

MELFA ASSISTA

Quick Set-up online course (Introduction)

This online course introduces the equipment required to use collaborative robots. It also explains how to connect and operate the robot.

Click



Introduction **Purpose of the Course**

This online course introduces the equipment required to use collaborative robots. It also explains how to connect and operate the robot.

The contents of this course are as follows. [TOC](#) Move to the desired page using this button.

Chapter 1 System architecture

Equipment

Chapter 2 Connecting the robot and peripheral devices

Connecting the collaborative robot, controller and hand

Chapter 3 Basic operations

Operating, programming, and teaching the robot using RT VisualBox

Chapter 4 Incorporating vision sensors

Introduction to programming and vision sensor settings





Chapter 5 Safety settings

In this chapter we will learn about functions that facilitate safety.

Final Test

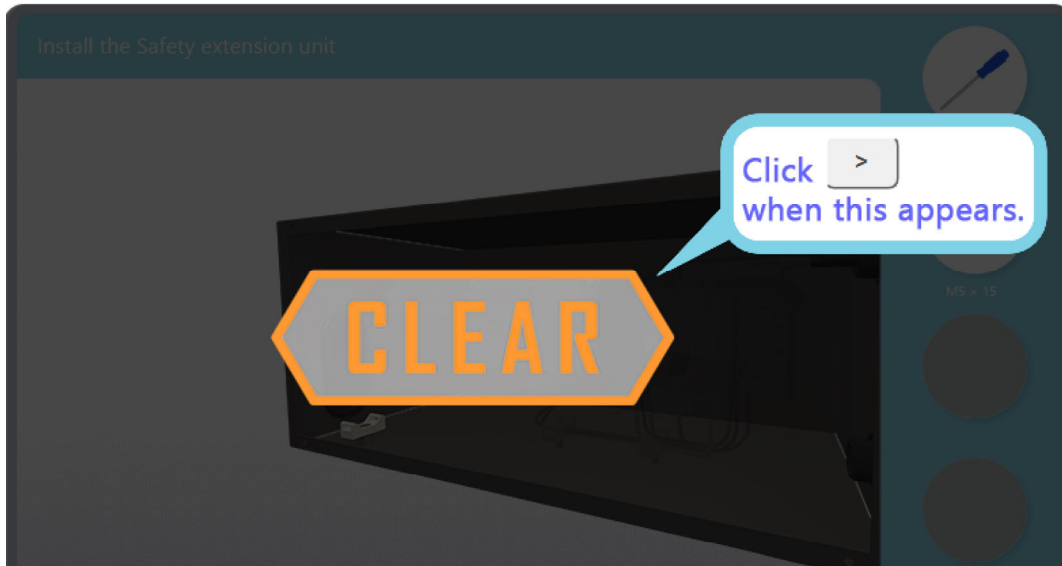
Passing grade: 60% or higher.

Introduction How to Use This e-Learning Tool

Go to the next page		Go to the next page.
Back to the previous page		Back to the previous page.
Move to the desired page		"Table of Contents" will be displayed, enabling you to navigate to the desired page.
Exit the learning		Exit the learning.

Introduction How to use the interface

Press the Play (▶) button.



Safety precautions

When you learn based on using actual products, please carefully read the safety precautions in the corresponding manuals.

Basic precautions and important points when using collaborative robots

Collaborative robots have a variety of safety functions, so unlike conventional industrial robots, they can work in the same space as humans without being separated by a machine guard. Even though collaborative robots are equipped with safety functions, it does not guarantee that they will not cause injury. To prevent injury, robot users, machine manufacturers who construct robot systems, and system builders such as system integrators must select and use functions correctly. Peripherals must be designed, manufactured, set, programmed, maintained, and inspected appropriately. Before working with collaborative robots, conduct risk assessments, check that no risk is present, and ensure all required documentation is in order. It is vitally important that all the points mentioned above are fully understood in order to work with collaborative robots safely and without incident. When using collaborative robots, always keep in mind that they may move unexpectedly.

Caution

The interface of the software used in this course may differ from the software version you are using. The software version used in this course is stated below.

· RT VisualBox Ver.1.00A

Reference materials

These are learning-related reference materials (these materials are not essential). You can download reference materials by clicking on them.

Chapter 1 **Equipment**

This section introduces equipment used with the robot. The equipment mentioned in this course is for reference only. Use equipment that is relevant to your needs.

Standard Configuration



ASSISTA

Robot
controllerSafety
extension unit

Machine cable

Options



Easy-setup kit



RT VisualBox



Vision sensor

Vision sensor
mounting bracket

Next



Hands



ZIMMER
(HRC-03-099455)



SCHUNK
(Co-act EGP-C40
N-N-Assista)



GIMATIC
(KIT-ASSISTA-G)

Next



Devices



M4 × 10



AWG # 11



AWG # 14



Ethernet Hub



PoE



Ethernet Cable

Ethernet Cable
(PoE)C-mount
lens (8mm)

Finger

Tools



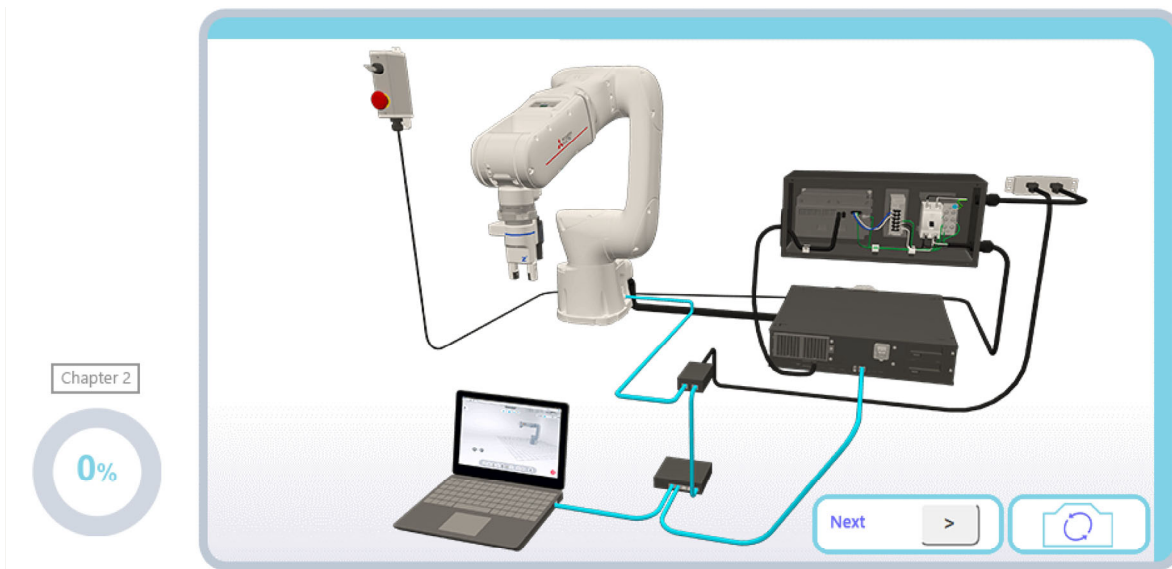
Next



*Ethernet is a registered trademark of FujiXerox Co., Ltd.

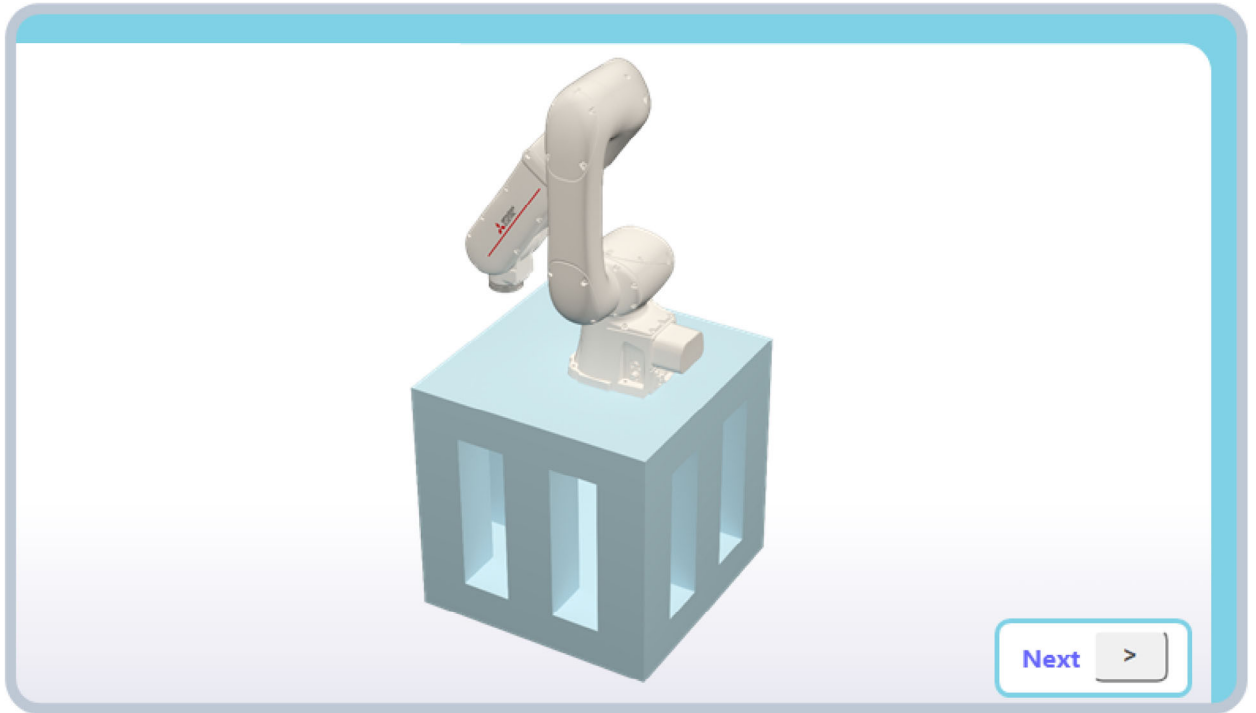
Chapter 2 Connecting the robot and peripherals

In this chapter we will learn how to connect the robot and peripheral devices. A connection diagram is shown below.



In this chapter we will learn how to install the robot and peripheral devices.

Chapter 2



Next >

2.1.1

Transporting the robot

We will learn the precautions that should be taken when removing the robot from the packaging, and transporting it to a cart or stand.

To prevent accidents, do not transport the robot by holding the cover.

When transporting the robot, hold the end of the forearm and area underneath the elbow.

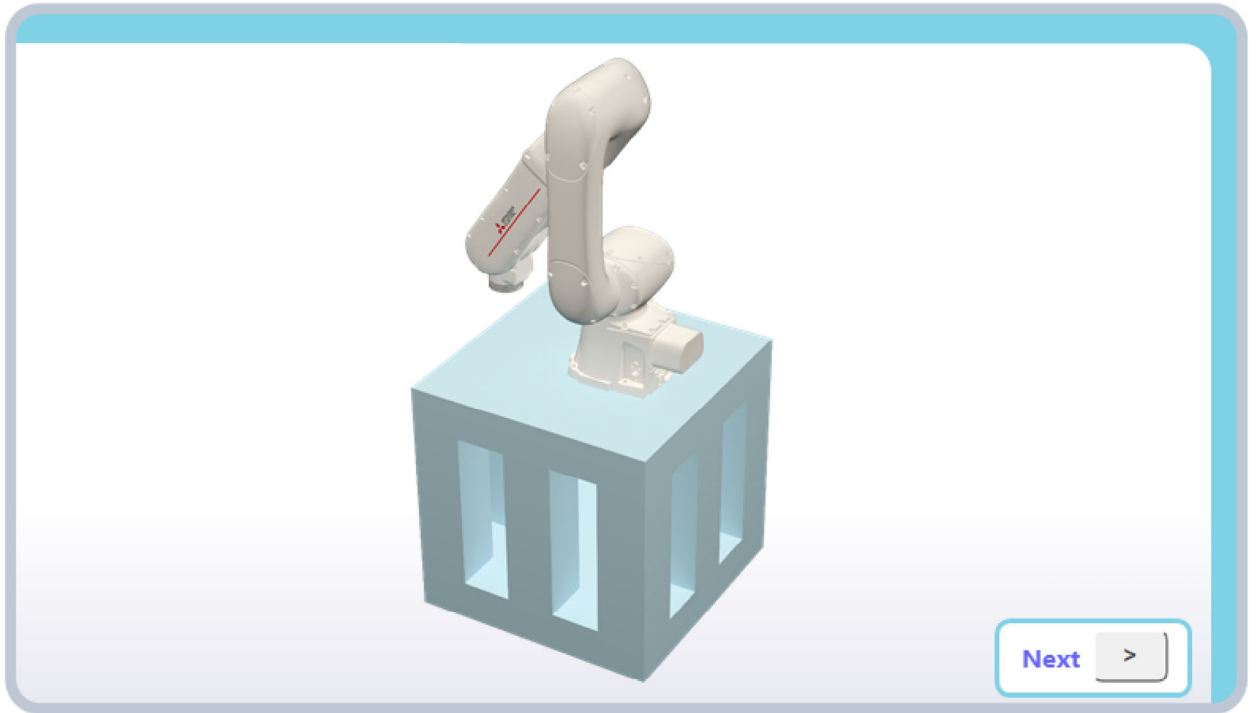


Chapter 2

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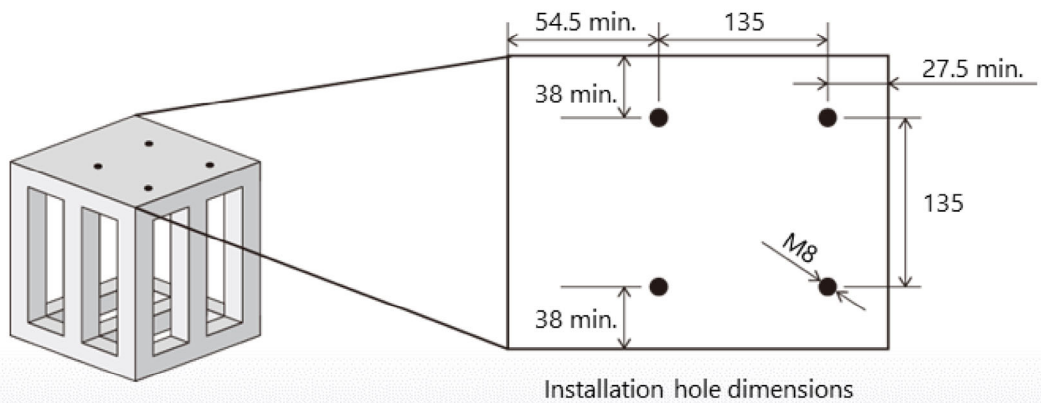
In this chapter we will learn how to install the robot.

Chapter 2



Next >

Installation hole dimensions



Installation stand
(Surface roughness: 25 Rz)

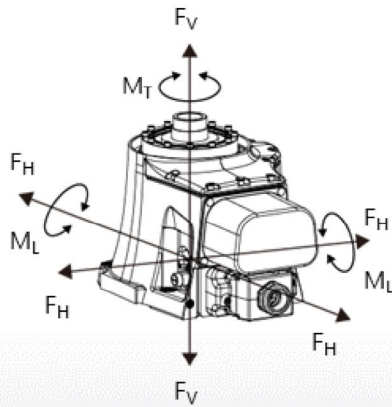
Chapter 2

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Next



Installation stand strength



	Value
Overturning moment (M_L)	325N · m
Torsional moment (M_T)	275N · m
Horizontal translation force (F_H)	700N
Vertical translation force (F_V)	1010N

Chapter 2

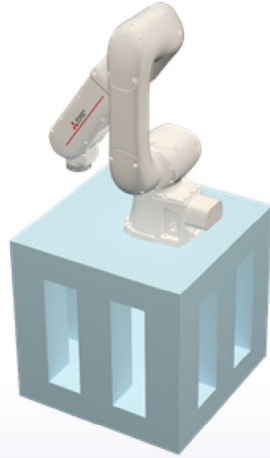
10%

Next



The robot can be floor or ceiling mounted. Continue to the installation method of your choice.

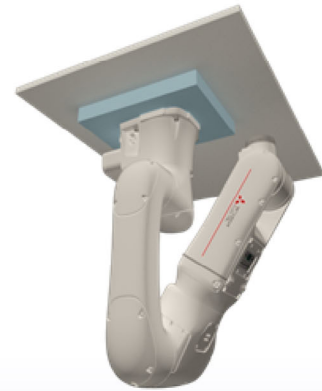
Floor mounted



Go to section 2.1.2-5 from the contents



Ceiling mounted



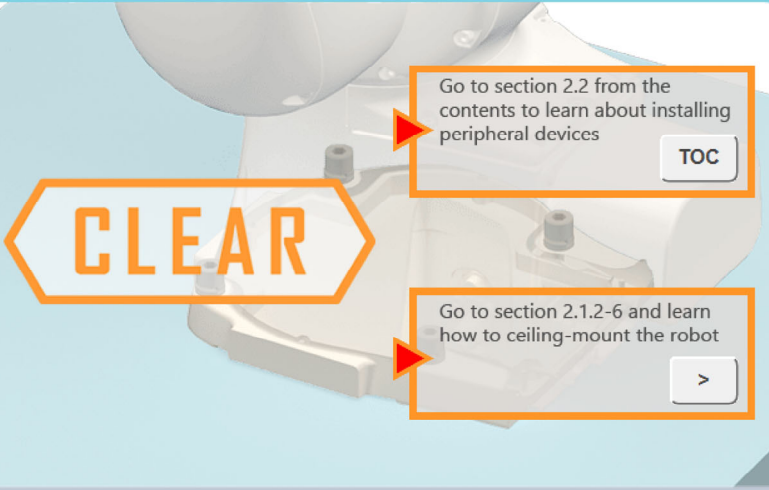
Go to section 2.1.2-6 from the contents

TOC

Chapter 2

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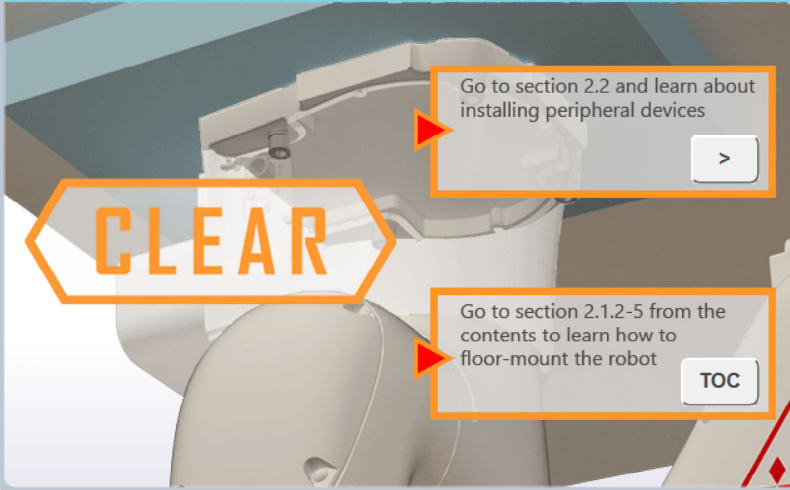
Secure the robot to the robot stand.



Chapter 2

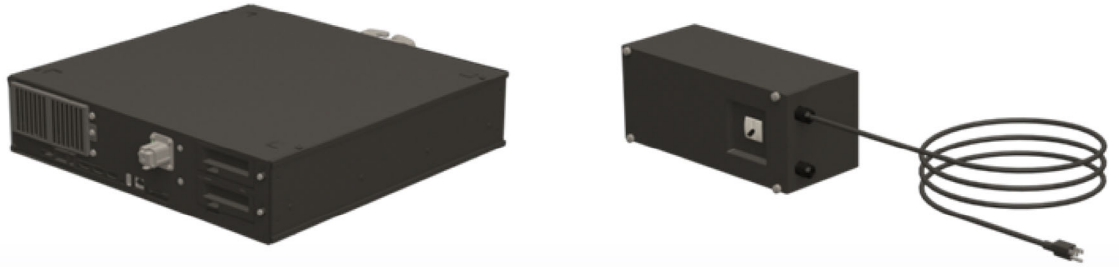


Secure the robot to the robot stand.



Chapter 2





Chapter 2

20%

Next



Install the robot controller on a level surface.



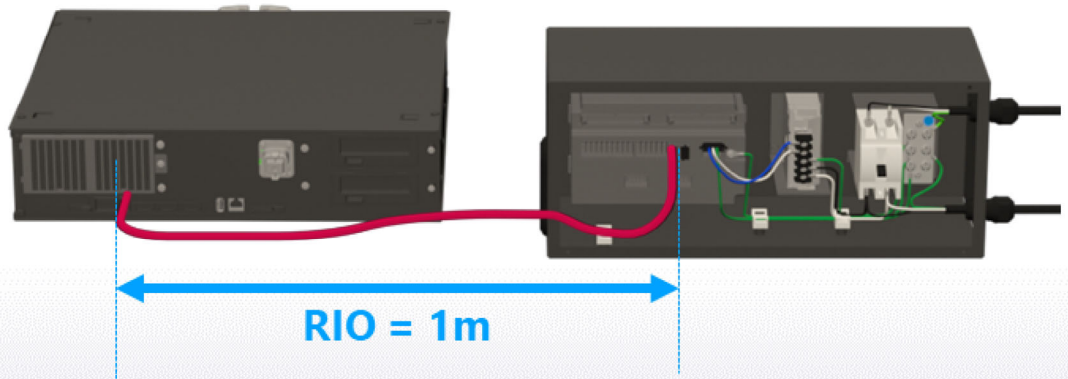
Chapter 2

20%

Next



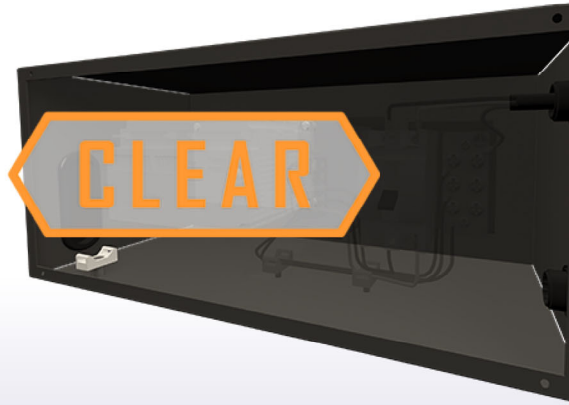
Chapter 2



Next



Install the Safety extension Unit



18 cm or more



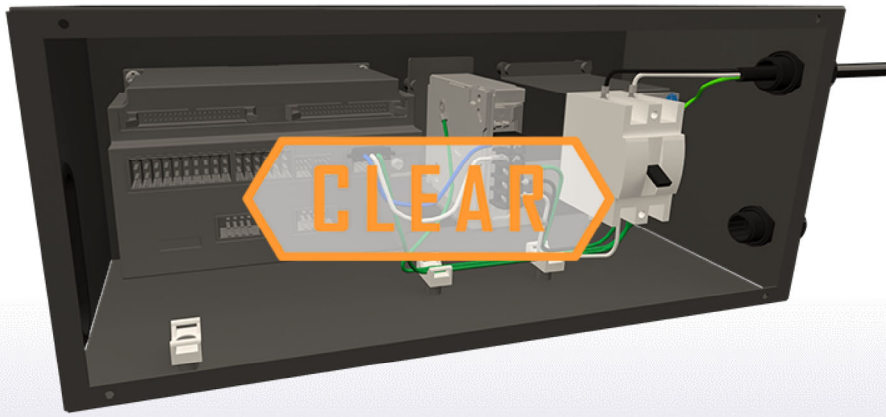
M5 x 15



Chapter 2



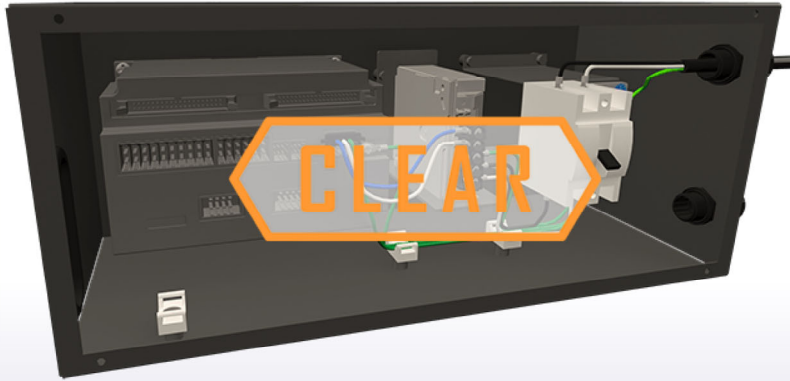
Connect the DCIN cable to the DCIN socket of the Safety extension unit.



Chapter 2

20%

Connect the FG wire to the ground terminal of the Safety extension unit.



Chapter 2

20%

2.4 Grounding the robot controller and connecting the power supply

Connect the grounding wire to the ground terminal of the robot controller.



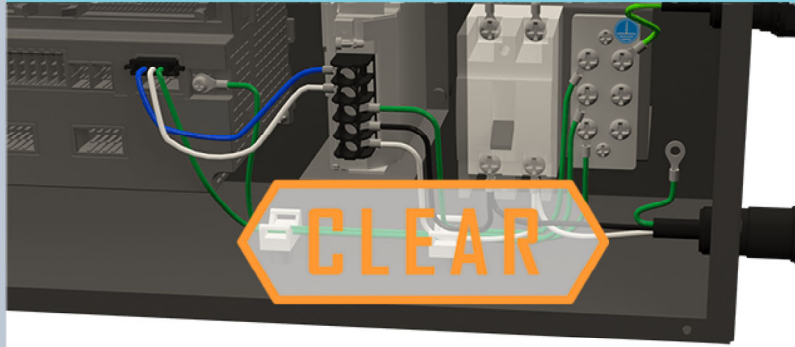
#11 AWG



Chapter 2

20%

Connect the ACIN cable to the Earth-leakage circuit breaker.



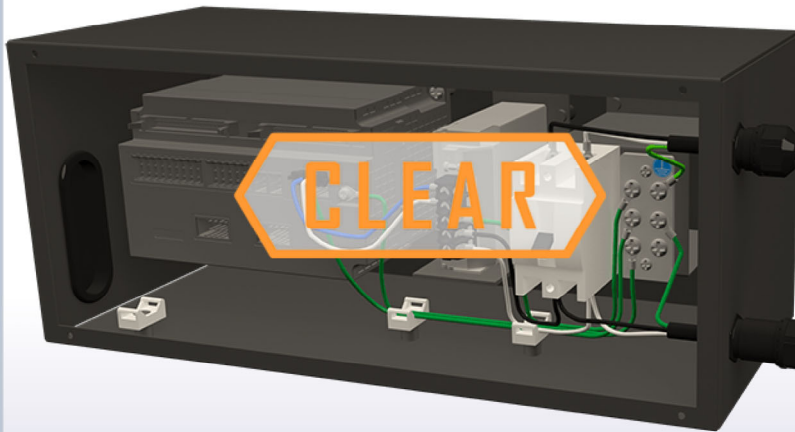
Chapter 2

30%

Connect the FG wire of the ACIN cable to the Ground terminal block.



CLEAR



Chapter 2



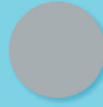
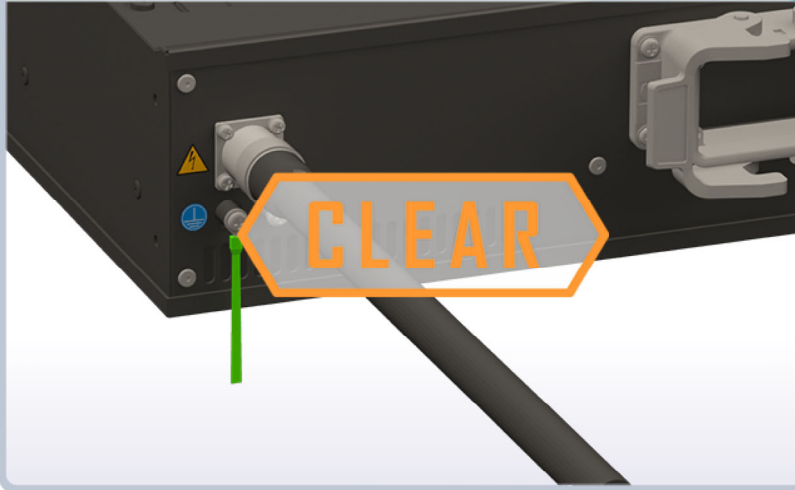
Secure the ACIN cable.



Chapter 2



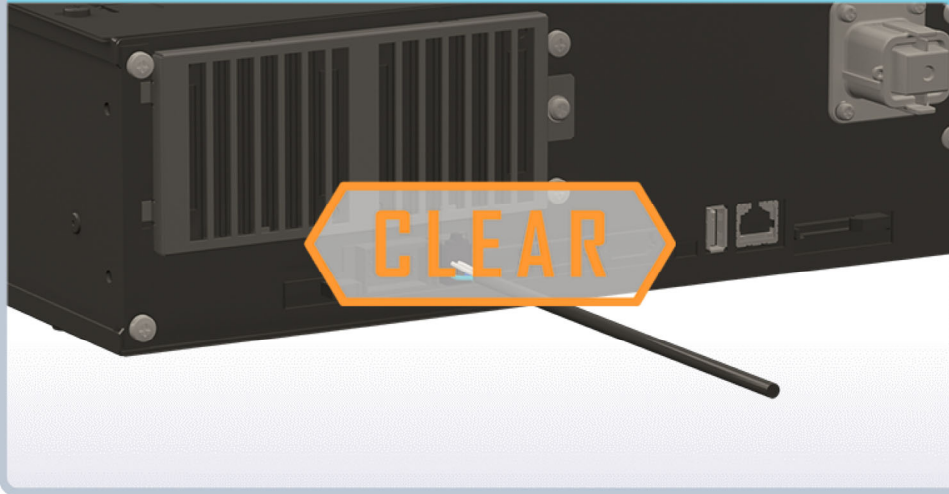
Connect the ACIN cable to the ACIN socket of the robot controller.



Chapter 2



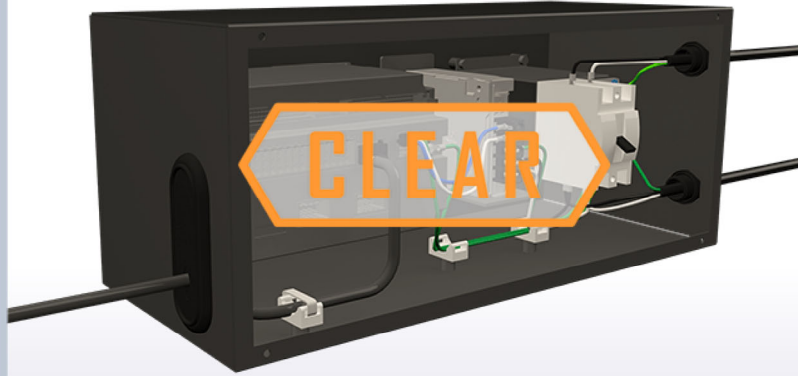
Connect the RIO cable to the RIO socket of the robot controller.



Chapter 2

40%

Secure the RIO cable with a cable tie.



Chapter 2



Install the front cover.



Chapter 2



Connect the EMG / Mode selector switch box to the robot controller.



Chapter 2

40%

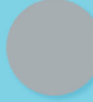
Connect the machine cable connector (controller side) to the robot controller.



Chapter 2



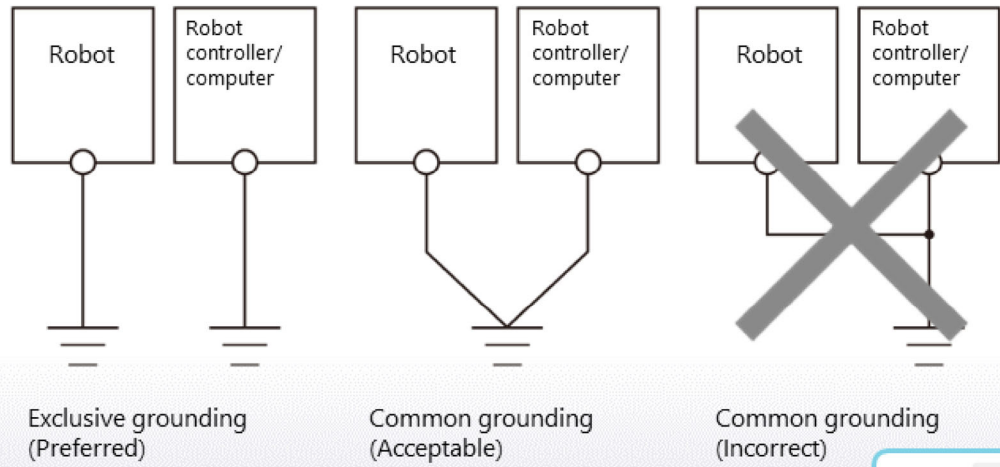
Connect the machine cable connector (robot side) to the robot.



Chapter 2



Do not ground the robot using the ground of other devices. Ground the robot using a ground that has a resistance of 100 ohms or less.



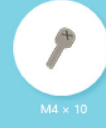
Chapter 2

50%

Next



Connect the grounding wire to the ground terminal on the robot.



Chapter 2



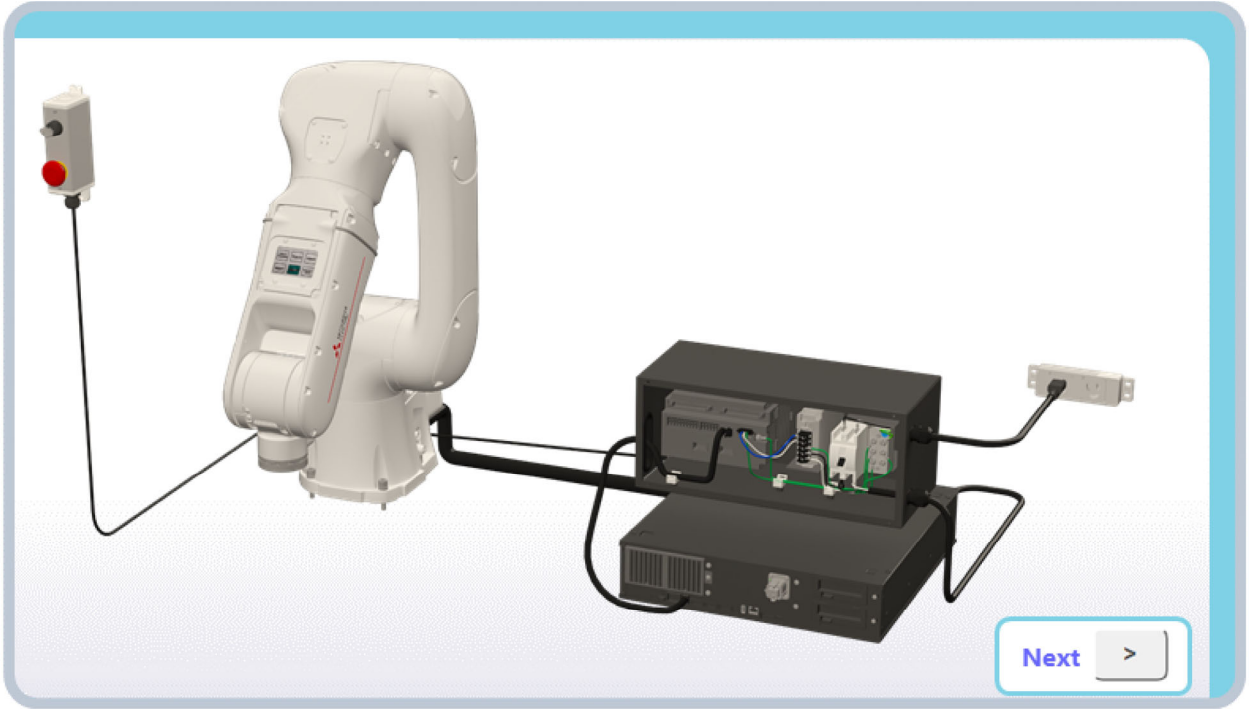
Plug in the Earth-leakage circuit breaker / Safety extension unit power supply box.



Chapter 2

50%

Chapter 2



Next >

Check that there are no obstacles, such as tools, within the operating range of the robot.



Chapter 2

60%

Next



Power on the Earth-leakage circuit breaker / Safety extension unit power supply box.

Normal operation

CLEAR

Chapter 2

60%



Rest errors with the RESET button



Chapter 2

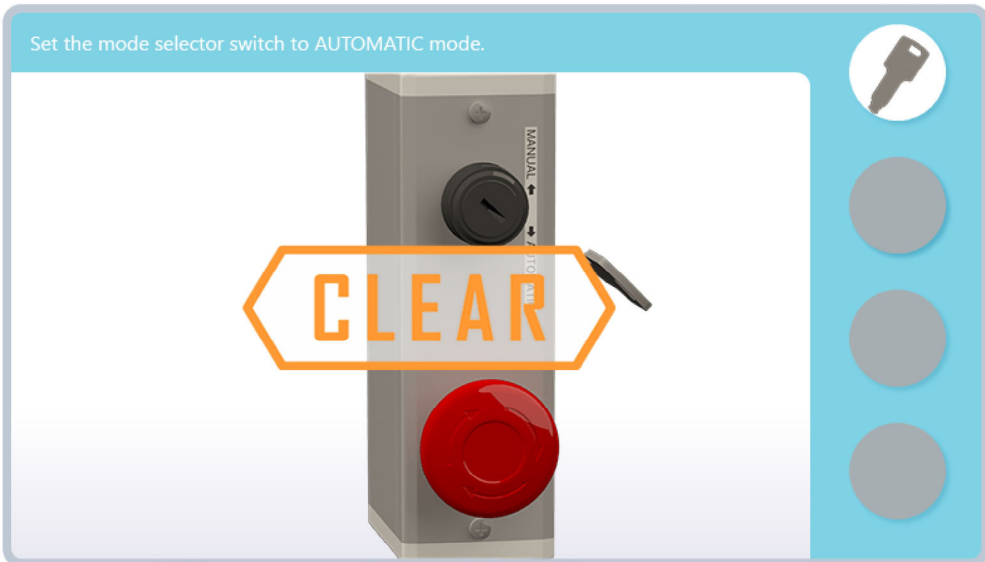


Set the mode selector switch to AUTOMATIC mode.

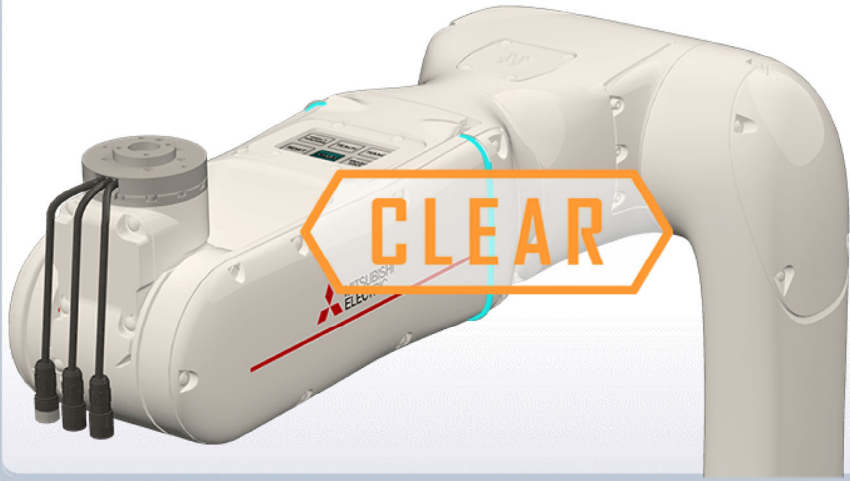
CLEAR



Chapter 2



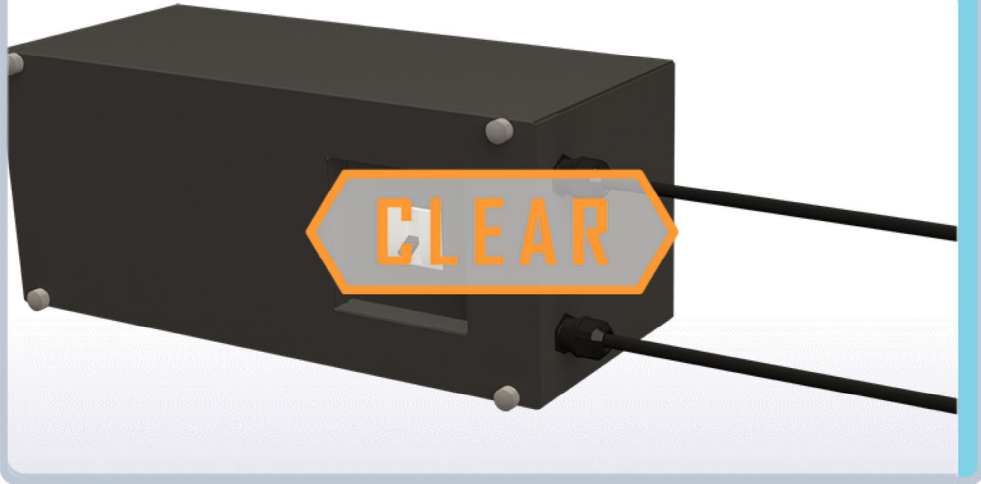
Disable direct teaching.



Chapter 2



Power off the Earth-leakage circuit breaker / Safety extension unit power supply box.



Chapter 2



In this section we will learn how to install a hand. You can learn how to install the three types of recommended hands shown below. Continue to the hand of your choice.

ZIMMER



Grasp force: 50N, 90N, 140N, 190N
Stroke: 20mm

Go to section 2.11.1
from the contents



GIMATIC



Grasp force: 98N
Stroke: 35mm

Go to section 2.11.2
from the contents



SCHUNK

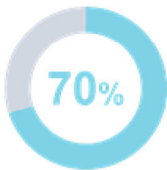


Grasp force: 35N, 70N, 105N, 140N
Stroke: 12mm

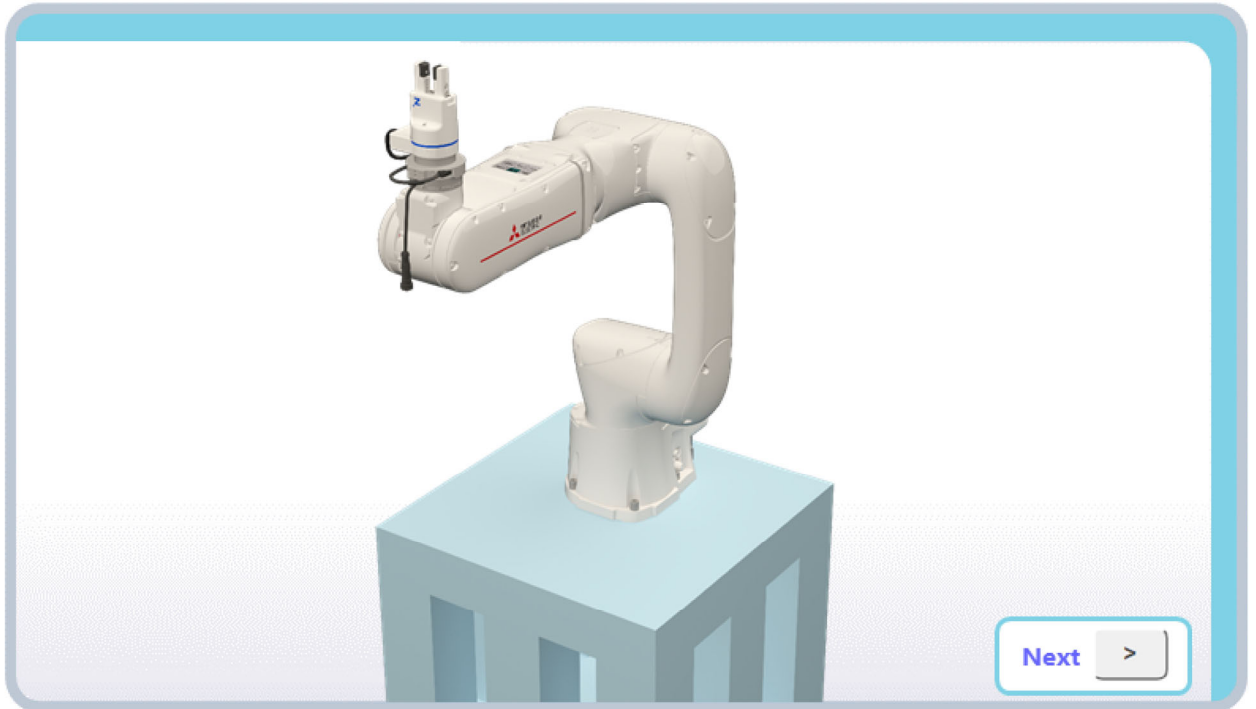
Go to section 2.11.3
from the contents



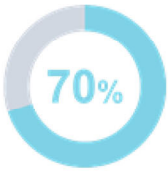
Chapter 2



We will learn how to install the recommended ZIMMER hand.



Chapter 2

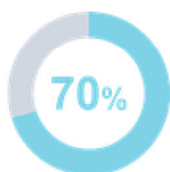


Next >

Check that the Status indicator LED has turned off.
If it is on, turn the power off.



Chapter 2



Next



Remove the hand cover.



CLEAR



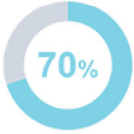
Chapter 2



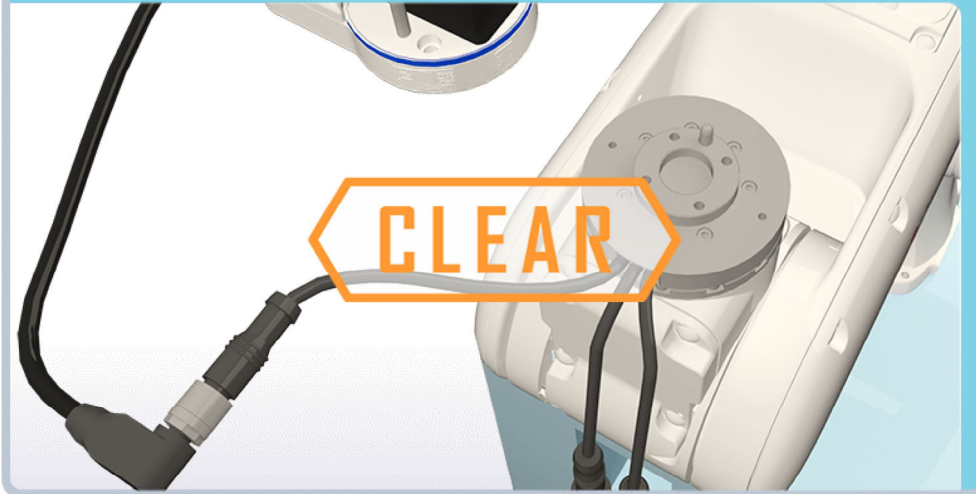
Insert the hand bracket positioning pin into the alignment hole on the robot flange.



Chapter 2



Connect the hand connector to the HND connector.

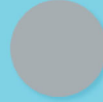
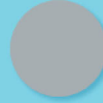


Chapter 2



House the connectors in the hand bracket.

CLEAR



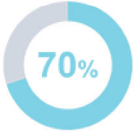
Chapter 2



Insert the adapter plate positioning pin into the alignment hole.



Chapter 2



Fix the hand bracket and adapter plate to the robot flange.

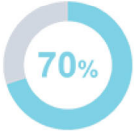
CLEAR



M4 x 20



Chapter 2



Insert the positioning pin into the alignment hole on the hand.

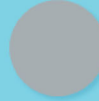


Chapter 2

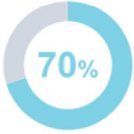


Connect the hand.

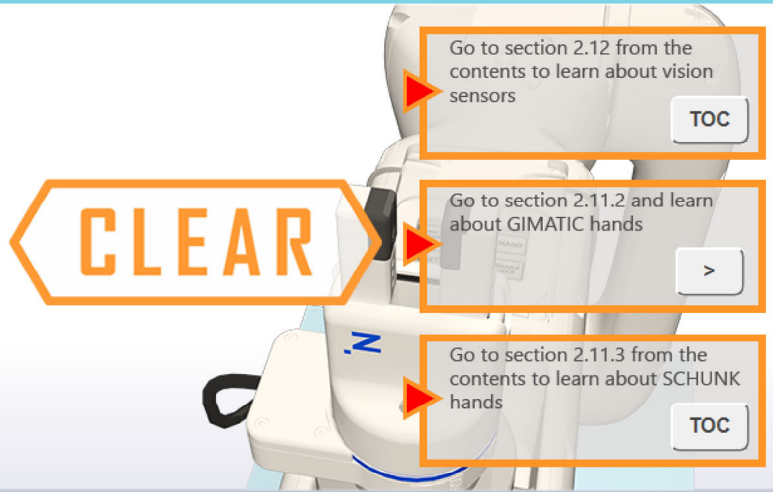
CLEAR



Chapter 2



Install the hand cover.



Chapter 2

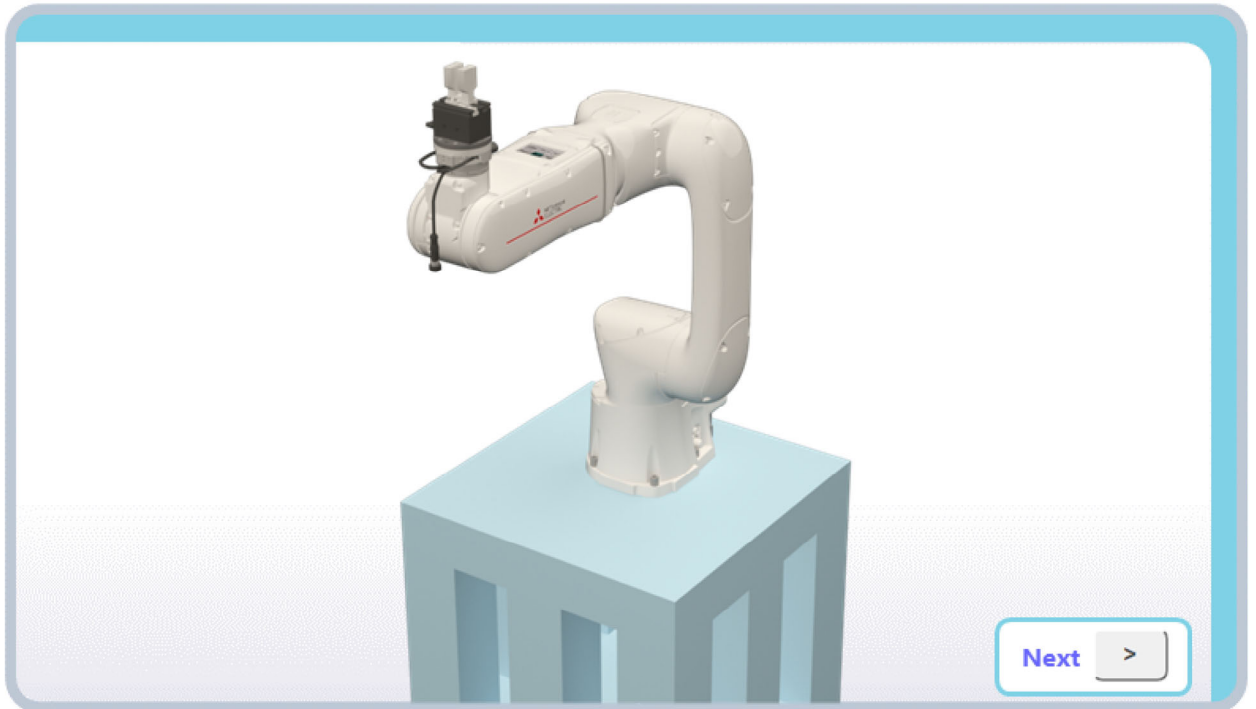


2.11.2

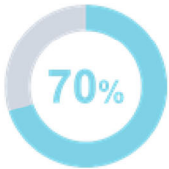
Hand installation (GIMATIC)

We will learn how to install the recommended GIMATIC hand.

Please be aware that this hand is open when powered on and closed when powered off. Take care to avoid injury and dropping workpieces.



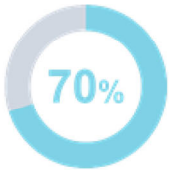
Chapter 2



Check that the Status indicator LED has turned off.
If it is on, turn the power off.



Chapter 2



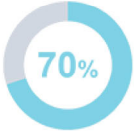
Next



Insert the hand bracket positioning pin into the alignment hole on the robot flange.



Chapter 2



Install adapter plate 2 on the hand.

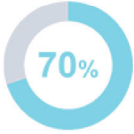
CLEAR



M3 x 6



Chapter 2



Connect the hand connector cable to the HND connector.



Chapter 2



House the connectors in the hand bracket.

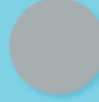
CLEAR



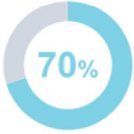
Chapter 2



Insert the Adapter plate 1 positioning pin into the alignment hole.



Chapter 2



Fix the hand bracket and adapter plate 1 to the robot flange.



M4 x 20



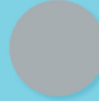
Chapter 2



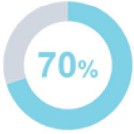
Fix the hand and Adapter plate 2 to Adapter plate 1.



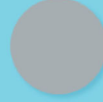
M4 x 10



Chapter 2



Connect the hand connector cable to the HND connector.



Chapter 2



Install the fingers on the hand.

Go to section 2.12 from the contents to learn about vision sensors [TOC](#)

Go to section 2.11.3 and learn about SCHUNK hands [>](#)

Go to section 2.11.1 from the contents to learn about ZIMMER hands [TOC](#)

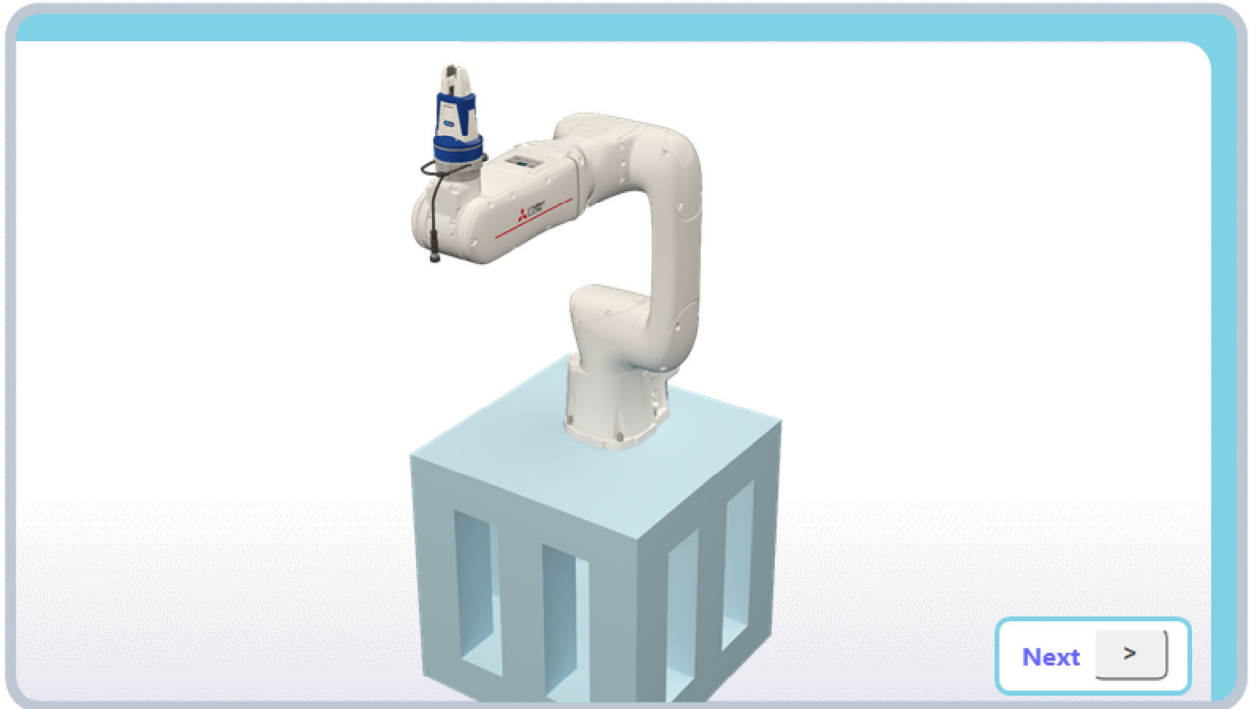
CLEAR



Chapter 2



We will learn how to install the recommended SCHUNK hand.



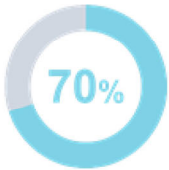
Chapter 2



Check that the Status indicator LED has turned off.
If it is on, turn the power off.



Chapter 2



Next



Insert the hand bracket positioning pin into the alignment hole on the robot flange.



Chapter 2

70%

Connect the hand connector cable to the HND connector.

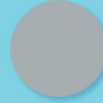


Chapter 2



House the connectors in the hand bracket.

CLEAR



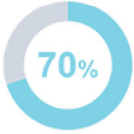
Chapter 2



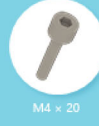
Insert the adapter plate positioning pin into the alignment hole.



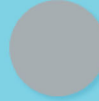
Chapter 2



Fix the hand bracket and adapter plate to the robot flange.



M4 x 20



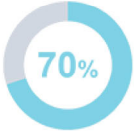
Chapter 2



Insert the hand positioning spacers opposite each other on the adapter plate.



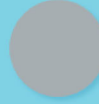
Chapter 2



Fix the hand to the adapter plate.



M4 x 10



Chapter 2



Install the fingers on the hand.

CLEAR

Go to the next section to learn about vision sensors



Go to section 2.11.1 from the contents to learn about ZIMMER hands

TOC

Go to section 2.11.2 from the contents to learn about GIMATIC hands

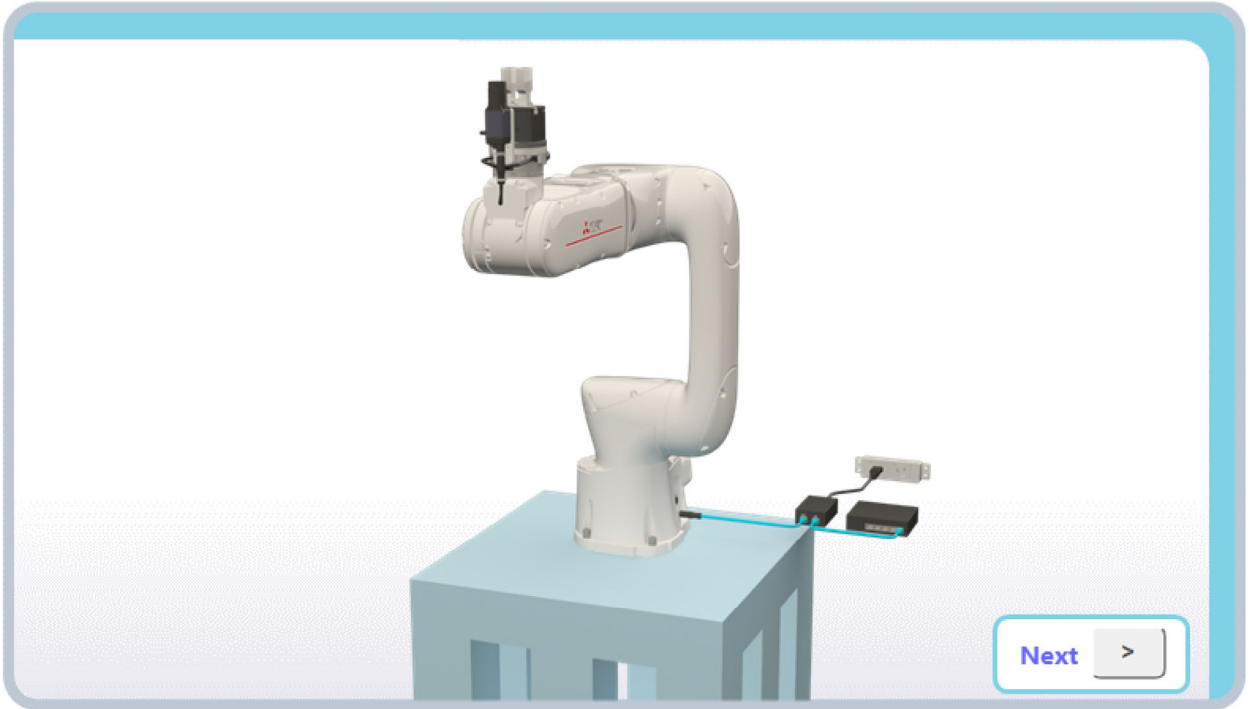
TOC



Chapter 2

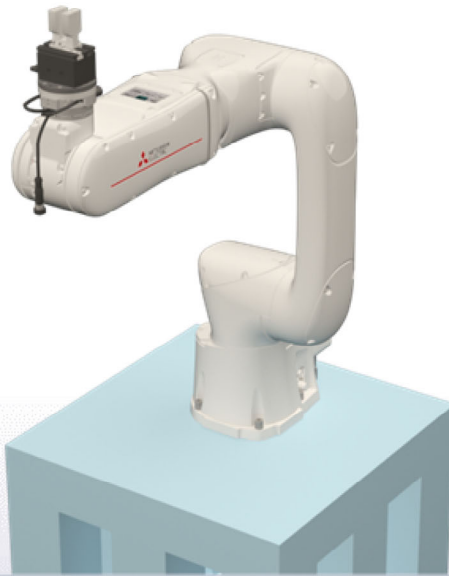


Chapter 2

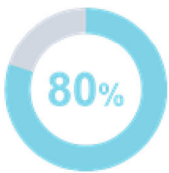


Next >

Check that the Status indicator LED has turned off.
If it is on, turn the power off.



Chapter 2



Next



Install the C-mount lens on the vision sensor.



Chapter 2



Install the vision sensor on the vision sensor mounting bracket.



M3 x 6



Chapter 2



Insert the positioning pins into the bracket.



Chapter 2



Mount the vision sensor on the hand bracket.

CLEAR



M4 x 12



Chapter 2



Connect the LAN cable to the vision sensor.

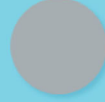


Chapter 2



Secure the cables with cable ties.

CLEAR



Chapter 2



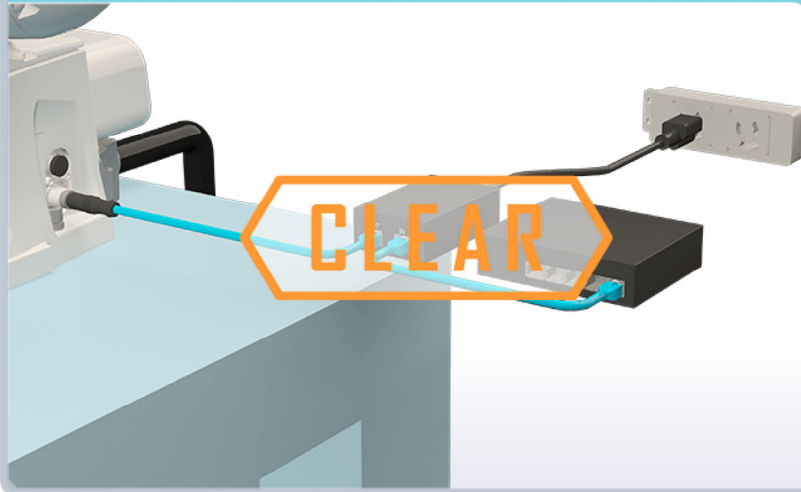
Connect the power cable to the PoE adapter.



Chapter 2

90%

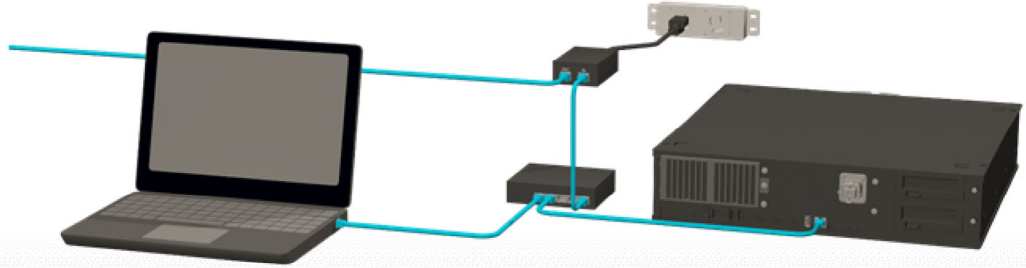
Connect the Ethernet hub.



Chapter 2



Connect the computer.

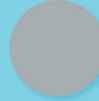


Chapter 2



Next >

Connect the computer and robot controller with an Ethernet cable.



Chapter 2



Chapter 3 Basic operation

In this chapter we will learn how to configure the basic settings, teach, program, and operate the robot so that it moves in a manner similar to that in the following video.

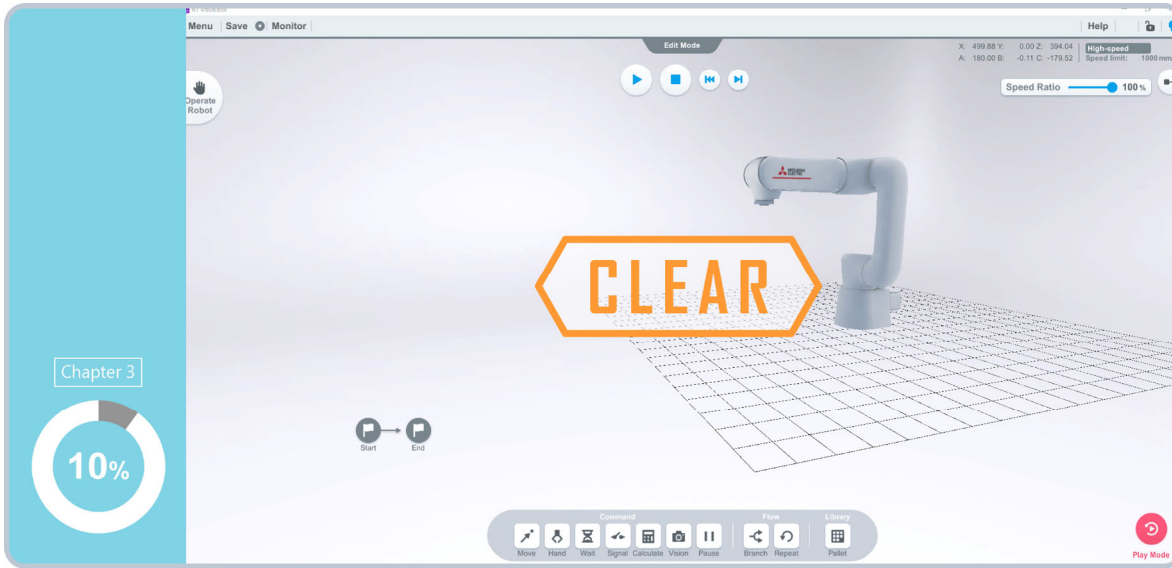


3.1

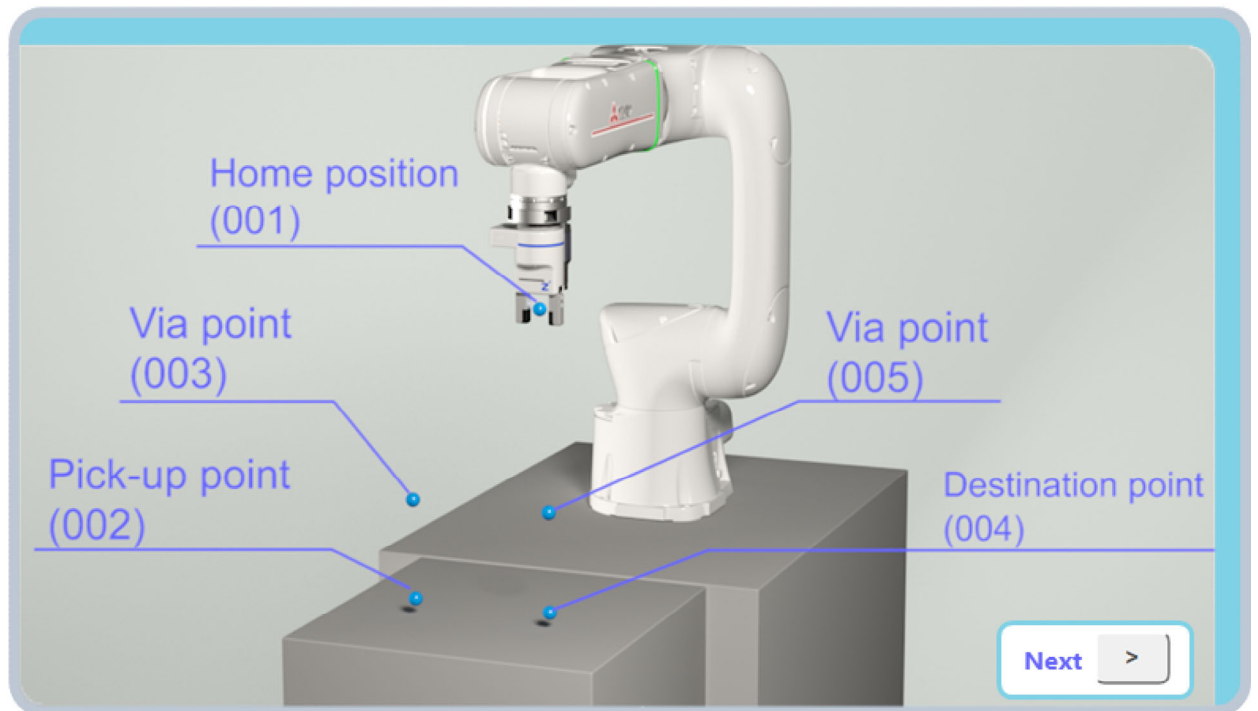
Basic settings

In this section we will learn how to configure the basic settings with RT VisualBox.

Zoom in when using a computer or switch to landscape mode when using a tablet to make the content easier to see.

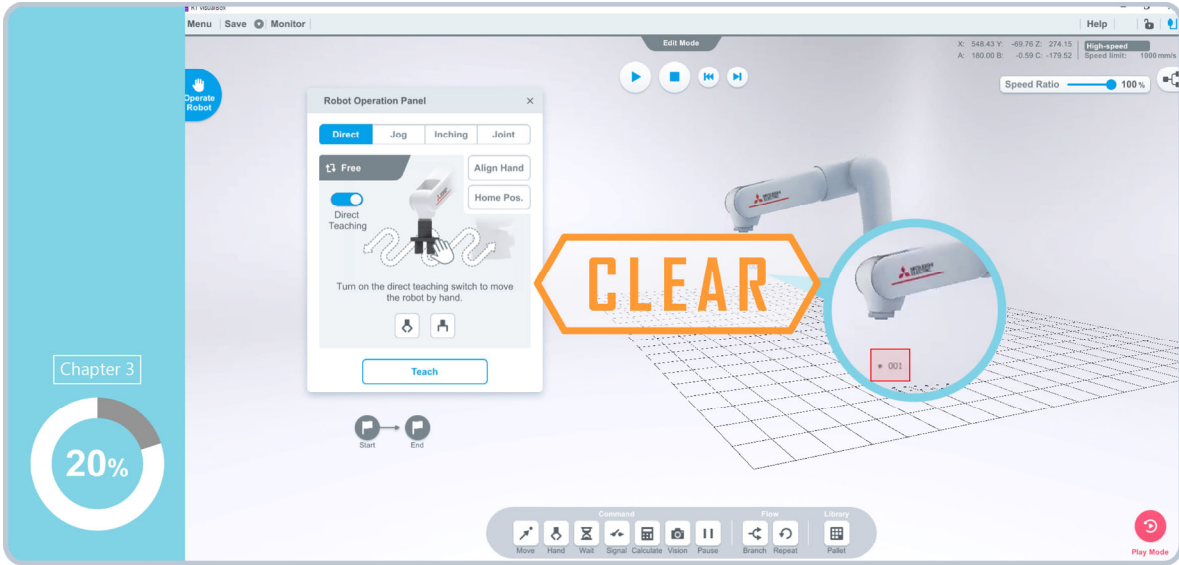


We will learn how to teach the following positions to the robot.



Chapter 3

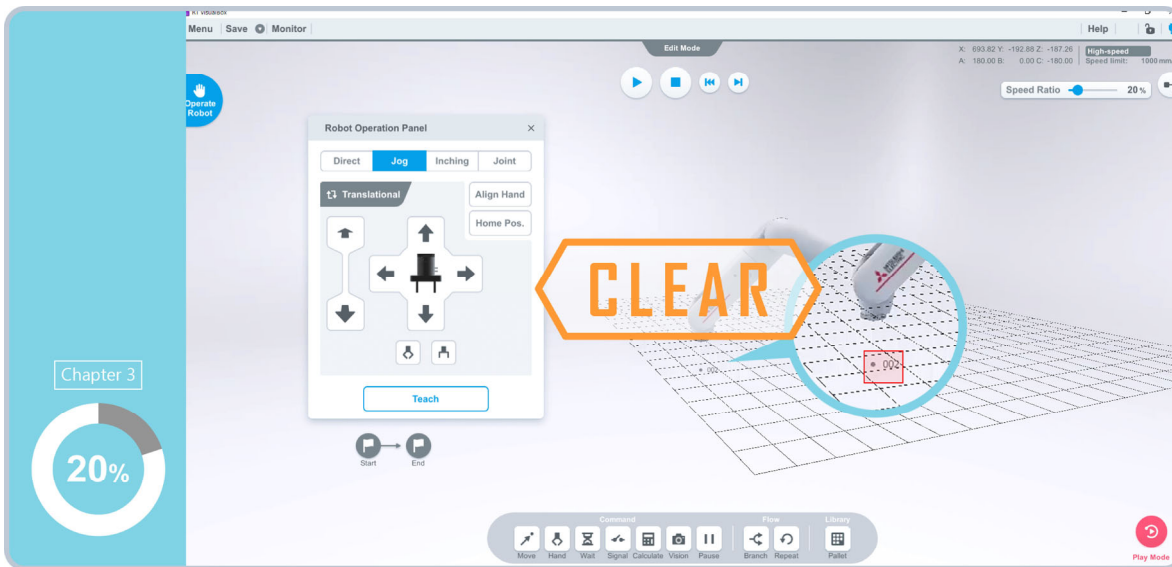
20%

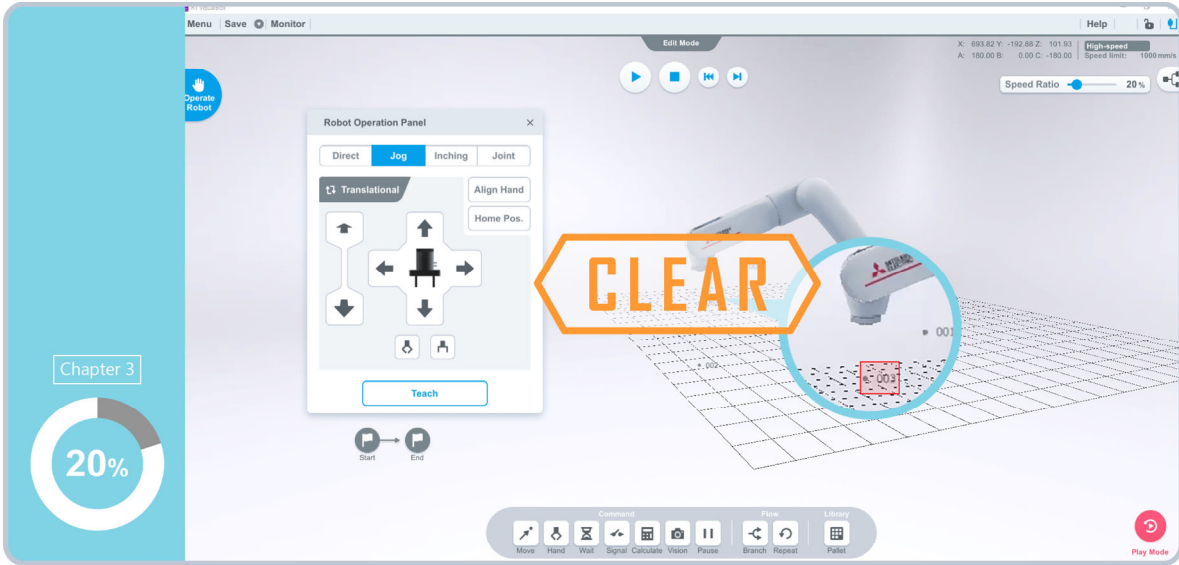


3.2.2

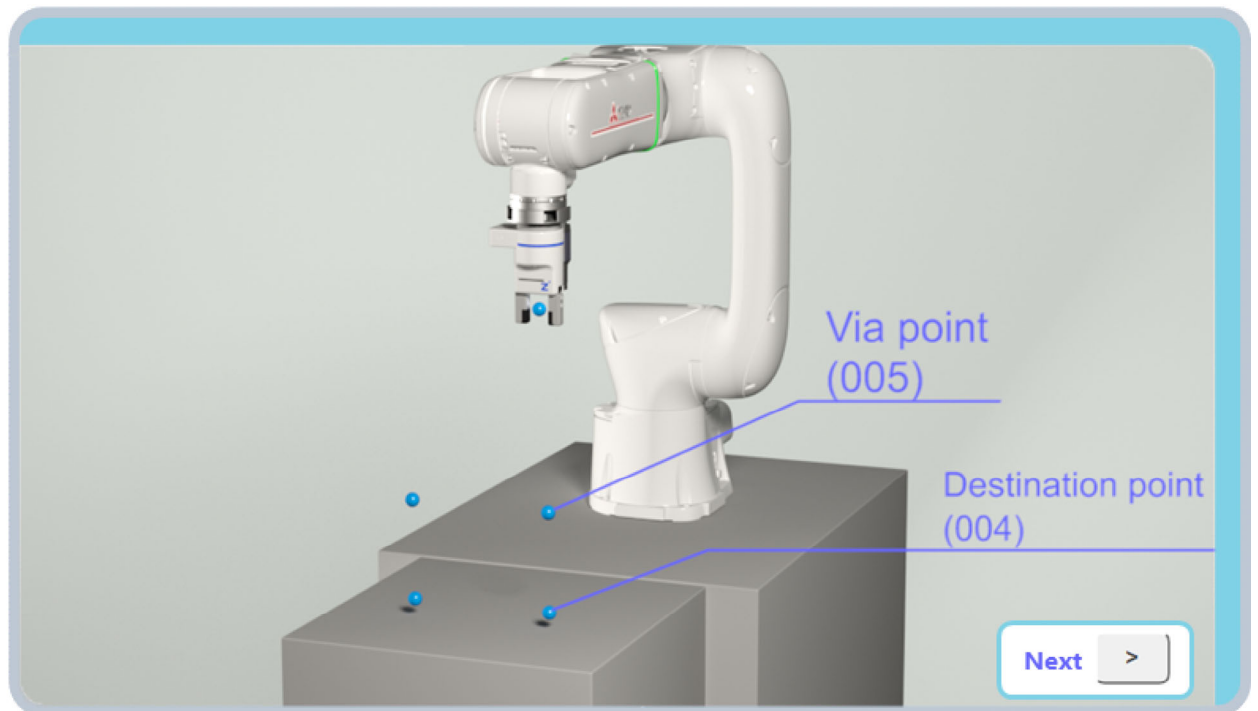
Pick-up point

Use direct teaching to move the robot arm above the workpiece, then refine the position using Jog operation. This chapter explains Jog operation.



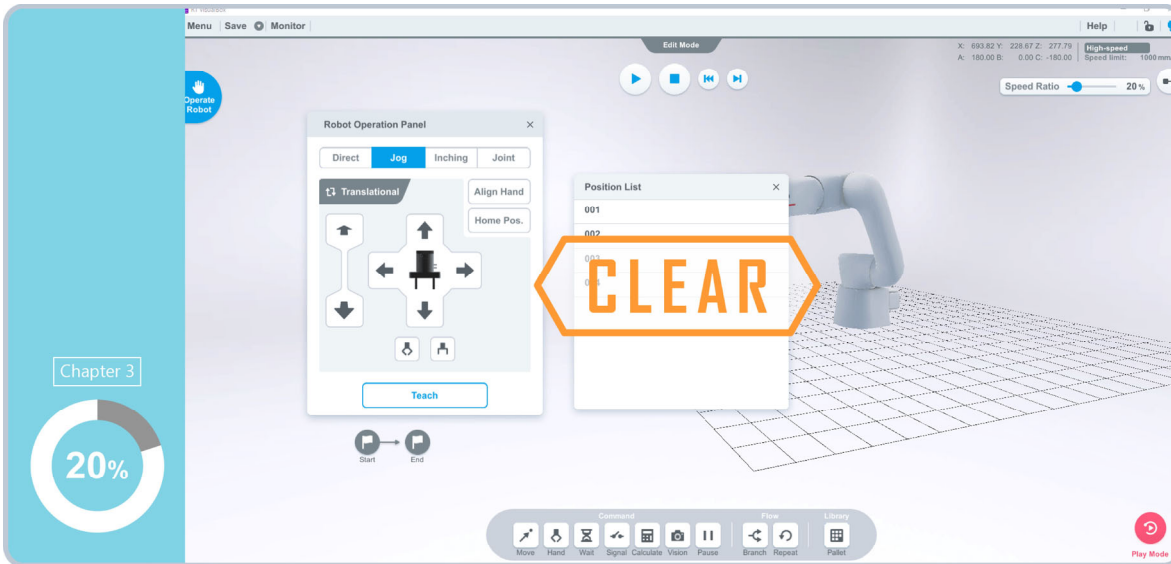


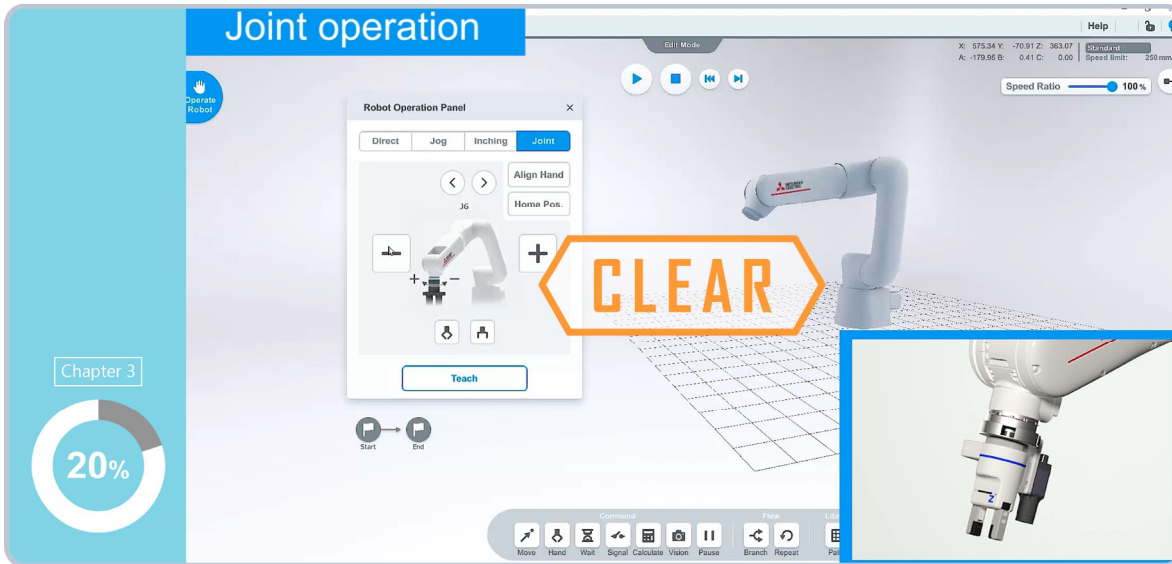
The Destination point and Via point can be taught in the same manner.



Chapter 3

20%







We will learn how to create a program.


Chapter 3


50%


Command



Move



Hand


Wait



Signal



Calculate


Vision



Pause

Flow


Branch


Repeat

Library

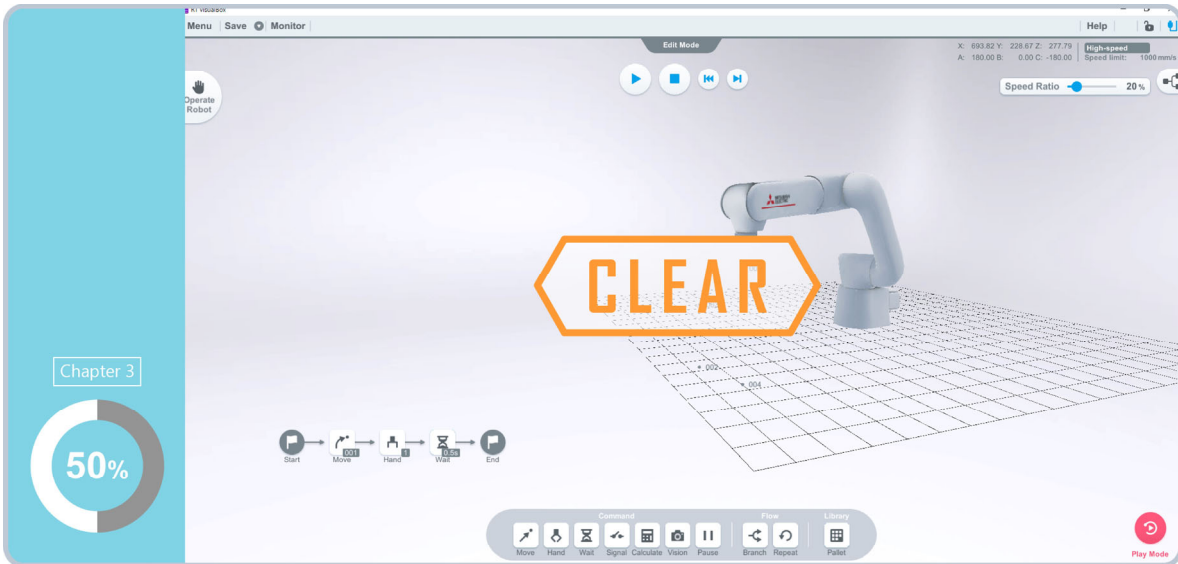

Pallet

Block name	Description
Move	Moves the robot (Tap/click to configure settings).
Hand	Opens/closes the hand (Tap/click to configure settings).
Wait	Instructs the robot to wait (Tap/click to configure settings).
Signal	Outputs signals (Tap/click to configure settings).
Calculate	Performs calculations (Tap/click to configure settings).
Vision	Identifies the workpiece (Tap/click to configure settings).
Pause	Pauses the operation.
Branch	Branches conditions (Tap/click to configure settings).
Repeat	Repeats the operation (Tap/click to configure settings).
Pallet	Used to set up palletizing operations (Tap/click to configure settings).

Next >

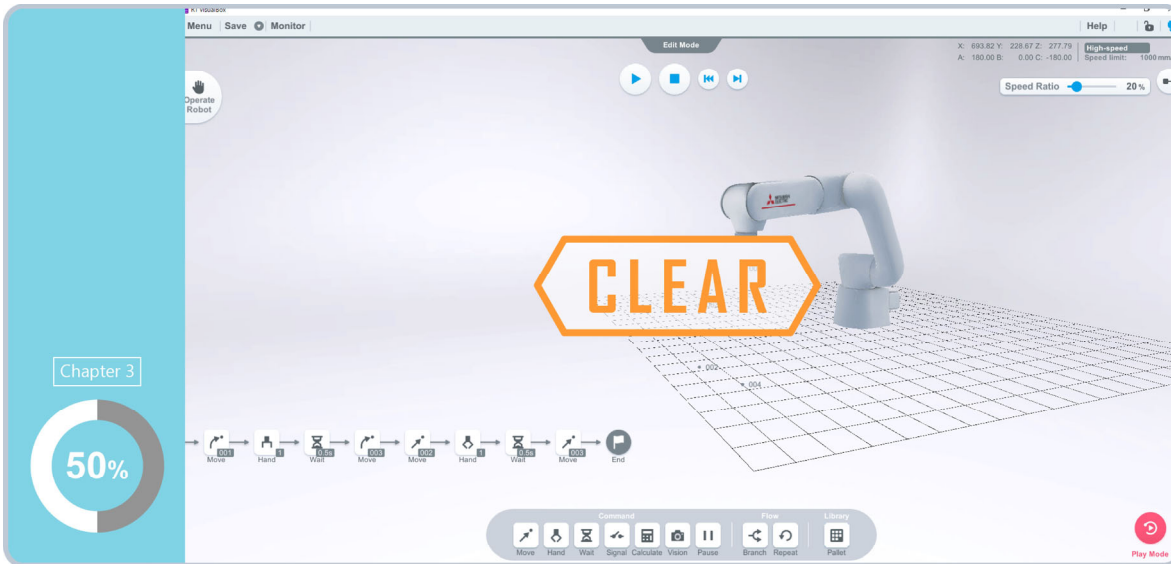
3.3.1

Moving to the Home position



3.3.2

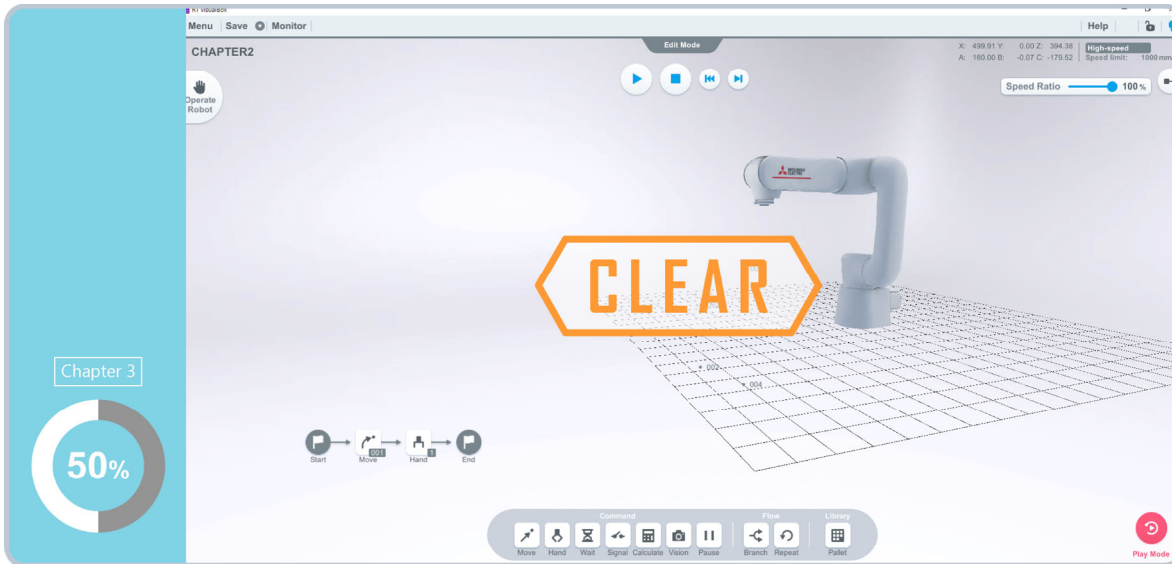
Picking up the workpiece





3.3.4

Deleting program blocks

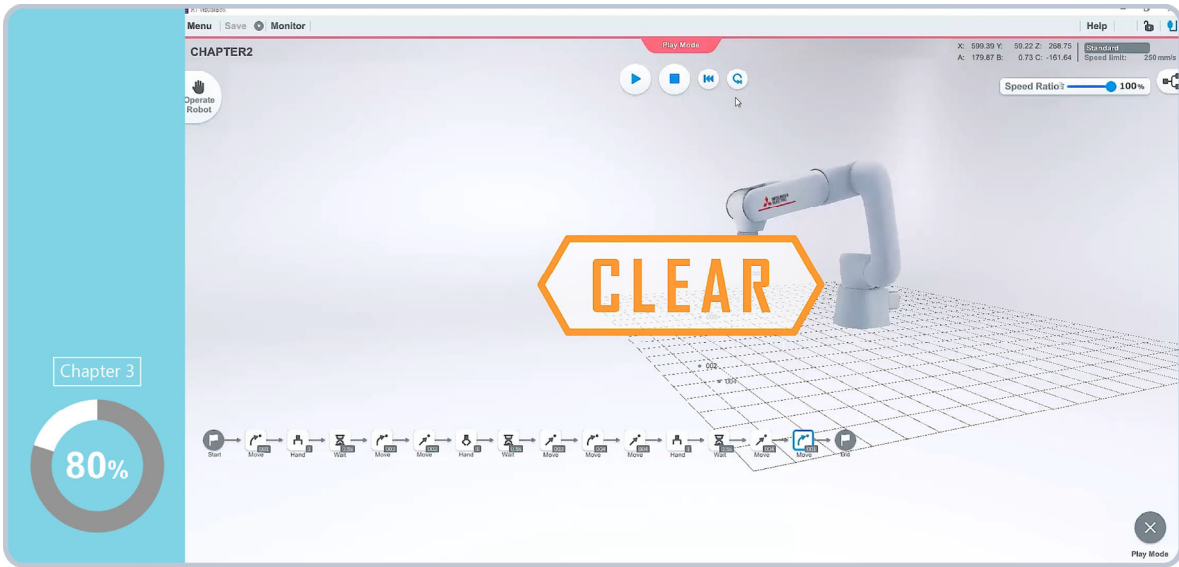


3.4

Step operation

We will learn how to check the program using Step operation.





Chapter 4 Vision sensors

Using a vision sensor allows the robot to utilize image data to automatically adjust its grasp position and angle. In this section we will learn how to configure vision sensor settings and integrate vision sensors into the program.

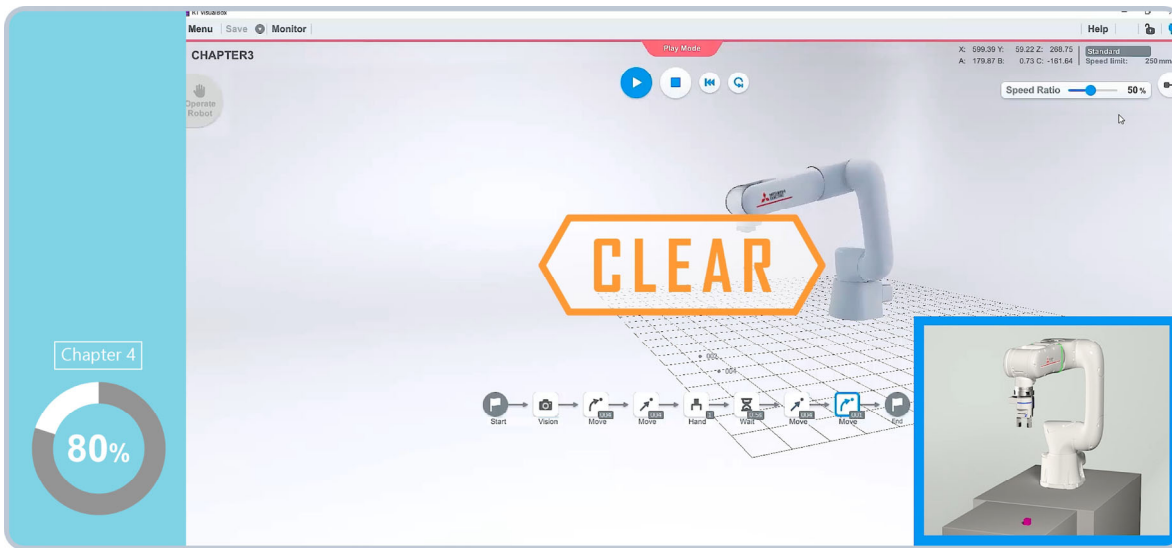


4.1 Connecting the vision sensor and registering the workpiece



Create a program while referring to chapter 2.





We have learned about the basics of connecting and using the robot as well as the equipment required to use it with the software.

In chapter 5 we will learn how to use the robot safely.

Chapter 5 **Safety settings**

In this chapter we will learn how to configure the functions that facilitate safety.



Return to Programming Screen Safety Settings Help

[Speed Limiting](#) [Safety I/O](#) [Position Limiting](#) [Monitor Model](#) [Change Password](#)

Low-Speed Space Settings

Configure the settings to set areas where low-speed operation is activated when the robot is in collaborative operation mode.
Enable even during high speed operation (non collaborative)

Date safety function parameters last modified: 2021/02/02-19:53:06

Unit : mm

Area 1 Activate low-speed outside of area

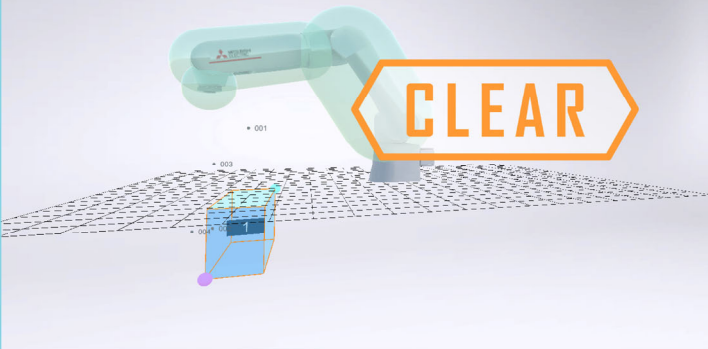
Diagonal Point 1		
X	Y	Z
503.61	-528.41	-68.45
Diagonal Point 2		
X	Y	Z
700.09	144.73	-328.98

Area 2 Activate low-speed outside of area

Diagonal Point 1		
X	Y	Z
0.00	0.00	0.00
Diagonal Point 2		
X	Y	Z
0.00	0.00	0.00

Area 3 Activate low-speed outside of area

Diagonal Point 1		
X	Y	Z
0.00	0.00	0.00
Diagonal Point 2		
X	Y	Z
0.00	0.00	0.00



Chapter 5

30%

[Return To Speed Limiting](#) [Operate Robot](#) [Undo](#) [Apply](#)

Return to Programming Screen Safety Settings Help

Speed Limiting Safety I/O **Position Limiting** Monitor Model Change Password

Position Limiting

Configure the settings to monitor planes/areas that the robot should not intrude into.

Date safety function parameters last modified: 2021/02/02:19:20:08

	Plane	Area			
Always	Collaborative	Safety Area1	Safety Area2		
1	ON	ON	ON	ON	Set
2					Set
3					Set
4					Set
5					Set
6					Set
7					Set
8					Set

Show/Hide Always Collaborative Safety Area1 Safety Area2

Undo Apply

Chapter 5

50%

Return to Programming Screen Safety Settings Help

Speed Limiting Safety I/O Position Limiting Monitor Model Change Password

Position Limiting

Configure the settings to monitor planes/areas that the robot should not intrude into.

Date safety function parameters last modified: 2021/02/03-09:28:43

Plane Area

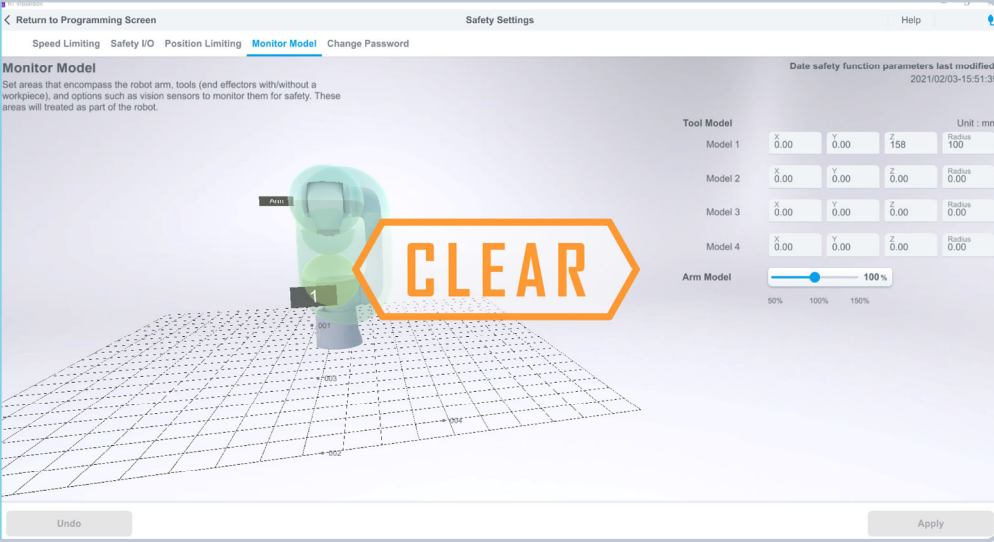
	Always	Collaborative	Safety Area1	Safety Area2	
1	ON	ON	ON	ON	Set
2					Set
3					Set
4					Set
5					Set
6					Set
7					Set
8					Set

Show/Hide Always Collaborative Safety Area1 Safety Area2

Undo Apply

Chapter 5

70%



Return to Programming Screen Safety Settings Help

Speed Limiting Safety I/O Position Limiting **Monitor Model** Change Password

Monitor Model

Set areas that encompass the robot arm, tools (end effectors with/without a workpiece), and options such as vision sensors to monitor them for safety. These areas will be treated as part of the robot.

Date safety function parameters last modified: 2021/02/03-15:51:39

Tool Model	X	Y	Z	Radius	Unit : mm
Model 1	0.00	0.00	158	100	
Model 2	0.00	0.00	0.00	0.00	
Model 3	0.00	0.00	0.00	0.00	
Model 4	0.00	0.00	0.00	0.00	

Arm Model: 100% (50% 100% 150%)

Undo Apply

Chapter 5

90%

Partner products can easily be used with ASSISTA.

Select all the partner products from the following items. (multiple answers)

Q1

RT VisualBox

Robot controller

Easy-setup kit

Hand

Hand cart

Select the statements which are correct regarding the transportation of ASSISTA. (multiple answers)

Q1

- Transport ASSISTA while holding the stated areas using two people.
- Isolate the Easy-setup kit one meter or more away from the robot controller.
- The error arising from power difference at initial power on is automatically set after a power reset.
- Install the robot controller on a level surface.
- The Safety extension unit can be installed inside the Easy-setup kit.

Select the statements which are correct regarding the basic operation of ASSISTA. (multiple answers)

Q1

- To use direct teaching, the operation mode must be switched to AUTOMATIC.
- Jog operation and inching can be performed using RT VisualBox.
- Programs can be created by arranging blocks in RT VisualBox.
- It is not possible to check the operations of each block in the program using Step operation.

Select the statements which are correct regarding the use of vision sensors with ASSISTA. (multiple answers)

Q1

- Using vision sensors allows for the position and angle of a workpiece to be identified.
- Identification settings cannot be configured using the Vision block in RT VisualBox.
- The focus can be adjusted automatically using the Autofocus function in RT VisualBox.

Select the statements which are correct regarding ASSISTA's safety functions. (multiple answers)

Q1

Speed settings can be configured using ASSISTA's safety functions.



Low-speed spaces can be set using ASSISTA's safety functions.



ASSISTA's safety functions allow for planes and areas to be used for position limiting.



Monitor models cannot be configured with ASSISTA's safety functions.

You have completed the Final Test. Your results are as follows.
To end the Final Test, proceed to the next page.

	1	2	3	4	5	6	7	8	9	10
Final Test 1	✓									
Final Test 2	✓									
Final Test 3	✓									
Final Test 4	✓									
Final Test 5	✓									

Total questions: **5**

Correct answers: **5**

Percentage: **100 %**

Clear

You have completed the MELFA ASSISTA Quick Set-up online course (Introduction) Course.

Thank you for taking this course.

We hope you enjoyed the lessons and the information you acquired in this course is useful for configuring systems in the future.

You can review the course as many times as you want.

Review

Close