser scanner. Refer to Figs. A-1 through A-3 in Appendix A for the connection points.

Wire Colors	Connect to
white	24 V from the TM Control Box
green	GND from the TM Control Box
white/brown	GND from the TM Control Box
green	GND from the TM Control Box
red	T12 of the G9SE relay
yellow	T22 of the G9SE relay

3. OS32C Configuration Tool Software

4.1. Connecting the Scanner to Your Laptop

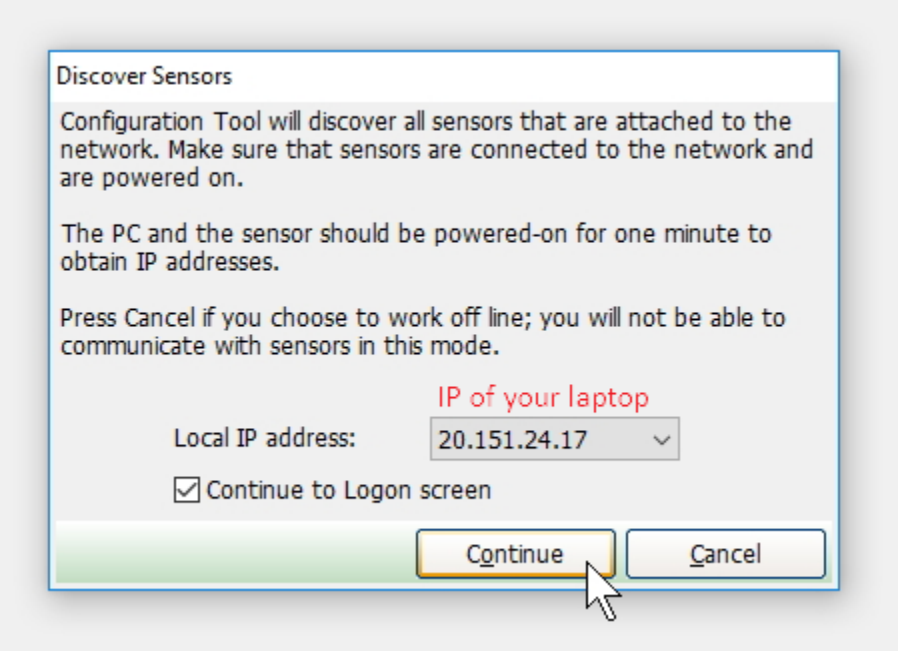
1. Download and install the OS32C Configuration Tool software from https://industrial.omron.us/en/products/os32c#downloads.
2. Connect your laptop to the OS32C scanner using the scanner's Ethernet cable.
3. Set your laptop's IP on DHCP. To do this, follow these steps.
    a. Click the Windows icon, then type "Change Ethernet settings" and press Enter.
    b. Click "Change adapter options" on the right-hand column.
    c. Double click on the Ethernet icon that the cable is connected to.
    d. Click the Properties button.
    e. In the list, scroll down to "Internet Protocol Version 4 (TCP/IPv4)" and highlight it.
    f. Click the Properties button.
    g. Click "Obtain an IP address automatically" and "Obtain DNS server address automatically".
    h. Click OK to close all windows.
4. Turn off all other wireless network cards such as your Wi-Fi, Bluetooth, etc. To do this, follow these steps.
    a. Click the Windows icon, then type "Change Wi-Fi settings".
    b. Turn the Wi-Fi button off.
    c. Click the Windows icon, then type "Change Bluetooth and other devices settings".
    d. Turn the Bluetooth button off.
5. Click the Windows icon, type "Command Prompt", and when the new window opens, type "ipconfig". It displays the IPv4 address.



The address shown above in the example will likely not be the same address you will see in your setup.

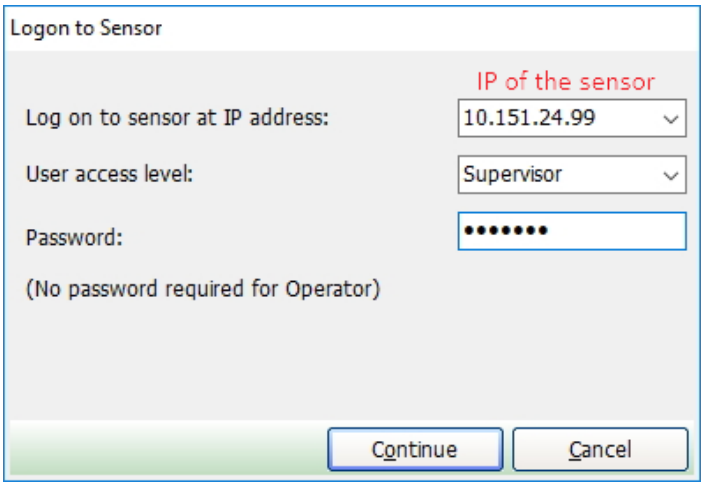
6. Open OS32C Configuration Tool.
7. Wait for about a minute or two to read the IP addresses of the laptop and scanner.

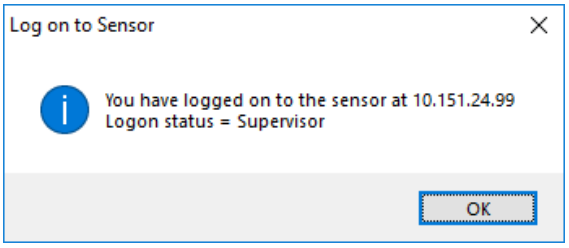
8. In the “Discover Sensors” window, click Continue.



   a. This should find the scanner. If it is not there, check your network settings, make sure that you have an IP address, and that all wireless networks are turned off.

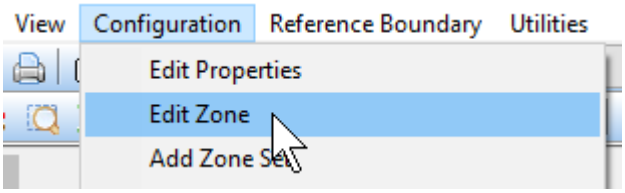
9. Log into the sensor as “Supervisor”, and use “supeusr” as its password.



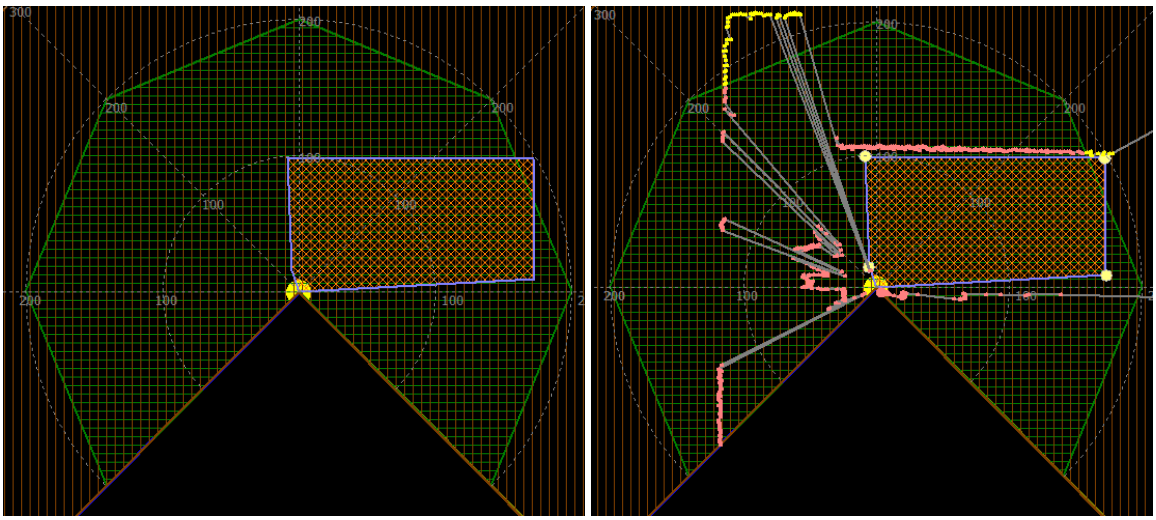


4.2. Configuring the Safety Zone

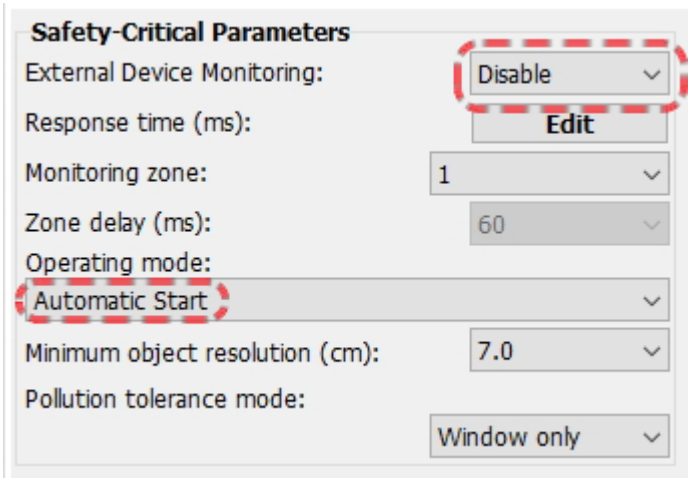
1. From the menu bar, go to Configuration > Edit Zone.



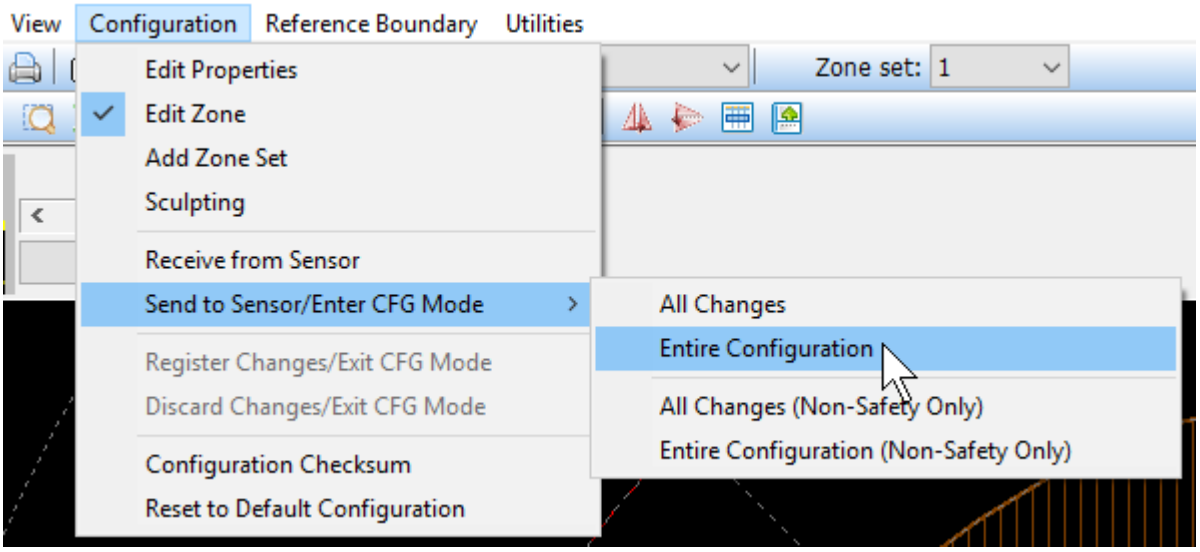
2. Yellow dots now appear in the main screen. Click and drag it to shape your safety zone. Right click to add more points.



3. In the right-hand column, set the External Device Monitoring to Disable, and Operating Mode to Automatic Start.



4. Go to Configuration > Send to Sensor > Entire Configuration.



5. When prompted, register your settings to your device, and print your safety checksum and keep it for future reference.
6. Check that the scanner clicks when there is an object in its safety zone, and also check that the TM is responding correctly according to which safety inputs the safety relay is connected to.

4. Appendix A: Connection Diagrams and Photos

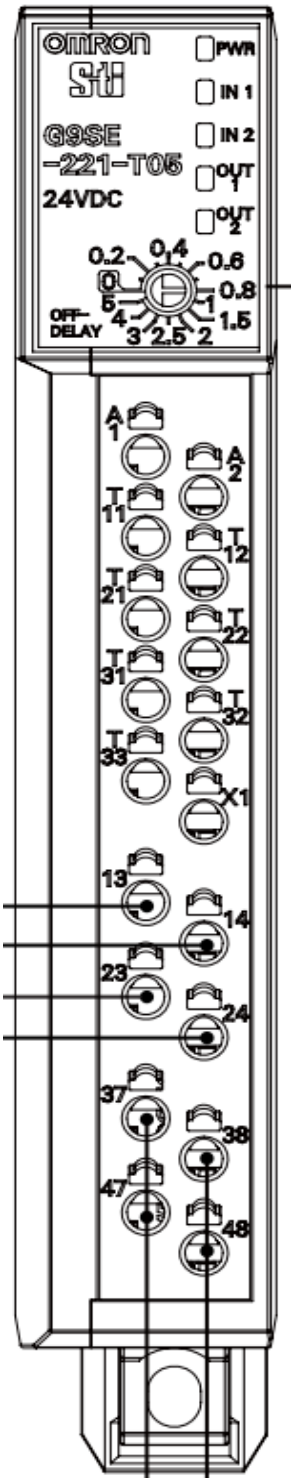


Fig. A-1: The front face of G9SE-221-T05 safety relay

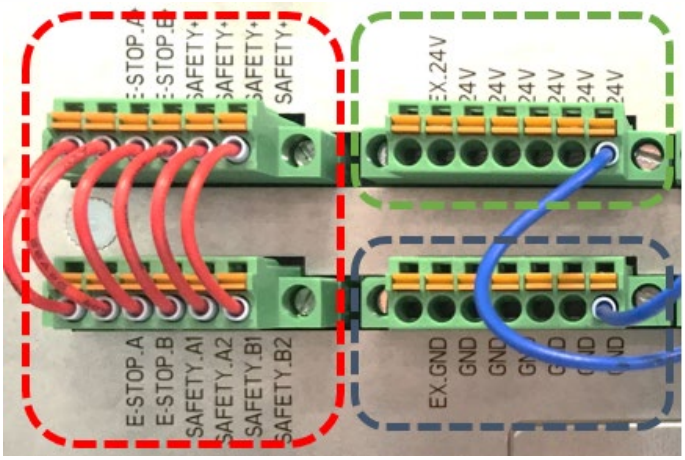


Fig. A-2: The connectors on the TM Control Box. The safety connectors are shown in red, 24 V outputs in green, and ground connection in blue.

Connector	Pin	Conductor Colors	Signal Name
18 Pins Mini-Type Connector	1	Orange/White	Zone Select 1
	2	Orange/Black	Zone Select 2
	3	Gray	Zone Select 3
	4	Pink	Zone Select 4
	5	Black	Start
	6	Violet	Standby input
	7	Blue	Auxiliary Output
	8	Red/Black	Warning Output
	9	Red	OSSD A
	10	Yellow	OSSD B
	11	Blue/White	Zone Select 8
	12	White	+24V
	13	White/Black	Zone Select 5
	14	Brown	0V
	15	Brown/White	EDM
	16	Tan	Zone Select 6
	17	Orange	Zone Select 7
	18	Green	Functional earth

Fig. A-3: Power and I/O connections of the OS32C laser scanner.

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