

OMRON

Vision Sensor

FH Series

Vision System



Robot Connection Guide

FANUC Corporation Edition

Z449-E1-01

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Introduction

Thank you for purchasing the FH Series.

This manual contains information that is necessary to use the FH Series.

Please read this manual and make sure you understand the functionality and performance of the FH Series before you attempt to use it in a control system.

Keep this manual in a safe place where it will be available for reference during operation.

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For details on Safety Precautions, refer to Safety Precautions in the *Vision System FH Series 3D Robot Vision Application Construction Guide (Cat. No. Z446)*.

Warning

For details on Waring, refer to Waring in the *Vision System FH Series 3D Robot Vision Application Construction Guide (Cat. No. Z446)*.

Precautions for Safe Use

For details on Precautions for Safe Use, refer to Precautions for Safe Use in the *Vision System FH Series 3D Robot Vision Application Construction Guide (Cat. No. Z446)*.

Precautions for Correct Use

For details on Precautions for Correct Use, refer to Precautions for Correct Use in the *Vision System FH Series 3D Robot Vision Application Construction Guide (Cat. No. Z446)*.

Regulations and Standards

For details on Regulations and Standards, refer to Regulations and Standards in the *Vision System FH Series 3D Robot Vision Application Construction Guide (Cat. No. Z446)*.

Related Manuals

<Application Construction Guide>

Name of Manual	Cat. No.	Model	Purpose	Contents
Vision Sensor FH Series 3D Robot Vision Application Construction Guide	Z446	FH-5050 FH-SMDA-GS050B	When User want to know about the FH series 3D robot vision system.	Describes the soft functions, setup, and operations to use FH series 3D robot vision system.

<Robot Manual>

Name of Manual	Cat. No.	Model	Purpose	Contents
Operator's Manual (Basic Operation)	B-83284EN	R-30iB/R-30iB Mate	When User want to know how to operate the robot controller	Describes how to operate the robot controller R-30iB/R-30iB Mate.
Error Code Manual	B-83284EN-1	R-30iB/R-30iB Mate	When User want to know what to do when a robot controller error occurs.	Describes the causes of alarms of the robot controller R-30iB/R-30iB Mate and how to deal with them.
Mechanical Unit Operator's Manual	B-83574EN	LR Mate 200iD/4S/4SH/4SC	When User want to know the setup and hardware specifications of FANUC robots	Describes the specifications, external dimensions, names of parts, installation, and wiring of FANUC robots.
Robot Safety Guide	I590	-	When User want to know how to handle an industrial robot safely	Describes precautions for safe handling of the robot.

Revision History

A manual revision code appears as a suffix to the catalog number on the front and back covers of the manual.

Cat. No. Z449-E1-01

↑ Revision code

Rev. Code	Rev. Date	Revision Contents
01	Feb. 2021	Original product

1. Overview

1.1. Overview

This manual describes procedures for connections and settings required for constructing robot vision applications by connecting your robot controller to the Vision Sensor FH (hereafter referred to as Vision Sensor).

Utilizing this manual and Robot Vision Application Construction Guide can reduce man-hours to connect the Vision Sensor to your robot controller, set the Vision Sensor, and create robot programs.

1.2. Instructions for Building a 3D Robot Vision Application

Please follow the flow below for constructing 3D robot vision applications

Procedure	Reference
Creating Data Set for Robot Vision	[3D Robot Vision Application Construction Guide] Chapter 6
↓	
System Settings for Vision Sensors	[3D Robot Vision Application Construction Guide] Chapter 7
↓	
Setting Communications for Robot controller	Refer to Chapter 3.1
↓	
Connecting Vision Sensor to Robot Controller	Refer to Chapter 3.2 Refer to Chapter 3.3
↓	
Robot Vision Settings for Vision Sensors	[3D Robot Vision Application Construction Guide] Chapter 8
↓	
Description of the sample programs	Refer to Chapter 6

1.3. Robot Programs Covered in this Manual

The two types of robot programs covered in this manual are output from the Robot Vision Dataset Output Tool. Each program is used for a different purpose.

Program	Program Name	Detail
Setup Program	FHSETUPMAIN	<p>This program allows the Vision Sensor to give operating instructions to the robot to configure the Vision Sensor for robot vision. This program consists of the following functions</p> <ul style="list-style-type: none">- Send the current robot position to the Vision Sensor.- Move to the indicated position on the Vision Sensor.
Sample Program	FHSMPLMAIN	<p>This program is a sample of the basic program flow for a pick application. In this program, the robot gives control instructions to the Vision Sensor. The program consists of the following functions</p> <ul style="list-style-type: none">- Connecting to the Vision Sensor- Scene switching of the Vision Sensor- Moving to the measurement position- Registering the current robot position to the Vision Sensor- Execute measurement instructions to the Vision Sensor- Receives the position of the workpiece to be recognized- Move to approach position- Move to the target work location (grasping position) <p>Based on this program, a pick-and-place application is built by adding the robot movement to operate the end-effector (hand) and to place the workpiece.</p>

2. System Configuration

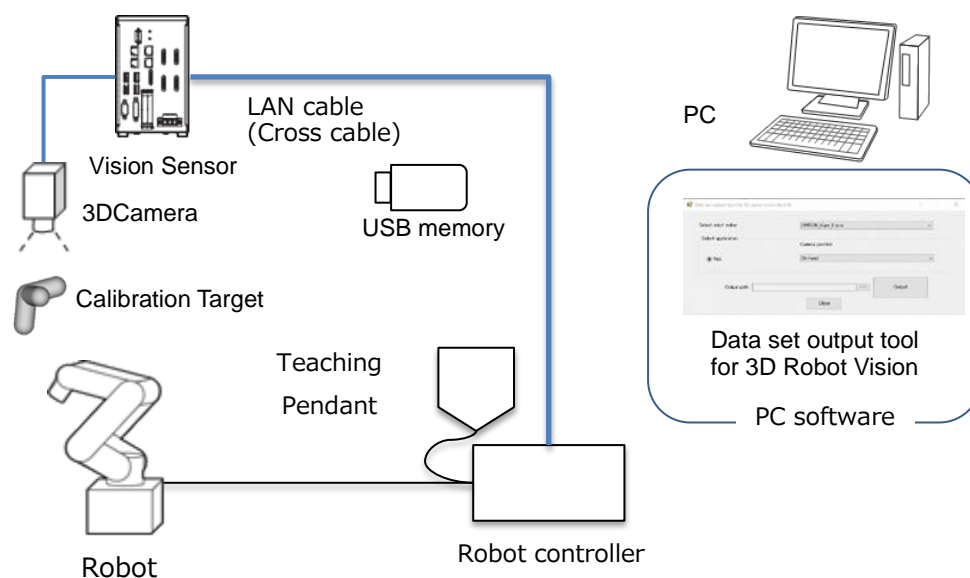
This chapter describes the system configuration and target devices to construct robot vision applications.

2.1. Cautions for Robot Equipment

The user socket message option (R648) must be installed in the robot controller.

2.2. When using Vision Sensor FH Series 3D Vision Sensor

2.2.1. System Configuration



2.2.2. Target Devices

Device name	Manufacturer	Name	Model	Remarks
Vision Sensor	OMRON	Vision Sensor FH Series	FH-5050	Ver. 6.40 or later Controllers other than FH-5050 are not supported.
3D Camera	OMRON	3D Vision Sensor	FH-SMDA-GS050B	-
Camera Cable	OMRON	Ethernet cable super bending resistance	FHV-VNBX□M FHV-VNLBX□M	-
Camera I/O cable	OMRON	I/O cable super bending resistance	FH-VSDX-BX□M FH-VSDX-LBX□M	-
Calibration target	OMRON	Handeye Calibration Target	FH-XCAL-R	-
	OMRON	Camera	FH-XCAL-S	-

		Calibration Target		
3D Software	OMRON	3D Robot Vision Software Installer	FH-UM3D1	-
Robot controller	FANUC Corp.	Robot controller	R-30iB Mate	User socket messaging (R648) option is required.
Robot	FANUC Corp.	Vertical multi-joint robot	LR Mate 200iD/4S	-
Teaching pendant	FANUC Corp.	Teaching pendant	iPendant	-
PC software	OMRON	Data set output tool for 3D robot vision	-	Ver.1.00 Please contact us for how to obtain it.
USB memory	OMRON	USB memory	FZ-MEM8G	Recommended product



Precautions for Correct Use

Do not use any device except mentioned above for each device of the system configuration.



Additional Information

This manual does not provide operations, installation, and wiring methods for each device.

For details, refer to manuals noted in Related Manuals.

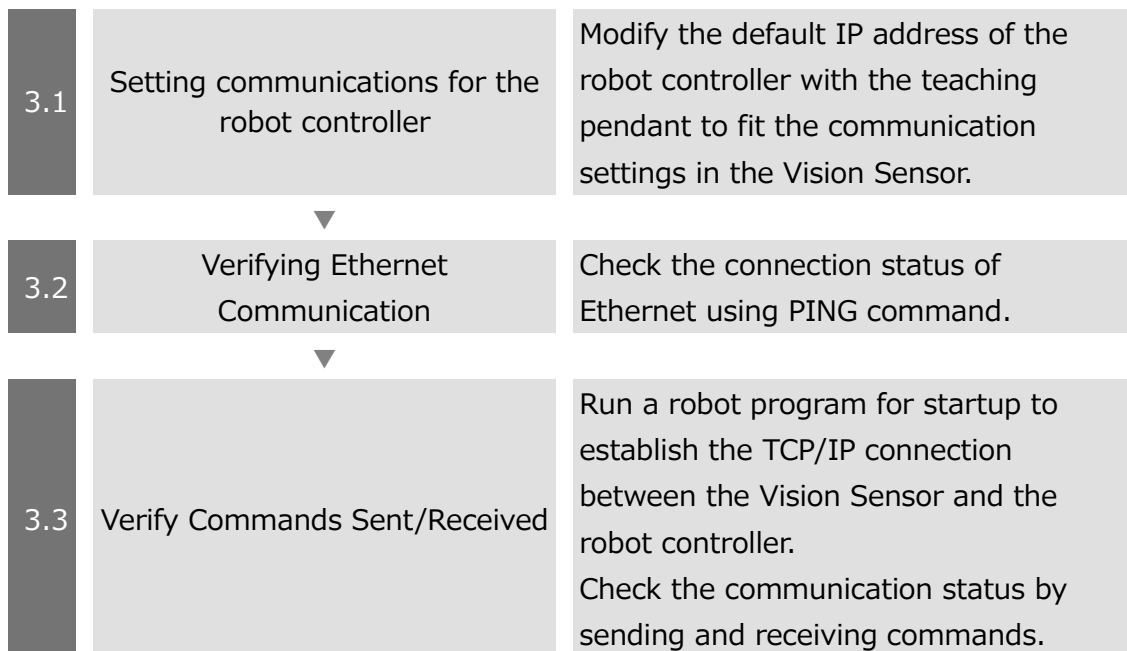
3. Connecting Vision Sensor to Robot Controller

This chapter describes procedures to connect the Vision Sensor to the robot controller. Please follow the flow below for the settings.

The IP address of each device is described below.

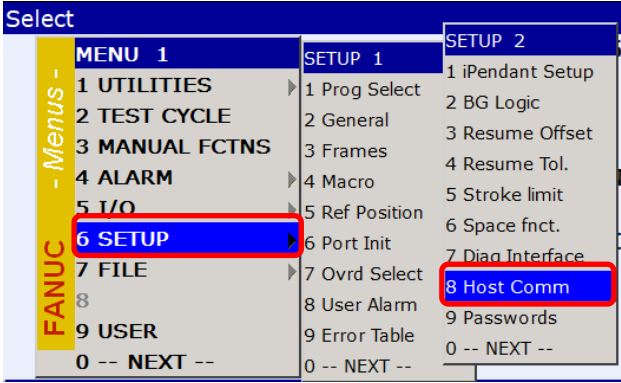
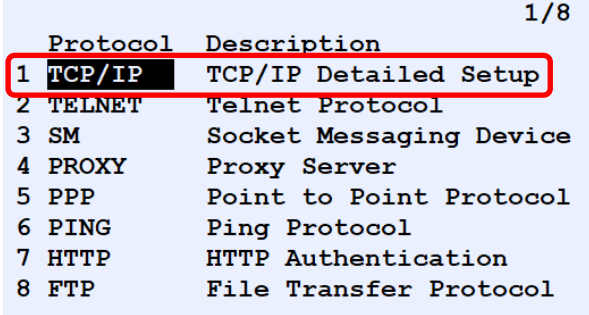
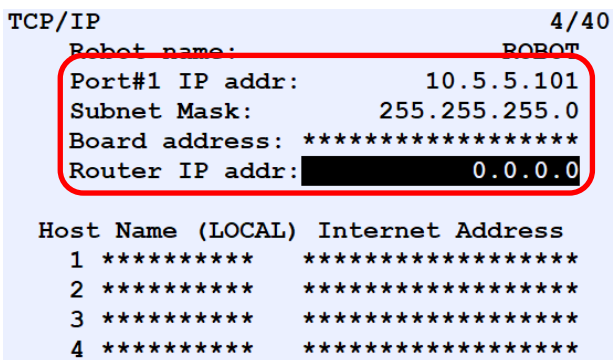
Vision Sensor : 10.5.5.100

Robot controller: 10.5.5.101

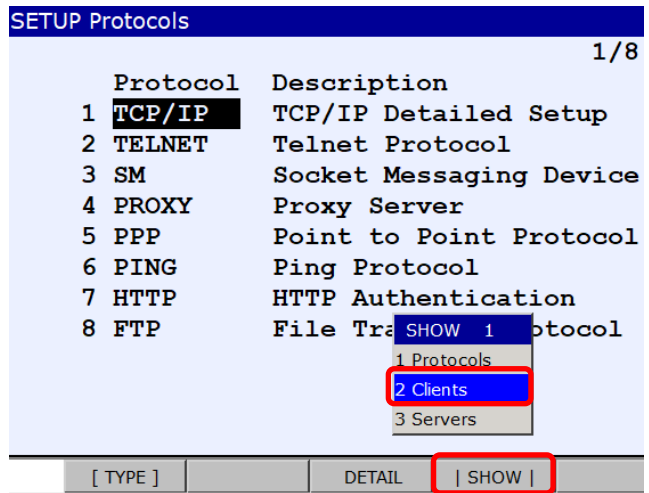


3.1. Setting Communications for Robot Controller

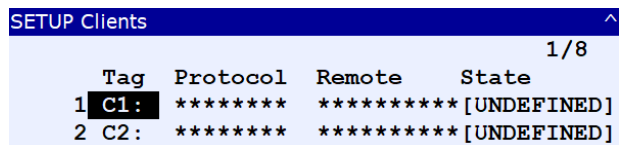
Please follow the procedures below to set the communications for the robot controller.

1	<p>Connect the Vision Sensor and the robot controller with twisted-pair LAN cables in category 5 or higher.</p> <p>Connect the robot controller to the port 1. Connect the Vision Sensor to the upper port.</p>																													
2	<p>Press [MENU] on the teaching pendant of the robot to display the "MENU".</p> <p>From the "MENU", select [6 SETUP] - [0 --NEXT--] - [8 Host Comm].</p> <p>On the "SETUP Protocols" screen, select [TCP/IP] and press [F3 DETAIL].</p> <p>On the setting screen shown on the right, set the robot network configuration. Select [Port #1 IP addr:], [Subnet Mask:], and [Router IP addr:] and press [ENTER] to input values.</p> <p>Set an IP address not to overlap with other devices.</p>	 <p>The screenshot shows a three-level menu structure. The first level is 'MENU 1' with options 1-9 and '0 -- NEXT --'. The second level is 'SETUP 1' with options 1-9 and '0 -- NEXT --'. The third level is 'SETUP 2' with options 1-9 and '0 -- NEXT --'. Red boxes highlight the selection path: '6 SETUP' in the first level, '8 Host Comm' in the second level, and '8 Host Comm' in the third level.</p>  <p>The screenshot shows a table with two columns: 'Protocol' and 'Description'. The first row is '1 TCP/IP' with the description 'TCP/IP Detailed Setup'. A red box highlights this row.</p> <table border="1"> <thead> <tr> <th>Protocol</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1 TCP/IP</td> <td>TCP/IP Detailed Setup</td> </tr> <tr> <td>2 TELNET</td> <td>Telnet Protocol</td> </tr> <tr> <td>3 SM</td> <td>Socket Messaging Device</td> </tr> <tr> <td>4 PROXY</td> <td>Proxy Server</td> </tr> <tr> <td>5 PPP</td> <td>Point to Point Protocol</td> </tr> <tr> <td>6 PING</td> <td>Ping Protocol</td> </tr> <tr> <td>7 HTTP</td> <td>HTTP Authentication</td> </tr> <tr> <td>8 FTP</td> <td>File Transfer Protocol</td> </tr> </tbody> </table>  <p>The screenshot shows the 'TCP/IP' configuration screen. The 'Robot name:' is 'ROBOT'. The 'Port#1 IP addr:' is '10.5.5.101'. The 'Subnet Mask:' is '255.255.255.0'. The 'Board address:' is '*****'. The 'Router IP addr:' is '0.0.0.0'. A red box highlights the IP address and Subnet Mask fields.</p> <table border="1"> <thead> <tr> <th>Host Name (LOCAL)</th> <th>Internet Address</th> </tr> </thead> <tbody> <tr> <td>1 *****</td> <td>*****</td> </tr> <tr> <td>2 *****</td> <td>*****</td> </tr> <tr> <td>3 *****</td> <td>*****</td> </tr> <tr> <td>4 *****</td> <td>*****</td> </tr> </tbody> </table>	Protocol	Description	1 TCP/IP	TCP/IP Detailed Setup	2 TELNET	Telnet Protocol	3 SM	Socket Messaging Device	4 PROXY	Proxy Server	5 PPP	Point to Point Protocol	6 PING	Ping Protocol	7 HTTP	HTTP Authentication	8 FTP	File Transfer Protocol	Host Name (LOCAL)	Internet Address	1 *****	*****	2 *****	*****	3 *****	*****	4 *****	*****
Protocol	Description																													
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Host Name (LOCAL)	Internet Address																													
1 *****	*****																													
2 *****	*****																													
3 *****	*****																													
4 *****	*****																													

Press [PREV] to return to the "SETUP Protocols" screen.
 Select [F4: SHOW] - [2. Clients].

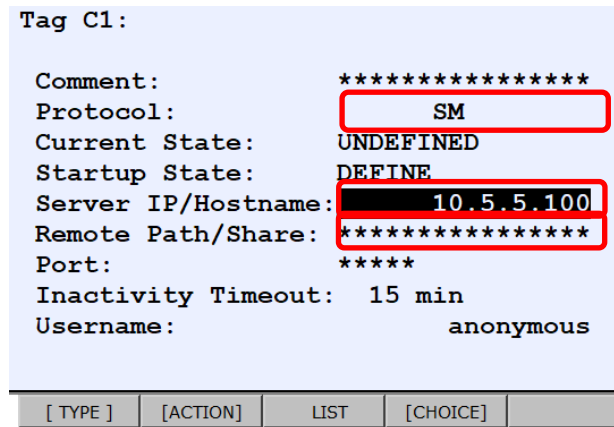


On the "SETUP Clients" screen, select [C1] tag and press [F3: DETAIL].



3

On the "Tag C1" screen, Select [Protocol:] and press [F4: CHOICE]. Select [SM] (Socket Messaging).



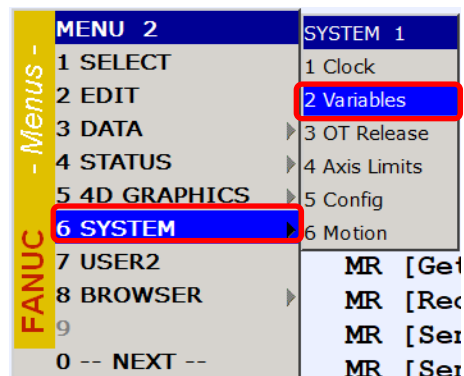
Select [Startup State] and press [F4: CHOICE:]. Select [DEFINE].

Select [Server IP/Hostname:] and press [Enter]. Enter the IP address for the Vision Sensor.

Hereafter, the robot communicates with the Vision Sensor using [C1:] as a tag name.

4

Open the "MENU" by pressing [MENU}.
 Select [0 -- NEXT --] - [6 SYSTEM] - [2. Variables].



On the "System variables" screen,
 Select [\$HOSTC_CFG]
 and press [F2: DETAIL].

231	\$GRSMT_GRP	GRSMT_GRP_T
232	\$HOSTC_CFG	[8] of HOST_CFG_T
233	\$HOSTENT	[23] of HOSTENT_I
234	\$HOSTNAME	'ROBOT'
235	\$HOSTS_CFG	[8] of HOST_CFG_T

\$HOSTC_CFG		1/8
1	[1]	HOST_CFG_T
2	[2]	HOST_CFG_I

Select1 [[1] HOSTC_CFG_T]
 and press [F2: DETAIL].

Select [\$SERVER_PORT] and
 press [ENTER]. Enter the port
 number.

\$HOSTC_CFG[1]		15/17
7	\$REMOTE	'10.5.5.100'
8	\$REPERRS	FALSE
9	\$TIMEOUT	15
10	\$PATH	','
11	\$SSTRT_PATH	*uninit*
12	\$SSTRT_REMOTE	'10.5.5.100'
13	\$USERNAME	'anonymous'
14	\$PWRD_TIMEOUT	0
15	\$SERVER_PORT	9876
16	\$USE_VIS_PRT	FALSE
17	\$USE_UDP	FALSE

The default value for the port
 number of the Vision Sensor is
 [9876]. A port number to set
 in [\$SERVER_PORT] shall be
 the same as that of the Vision
 Sensor.

Copy a robot program
 outputted from the data set
 output tool to the root
 directory of the USB memory
 stick.

FANUC - Menus -	MENU 1	FILE 1
	1 UTILITIES	1 File
	2 TEST CYCLE	2 File Memory
	3 MANUAL FCTNS	3 Auto Backup
	4 ALARM	*unin:
	5 I/O	*unin:
	6 SETUP	'10.5
	7 FILE	'anony
	8	0
	9 USER	9876
0 -- NEXT --	FALSE	

Insert the USB memory stick
 storing the copied robot
 program to a USB port on the
 teaching pendant or the robot
 controller.

5

Select [MENU] - [7: FILE] - [1:
 FILE] of the teaching pendant.

UT1:*.*		7/32
1	*	(all files)
2	KL	(all KAREL source)
3	CF	(all command files)
4	TX	(all text files)
5	LS	(all KAREL listings)
6	DT	(all KAREL data files)
7	PC	(all KAREL p-code)
8	TP	(all TP programs)
9	MN	(all MN programs)
10	VR	(all variable files)
11	SV	(all system files)

In [F5: UTIL] - [SET Device],
 select [USB on TP (UT1:)] or
 [USB Disk (UD1:)].

Press [F2: DIR] and select
 [*].PC]. Press [F3: LOAD] to
 load a .pc file.

	Likewise, select [*.TP] and press [F3: LOAD] to load a .TP file.
6	Restart the robot controller to reflect the communication settings and the system variable settings to the robot controller.



Additional Information

This manual does not provide operation, installation, and wiring methods for each device.

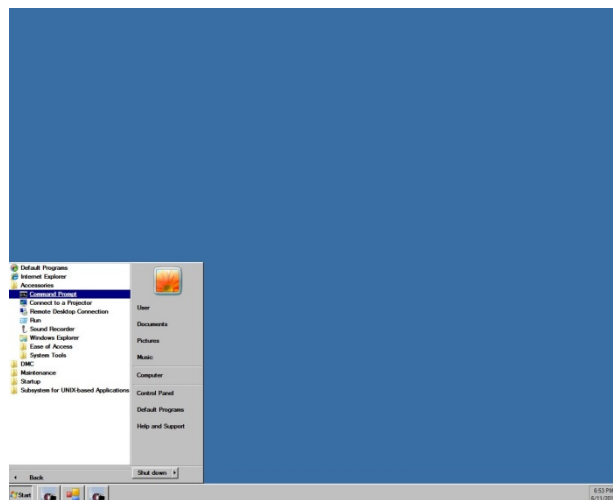
For details, refer to manuals noted in Related Manuals.

3.2. Connecting and Checking Vision Sensor and Robot Controller

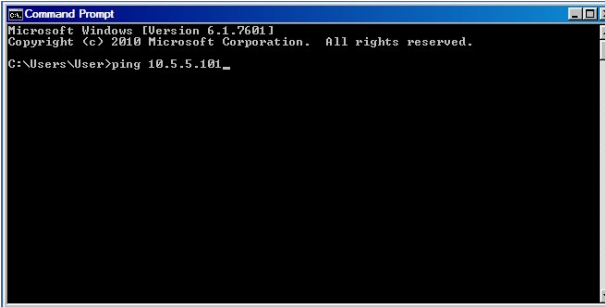
Follow the procedures below to connect the Vision Sensor and the robot controller and to check the connection status.

3.2.1. Verifying Ethernet Communication (FH Series Vision Sensor)

1	Connect the Vision Sensor and the robot controller with LAN cables.
2	<p>(Operation of the Vision Sensor)</p> <p>Move the mouse cursor to lower left of the window to display [Start]. Select [Start] - [All Programs] - [Accessories] - [Command Prompt] to launch [Command Prompt].</p>



3 (Operation of the Vision Sensor)
Execute PING command to the IP address of the robot controller.



```

Command Prompt
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2010 Microsoft Corporation. All rights reserved.

C:\Users\User>ping 10.5.5.101

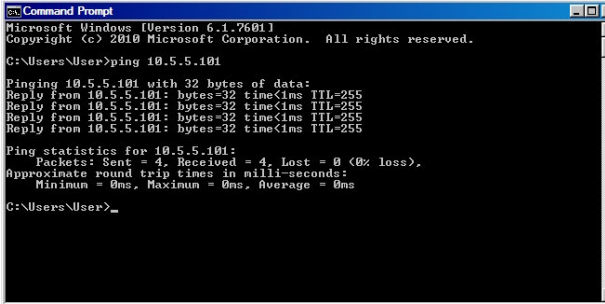
Pinging 10.5.5.101 with 32 bytes of data:
Reply from 10.5.5.101: bytes=32 time<1ms TTL=255
Reply from 10.5.5.101: bytes=32 time<1ms TTL=255
Reply from 10.5.5.101: bytes=32 time<1ms TTL=255
Reply from 10.5.5.101: bytes=32 time<1ms TTL=255

Ping statistics for 10.5.5.101:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\User>

```

4 (Operation of the Vision Sensor)
When 32-byte data could be successfully sent/received four times as shown in the figure on the right, that means that the communications have been established and the wiring and settings of Ethernet is correctly done.



```

Command Prompt
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2010 Microsoft Corporation. All rights reserved.

C:\Users\User>ping 10.5.5.101

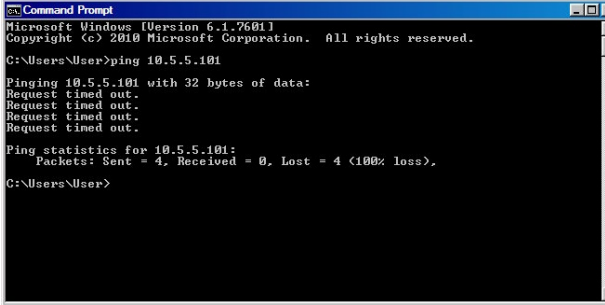
Pinging 10.5.5.101 with 32 bytes of data:
Reply from 10.5.5.101: bytes=32 time<1ms TTL=255
Reply from 10.5.5.101: bytes=32 time<1ms TTL=255
Reply from 10.5.5.101: bytes=32 time<1ms TTL=255
Reply from 10.5.5.101: bytes=32 time<1ms TTL=255

Ping statistics for 10.5.5.101:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\User>

```

When 32-byte data cannot be sent/received four times and PING command timed out, check whether or not the robot controller is turned on, the wiring was correctly done, or communication settings are correct.



```

Command Prompt
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2010 Microsoft Corporation. All rights reserved.

C:\Users\User>ping 10.5.5.101

Pinging 10.5.5.101 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

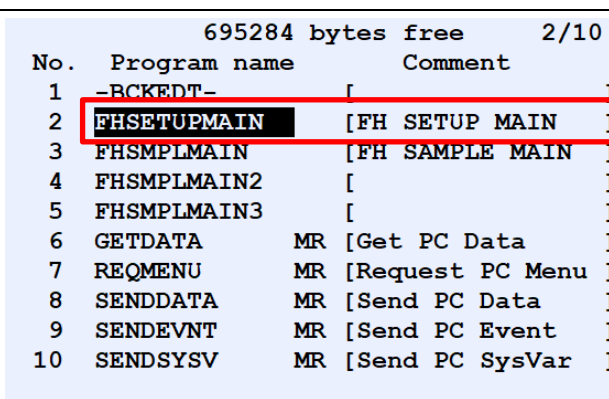
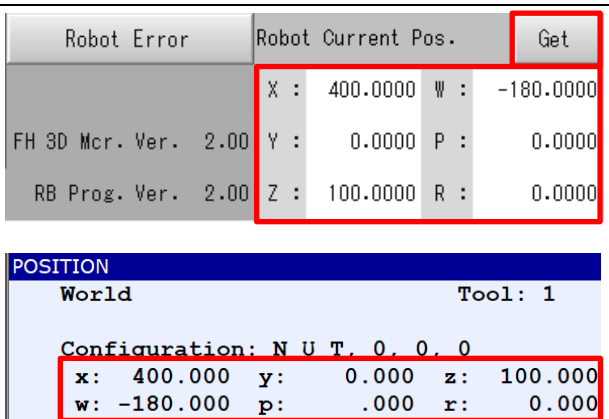
Ping statistics for 10.5.5.101:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Users\User>

```

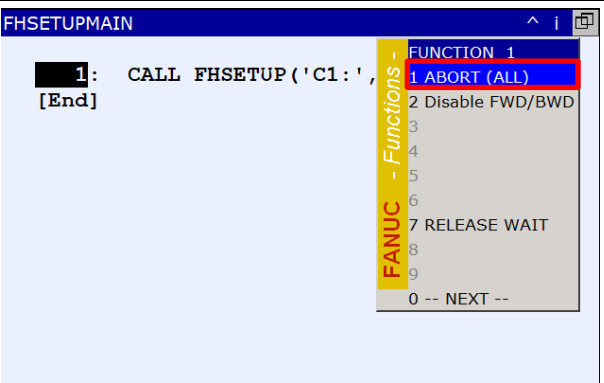
3.3. Verify Commands Sent/Received

Execute the setup program on the robot controller and follow the steps below to confirm that commands can be sent and received from the Vision Sensor.

<p>1 (Operation of the Teaching pendant) Check that the operation mode is AUTO on the operation panel.</p> <p>Select [SELECT] on the teaching pendant and press [ENTER] after putting the cursor on the "FHSETUPMAIN".</p> <p>In the local mode, press the [ACTION] on the operation panel.</p>	 <p>695284 bytes free 2/10</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Program name</th> <th>Comment</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-RCKEDT-</td> <td>[]</td> </tr> <tr> <td>2</td> <td>FHSETUPMAIN</td> <td>[FH SETUP MAIN]</td> </tr> <tr> <td>3</td> <td>FHSMPLMAIN</td> <td>[FH SAMPLE MAIN]</td> </tr> <tr> <td>4</td> <td>FHSMPLMAIN2</td> <td>[]</td> </tr> <tr> <td>5</td> <td>FHSMPLMAIN3</td> <td>[]</td> </tr> <tr> <td>6</td> <td>GETDATA</td> <td>MR [Get PC Data]</td> </tr> <tr> <td>7</td> <td>REQMENU</td> <td>MR [Request PC Menu]</td> </tr> <tr> <td>8</td> <td>SENDDATA</td> <td>MR [Send PC Data]</td> </tr> <tr> <td>9</td> <td>SENDEVNT</td> <td>MR [Send PC Event]</td> </tr> <tr> <td>10</td> <td>SENDSYSV</td> <td>MR [Send PC SysVar]</td> </tr> </tbody> </table>	No.	Program name	Comment	1	-RCKEDT-	[]	2	FHSETUPMAIN	[FH SETUP MAIN]	3	FHSMPLMAIN	[FH SAMPLE MAIN]	4	FHSMPLMAIN2	[]	5	FHSMPLMAIN3	[]	6	GETDATA	MR [Get PC Data]	7	REQMENU	MR [Request PC Menu]	8	SENDDATA	MR [Send PC Data]	9	SENDEVNT	MR [Send PC Event]	10	SENDSYSV	MR [Send PC SysVar]
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<p>2 (Operations of the Teaching pendant and the Vision Sensor)</p> <p>Like shown on the right figure, when the world coordinates of the position display screen displayed from the teaching pendant is displayed as the current robot position on the Vision Sensor after clicking [Get] on the Main Window of the Vision Sensor and, transmitting/receiving commands between them have been succeeded.</p>	 <table border="1"> <thead> <tr> <th>Robot Error</th> <th>Robot Current Pos.</th> <th>Get</th> </tr> </thead> <tbody> <tr> <td></td> <td>X : 400.0000 W : -180.0000</td> <td></td> </tr> <tr> <td>FH 3D Mcr. Ver. 2.00</td> <td>Y : 0.0000 P : 0.0000</td> <td></td> </tr> <tr> <td>RB Prog. Ver. 2.00</td> <td>Z : 100.0000 R : 0.0000</td> <td></td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">POSITION</th> </tr> </thead> <tbody> <tr> <td>World</td> <td>Tool: 1</td> </tr> <tr> <td colspan="2">Configuration: N U T, 0, 0, 0</td> </tr> <tr> <td>x: 400.000</td> <td>y: 0.000 z: 100.000</td> </tr> <tr> <td>w: -180.000</td> <td>p: .000 r: 0.000</td> </tr> </tbody> </table>	Robot Error	Robot Current Pos.	Get		X : 400.0000 W : -180.0000		FH 3D Mcr. Ver. 2.00	Y : 0.0000 P : 0.0000		RB Prog. Ver. 2.00	Z : 100.0000 R : 0.0000		POSITION		World	Tool: 1	Configuration: N U T, 0, 0, 0		x: 400.000	y: 0.000 z: 100.000	w: -180.000	p: .000 r: 0.000											
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<p>3 Like shown on the right figure, If the [Robot Error] button turns red, the connection has failed. Check the wiring and others.</p>																																		

(Operation of the Teaching pendant)
Press the [FCTN] button to open the menu.

4 Select [1. ABORT (ALL)] and press the Enter button.



Additional Information

This manual does not provide operation, installation, and wiring methods for each device.

For details, refer to manuals noted in Related Manuals.

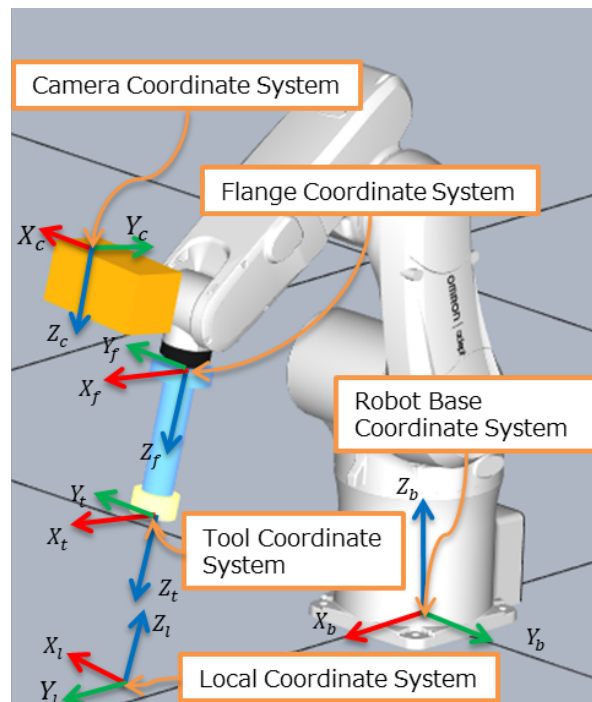
4. Coordinate System

This chapter describes the coordinate system handled by the robot vision application.

4.1. Name of Coordinate System

The robot coordinate system of the Vision Sensor uses the name shown in the table below.

Coordinate System	Meaning
Robot Base Coordinate System	Coordinate system with the robot base as the origin
Local Coordinate System	User-defined coordinate system
Flange Coordinate system	Coordinate system defined on the flange surface of the robot
Tool Coordinate System	The coordinate system is defined in the tool center point by offsetting the origin of the flange coordinates system.
Camera Coordinate System	With the optical center of the camera as the starting point, the X and Y axes are the horizontal and vertical directions of the image, and the Z axis is the optical axis of the camera.



The orientation of the coordinate axes of each coordinate system depends on the robot. Please refer to the instruction manual for each robot.

There are the following differences between the names of the coordinate system in the Vision Sensor and the coordinate system in FANUC Corporation.

Vision Sensor	FANUC Corporation
Local Coordinate System	User Coordinate System
Tool Coordinate System	Tool Coordinate System

5. How to Start the Setup Program

This chapter describes how to start the setup program. To set the robot vision of the Vision Sensor, the setup program must be running on the robot side. Establish the connection between the Vision Sensor and the robot controller by [3. Connecting Vision Sensor to Robot Controller]

- 1 (Operation of the Teaching pendant)
Check that the operation mode is AUTO on the operation panel.

Select [SELECT] on the teaching pendant and press [ENTER] after putting the cursor on the "FHSETUPMAIN".

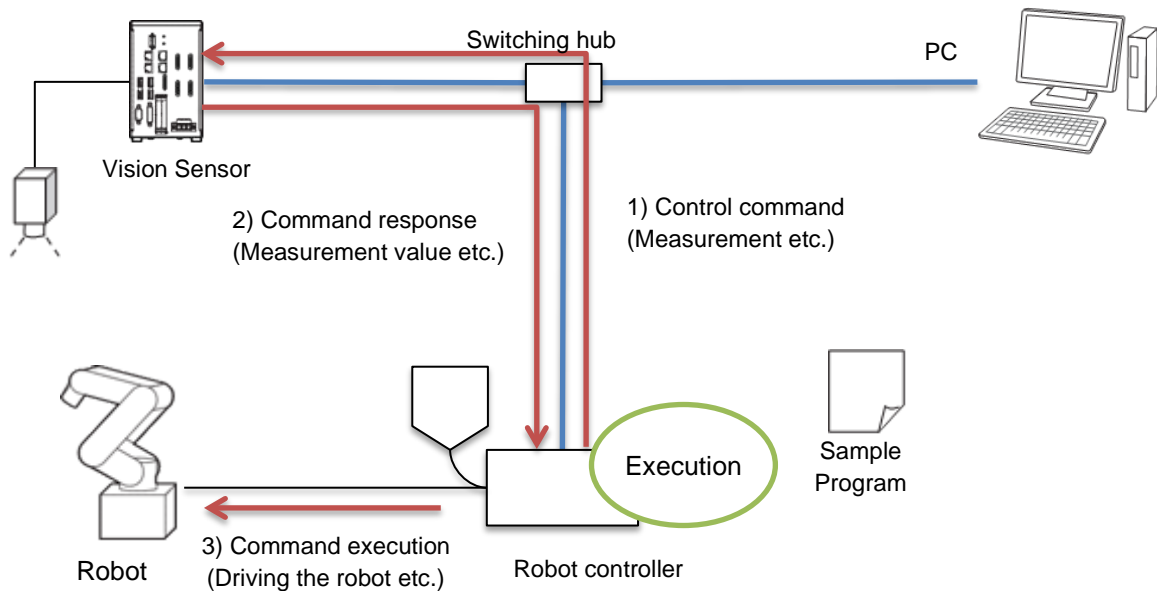
In the local mode, press the [ACTION] on the operation panel.

No.	Program name	Comment
1	-BCKEDT-	[]
2	FHSETUPMAIN	[FH SETUP MAIN]
3	FHSMPLMAIN	[FH SAMPLE MAIN]
4	FHSMPLMAIN2	[]
5	FHSMPLMAIN3	[]
6	GETDATA	MR [Get PC Data]
7	REQMENU	MR [Request PC Menu]
8	SENDDATA	MR [Send PC Data]
9	SENDEVNT	MR [Send PC Event]
10	SENDSYSV	MR [Send PC SysVar]

6. Description of the Sample Programs

This chapter describes design examples of robot programs to construct applications using a sample program (FHSMPLMAIN).

You can understand how to implement a robot program to control the Vision Sensor as shown in the following figure.



The sample program is implemented with the following procedures. When building an actual application, design, implement and test the robot program, utilizing the functions described in Chapter 7.

- 6.1 Connecting the Vision Sensor to the robot controller
- 6.2 Switching scenes on the Vision Sensor
- 6.3 Moving the Robot to the Image Position
- 6.4 Register the Current Robot Position in the Vision Sensor
- 6.5 Executing Measurements on the Vision Sensor
- 6.6 Getting the Measurement Results
- 6.7 Moving the Robot to the Robot Approach Position at Measurement
- 6.8 Moving the Robot to the Robot Command position at Measurement
- 6.9 Disconnecting the Vision Sensor from the Robot Controller



Precautions for Correct Use

The implementation procedures for robot programs noted in this chapter are a reference. You should design, implement, and test actually operating robot programs based on your specific environment and applications.

In the Main Window or “Layout setup” of the Vision Sensor, check that the “Output” of the current layout is ON. If the setting were OFF, the Vision Sensor will not output measurement values.

6.1. Connecting Vision Sensor to Robot Controller

For connecting the Vision Sensor to the Robot Controller, follow the procedures below.

1	<p>Set the IP address of the Vision Sensor to the tag [C1:] according to the step 1 in Chapter 3.1 additionally, set the port number of the Vision Sensor according to the step 2 in Chapter 3.1</p>
2	<p>Call the initialization function (FHDEFGLOBAL) for external variables and initialize them. The external variables include variables to monitor the communication state. When executing the connection processing, be sure to call and execute the initialization function (FHDEFGLOBAL) for the external variables.</p> <pre> 35: !;;;;;;;;;;;;;; ; 36: ! (2)Initialize global variables ; 37: !;;;;;;;;;;;;;; ; 38: ; 39: CALL FHDEFGLOBAL ; Initialization function for external variables </pre>
3	<p>Set the number of the local coordinate system and tool coordinate system to be used.</p> <pre> 40: UserCoordNo =0 ; Local Coord No 41: ToolCoordNo =0 ; Tool Coord No </pre>
4	<p>Set the number of retry times and timeout period [sec.] at connection to the register 196 and 197 respectively.</p> <p>Set the number of retry times and timeout period [sec] when communicating with registers 198 and 199 respectively.</p> <pre> 46: !;;;;;;;;;;;;;; ; 47: ! (1) Set the network ; 48: ! configuration. ; 49: ! You have to configure a client ; 50: ! TAG 'C1' and the following ; 51: ! communication settings. ; 52: !;;;;;;;;;;;;;; ; 53: ; 54: R[196]=2 ; The number of retry times at server connection 55: R[197]=10 ; The timeout period at server connection [sec.] 56: R[198]=2 ; The number of retry times at communications 57: R[199]=10 ; The timeout period at communications [sec.] </pre>
5	<p>Set the register variables as arguments for the connection function (FHCONNECT) to the Vision Sensor and call it.</p> <pre> 59: !;;;;;;;;;;;;;; ; 60: ! Connect to the FH server ; 61: !;;;;;;;;;;;;;; ; </pre>


```

88: ;
89: PR[100,1]=400 ;
90: PR[100,2]=-0 ;
91: PR[100,3]=100 ;
92: PR[100,4]=180 ;
93: PR[100,5]=0 ;
94: PR[100,6]=0 ;

```

Set the robot imaging position to the variables.

Set the position register number as arguments for the robot motion sample function (FHSMPMOVE) and execute it.

```

96: !!!!!!!!!!!!! CAUTION !!!!!!!!!!!!! ;
97: !The following function drives ;
98: !a robot motion immediately. ;
99: !Confirm the settings ;
100: !before execution. ;
101: !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!! ;
102: ;
103: CALL FHSMPMOVE(100) ;
104: IF R[200]<>0,JMP LBL[998] ;

```

Position register number that the robot position is set.

Robot move sample function

3

! WARNING

- These operations drive the robot.
- Operate the robot in the state whereby pressing the [Emergency stop] button can stop its motion anytime.



6.4. Register the Current Robot Position in the Vision Sensor

To register the current robot position to the Vision Sensor, use "FHSMPLEGP".

1 Before executing measurements, execute the current position registration command execution sample function (FHSMPLEGP) to the Vision Sensor.

```
106: !;;;;;;;;;;;;;; ;
107: ! (3) Register the current ;
108: ! position of the robot to ;
109: ! the FH before measurement ;
110: !;;;;;;;;;;;;;; ;
111: ;
112: CALL FHSMPLEGP(R[198],R[199]) ;
113: IF R[200]<>0,JMP LBL[998] ;
```

Current position registration
command execution sample
function

6.5. Executing Measurements on Vision Sensor

Send the measurement command to the Vision Sensor and receives a response to that command.

1 To send the measurement command to the Vision Sensor, set the command name to "MEASURE" and execute "FHRUNSND CMD".

```
116: !;;;;;;;;;;;;;; ;
117: ! (4) Execute measurement and get ;
118: ! the measurement results of ;
119: ! the FH ;
120: !;;;;;;;;;;;;;; ;
121: ; nonprocedural command transmission function
122: CALL FHRUNSND CMD(0,'MEASURE','...','...','...','...') ;
123: IF R[200]<>0,JMP LBL[998] ;
```

2 To receive the response to the measurement command from the Vision Sensor, execute "FHRUNRCVRES".

```
125: CALL FHRUNRCVRES(R[198],R[199],194) ;
126: IF R[200]<>0,JMP LBL[998] ; command response receiving function
127: ;
128: IF R[194]<>1,JMP LBL[998] ;
```

If the response is not OK, exit the program.


```

143: R[195]=50 ; Set the robot approach distance to the variable.
144: PR[100,1]=R[181] ;
145: PR[100,2]=R[182] ;
146: PR[100,3]=R[183]+R[195] ; Add the robot approach distance to
147: PR[100,4]=R[184] ; the measurement results.
148: PR[100,5]=R[185] ;
149: PR[100,6]=R[186] ;

```

Set the variable as arguments for the robot motion sample function (FHSMPLMOVE) and execute it.

```

151: !;!!!!!!!! CAUTION !!!!!!!!! ;
152: !The following function drives ;
153: !a robot motion immediately. ;
154: !Confirm the settings ;
155: !before execution. ;
156: !;!!!!!!!!!!!!!!!!!!!!!!!!!!!! ;
157: ;
158: CALL FHSMPLMOVE( 100 ) ; Robot motion sample function
159: IF R[200]<>0,JMP LBL[998] ;

```

4

WARNING


- These operations drive the robot.
- Operate the robot in the state whereby pressing the [Emergency stop] button can stop its motion anytime.




6.8. Moving Robot to Robot Command Position at Measurement

For a processing to move the robot to the robot command position at measurement, follow the procedures below.

1	By the procedures at step 2 in Chapter 6.6, check that the measurement results are stored in variables.
2	<p>Set the variables as arguments for the robot motion sample function (fhsample_move) and execute it.</p> <pre>172: イレゾ`[100,3]=イレゾ`[100,3]-レゾ`[195] ; 173: ; 174: !;!!!!!!!! CAUTION !!!!!!!!! ; 175: !The following function drives ; 176: !a robot motion immediately. ; 177: !Confirm the settings ; 178: !before execution. ; 179: !;!!!!!!!!!!!!!!!!!!!!!!!!!!!! ; 180: ; 181: CALL FHSMPMOVE(100) ; 182: IF R[200]<>0,JMP LBL[998] ;</pre> <p style="text-align: right; color: red;">Subtract the robot approach distance to the measurement results.</p> <p style="text-align: right; color: red;">Robot motion sample function</p>

 WARNING

- These operations drive the robot.
- Operate the robot in the state whereby pressing the [Emergency stop] button can stop its motion anytime.



6.9. Disconnecting Vision Sensor from Robot Controller

For a processing to disconnect the Vision Sensor from the Robot Controller, follow the procedures below.

1	<p>Execute the disconnection function to the Vision Sensor.</p> <pre>188: !;!!!!!!!!!!!!!!!!!!!!!!!!!!!! ; 189: ! (1) Disconnect to the FH server ; 190: !;!!!!!!!!!!!!!!!!!!!!!!!!!!!! ; 191: ; 192: LBL[998] ; 193: CALL FHCLOSE ; 194: ; 195: !EXIT Program ; 196: LBL[999] ;</pre> <p style="text-align: right; color: red;">Disconnection function to the Vision Sensor (FH server)</p>
---	--

7. Function Reference

This chapter describes the functions for building a robot vision application

7.1. List of Functions

This is a list of functions that can be used by the actual driving robot program.

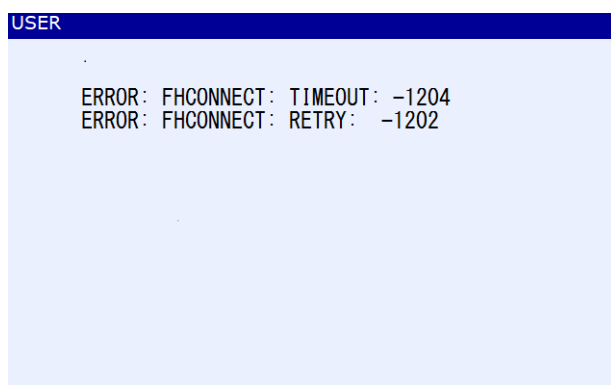
Function Name	Description	Reference
FHDEFGLOBAL	Initialize a global variable.	Chapter 7.3.1
FHCONNECT	Connect to the Vision Sensor	Chapter 7.3.2
FHCLOSE	Disconnects from the Vision Sensor	Chapter 7.3.3
FHSMPLCHGSN	Switching the scene of the Vision Sensor	Chapter 7.3.4
FHSMPLREGP	Register the current robot position to the Vision Sensor	Chapter 7.3.5
FHSMPLTRIG	Sends measurement commands to the Vision Sensor and receives the measurement results from the Vision Sensor	Chapter 7.3.6
FHSMPLMOVE	Move the robot	Chapter 7.3.7
FHRUNSND CMD	Send a no-procedure command to the Vision Sensor	Chapter 7.3.8
FHRUNRCVRES	Receive a command response from the Vision Sensor	Chapter 7.3.9
FHRUNRCVVAL	Receive numerical data from the Vision Sensor	Chapter 7.3.10

■ Function execution error

In all functions, the execution result (error number) is stored in the register variable 200.

7.2. Error Message

The error message will be displayed on the user screen of the teaching pendant.



7.3. Function Details

7.3.1. FHDEFGLOBAL

■ Function

Initialize a global variable.

■ Syntax

FHDEFGLOBAL()

■ Parameters

None

■ Remarks

Define the global variables that are necessary to use the robot application.

■ Return Value

None

■ Precautions

Be sure to call this function before using any other function.

■ Example

The following example defines a global variable.

CALL FHDEFGLOBAL

7.3.2. FHCONNECT

■ Function

Connect to the Vision Sensor

■ Syntax

FHCONNECT([Argument1], [Argument2], [Argument3])

■ Parameters

Argument	Input/Output	Data type	Description
Argument1	Input	STRING	Connection device name ([C1:] to [C8:])
Argument2	Input	INTEGER	Number of connections retries (0 - 99)
Argument3	Input	INTEGER	Connection Timeout Time (0 to 99sec)

■ Remarks

Connects to the Vision Sensor specified in the Connection Device Name parameter.
Request a connection every hour specified in the Connection Timeout Time parameter.
Request a connection as many times as specified in the connection retry count parameter.
Return an error if the connection fails.
Return an error if the parameter is out of the input range

■ Return Value

Err. No.	Error Message	Description
0	-	normal termination
-1200	ERROR:FHCONNECT:RETRY:-1200	Out of connection retry count input range
	ERROR:FHCONNECT:TIMEOUT:-1200	Connection Timeout Time Input Range
-1202	ERROR:FHCONNECT:RETRY:-1202	Connection retry count over
-1204	ERROR:FHCONNECT:TIMEOUT:-1204	Connection timeout time is over.
-1802	ERROR:FHCONNECT:TP Argument:-1802	Register value acquisition error

■ Precautions

Only one Vision Sensor can be connected to the robot controller.
If you want to connect to another Vision Sensor, disconnect from the connected Vision Sensor.
Although this function can set the connection timeout period in seconds, the actual connection timeout error can be detected in about 10 seconds.

■ Example

In the following example, we will connect to the Vision Sensor using the connection device "C1".

CALL FHCONNECT('C1:',2,10)

7.3.3. FHCLOSE

■ Function

Disconnects from the Vision Sensor

■ Syntax

FHCLOSE

■ Parameter

None

■ Remarks

Disconnects from the Vision Sensor

■ Return Value

Err. No.	Error Message	Description
0	-	normal termination

■ Precautions

None

■ Example

The following example closes the connection to the Vision Sensor connected by FHCONNECT.

CALL FHCLOSE

7.3.4. FHSMPCHGSN

■ Function

Switching the scene of the Vision Sensor.

■ Syntax

FHSMPCHGSN([Argument1], [Argument2], [Argument3])

■ Parameter

Argument	Input/Output	Data type	Description
Argument1	Input	INTEGER	Number of receive retries (0 - 99)
Argument2	Input	INTEGER	Receive timeout time (0 to 99sec)
Argument3	Input	INTEGER	Scene number to switch to (0 - 127)

■ Remarks

Sends a command to the Vision Sensor to switch to the scene number specified in the parameter.

It returns an error if this command is not connected to the Vision Sensor.

Return an error is returned if the scene number specified in the parameters is out of the input range.

Returns an error if a response is received from the Vision Sensor indicating that the scene change command failed.

■ Return value

Err. No.	Error Message	Description
0	-	normal termination
-1300	ERROR:FHRCVSTR:RETRY:-1300	Out of the range of receive retry count input
	ERROR:FHRCVSTR:TIMEOUT:-1300	Out of the input range for the receive timeout count
-1301	ERROR:FHRCVSTR:NO_CONNECTION:-1301	Calling in the unconnected state
-1303	ERROR:FHRCVSTR:RETRY:-1303	Receive retry count overrun
-1304	ERROR:FHRCVSTR:TIMEOUT:-1304	Receive timeout time is over.
-1601	ERROR:FHSMPCHGSN:No Connection:-1601	Calling in the unconnected state
-1800	ERROR:FHSMPCHGSN:Scene Change Failed:-1800	Response NG
-1802	ERROR:FHSMPCHGSN:TP Argument:-1802	Register value acquisition error

■ Precautions

None

■ Example

In the following example, we will switch to scene 0.

CALL FHSMPCHGSN(2,10,0)

7.3.5. FHSMPLEGP

■ Function

Register the current robot position to the Vision Sensor.

■ Syntax

FHSMPLEGP([Argument1], [Argument2])

■ Parameter

Argument	Input/Output	Data type	Description
Argument1	Input	INTEGER	Number of receive retries (0 - 99)
Argument2	Input	INTEGER	Receive timeout time (0 to 99sec)

■ Remarks

Get the current robot position and register the current robot position to the Vision Sensor. Return an error if this function is called while the Vision Sensor is not connected.

Returns an error if a response of current robot position registration failure is received from the Vision Sensor.

■ Return value

Err. No.	Error Message	Description
0	-	normal termination
-1300	ERROR:FHRCVSTR:RETRY:-1300	Out of the range of receive retry count input
	ERROR:FHRCVSTR:TIMEOUT:-1300	Out of the input range for the receive timeout count
-1301	ERROR:FHRCVSTR:NO_CONNECTION:-1301	Calling in the unconnected state
-1303	ERROR:FHRCVSTR:RETRY:-1303	Receive retry count overrun
-1304	ERROR:FHRCVSTR:TIMEOUT:-1304	Receive timeout time is over.
-1601	ERROR:FHSMPLEGP:No Connection:-1601	Calling in the unconnected state
-1800	ERROR:FHSMPLEGP:Trigger NG:-1800	Response NG
-1802	ERROR:FHSMPLEGP:TP Argument:-1802	Register value acquisition error

■ Precautions

When using this function, set the values of "UserCoordNo" and "ToolCoordNo" to 0.

■ Example

In the following example, the current robot position is registered to the Vision Sensor.

UserCoordNo=0

ToolCoordNo=0

CALL FHSMPREGP(2,10)

7.3.6. FHSMPLTRIG

■ Function

Sends measurement commands to the Vision Sensor and receives the measurement results from the Vision Sensor

■ Syntax

FHSMPLTRIG([Argument1], [Argument2], [Argument3])

■ Parameter

Argument	Input/Output	Data type	Description
Argument1	Input	INTEGER	Number of receive retries (0 - 99)
Argument2	Input	INTEGER	Receive timeout time (0 to 99sec)
Argument3	Input	INTEGER	Position register number that stores the measurement results received from the Vision Sensor

■ Remarks

Sends measurement commands to the Vision Sensor.

Receives the measurement results from the Vision Sensor and get the robot position.

Returns an error if called while not connected to the Vision Sensor.

Returns an error if a measurement command failure response is received from the Vision Sensor.

Returns an error if the Vision Sensor's overall judgment is NG.

■ Return Value

Err. No.	Error Message	Description
0	-	normal termination
-1300	ERROR:FHRCVSTR:RETRY:-1300	Out of the range of receive retry count input
	ERROR:FHRCVSTR:TIMEOUT:-1300	Out of the input range for the receive timeout count
-1303	ERROR:FHRCVSTR:RETRY:-1303	Receive retry count overrun
-1304	ERROR:FHRCVSTR:TIMEOUT:-1304	Receive timeout time is over.
-1502	ERROR:FHMESRESULT:PARAM_NUM:-1502	Abnormal number of parameters
-1601	ERROR:FHSMPLTRIG:No Connection:-1601	Calling in the unconnected state

-1800	ERROR:FHMESRESULT:TRIG_NG:-1800	Response NG
-1801	ERROR:FHMESRESULT:TJG_NG:-1801	Overall judgment NG
-1802	ERROR:FHSMPLTRIG:TP Argument:-1802	Register value acquisition error
-1803	ERROR:FHSMPLTRIG: SET_EPOS_REG:-1803	Failed to register the position in the position register

■ Precautions

The measurement result received from the Vision Sensor will be stored in the position register. To get the measurement result with this function, Result Output (Message) must be placed in the flow, and the settings must be as follows

Result Output (Message) Processing Item		The destination of the received measurement results
Setting Target	Setting details	
Output device	IoModule2: Serial (Ethernet)	-
Termination string	\r (Carriage Return)	-
Delimiter string	\x20 (Space)	-
Output data 0	Overall judgment(*1)	(Do not store)
Output data 1	Robot command position X(*1)	PR[X,1]
Output data 2	Robot command position Y(*1)	PR[X,2]
Output data 3	Robot command position Z(*1)	PR[X,2]
Output data4	Robot command position W(*1)	PR[X,3]
Output data 5	Robot command position P(*1)	PR[X,4]
Output data6	Robot command position R(*1)	PR[X,5]

*1: The output data format should be set as follows

- Data type: Number
- Digits of integer: 6
- Digits of decimal: 4

■ Example

In the following example, a measurement command is sent to the Vision Sensor, and after receiving the measurement result from the image sensor, the robot moves to the position of the measurement result.

CALL FHSMPLTRIG(2,10,100)

CALL FHSMPLMOVE(100)

7.3.7. FHSMPMOVE

■ Function

Move the robot

■ Syntax

FHSMPMOVE([Argument1])

■ Parameter

Argument	Input/Output	Data type	Description
Argument1	Input	INTEGER	The position register number of the robot coordinates of the destination

■ Remarks

Moves the robot to the position specified by the parameter.

Returns an error if the target robot position is out of the movement range.

■ Return Value

Err. No.	Error Message	Description
0	-	normal termination
-1503	ERROR:FHSMPMOVE:Positon out of range:-1503	out of range error
-1802	ERROR: FHSMPMOVE:TP Argument:-1802	Register value acquisition error

■ Precautions

When using this function, set the values of "UserCoordNo" and "ToolCoordNo" to 0.

■ Example

In the following example, Move the robot to the (X,Y,Z,W,P,R) = (300,0,200,180,0,0)

UserCoordNo = 0

ToolCoordNo = 0

PR[100,1] = 300

PR[100,2] = 0

PR[100,3] = 200

PR[100,4] = 180

PR[100,5] = 0

PR[100,6] = 0

CALL FHSMPMOVE(100)

IF R[200]<>0,JMP LBL[999]

!EXIT Program ;

LBL[999]

7.3.8. FHRUNSNDCMD

■ Function

Send a no-procedure command to the Vision Sensor

■ Syntax

FHRUNSNDCMD([Argument1], [Argument2], [Argument3], [Argument4], [Argument5], [Argument6], [Argument7])

■ Parameter

Argument	Input/Output	Data type	Description
Argument1	Input	INTEGER	Number of no-procedural command arguments to be sent to the Vision Sensor (0 to 5)
Argument2	Input	STRING	No-procedural commands to be sent to the Vision Sensor
Argument3 - Argument7	Input	STRING	Argument3: Argument 1 of the no-procedure command sent to the Vision Sensor(string). Argument4: Argument 2 of the no-procedure command sent to the Vision Sensor(string). Argument5: Argument 3 of the no-procedure command sent to the Vision Sensor(string). Argument6: Argument 4 of the no-procedure command sent to the Vision Sensor(string). Argument7: Argument 5 of the no-procedure command sent to the Vision Sensor(string).

■ Remarks

Sends a no-procedure command to the Vision Sensor, concatenating the parameters according to the following format.

If the number of no-protocol command arguments is out of the input range, an error is returned.

<Format>

No-protocol command	SP(*1)	Command argument 1	SP	Command argument 2	SP	...	Command argument n(*2)
---------------------	--------	--------------------	----	--------------------	----	-----	------------------------

*1: "SP" is space

*2: The command argument n depends on the number of non-procedural command

arguments.

■ Return Value

Err. No.	Error Message	Description
0	-	normal termination
-1506	ERROR: FHRUNSNDCCMD:INVALID_CMD_ARG_NO:- 1506	The number of no-procedural command arguments is out of the input range.
-1601	ERROR:FHSNDSTR:NO_CONNECTION:-1601	Calling in the unconnected state
-1601	ERROR:FHSNDSTR:NO_DATA:-1601	Send string length 0
-1602	ERROR:FHSNDSTR:STRING_LEN:-1602	Send failure
-1802	ERROR:FHRUNSNDCCMD:TP Argument:-1802	Send string length over
-1806	ERROR:FHRUNSNDCCMD:STRING_LENGTH:- 1806	Send string generation error

■ Precautions

The length of the string of the no-stepping command that can be sent is 127 bytes (not including the delimiter).

Set the parameters for arguments 1 - 7 so that the length of the string of the no-procedure command to be sent does not exceed 127 bytes.

■ Example

The following example shows how to send the measurement command "MEASURE" to the Vision Sensor

CALL FHRUNSNDCCMD(0,'MEASURE','...' /...' /...' /...' /...')

7.3.9. FHRUNRCVRES

■ Function

Receive a command response from the Vision Sensor

■ Syntax

FHRUNRCVRES([Argument1], [Argument2], [Argument3])

■ Parameter

Argument	Input/Output	Data type	Description
Argument1	Input	INTEGER	Number of receive retries (0 - 99)
Argument2	Input	INTEGER	Receive timeout time (0 to 99sec)
Argument3	Input	INTEGER	Command Response Result Storage Register Number (1: command response "OK" - 1: other than the command response "OK")

■ Remarks

Receive the response (command response) to the no-procedure command sent to the Vision Sensor.

If the command response is OK, assign 1 to the command response result cmd_res.

If the command response is not OK, assign "-1" to the command response result cmd_res.

■ Return Value

Err. No.	Error Message	Description
0	-	normal termination
-1300	ERROR:FHRCVSTR:RETRY:-1300	Out of the range of receive retry count input
	ERROR:FHRCVSTR:TIMEOUT:-1300	Out of the input range for the receive timeout count
-1301	ERROR:FHRCVSTR:NO_CONNECTION:-1301	Calling in the unconnected state
-1303	ERROR:FHRCVSTR:RETRY:-1303	Receive retry count overrun
-1304	ERROR:FHRCVSTR:TIMEOUT:-1304	Receive timeout time is over.
-1802	ERROR:FHRUNRCVRES:TP Argument:-1802	Register value acquisition error

-1803	ERROR:FHRUNRCVRES:SET_INT_REG:-1803	Register value setting error
-------	-------------------------------------	------------------------------

■ Precautions

None

■ Example

In the following example, a command response is received from the Vision Sensor, and if the received command response is not OK (0), the program is terminated.

```
CALL FHRUNRCVRES(2, 10, 194)
```

```
IF R[200]<>0,JMP LBL[998]
```

```
LBL[998]
```

```
CALL FHCLOSE
```

7.3.10. FHRUNRCVVAL

■ Function

Receive numerical data from the Vision Sensor

■ Syntax

FHRUNRCVVAL([Argument1], [Argument2], [Argument3])

■ Parameter

Argument	Input/Output	Data type	Description
Argument1	Input	INTEGER	Number of receive retries (0 - 99)
Argument2	Input	INTEGER	Receive timeout time (0 to 99sec)
Argument3	Input	INTEGER	The first register number that stores the analysis results of the received numerical sequence

■ Remarks

This function stores the numerical data sent from the Vision Sensor into the register specified by the parameter.

This function outputs up to 10 values.

If there are more than 11 numbers, this function outputs only the first 10.

If the length of the segmented string is longer than 12 bytes, this function returns an error of abnormal parameter length.

Returns an error if the number of numeric data is zero.

The following is an example of the output when a string is included.

<Conversion example>

The string before conversion	The result of the analysis after conversion
abc	0
123abc	0
abc123	0
1.00E+03	1000

■ Return Value

Err. No.	Error Message	Description
0	-	normal termination
-1300	ERROR:FHRCVSTR:RETRY:-1300	Out of the range of receive retry count input
-1300	ERROR:FHRCVSTR:TIMEOUT:-1300	Out of the input range for the receive

		timeout count
-1301	ERROR:FHRCVSTR:NO_DATA:-1301	Receive data length 0
	ERROR:FHRCVSTR:NO_CONNECTION:-1301	Calling in the unconnected state
-1302	ERROR:FHRCVSTR:STRING_LEN:-1302	Receive data length over
-1303	ERROR:FHRCVSTR:RETRY:-1303	Receive retry count overrun
-1304	ERROR:FHRCVSTR:TIMEOUT:-1304	Receive timeout time is over.
-1502	ERROR:FHPARSEVAL:PARAM_TOO_LONG:-1502	Abnormal parameter length
-1502	ERROR:FHPARSEVAL:PARAM_NUM:-1502	Abnormal number of parameters
-1504	ERROR:FHPARSEVAL:NO_CMD:-1504	The length of the string to be divided is 0.
-1802	ERROR:FHRUNRCVVAL:TP Argument:-1802	Register value acquisition error
-1803	ERROR:FHRUNRCVVAL:SET_INT_REG:-1802	Register value setting error
-1805	ERROR:FHRUNRCVVAL:REGISTER_NO:-1805	Out of range of the register number to be stored

■ Precautions

The maximum length of the string to be received is 127 bytes (not including the delimiter). if more than 128 bytes are received, an error is returned.

The measurement result received from the Vision Sensor will be stored in the param[].

To get the measurement result with this function, Result Output (Message) must be placed in the flow, and the settings must be as follows

Result Output (Message) Processing Item		The destination of the received measurement results
Setting Target	Setting details	
Output device	IoModule2: Serial (Ethernet)	-
Termination string	\r (Carriage Return)	-
Delimiter string	\x20 (Space)	-
Output Data 0 - 9	numerical data(*1)	R[X] - R[X + 9>(*2)

*1: The output data format should be set as follows

- Data type: Number

- Digits of integer: 6
- Digits of decimal: 4

*2: X is the first register number that stores the analysis results of the received numerical sequence.

■ Example

In the following example, the program receives a sequence of numbers sent by the Vision Sensor and exits the program if the first received data is not 1.

```
CALL FHRUNRCVVAL(2,10,180)
```

```
IF R[180]<>1,JMP LBL[998]
```

```
LBL[998]
```

```
CALL FHCLOSE
```


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