Upon receipt of the product and prior to initial operation, read these instructions thoroughly and retain for future reference.

The DX200 operator's manuals above correspond to specific usage. Be sure to use the appropriate manual.

Please have the following information available when contacting Yaskawa Customer Support:
- System
- Primary Application
- Software Version (Located on Programming Pendant by selecting: {Main Menu} - {System Info} - {Version})
- Robot Serial Number (Located on robot data plate)
- Robot Sales Order Number (Located on controller data plate)
DANGER

- This manual explains the vision function of the DX200/FS100 system. Read this manual carefully and be sure to understand its contents before handling the DX200/FS100.
- General items related to safety are listed in the Chapter 1: Safety of the DX200/FS100 Instructions. To ensure correct and safe operation, carefully read the DX200/FS100 Instructions before reading this manual.

CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications.
- If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.
NOTES FOR SAFE OPERATION

Read this manual carefully before installation, operation, maintenance, or inspection of the DX200/FS100.

In this manual, the Notes for Safe Operation are classified as “DANGER”, “WARNING”, “CAUTION”, or “NOTICE”.

**DANGER**
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Safety Signs identified by the signal word DANGER should be used sparingly and only for those situations presenting the most serious hazards.

**WARNING**
Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury. Hazards identified by the signal word WARNING present a lesser degree of risk of injury or death than those identified by the signal word DANGER.

**CAUTION**
Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury. It may also be used without the safety alert symbol as an alternative to “NOTICE”.

**NOTICE**
NOTICE is the preferred signal word to address practices not related to personal injury. The safety alert symbol should not be used with this signal word. As an alternative to “NOTICE”, the word “CAUTION” without the safety alert symbol may be used to indicate a message not related to personal injury.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.

**NOTE**
To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “DANGER”, “WARNING” and “CAUTION”.

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “DANGER”, “WARNING” and “CAUTION”.

iii HW1483911
<DX200>

WARNING

• Before operating the manipulator, check that servo power is turned OFF when the emergency stop buttons on the front door of the DX200 and programming pendant are pressed. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.

Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.

Fig. : Emergency Stop Button

• Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn the servo power ON.

Injury may result from unintentional or unexpected manipulator motion.

Fig. : Release of EM

• Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator:
  – Be sure to use a lockout device to the safeguarding when going inside.
    Also, display the sign that the operation is being performed inside the safeguarding and make sure no one closes the safeguarding.
  – View the manipulator from the front whenever possible.
  – Always follow the predetermined operating procedure.
  – Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

• Confirm that no person is present in the P-point maximum envelope of the manipulator and that you are in a safe location before:
  – Turning ON the power for the DX200.
  – Moving the manipulator with the programming pendant.
  – Running the system in the check mode.
  – Performing automatic operations.

Injury may result if anyone enters the working envelope of the manipulator during operation. Always press an emergency stop button immediately if there are problems.

The emergency stop button is located on the right of the front door of the DX200 and programming pendant.
<FS100>

WARNING

• Before operating the manipulator, check that servo power is turned OFF when the emergency stop button on the programming pendant is pressed. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.

Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop button does not function.

*Fig. : Emergency Stop Button*

• In the case of not using the programming pendant, be sure to supply the emergency stop button on the equipment. Then before operating the manipulator, check to be sure that the servo power is turned OFF by pressing the emergency stop button. Connect the external emergency stop button to the 5-6 pin and 16-17 pin of the robot system signal connector (CN2).

• Upon shipment of the FS100, this signal is connected by a jumper cable in the dummy connector. To use the signal, make sure to supply a new connector, and then input it.

If the signal is input with the jumper cable connected, it does not function, which may result in personal injury or equipment damage.

• Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn the servo power ON.

Injury may result from unintentional or unexpected manipulator motion.

*Fig. : Release of Emergency Stop Button*

• Observe the following precautions when performing teaching operations within the manipulator’s operating range:
  – View the manipulator from the front whenever possible.
  – Always follow the predetermined operating procedure.
  – Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.
WARNING

- Confirm that no person is present in the P-point maximum envelope of the manipulator and that you are in a safe location before:
  - Turning ON the power for the FS100.
  - Moving the manipulator with the programming pendant
  - Running the system in the check mode
  - Performing automatic operations
  - Ensure that you have a safe place to retreat in case of emergency.

Injury may result if anyone enters the P-point maximum envelope of the manipulator during operation. Always press an emergency stop button immediately if there is a problem.

The emergency stop buttons are located on the right of the programming pendant for the FS100.

CAUTION

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
  - Check for problems in manipulator movement.
  - Check for damage to insulation and sheathing of external wires.
- Always return the programming pendant to the hook on the DX200/FS100 cabinet after use.

If the programming pendant is inadvertently left on the manipulator, on a fixture, or on the floor, the manipulator or a tool may collide with the programming pendant during manipulator movement, which may result in personal injury or equipment damage.

- Read and understand the Explanation of Warning Labels in the DX200/FS100 Instructions before operating the manipulator.
Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the DX200/FS100 controller, manipulator cables, the DX200/FS100 programming pendant (optional for the FS100), and the FS100 programming pendant dummy connector (optional for the FS100).

In this manual, the equipment is designated as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX200/FS100 controller</td>
<td>DX200/FS100</td>
</tr>
<tr>
<td>DX200/FS100 programming pendant</td>
<td>Programming pendant</td>
</tr>
<tr>
<td>Cable between the manipulator and the DX200/FS100 controller</td>
<td>Manipulator Cable</td>
</tr>
<tr>
<td>Robot</td>
<td>Manipulator</td>
</tr>
<tr>
<td>FS100 programming pendant dummy connector</td>
<td>Programming pendant dummy connector</td>
</tr>
</tbody>
</table>
<DX200>

Descriptions of the programming pendant keys, buttons, and displays are shown as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming Pendant</td>
<td></td>
</tr>
<tr>
<td>Character Keys /Symbol Keys</td>
<td>The keys which have characters or its symbol printed on them are denoted with [,</td>
</tr>
<tr>
<td></td>
<td>ex. [ENTER]</td>
</tr>
<tr>
<td>Axis Keys /Numeric Keys</td>
<td>[Axis Key] and [Numeric Key] are generic names for the keys for axis operation and</td>
</tr>
<tr>
<td></td>
<td>number input.</td>
</tr>
<tr>
<td>Keys pressed</td>
<td>When two keys are to be pressed simultaneously, the keys are shown with a</td>
</tr>
<tr>
<td>simultaneously</td>
<td>“+” sign between them, ex. [SHIFT]+[COORD]</td>
</tr>
<tr>
<td>Displays</td>
<td>The menu displayed in the programming pendant is denoted with { }. ex. (JOB)</td>
</tr>
</tbody>
</table>

<FS100>

Descriptions of the programming pendant and playback panel keys, buttons, and displays are shown as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming Pendant</td>
<td></td>
</tr>
<tr>
<td>Character Keys</td>
<td>The keys which have characters printed on them are denoted with [,</td>
</tr>
<tr>
<td></td>
<td>ex. [ENTER]</td>
</tr>
<tr>
<td>Symbol Keys</td>
<td>The keys which have a symbol printed on them are not denoted with [ ] but depicted</td>
</tr>
<tr>
<td></td>
<td>with a small picture. ex. PAGE key</td>
</tr>
<tr>
<td></td>
<td>The Cursor is an exception, and a picture is not shown.</td>
</tr>
<tr>
<td>Axis Keys /Numeric Keys</td>
<td>“Axis Keys” and “Numeric Keys” are generic names for the keys for axis operation and</td>
</tr>
<tr>
<td></td>
<td>number input.</td>
</tr>
<tr>
<td>Keys pressed</td>
<td>When two keys are to be pressed simultaneously, the keys are shown with a</td>
</tr>
<tr>
<td>simultaneously</td>
<td>“+” sign between them, ex. SHIFT key +COORD key</td>
</tr>
<tr>
<td>Mode Key</td>
<td>Three kinds of modes that can be selected by the mode key are denoted as follows:</td>
</tr>
<tr>
<td></td>
<td>REMOTE, PLAY, or TEACH</td>
</tr>
<tr>
<td>Button</td>
<td>Three buttons on the upper side of the programming pendant are denoted as follows:</td>
</tr>
<tr>
<td></td>
<td>HOLD button</td>
</tr>
<tr>
<td></td>
<td>START button</td>
</tr>
<tr>
<td></td>
<td>EMERGENCY STOP button</td>
</tr>
<tr>
<td>Displays</td>
<td>The menu displayed in the programming pendant is denoted with { }. ex. (JOB)</td>
</tr>
<tr>
<td>PC Keyboard</td>
<td>The name of the key is denoted</td>
</tr>
<tr>
<td></td>
<td>ex. Ctrl key on the keyboard</td>
</tr>
</tbody>
</table>
Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select • • • " means that the cursor is moved to the object item and [SELECT] is pressed, or that the item is directly selected by touching the screen.

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1 Outline.................................................................................................................... 1-1

1.1 General Operation Conditions ............................................................................. 1-1

1.1.1 System Version .................................................................................................. 1-1

1.1.2 List of Connectable Vision Systems (Only Additional Models) ......................... 1-1

2 OMRON FH Series (for RS-232C Connections) ....................................................... 2-1

2.1 System Configuration ............................................................................................. 2-1

2.2 Vision System Setup ............................................................................................. 2-2

2.2.1 System Settings ................................................................................................ 2-2

2.2.2 Detection Scene Settings .................................................................................. 2-6

2.2.3 Settings for Operation ....................................................................................... 2-8

2.3 DX200 Setup ......................................................................................................... 2-10

2.3.1 Parameter Settings ........................................................................................... 2-10

2.3.2 Vision Condition File Settings .......................................................................... 2-11

2.3.3 Variable Initialization ....................................................................................... 2-12

2.4 List of Robot Language (INFORM III) Commands .................................................. 2-13

2.4.1 Sensor Commands ........................................................................................... 2-13

VSTART 13
VWAIT 14

2.4.2 Usage Example ................................................................................................ 2-14

2.4.2.1 Acquiring Data by Performing Detection in Specified Scene ....................... 2-14

2.4.2.2 Scene Group Switching ............................................................................... 2-15

3 OMRON FH Series (for Ethernet Connection) .......................................................... 3-1

3.1 System Configuration ........................................................................................... 3-1

3.2 Vision System Setup ............................................................................................. 3-2

3.2.1 System Settings ................................................................................................ 3-2

3.2.2 Detection Scene Settings .................................................................................. 3-6

3.2.3 Settings for Operation ....................................................................................... 3-8

3.3 DX200/FS100 Setup ............................................................................................. 3-10

3.3.1 Ethernet Settings ............................................................................................. 3-10

3.3.2 Parameter Settings ........................................................................................... 3-11

3.3.3 Vision Condition File Settings .......................................................................... 3-12

3.3.4 Variable Initialization ....................................................................................... 3-13

3.4 List of Robot Language (INFORM III) Commands .................................................. 3-14

3.4.1 Sensor Commands ........................................................................................... 3-14

VSTART 14
VWAIT 15

3.4.2 Usage Example ........................................................................................................ 3-15
  3.4.2.1 Acquiring Data by Performing Detection in Specified Scene ................ 3-15
  3.4.2.2 Scene Group Switching ............................................................................. 3-16

4 OMRON FQ2-S Series (for Ethernet Connection) .................................................... 4-1
  4.1 System Configuration ............................................................................................ 4-1
  4.2 Vision System Setup ............................................................................................. 4-2
    4.2.1 System Settings .................................................................................................. 4-2
    4.2.2 Detection Scene Settings ............................................................................... 4-4
    4.2.3 Setting for Operation ....................................................................................... 4-7
  4.3 DX200/FS100 Setup ............................................................................................... 4-8
    4.3.1 Ethernet Settings ............................................................................................. 4-8
    4.3.2 Parameter Settings ............................................................................................ 4-9
    4.3.3 Vision Condition File Settings ....................................................................... 4-10
    4.3.4 Variable Initialization ....................................................................................... 4-11
  4.4 List of Robot Language (INFORM III) Commands .............................................. 4-12
    4.4.1 Sensor Commands ............................................................................................ 4-12
      VSTART 12
      VWAIT 13
    4.4.2 Usage Example ............................................................................................... 4-13
      4.4.2.1 Acquiring Data by Performing Detection in Specified Scene ............. 4-13

5 KEYENCE CV-X100/200 Series (for Ethernet Connection) ....................................... 5-1
  5.1 System Configuration ............................................................................................. 5-1
  5.2 Vision System Setup ............................................................................................. 5-2
    5.2.1 System Settings .................................................................................................. 5-2
    5.2.2 Detection Scene Settings ............................................................................... 5-3
  5.3 DX200/FS100 Setup ............................................................................................... 5-6
    5.3.1 Ethernet Settings ............................................................................................. 5-6
    5.3.2 Parameter Settings ............................................................................................ 5-7
    5.3.3 Vision Condition File Settings ....................................................................... 5-8
    5.3.4 Variable Initialization ....................................................................................... 5-9
  5.4 List of Robot Language (INFORM III) Commands .............................................. 5-10
    5.4.1 Sensor Commands ............................................................................................ 5-10
      VSTART 10
      VWAIT 11
5.4.2 Usage Example .................................................................................................. 5-11
5.4.2.1 Acquiring Data by Performing Detection in Specified Scene ......................... 5-11
5.4.2.2 Switching to the Operation/Stop Mode ..................................................... 5-12
5.4.2.3 Switching the Inspection Settings ......................................................... 5-12

6 KEYENCE XG-8000 Series (for Ethernet Connection) .................................................. 6-1

6.1 System Configuration ............................................................................................ 6-1

6.2 Vision System Setup ............................................................................................ 6-2
6.2.1 System Settings ............................................................................................... 6-2
6.2.2 Detection Scene Settings .................................................................................. 6-4

6.3 DX200/FS100 Setup ............................................................................................. 6-7
6.3.1 Ethernet Settings ............................................................................................. 6-7
6.3.2 Parameter Settings ........................................................................................... 6-8
6.3.3 Vision Condition File Settings ......................................................................... 6-9
6.3.4 Variable Initialization ....................................................................................... 6-10

6.4 List of Robot Language (INFORM III) Commands .................................................... 6-11
6.4.1 Sensor Commands .......................................................................................... 6-11
       VSTART 11
       VWAIT 12

6.4.2 Usage Example ............................................................................................... 6-12
6.4.2.1 Acquiring the Data by Detecting .............................................................. 6-12
6.4.2.2 Executing a Screen Capture Using Custom Commands ............................... 6-13
6.4.2.3 Switching to the Operation/Stop Mode ...................................................... 6-13
6.4.2.4 Switching the Inspection Settings .............................................................. 6-14

7 KEYENCE XG-X2000 Series (for Ethernet Connection) .................................................. 7-1

7.1 System Configuration ............................................................................................ 7-1

7.2 Vision System Setup ............................................................................................ 7-2
7.2.1 System Settings ............................................................................................... 7-2
7.2.2 Detection Scene Settings .................................................................................. 7-4

7.3 DX200/FS100 Setup ............................................................................................. 7-6
7.3.1 Ethernet Settings ............................................................................................. 7-6
7.3.2 Parameter Settings ........................................................................................... 7-7
7.3.3 Vision Condition File Settings ......................................................................... 7-8
7.3.4 Variable Initialization ....................................................................................... 7-9

7.4 List of Robot Language (INFORM III) Commands .................................................... 7-10
7.4.1 Sensor Commands .......................................................................................... 7-10
       VSTART 10
VWAIT 11

7.4.2 Usage Example ........................................................................................................... 7-11
  7.4.2.1 Acquiring the Data by Detecting ......................................................................... 7-11
  7.4.2.2 Performing the Background setting read by Custom Instruction .................. 7-12
  7.4.2.3 Switching to the Operation / Stop Mode ............................................................ 7-14
  7.4.2.4 Switching the Inspection Settings ..................................................................... 7-14

8 Revision History .................................................................................................................. 8-1
  8.1 Contents ..................................................................................................................... 8-1
1 Outline

This manual describes the setup procedures for the other models which are not mentioned in the following instruction manuals.

- HW1481920 DX200 OPTIONS INSTRUCTIONS FOR VISION FUNCTION
- HW1482636 FS100 OPTIONS INSTRUCTIONS FOR VISION FUNCTION

1.1 General Operation Conditions

This chapter describes the general operation conditions for additional models.

1.1.1 System Version

For the vision function described in this manual, the following system version is necessary.

\[
\text{Table 1-1: Required System Version}
\]

<table>
<thead>
<tr>
<th>Controller</th>
<th>System version</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX200</td>
<td>DN1.00.00 (xx)-00 or later</td>
</tr>
<tr>
<td>FS100</td>
<td>FS2.32.00 (xx)-00 or later</td>
</tr>
</tbody>
</table>

The system version can be checked using the following procedure.

- From the Main Menu, select {SYSTEM INFO} - {VERSION} - {SYSTEM}.

1.1.2 List of Connectable Vision Systems (Only Additional Models)

The connectable vision systems to use with the vision function are as follows.

\[
\text{Table 1-2: List of connectable vision system (Only Additional Models)}
\]

<table>
<thead>
<tr>
<th>Maker</th>
<th>Model</th>
<th>Communication</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMRON</td>
<td>FH series</td>
<td>RS-232C</td>
<td>FS100 is not supported</td>
</tr>
<tr>
<td>OMRON</td>
<td>FH series</td>
<td>Ethernet</td>
<td></td>
</tr>
<tr>
<td>OMRON</td>
<td>FQ2-S series</td>
<td>Ethernet</td>
<td></td>
</tr>
<tr>
<td>KEYENCE</td>
<td>CV-X100/200 series</td>
<td>Ethernet</td>
<td></td>
</tr>
<tr>
<td>KEYENCE</td>
<td>XG-8000 series</td>
<td>Ethernet</td>
<td></td>
</tr>
<tr>
<td>KEYENCE</td>
<td>XG-X2000 series</td>
<td>Ethernet</td>
<td></td>
</tr>
</tbody>
</table>
2 OMRON FH Series (for RS-232C Connections)

The procedure for connecting the OMRON FH series to the DX200 using a serial cable (RS-232C) is shown below.

**NOTE**
The FS100 is not supported by the RS-232C connection. Connect the FS100 with using the Ethernet by referring to the following chapter.

2.1 System Configuration

An example of the basic system configuration for OMRON FH series (for RS-232C connection) is shown below.

The following shows the OMRON FH1050 as an example.

![Fig. 2-1: System Configuration](image)

### Table 2-1: List of Devices

<table>
<thead>
<tr>
<th>No.</th>
<th>Required device</th>
<th>Model</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Sensor controller</td>
<td>FH1050</td>
<td>1</td>
</tr>
<tr>
<td>②</td>
<td>Camera</td>
<td>FZ-S</td>
<td>1</td>
</tr>
<tr>
<td>③</td>
<td>DX200</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>④</td>
<td>Power supply (24V)</td>
<td>S8VS-18024</td>
<td>1</td>
</tr>
<tr>
<td>⑤</td>
<td>Camera cable (flex-resistant)</td>
<td>FZ-VSB4 10M</td>
<td>1</td>
</tr>
<tr>
<td>⑥</td>
<td>Serial cable (RS-232C crossover)</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>⑦</td>
<td>Monitor (The DVI-I terminal is required.)</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>⑧</td>
<td>Monitor cable (DVI)</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>⑨</td>
<td>Mouse</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

1 Being different from the FZ series, a standard pin layout cable is used for the serial cable of FH series.
2.2 Vision System Setup

The OMRON FH series-side setup procedures are shown below.

NOTE

This procedure is for the OMRON FH series in the factory settings. Any existing changes to the settings must be returned to the default values before performing this procedure.

2.2.1 System Settings

Perform the system settings.

1. In Language setting, select {English}, and then select {OK}. In the next window, select {Yes}.

2. In the top menu bar, select "Tool" - "System Settings".

3. From the menu tree on the left, select "Startup setting".
2. OMRON FH Series (for RS-232C Connections)

2.2 Vision System Setup

4. Select the {Communication} tab, and then change the setting of "Serial(RS-232C/422)" to "Normal(Fxxx series method)".

5. Press {Apply} on the bottom right, and then select {Close} to close the window.

6. On the layout window, press {Data save}, and then select {OK}.

7. In the top menu bar, select "Function", and then select "System restart". Select {OK} on the system restart window to restart the FH.

8. After the system restarts, open the system settings window (same as step 2).
2. OMRON FH Series (for RS-232C Connections)

2.2 Vision System Setup

9. From the menu tree on the left, select "RS-232C/422(Normal(Fxxx series method))".

10. Select the {Setting} tab, and then change the setting of "Baud rate [bps]" to "19200" and the setting of "Stop bit [bit]" to "2".

11. Press {Apply} on the bottom right, and then select {Close} to close the window.

12. In the top menu bar, select "Window", and then select "Layout setup".
13. For all layout settings being used during communications, set "Output" to "ON", and then select {OK} to close the window.

14. Save the data to the system (same as step 6).

If communication is unstable, change the setting of "Baud rate [bps]" to "9600", and as in chapter 2.3.1 "Parameter Settings", change the value for "RS103" to "7".
2.2.2 Detection Scene Settings

Perform settings for each detection scene.

1. Create the detection processing according to the targeted application.

2. On the layout window, select {Edit flow} to open the edit flow window.

3. On the Edit flow window, add a "Data Output" unit to the end of the flow.

4. Select the icon of the "Data Output" unit to open the setting window.

5. On the "Output data" of the {Setting} tab, for each workpiece, set the following four data items in sequence. By adding serial data output units, up to eight workpieces with 32 data items can be specified.
6. Select the {Output format} tab, and select "RS-232C/RS-422" for "Communication method", and (Binary) for {Format setting}.

7. At the bottom of the window, select {OK} to complete the data output setup.

8. Return to the edit flow window, and then select {Close} to close the edit flow window.

9. Return to the layout window, press {Data save}, and then select {OK}.
2.2.3 Settings for Operation

Perform settings for automatic operation after turning ON the power.

1. In the top menu bar, select "Tool" - "System Settings".

2. From the menu tree on the left, select "Startup setting".

3. Select the (Basic) tab, and then select the layout, which is expected to show at the starting, from the "Startup layout".

4. Also, to startup with a specific detection scene and scene group, check the check box of "Specify startup scene, scene group" in "Scene", and then set a specific condition to each "Scene group" and "Scene".

5. At the bottom right of the window, press {Apply}, and then select {Close} on the bottom to close the window.
6. Return to the layout window, press {Data save}, and then select {OK}.
2.3 DX200 Setup

The DX200-side setup procedures are shown below.

2.3.1 Parameter Settings

Change the setting of the security mode to the management mode, and then change the following parameters.

Table 2-2: List of Devices

<table>
<thead>
<tr>
<th>Connection method</th>
<th>Parameter</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMRON FH series (for RS-232C)</td>
<td>RS100</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>RS101</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>RS102</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>RS103</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>RS109</td>
<td>5</td>
</tr>
</tbody>
</table>

When "Baud rate [bps]" is set to "9600" as in chapter 2.2.1 "System Settings", change the value for "RS103" to "7".

NOTE

This procedure is for the DX200/FS100 with the enabled vision function. If the vision function is not enabled, contact your YASKAWA representative. The contact information is found on the back cover of this manual.
2.3.2 Vision Condition File Settings

For the data to be detected, perform settings for the vision condition file.

The vision condition file is only applied when the FIND tag of VSTART is set as in chapter 2.4.1 “Sensor Commands”.

1. From the Main Menu on the left window of the Programming Pendant, select {OPTION} - {VISION COND.}.

2. Select the "COORDINATE" box to change the setting to "PIXEL".

3. Input the number of the workpieces, which the output setting is performed at the vision side, into "RESULT MAX NO.".

4. For each variable in "< VARIABLE FOR RESULT >", input the variable number that saves the vision result. It is not necessary to enter any numbers when each initial value does not need to be changed.

When the number of workpieces is two or more, the < VARIABLE FOR RESULT > numbers will be used as the first part of a series of numbers for saving data. Confirm that there are enough consecutive empty spaces for the variables.

Ex) When the RESULT MAX NO. is 5:
Data storage location is B090 to 94, P110 to 114, I090 to 94, R090 to 94.
Confirm that five consecutive variables are available.
2.3.3 Variable Initialization

Perform setting variables for storing detection data.

1. From the Main Menu on the left window of the Programming Pendant, select {VARIABLE} - {POSITION(ROBOT)}.

2. In {Page} - {P=}, input the P variable that was set in chapter 2.3.2 “Vision Condition File Settings”.

3. Select "********" next to the variable number, and then change it to "BASE".

4. When the number of workpieces is two or more, change all the storage locations to "BASE".

NOTE
After performing the camera calibration with using the vision system, change "BASE" to "USER", and change the value to a user coordinate number.
2.4 List of Robot Language (INFORM III) Commands

This chapter describes INFORM for the OMRON FH series.

2.4.1 Sensor Commands

**VSTART**

- **Function**
  Executes processing for OMRON FH series.

- **Format**

- **Explanation**

<table>
<thead>
<tr>
<th>Function tag</th>
<th>Additional tag</th>
<th>Processing details</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIND</td>
<td>FT: FIND TYPE number</td>
<td>After switching to the &quot;FT&quot; scene number, the image and the detection results are acquired. *Maximum eight individual detection results.</td>
</tr>
<tr>
<td></td>
<td>MD: FIND MODEL number</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VF#: VISION FILE number</td>
<td></td>
</tr>
<tr>
<td>SELCND</td>
<td>CND:</td>
<td>Switches to the &quot;CND&quot; scene group number.</td>
</tr>
<tr>
<td></td>
<td>0 - 31</td>
<td></td>
</tr>
<tr>
<td>CALIB</td>
<td>CALF#:</td>
<td>&quot;CALF#&quot; data is used to perform the vision calibration.</td>
</tr>
<tr>
<td></td>
<td>1 - 16</td>
<td></td>
</tr>
</tbody>
</table>

1 If the setting values are out of range, an alarm occurs upon execution.
VWAIT

- **Function**
  Waits for the end of processing for OMRON FH series.

- **Format**

  ![VWAIT END Diagram]

- **Explanation**
  Waits until the executed VSTART finishes, and then proceeds to the next command.
  VWAIT is used with VSTART as a set.

### 2.4.2 Usage Example

#### 2.4.2.1 Acquiring Data by Performing Detection in Specified Scene

- **Robot Job**

  ```
  JOB:OMRON_FH_FIND
  0000     NOP
  0001    '1)Initialize variables
  0002     CLEAR B090 1
  0003     CLEAR I090 1
  0004     CLEAR R090 1
  0005     SUB P[110] P[110]
  0006    '2)VSTART FIND
  0007     VSTART FIND FT=0 MD=0 VF#(1)
  0008     VWAIT
  0009     END
  ```

- **Explanation**
  1. Initializes the variable data of the storage destination.
     Even without initializing the variables, the VSTART-VWAIT command will overwrite any data. However, by deleting the previous data beforehand, it is possible to confirm whether the data was correctly stored in case of interrupting the job externally. The variable numbers and quantities to initialize are matched to the numbers set in the vision condition file.

  2. After loading the scene "0" specified in "FT" in the OMRON FH series, acquiring and processing of the image are performed. The results are saved in the storage destination set in "1" of the vision condition file as specified in "VF#()".
2.4.2.2 Scene Group Switching

- **Robot Job**

```
JOB:OMRON_FH_SELCND
0000   NOP
0001  '1)VSTART SELCND
0002  VSTART SELCND CND=0
0003   VWAIT
0004    END
```

- **Explanation**

(1) Loads the scene group "0" as specified in "CND" in the OMRON FH series.
3 OMRON FH Series (for Ethernet Connection)

The procedure for connecting the OMRON FH series to the DX200/FS100 using an Ethernet cable (Ethernet) is shown below.

**NOTE**

The vision function does not support communication using EtherNet/IP or EtherCAT.

3.1 System Configuration

An example of the basic system configuration for OMRON FH series (for Ethernet connection) is shown below.

The following shows the OMRON FH1050 as an example.

![Fig. 3-1: System Configuration](image)

Table 3-1: List of Devices

<table>
<thead>
<tr>
<th>No.</th>
<th>Required device</th>
<th>Model</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Sensor controller</td>
<td>FH1050</td>
<td>1</td>
</tr>
<tr>
<td>②</td>
<td>Camera</td>
<td>FZ-S</td>
<td>1</td>
</tr>
<tr>
<td>③</td>
<td>DX200/FS100</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>④</td>
<td>Power supply (24V)</td>
<td>S8VS-18024</td>
<td>1</td>
</tr>
<tr>
<td>⑤</td>
<td>Camera cable (flex-resistant)</td>
<td>FZ-VSB4 10M</td>
<td>1</td>
</tr>
<tr>
<td>⑥</td>
<td>Ethernet cable (crossover)</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>⑦</td>
<td>Monitor (The DVI-I terminal is required.)</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>⑧</td>
<td>Monitor cable (DVI)</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>⑨</td>
<td>Mouse</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>
3.2 Vision System Setup

The OMRON FH series setup procedures are shown below.

This procedure is for the OMRON FH series in the factory settings. Any existing changes to the settings must be returned to the default values before performing this procedure.

3.2.1 System Settings

Perform the system settings.

1. In Language setting, select {English}, and then select {OK}. In the next window, select {Yes}.

2. In the top menu bar, select "Tool" - "System Settings".

3. From the menu tree on the left, select "Startup setting".
3.2 Vision System Setup

4. Select the {Communication} tab, and then change "Serial(Ethernet)" to "Normal(TCP)".

5. Press {Apply} on the bottom right, and then select {Close} to close the window.

6. On the layout window, press {Data save}, and then select {OK}.

7. In the top menu bar, select "Function", and then select "System restart". Select {OK} on the system restart window to restart the FH.

8. After the system restarts, open the system settings window (same as step 2).
9. From the menu tree on the left, select "Ethernet(Normal(TCP))".

10. In "Address setting 2", select "Use the following IP address", and set "IP address", "Subnet mask", "Default gateway", and "DNS server" as shown below. In "Input/Output setting", check that "Input port No." is set to "9876", and then press {OK}.

Table 3-2: Ethernet Settings

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP address</td>
<td>192.168. 0. 10</td>
</tr>
<tr>
<td>Subnet mask</td>
<td>255.255. 0.000</td>
</tr>
<tr>
<td>Default gateway</td>
<td>192.168. 0. 0</td>
</tr>
<tr>
<td>DNS server</td>
<td>192.168. 0.255</td>
</tr>
</tbody>
</table>

* This image is for the DX200.

11. Press {Apply} on the bottom right, and then select {Close} to close the window.
12. In the top menu bar, select "Window", and then select "Layout setup".

13. For the all layout settings being used during communications, set "Output" to "ON", and then select {OK} to close the window.

14. Save the data to the system (same as step 6).
3.2.2 Detection Scene Settings

Perform settings for each detection scene.

1. Create detection processing according to the targeted application.

2. On the layout window, select (Edit flow) to open the edit flow window.

3. On the Edit flow window, add a "Data Output" unit to the end of the flow.

4. Select the icon of the "Data Output" unit to open the setting window.

5. On the "Output data" of the (Setting) tab, for each workpiece, set the following four data items in sequence. By adding serial data output units, up to 20 workpieces with 80 data items can be specified.
6. Select the {Output format} tab, and select "Ethernet" for "Communication method", "Binary" for "Format setting", and "Refer System(Ethernet)" for "Output IP address setting".

7. At the bottom of the window, select {OK} to complete the data output setup.

8. Return to the edit flow window, and then select {Close} to close the edit flow window.

9. Return to the layout window, press {Data save}, and then select {OK}.
3.2.3 Settings for Operation

Perform settings for automatic operation after turning ON the power.

1. In the top menu bar, select "Tool" - "System Settings".

2. From the menu tree on the left, select "Startup setting".

3. Select the {Basic} tab, and then select the layout, which is expected to show at the starting, from the "Startup layout".

4. Also, to startup with a specific detection scene and scene group, check the check box of "Specify startup scene, scene group" in "Scene", and then set a specific condition to each "Scene group" and "Scene".

5. At the bottom right of the window, press {Apply}, and then select {Close} on the bottom to close the window.
6. Return to the layout window, press {Data save}, and then select {OK}.
3.3 DX200/FS100 Setup

The DX200/FS100-side setup procedures are shown below.

### 3.3.1 Ethernet Settings

Change the IP address of the DX200/FS100.

1. Start in maintenance mode, and then change the setting of the security mode to management mode.

2. From the Main Menu, select {SYSTEM} - {SETUP}.

3. Enter the IP address:
   - DX200: {OPTION FUNCTION} - {NETWORK} - {HOST SETUP} - {IP ADDRESS}.
   - FS100: {NETWORK} - {IP ADDRESS}.

* This image is for the DX200.

**NOTE**

This procedure is for the DX200/FS100 with the enabled vision function. If the vision function is not enabled, contact your YASKAWA representative. The contact information is found on the back cover of this manual.
3.3 DX200/FS100 Setup

4. DX200: Press [Enter] twice to apply the changes.
   FS100: Press [Enter] once to apply the changes.

3.3.2 Parameter Settings

Change the setting of the security mode to the management mode, and then change the following parameters.

Table 3-3: List of Devices

<table>
<thead>
<tr>
<th>Connection method</th>
<th>Parameter</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMRON FH series (for Ethernet)</td>
<td>RS109</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>RS460</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>RS461</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>RS462</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>RS463</td>
<td>0</td>
</tr>
</tbody>
</table>

When changing the IP address for the OMRON FH series, enter the IP address into values "RS460 - 463".

(Ex) When the IP address for the OMRON FH series is changed to 192.168.0.11, set the values as follows:
RS460 = 192, RS461 = 168, RS462 = 0, RS463 = 11
3.3.3 Vision Condition File Settings

For the data to be detected, perform settings for the vision condition file.

The vision condition file is only applied when the FIND tag of VSTART is set as in chapter 3.4.1 “Sensor Commands”.

1. From the Main Menu on the left window of the Programing Pendant, select (OPTION) - (VISION COND.).

2. Select the "COORDINATE" box to change the setting to "PIXEL".

3. Input the number of the workpieces, which the output setting is performed at the vision side, into "RESULT MAX NO.".

4. For each variable in "< VARIABLE FOR RESULT >", input the variable number that saves the vision result. It is not necessary to enter any numbers when each initial value does not need to be changed.

When the number of workpieces is two or more, the < VARIABLE FOR RESULT > numbers will be used as the first part of a series of numbers for saving data. Confirm that there are enough consecutive empty spaces for the variables.

(Ex) When the RESULT MAX NO. is 5:
Data storage location is P110 to 114, I090 to 94, R090 to 94. Confirm that five consecutive variables are available.
3.3.4 Variable Initialization

Perform setting variables for storing detection data.

1. From the Main Menu on the left window of the Programming Pendant, select (VARIABLE) - (POSITION(ROBOT)).

![Image of Programming Pendant showing VARIABLE and POSITION(ROBOT)]

2. In (Page) - (P=), input the P variable that was set in chapter 3.3.3 "Vision Condition File Settings".

![Image of Programming Pendant showing page selection]  

3. Select ******** next to the variable number, and then change it to "BASE".

![Image of Programming Pendant showing variable selection and "BASE" change]  

4. When the number of workpieces is two or more, change all the storage locations to "BASE".

![Image of Programming Pendant showing multiple storage locations]  

**NOTE**

After performing the camera calibration with using the vision system, change "BASE" to "USER", and change the value to a user coordinate number.
3.4 List of Robot Language (INFORM III) Commands

This chapter describes INFORM for the OMRON FH series.

3.4.1 Sensor Commands

VSTART

- **Function**
  Executes processing for OMRON FH series.

- **Format**

- **Explanation**

<table>
<thead>
<tr>
<th>Function tag</th>
<th>Additional tag</th>
<th>Processing details</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIND</td>
<td>FT: FIND TYPE number</td>
<td>After switching to the &quot;FT&quot; scene number, the image and the detection results are acquired. *Maximum 20 individual detection results</td>
</tr>
<tr>
<td></td>
<td>MD: FIND MODEL number</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VF#: VISION FILE number</td>
<td></td>
</tr>
<tr>
<td>SELCND</td>
<td>CND:</td>
<td>Switches to the &quot;CND&quot; scene group number.</td>
</tr>
<tr>
<td></td>
<td>0 - 31</td>
<td></td>
</tr>
<tr>
<td>CALIB</td>
<td>CALF#:</td>
<td>*CALF# data is used to perform the vision calibration. *No reference in this instruction manual.</td>
</tr>
<tr>
<td></td>
<td>1 - 16</td>
<td></td>
</tr>
</tbody>
</table>
3.4 List of Robot Language (INFORM III) Commands

3.4.1 VWAIT

**Function**
Waits for the end of processing for OMRON FH series.

**Format**

```
VWAIT
```

**Explanation**
Waits until the executed VSTART finishes, and then proceeds to the next command.
VWAIT is used with VSTART as a set.

3.4.2 Usage Example

3.4.2.1 Acquiring Data by Performing Detection in Specified Scene

**Robot Job**

```
JOB:OMRON_FH_FIND
0000 NOP
0001 '1)Initialize variables
0002 CLEAR B090 1
0003 CLEAR I090 1
0004 CLEAR R090 1
0005 SUB P[110] P[110]
0006 '2)VSTART FIND
0007 VSTART FIND FT=0 MD=0 VF#(1)
0008 VWAIT
0009 END
```

**Explanation**

1. Initializes the variable data of the storage destination.
   Even without initializing the variables, the VSTART-VWAIT command will overwrite any data. However, by deleting the previous data beforehand, it is possible to confirm whether the data was correctly stored in case of interrupting the job externally.
   The variable numbers and quantities to initialize are matched to the numbers set in the vision condition file.

2. After loading the scene "0" specified in "FT" in the OMRON FH series, acquiring and processing of the image are performed. The results are saved in the storage destination set in "1" of the vision condition file as specified in "VF#()".

3.4.2.2 Scene Group Switching

- **Robot Job**

  ```plaintext
  JOB:OMRON_FH_SELCOND
  0000  NOP
  0001  '1)VSTART SELCND
  0002  VSTART SELCND CND=0
  0003  VWAIT
  0004  END
  ```

- **Explanation**

  (1) Loads the scene group "0" as specified in "CND" in the OMRON FH series.
4 OMRON FQ2-S Series (for Ethernet Connection)

The procedure for connecting the OMRON FQ2-S series to the DX200/FS100 using an Ethernet cable (Ethernet) is shown below.

**NOTE**

The vision function does not support communication using EtherNet/IP.

### 4.1 System Configuration

An example of the basic system configuration for OMRON FQ2-S series (for Ethernet connection) is shown below.

**SUPPLEMENT**

The following shows the OMRON FQ2-S25010F as an example.

**Fig. 4-1: System Configuration**

![System Configuration Diagram]

**Table 4-1: List of Devices**

<table>
<thead>
<tr>
<th>No.</th>
<th>Required device</th>
<th>Model</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>FQ2-S camera</td>
<td>FQ2-S25010F</td>
<td>1</td>
</tr>
<tr>
<td>②</td>
<td>Switching HUB</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>③</td>
<td>DX200/FS100</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>④</td>
<td>Power supply (24V)</td>
<td>S8VS-12024</td>
<td>1</td>
</tr>
<tr>
<td>⑤</td>
<td>I/O Cable</td>
<td>FQ-WD010</td>
<td>1</td>
</tr>
<tr>
<td>⑥</td>
<td>Ethernet Cable (camera)</td>
<td>FQ-WN010</td>
<td>1</td>
</tr>
<tr>
<td>⑦</td>
<td>Ethernet Cable</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>⑧</td>
<td>Touch finder or PC</td>
<td>FQ2-D30</td>
<td>1</td>
</tr>
</tbody>
</table>
4.2 Vision System Setup

The OMRON FQ2-S series setup procedures are shown below.

**NOTE**
This procedure is for the OMRON FQ2-S series in the factory settings. Any existing changes to the settings must be returned to the default values before performing this procedure.

### 4.2.1 System Settings

Perform the system settings.

1. In Language setting, select {English}, and then select {Yes}.
2. Select the setting camera, and then select {Network}.
3. Set the {Ethernet} as follows.

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP address setting</td>
<td>Fixed</td>
</tr>
<tr>
<td>IP Address</td>
<td>192.168.0.10</td>
</tr>
<tr>
<td>Subnet mask</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td>Default gateway</td>
<td>192.168.0.1</td>
</tr>
</tbody>
</table>

4. Check in the check box of the camera in Sensor List, and then select {OK} to connect to the camera.
5. Push the tool button on the bottom right of window, and then select the {Sensor settings}.

6. Select {Data output} – {No-protocol data}.

7. Setup the No-protocol data as follows, select the {Back} twice, and then select the {OK} in the Data output window.

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comm. Type</td>
<td>No protocol (TCP)</td>
</tr>
<tr>
<td>Input port No.</td>
<td>9876</td>
</tr>
<tr>
<td>Connection mode</td>
<td>TCP server</td>
</tr>
</tbody>
</table>

8. Select {Back} on the bottom right of window, and then select the {YES} in the Save data window to save the settings.

9. Reboot the FQ2-S.
4.2 Vision System Setup

4.2.2 Detection Scene Settings

Perform settings for each detection scene.

1. Create detection processing.

2. Select {Inspect} - {Calculation}.

3. Select the {Expression}, and then set the expression for output data in following sequence. After setting, select the {Back} button twice, and then back to the Setup.

Table 4-4: Required data : data of one workpiece

<table>
<thead>
<tr>
<th>No.</th>
<th>Output data Expression</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>I0.CR*(I0.JG + 1)</td>
<td>work0 : Correlation value</td>
</tr>
</tbody>
</table>

Table 4-5: Added Data : When Acquiring 2 or More Workpieces Data

<table>
<thead>
<tr>
<th>No.</th>
<th>Output data Expression</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I0.CR[1]*(I0.JG[1] + 1)</td>
<td>work1 : Correlation value</td>
</tr>
<tr>
<td>2</td>
<td>I0.CR[2]*(I0.JG[2] + 1)</td>
<td>work2 : Correlation value</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>I0.CR[N]*(I0.JG[N] + 1)</td>
<td>workN : Rotation deviation amount</td>
</tr>
</tbody>
</table>
4.2 Vision System Setup

4. Select the {In/Out} - {I/O setting}.

5. Select the {Output data setting} - {Noprotocol data output} - {Output data set}.

6. Set the data for output data in following sequence, and then select the {Back}.

The following shows the unit of {SEARCH} as an example. For the other units, when the format of the output data matches, output is available.

Table 4-6: Required data : data of one workpiece

<table>
<thead>
<tr>
<th>No.</th>
<th>Output data·Expression</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>I0.X[0]</td>
<td>work0 : X coordinate</td>
</tr>
<tr>
<td>1</td>
<td>I0.Y[0]</td>
<td>work0 : Y coordinate</td>
</tr>
<tr>
<td>2</td>
<td>I0.TH[0]</td>
<td>work0 : Rotation deviation amount</td>
</tr>
<tr>
<td>3</td>
<td>Z1.D00 (Expression 0)</td>
<td>work0 : Correlation value</td>
</tr>
</tbody>
</table>
4.2 Vision System Setup

Table 4-7: Added Data : When Acquiring 2 or More Workpieces data

<table>
<thead>
<tr>
<th>No.</th>
<th>Output data - Expression</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>I0.X[1]</td>
<td>work1 : X coordinate</td>
</tr>
<tr>
<td>5</td>
<td>I0.Y[1]</td>
<td>work1 : Y coordinate</td>
</tr>
<tr>
<td>6</td>
<td>I0.TH[1]</td>
<td>work1 : Rotation deviation amount</td>
</tr>
<tr>
<td>7</td>
<td>Z1.D01 (Expression 1)</td>
<td>work1 : Correlation value</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>4N</td>
<td>I0.X[N]</td>
<td>workN : X coordinate</td>
</tr>
<tr>
<td>4N+1</td>
<td>I0.Y[N]</td>
<td>workN : Y coordinate</td>
</tr>
<tr>
<td>4N+2</td>
<td>I0.TH[N]</td>
<td>workN : Rotation deviation amount</td>
</tr>
<tr>
<td>4N+3</td>
<td>Z1.D[N] (Expression N)</td>
<td>workN : Correlation value</td>
</tr>
</tbody>
</table>

NOTE
It is possible to acquire the data for up to 8 workpieces (n=7). When adding, be sure to add one workpiece with four data items at a time.

7. Select {Output format}, set as following. Then, select {Back}.

Table 4-8: Output format settings

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output form</td>
<td>Binary</td>
</tr>
<tr>
<td>Decimal output form</td>
<td>Fixed point</td>
</tr>
</tbody>
</table>
4.2.3 Setting for Operation

Perform settings for automatic operation after turning ON the power.

1. Push the tool button on the bottom right of window, and then select the {Sensor settings}.

2. Select {Startup settings}.

3. Set the {Select startup scene} as follows.

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startup mode</td>
<td>ON</td>
</tr>
<tr>
<td>Startup scene</td>
<td>0</td>
</tr>
</tbody>
</table>

4. Select the {Back} twice, and then select {YES} in the Save data window.
4.3 DX200/FS100 Setup

The DX200/FS100 setup procedures are shown below.

This procedure is for the DX200/FS100 with the enabled vision function. If the vision function is not enabled, contact your YASKAWA representative. The contact information is found on the back cover of this manual.

4.3.1 Ethernet Settings

Change the IP address of the DX200/FS100.

1. Start in maintenance mode, and then change the setting of the security mode to management mode.

2. From the Main Menu, select {SYSTEM} - {SETUP}.

3. Enter the IP address:
   DX200: {OPTION FUNCTION} - {NETWORK} - {HOST SETUP} - {IP ADDRESS}.
   FS100: {NETWORK} - {IP ADDRESS}.

* This image is for the DX200.
4. DX200: Press [Enter] twice to apply the changes. 
   FS100: Press [Enter] once to apply the changes.

* This image is for the DX200.

### 4.3.2 Parameter Settings

Change the setting of the security mode to the management mode, and then, change the following parameters.

<table>
<thead>
<tr>
<th>Connection method</th>
<th>Parameter</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMRON FQ2-S series (Ethernet)</td>
<td>RS109</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>RS460</td>
<td>0 10</td>
</tr>
<tr>
<td></td>
<td>RS461</td>
<td>0 0</td>
</tr>
<tr>
<td></td>
<td>RS462</td>
<td>0 0</td>
</tr>
<tr>
<td></td>
<td>RS463</td>
<td>0 10</td>
</tr>
</tbody>
</table>

When changing the IP address for the OMRON FQ2-S series, enter the IP address into values “RS460 - 463”.

(Ex) When the IP address for the OMRON FQ2-S series is changed to 192.168.255.10, set the values as follows:

RS460 = 192, RS461 = 168, RS462 = 255, RS463 = 10.
4.3.3 Vision Condition File Settings

For the data to be detected, perform settings for the vision condition file.

1. From the Main Menu on the left window of the Programming Pendant, select {OPTION} - {VISION COND}.

![Main Menu Screen]

2. Select the COORDINATE box to change the setting to {PIXEL}.

3. Input the number of workpieces, which the output setting is performed at the vision side, into {RESULT MAX NO}.

4. For each variable in <VARIABLE FOR RESULT>, input the variable number that saves the vision result. It is not necessary to enter any numbers when each initial value does not need to be changed.

NOTE

When the number of workpieces is two or more, the < VARIABLE FOR RESULT > numbers will be used as the first part of a series of numbers for saving data. Confirm that there are enough consecutive empty spaces for the variables.

(Ex) when the RESULT MAX NO. is 5

Data storage location is P110 to 114, I090 to 114, R090 to 94

Confirm that five consecutive variables are available.
4.3.4 Variable Initialization

Perform setting variables for storing detection data.

1. From the Main Menu on the left window of the Programming Pendant, select (VARIABLE) - (POSITION (ROBOT)).

2. In (Page) - (P=), input the P variable that was set in chapter 4.3.3 “Vision Condition File Settings”.

3. Select "********" next to the variable number, and then change it to "BASE".

4. Select "********" next to the variable number, and then change it to "BASE". When the number of workpieces is two or more, change all the storage locations to "BASE".

NOTE
After performing the camera calibration with using the vision system, change "BASE" to "USER", and change the value to a user coordinate number.
4.4 List of Robot Language (INFORM III) Commands

This chapter describes INFORM for the OMRON FQ2-S series.

4.4.1 Sensor Commands

VSTART

- **Function**
  Executes processing for OMRON FQ2-S series.

- **Format**

```
VSTART - FIND - FT - FIND TYPE - A - B - END

FIND
  - SELCND
  - CALIB

MD
  - FIND MODEL
  - VF#

VISION FILE
```

- **Explanation**

<table>
<thead>
<tr>
<th>Function tag</th>
<th>Additional tag</th>
<th>Processing details</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIND</td>
<td>FT : FIND TYPE number</td>
<td>0 - 31</td>
</tr>
<tr>
<td></td>
<td>MD : FIND MODEL number</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>VF#(): VISION FILE number</td>
<td>1 - 32</td>
</tr>
</tbody>
</table>

**SELCND**

**CALIB**

CALF#():

1  FQ2-S series does not have the scene group function that is used in SELCND tag. Set the tag described in the explanation only.
VWAIT

- **Function**
  Waits for the end of processing for OMRON FQ2-S series.

- **Format**

  ![Diagram](image)

- **Explanation**
  Waits until the executed VSTART finishes, and then proceeds to the next command.
  VWAIT is used with VSTART as a set.

### 4.4.2 Usage Example

#### 4.4.2.1 Acquiring Data by Performing Detection in Specified Scene

- **Robot Job**

<table>
<thead>
<tr>
<th>JOB:OMRON_FQ2S_FIND</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000 NOP</td>
</tr>
<tr>
<td>0001 '1)Initialize variables</td>
</tr>
<tr>
<td>0002 CLEAR B090 1</td>
</tr>
<tr>
<td>0003 CLEAR I090 1</td>
</tr>
<tr>
<td>0004 CLEAR R090 1</td>
</tr>
<tr>
<td>0005 SUB P[110] P[110]</td>
</tr>
<tr>
<td>0006 '2)VSTART FIND</td>
</tr>
<tr>
<td>0007 VSTART FIND FT=0 MD=0 VF#(1)</td>
</tr>
<tr>
<td>0008 VWAIT</td>
</tr>
<tr>
<td>0009 END</td>
</tr>
</tbody>
</table>

- **Explanation**
  1. Initializes the variable data of the storage destination. Even without initializing the variables, the VSTART-VWAIT command will overwrite any data. However, by deleting the previous data beforehand, it is possible to confirm whether the data was correctly stored in case of interrupting the job externally. The variable numbers and quantities to initialize are matched to the numbers set in the vision condition file.
  2. After loading the scene "0" specified in "FT" in the OMRON FQ2-S series, acquiring and processing of the image are performed. The results are saved in the storage destination set in "1" of the vision condition file as specified in "VF# ()".
The procedure for connecting the KEYENCE CV-X100/200 series to the DX200/FS100 using an Ethernet cable (Ethernet) is shown below.

**NOTE**
The vision function does not support communication using EtherNet/IP.

### 5.1 System Configuration

An example of the basic system configuration for KEYENCE CV-X100/200 (for Ethernet connection) is shown below.

The following shows the KEYENCE CV-X100/200 as an example.

### Fig. 5-1: System Configuration

![Diagram of system configuration](image)

### Table 5-1: List of Devices

<table>
<thead>
<tr>
<th>No.</th>
<th>Required device</th>
<th>Model</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Sensor controller</td>
<td>CV-X100/200</td>
<td>1</td>
</tr>
<tr>
<td>②</td>
<td>Camera</td>
<td>CV-035M</td>
<td>1</td>
</tr>
<tr>
<td>③</td>
<td>DX200/FS100</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>④</td>
<td>Power supply (24V)</td>
<td>CA-U3</td>
<td>1</td>
</tr>
<tr>
<td>⑤</td>
<td>Camera cable</td>
<td>CA-CN3</td>
<td>1</td>
</tr>
<tr>
<td>⑥</td>
<td>Ethernet cable</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>⑦</td>
<td>Monitor</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>⑧</td>
<td>Monitor cable (D-sub)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>⑨</td>
<td>Mouse</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**NOTE**
- (The D-sub terminal is required.)
5 KEYENCE CV-X100/200 Series (for Ethernet Connection)
5.2 Vision System Setup

5.2 Vision System Setup

The KEYENCE CV-X100/200 series setup procedures are shown below.

NOTE
This procedure is for the KEYENCE CV-X100/200 series in the factory settings. Any existing changes to the settings must be returned to the default values before performing this procedure.

5.2.1 System Settings

Perform the system settings.

1. In the System Language of the Start Up Settings, change the language to {English}, and then select {Close}.
2. In the Create New window of the program, select {Execute}.
3. From the menu, select {Global} - {Communications & I/O} - {Network}.
4. Perform the network settings as shown below, and then select {OK}.

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Setting value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto-acquire IP Address (BOOTP)</td>
<td>(Clear the check box)</td>
<td>System default value</td>
</tr>
<tr>
<td>IP Address</td>
<td>DX200: 192.168.000.010</td>
<td>System default value</td>
</tr>
<tr>
<td></td>
<td>FS100: 010.000.000.010</td>
<td></td>
</tr>
<tr>
<td>Subnet Mask</td>
<td>255.255.255.000</td>
<td>System default value</td>
</tr>
<tr>
<td>Default Gateway</td>
<td>000.000.000.000</td>
<td>System default value</td>
</tr>
<tr>
<td>Port Non-Procedural (Command/ Result Output)</td>
<td>08500</td>
<td>System default value</td>
</tr>
<tr>
<td>Delimiter</td>
<td>CR</td>
<td>System default value</td>
</tr>
<tr>
<td>Set Trigger-command Response to CV-compatible Mode</td>
<td>(Clear the check box)</td>
<td>System default value</td>
</tr>
</tbody>
</table>
5. Select {Save} on the menu, and then select {OK}.

5.2.2 Detection Scene Settings

Perform settings for each detection scene.
1. Create detection processing.
2. Select {Output} from the menu.
3. Select {Ethernet (Non-Procedure)}, and then select {Select Data}.

4. Set the output data.
5. In Output Data, set the data to output in the following order, and then select {OK}.

The following shows the "Position Adjustment" unit as an example. For the other units, when the format of the output data matches, output is available.

Table 5-3: Required Data: Data for 1 Workpiece

<table>
<thead>
<tr>
<th>No.</th>
<th>Output Data and Expression</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>T100: [Unit Name]. Number</td>
<td>Number of detections</td>
</tr>
<tr>
<td>1</td>
<td>T100: [Unit Name]. Correlation value[0]</td>
<td>Workpiece 0: Correlation value</td>
</tr>
<tr>
<td>2</td>
<td>T100: [Unit Name]. Position X[0]</td>
<td>The following format is also available: Position XY Angle[0]</td>
</tr>
<tr>
<td>3</td>
<td>T100: [Unit Name]. Position Y[0]</td>
<td>Workpiece 0: Y coordinate</td>
</tr>
<tr>
<td>4</td>
<td>T100: [Unit Name]. Angle[0]</td>
<td>Workpiece 0: Rotation offset amount</td>
</tr>
</tbody>
</table>

Table 5-4: Added Data: When Acquiring 2 or More Workpieces Data

<table>
<thead>
<tr>
<th>No.</th>
<th>Output Data and Expression</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>T100: [Unit Name]. Correlation value[1]</td>
<td>Workpiece 1: Correlation value</td>
</tr>
<tr>
<td>6</td>
<td>T100: [Unit Name]. Position X[1]</td>
<td>The following format is also available: Position XY Angle[1]</td>
</tr>
<tr>
<td>7</td>
<td>T100: [Unit Name]. Position Y[1]</td>
<td>Workpiece 1: Y coordinate</td>
</tr>
<tr>
<td>8</td>
<td>T100: [Unit Name]. Angle[1]</td>
<td>Workpiece 1: Rotation offset amount</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>4n+1</td>
<td>T100: [Unit Name]. Correlation value[n]</td>
<td>Workpiece n: Correlation value</td>
</tr>
<tr>
<td>4n+2</td>
<td>T100: [Unit Name]. Position X[n]</td>
<td>The following format is also available: Position XY Angle[n]</td>
</tr>
<tr>
<td>4n+3</td>
<td>T100: [Unit Name]. Position Y[n]</td>
<td>Workpiece n: Y coordinate</td>
</tr>
<tr>
<td>4n+4</td>
<td>T100: [Unit Name]. Angle[n]</td>
<td>Workpiece n: Rotation offset amount</td>
</tr>
</tbody>
</table>

NOTE: It is possible to acquire the data for up to 20 workpieces (n=19). When adding, be sure to add one workpiece with four data items at a time.

6. Set {Comma} for Data Delimiter, and then select {OK}.
7. In the menu, select {Save}, and then select {OK}.
5 KEYENCE CV-X100/200 Series (for Ethernet Connection)
5.3 DX200/FS100 Setup

The DX200/FS100-side setup procedures are shown below.

**5.3.1 Ethernet Settings**

Change the IP address of the DX200/FS100.

1. Start in maintenance mode, and then change the setting of the security mode to the management mode.

2. From the Main Menu, select {SYSTEM} - {SETUP}.

   ![Image](image1)

   * This image is for the DX200.

3. Enter the IP address:
   - DX200: {OPTION FUNCTION} - {NETWORK} - {HOST SETUP} - {IP ADDRESS}.
   - FS100: {NETWORK} - {IP ADDRESS}.

   ![Image](image2)

   * This image is for the DX200.

   **NOTE**

   This procedure is for the DX200/FS100 with the enabled vision function. If the vision function is not enabled, contact your YASKAWA representative. The contact information is found on the back cover of this manual.
5.3 DX200/FS100 Setup

4. DX200: Press [Enter] twice to apply the changes.  
   FS100: Press [Enter] once to apply the changes.

* This image is for the DX200.

5.3.2 Parameter Settings

Change the setting of the security mode to the management mode, and then change the following parameters.

<table>
<thead>
<tr>
<th>Connection method</th>
<th>Parameter</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEYENCE CV-X100/200 series (Ethernet)</td>
<td>RS109</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>RS460</td>
<td>0 10</td>
</tr>
<tr>
<td></td>
<td>RS461</td>
<td>0 0</td>
</tr>
<tr>
<td></td>
<td>RS462</td>
<td>0 0</td>
</tr>
<tr>
<td></td>
<td>RS463</td>
<td>0 10</td>
</tr>
</tbody>
</table>

When changing the IP address for the KEYENCE CV-X100/200 series, enter the IP address into values "RS460 - 463".  
(Ex) When the IP address for the KEYENCE CV-X100/200 series is changed to 192.168.0.11, set the values as follows: RS460 = 192, RS461 = 168, RS462 = 0, RS463 = 11
5.3.3 Vision Condition File Settings

For the data to be detected, perform settings for the vision condition file.

1. From the Main Menu on the left window of the Programming Pendant, select [OPTION] - [VISION COND.].

2. Select the "COORDINATE" box to change the setting to "PIXEL".

3. Input the number of the workpieces, which the output setting is performed at the vision side, into "RESULT MAX NO.".

4. For each variable in "< VARIABLE FOR RESULT >", input the variable number that saves the vision result. It is not necessary to enter any numbers when each initial value does not need to be changed.

When the number of workpieces is two or more, the < VARIABLE FOR RESULT > numbers will be used as the first part of a series of numbers for saving data. Confirm that there are enough consecutive empty spaces for the variables.

(Ex) When the RESULT MAX NO. is 5:
Data storage location is P110 to 114, I090 to 94, R090 to 94. Confirm that five consecutive variables are available.
5.3.4 Variable Initialization

Perform setting variables for storing detection data.

1. From the Main Menu on the left window of the Programming Pendant, select {VARIABLE} - {POSITION(ROBOT)}.

2. In {Page} - {P=}, input the P variable that was set in chapter 5.3.3 “Vision Condition File Settings”.

3. Select "********" next to the variable number, and then change it to "BASE".

4. When the number of workpieces is two or more, change all the storage locations to "BASE".

NOTE
After performing the camera calibration with using the vision system, change "BASE" to "USER", and change the value to a user coordinate number.
5.4 List of Robot Language (INFORM III) Commands

This chapter describes INFORM for the KEYENCE CV-X100/200 series.

5.4.1 Sensor Commands

VSTART

**Function**
Executes processing for KEYENCE CV-X100/200 series.

**Format**

```
VSTART
  | FIND
  | FT
  | FIND TYPE
  | END
  | SELCND
  | CND
  | SCENE NUMBER
  | CALIB
  | CALF#
  | CALIB FILE
  | MD
  | FIND MODEL
  | VF#
  | VISION FILE
```

**Explanation**

<table>
<thead>
<tr>
<th>Function tag</th>
<th>Additional tag</th>
<th>Processing details</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIND</td>
<td>FT: FIND TYPE number</td>
<td>Performs taking images and acquiring the detection results. * Maximum number of detection: 20</td>
</tr>
<tr>
<td></td>
<td>MD: FIND MODEL number</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VF#: VISION FILE number</td>
<td></td>
</tr>
<tr>
<td>0 0 1 - 32</td>
<td>1 - 32</td>
<td></td>
</tr>
</tbody>
</table>

| SELCND       | CND:            | Switches to the inspection setting number of "CND". |
|              | 0 - 255         |                      |

| CALIB        | CALF#:          | "CALF#" data is used to perform the vision calibration. * No reference in this instruction manual. |
|              | 1 - 16          |                      |

1 If executed using a number not shown in the explanation, an alarm 4124: WRONG EXECUTION OF VISION INST "11" occurs. Set the number described in the explanation only.
5.4 List of Robot Language (INFORM III) Commands

VWAIT

- **Function**
  Waits for the end of processing for KEYENCE CV-X100/200 series.

- **Format**
  ```
  VWAIT       END
  ```

- **Explanation**
  Waits until the executed VSTART finishes, and then proceeds to the next command.
  VWAIT is used with VSTART as a set.

### 5.4.2 Usage Example

#### 5.4.2.1 Acquiring Data by Performing Detection in Specified Scene

- **Robot Job**

  ```
  JOB:OMRON_CV-X_FIND_FIND
  0000     NOP
  0001    '1)Initialize variables
  0002     CLEAR B090 1
  0003     CLEAR I090 1
  0004     CLEAR R090 1
  0005     SUB P[110] P[110]
  0006    '2)VSTART FIND
  0007     VSTART FIND FT=0 MD=0 VF#(1)
  0008     VWAIT
  0009     END
  ```

- **Explanation**
  1. Initializes the variable data of the storage destination.
     Even without initializing the variables, the VSTART-VWAIT command will overwrite any data. However, by deleting the previous data beforehand, it is possible to confirm whether the data was correctly stored in case of interrupting the job externally.
     The variable numbers and quantities to initialize are matched to the numbers set in the vision condition file.
  2. For KEYENCE CV-X100/200 series, taking images and acquiring the detection results are performed with using the currently opened inspection setting. Then, the results are stored in the storage destination set in the "1" vision condition file as specified in "VF#()".
5.4.2.2 Switching to the Operation/Stop Mode

- **Robot Job (Operation mode)**

```plaintext
JOB:KEYENCE_CV-X_FIND_MD2
0000  NOP
0001  '1)VSTART FIND
0002  VSTART FIND FT=0 MD=2 VF#(1)
0003  VWAIT
0004  END
```

- **Robot Job (Stop mode)**

```plaintext
JOB:KEYENCE_CV-X_FIND_MD2
0000  NOP
0001  '1)VSTART FIND
0002  VSTART FIND FT=0 MD=3 VF#(1)
0003  VWAIT
0004  END
```

- **Explanation**

  (1) Switches the state of the KEYENCE CV-X100/200 to operation mode (or stop mode).
  
  In stop mode, other VSTART commands are not received. When there is a case being stop mode by an external operation, switch to operation mode. Switching to operation mode while already in operation mode, an alarm does not occur. Switching to stop mode while already in stop mode, an alarm does not also occur.

5.4.2.3 Switching the Inspection Settings

- **Robot Job**

```plaintext
JOB:KEYENCE_CV-X_SELCND
0000  NOP
0001  '1)VSTART SELCND
0002  VSTART SELCND CND=0
0003  VWAIT
0004  END
```

- **Explanation**

  (1) Loads the inspection setting number "0", which specified in "CND", in the KEYENCE CV-X100/200 series.
6 KEYENCE XG-8000 Series (for Ethernet Connection)

The procedure for connecting the KEYENCE XG-8000 to the DX200/FS100 using an Ethernet cable (Ethernet) is shown below.

**NOTE**
The vision function does not support communication using EtherNet/IP.

6.1 System Configuration

An example of the basic system configuration for KEYENCE XG-8000 (for Ethernet connection) is shown below.

The following shows the KEYENCE XG-8000 as an example.

**Fig. 6-1: System Configuration**

<table>
<thead>
<tr>
<th>No.</th>
<th>Required device</th>
<th>Model</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Sensor controller</td>
<td>XG-8000</td>
<td>1</td>
</tr>
<tr>
<td>②</td>
<td>Camera</td>
<td>XG-035M</td>
<td>1</td>
</tr>
<tr>
<td>③</td>
<td>DX200/FS100</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>④</td>
<td>Power supply (24V)</td>
<td>CA-U3</td>
<td>1</td>
</tr>
<tr>
<td>⑤</td>
<td>Camera cable</td>
<td>CA-CN3</td>
<td>1</td>
</tr>
<tr>
<td>⑥</td>
<td>Ethernet cable</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>⑦</td>
<td>Monitor</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>⑧</td>
<td>Monitor cable (D-sub)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>⑨</td>
<td>Console</td>
<td>OP-84231</td>
<td>1</td>
</tr>
</tbody>
</table>
6.2 Vision System Setup

The KEYENCE XG-8000 series setup procedures are shown below.

### 6.2.1 System Settings

Perform the system settings.

1. In the System Language of the Start Up Settings, change the language to **English**, and then select **Close**.

2. Press [1 (Function)] on the console, and then from the Function menu, select **Go Offline**.

3. From the System Configuration, select **Communications & I/O** - **(Ethernet (TCP/IP))**.

**NOTE**

This procedure is for the KEYENCE XG-8000 series in the factory settings. Any existing changes to the settings must be returned to the default values before performing this procedure.
4. Set the Ethernet as shown below, and then select {OK} at the bottom of the window.

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Setting value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP address</td>
<td>DX200: 192.168.000.010</td>
<td>System default value</td>
</tr>
<tr>
<td></td>
<td>FS100: 010.000.000.010</td>
<td></td>
</tr>
<tr>
<td>Subnet mask</td>
<td>255.255.255.000</td>
<td>System default value</td>
</tr>
<tr>
<td>Default gateway</td>
<td>000.000.000.000</td>
<td>System default value</td>
</tr>
<tr>
<td>Enable BOOTP</td>
<td>(Clear the check box)</td>
<td>System default value</td>
</tr>
<tr>
<td>Port Command &amp; Data Output</td>
<td>08500</td>
<td>System default value</td>
</tr>
<tr>
<td>Start Delimiter</td>
<td>None</td>
<td>System default value</td>
</tr>
<tr>
<td>End Delimiter</td>
<td>CR</td>
<td>System default value</td>
</tr>
<tr>
<td>Use individual delimiters per function</td>
<td>(Clear the check box)</td>
<td>System default value</td>
</tr>
<tr>
<td>CV Compatible Trigger Response</td>
<td>(Clear the check box)</td>
<td>System default value</td>
</tr>
</tbody>
</table>

* This image is for the DX200.
5. Return to the System Configuration, select “Go Online”.

6. Press [1 (Function)] on the console, select “Save Program” on the Function menu, and then select {OK}.

6.2 Detection Scene Settings

Perform settings for each detection scene.

1. Lower the [RUN/STOP] bar once on the console, and then on the confirmation window, select (OK) to open the edit flow window.

2. Create detection processing.

3. At the end of the processing flow, select "Output", and then add the "Data Output" unit.
4. Select the added data output unit.
5. Set "Ethernet (TCP/IP)" for Device.
6. In Output Data, set the data to output in the following order.

The following shows the {ShapeTrax2} unit as an example. For the other units, when the format of the output data matches, output is available.

Table 6-3: Required Data: Data for 1 Workpiece

<table>
<thead>
<tr>
<th>No.</th>
<th>Output Data and Expression</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>RSLT.N:MS</td>
<td>Number of detections</td>
</tr>
<tr>
<td>1</td>
<td>RSLT.C[0]:MS</td>
<td>Workpiece 0: Correlation value</td>
</tr>
<tr>
<td>2</td>
<td>RSLT.X[0]:MS</td>
<td>Workpiece 0: X coordinate</td>
</tr>
<tr>
<td>3</td>
<td>RSLT.Y[0]:MS</td>
<td>Workpiece 0: Y coordinate</td>
</tr>
<tr>
<td>4</td>
<td>RSLT.T[0]:MS</td>
<td>Workpiece 0: Rotation offset amount</td>
</tr>
</tbody>
</table>

Table 6-4: Added Data: When Acquiring 2 or More Workpieces Data

<table>
<thead>
<tr>
<th>No.</th>
<th>Output Data and Expression</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>RSLT.C[1]:MS</td>
<td>Workpiece 1: Correlation value</td>
</tr>
<tr>
<td>6</td>
<td>RSLT.X[1]:MS</td>
<td>Workpiece 1: X coordinate</td>
</tr>
<tr>
<td>7</td>
<td>RSLT.Y[1]:MS</td>
<td>Workpiece 1: Y coordinate</td>
</tr>
<tr>
<td>8</td>
<td>RSLT.T[1]:MS</td>
<td>Workpiece 1: Rotation offset amount</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td>...</td>
</tr>
<tr>
<td>4n+1</td>
<td>RSLT.C[n]:MS</td>
<td>Workpiece n: Correlation value</td>
</tr>
<tr>
<td>4n+2</td>
<td>RSLT.X[n]:MS</td>
<td>Workpiece n: X coordinate</td>
</tr>
<tr>
<td>4n+3</td>
<td>RSLT.Y[n]:MS</td>
<td>Workpiece n: Y coordinate</td>
</tr>
<tr>
<td>4n+4</td>
<td>RSLT.T[n]:MS</td>
<td>Workpiece n: Rotation offset amount</td>
</tr>
</tbody>
</table>

It is possible to acquire the data for up to 20 workpieces (n=19). When adding, be sure to add one workpiece with four data items at a time.

7. Set {Comma} for Data Delimiter.

8. At the bottom of the window, press {Save} to refresh the flow settings.
6.3 DX200/FS100 Setup

The DX200/FS100-side setup procedures are shown below.

**6.3.1 Ethernet Settings**

Change the IP address of the DX200/FS100.

1. Start in maintenance mode, and then change the setting of the security mode to the management mode.

2. From the Main Menu, select **{SYSTEM} - {SETUP}.**

![Image](image_url)

* This image is for the DX200.

3. Enter the IP address:
   - DX200: **{OPTION FUNCTION} - {NETWORK} - {HOST SETUP} - {IP ADDRESS}**
   - FS100: **{NETWORK} - {IP ADDRESS}**

![Image](image_url)

* This image is for the DX200.

**NOTE**

This procedure is for the DX200/FS100 with the enabled vision function. If the vision function is not enabled, contact your YASKAWA representative. The contact information is found on the back cover of this manual.
6.3 DX200/FS100 Setup

4. DX200: Press [Enter] twice to apply the changes.
   FS100: Press [Enter] once to apply the changes.

* This image is for the DX200.

6.3.2 Parameter Settings

Change the setting of the security mode to the management mode, and then change the following parameters.

**Table 6-5: List of Devices**

<table>
<thead>
<tr>
<th>Connection method</th>
<th>Parameter</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEYENCE XG-8000 series (Ethernet)</td>
<td>RS109</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>RS460</td>
<td>0, 10</td>
</tr>
<tr>
<td></td>
<td>RS461</td>
<td>0, 0</td>
</tr>
<tr>
<td></td>
<td>RS462</td>
<td>0, 0</td>
</tr>
<tr>
<td></td>
<td>RS463</td>
<td>0, 10</td>
</tr>
</tbody>
</table>

*When changing the IP address for the KEYENCE XG-8000 series, enter the IP address into values "RS460 - 463".*

*(Ex) When the IP address for the KEYENCE XG-8000 series is changed to 192.168.255.10, set the values as follows: RS460 = 192, RS461 = 168, RS462 = 255, RS463 = 10*
6.3.3 Vision Condition File Settings

For the data to be detected, perform settings for the vision condition file.

The vision condition file is only applied when the FIND tag of VSTART is set as in chapter 6.4.1 “Sensor Commands”.

1. From the Main Menu on the left window of the Programming Pendant, select {OPTION} - {VISION COND.}.

2. Select the "COORDINATE" box to change the setting to "PIXEL".

3. Input the number of the workpieces, which the output setting is performed at the vision side, into "RESULT MAX NO."

4. For each variable in "< VARIABLE FOR RESULT >", input the variable number that saves the vision result. It is not necessary to enter any numbers when each initial value does not need to be changed.

When the number of workpieces is two or more, the < VARIABLE FOR RESULT > numbers will be used as the first part of a series of numbers for saving data. Confirm that there are enough consecutive empty spaces for the variables.

(Ex) When the RESULT MAX NO. is 5: Data storage location is P110 to 114, I090 to 94, R090 to 94. Confirm that five consecutive variables are available.
6.3.4 Variable Initialization

Perform setting variables for storing detection data.

1. From the Main Menu on the left window of the Programing Pendant, select {VARIABLE} - {POSITION(ROBOT)}.

2. In {Page} - {P=}, input the P variable that was set in chapter 6.3.3 "Vision Condition File Settings".

3. Select "********" next to the variable number, and then change it to "BASE".

4. When the number of workpieces is two or more, change all the storage locations to "BASE".

**NOTE**

After performing the camera calibration with using the vision system, change "BASE" to "USER", and change the value to a user coordinate number.
6.4 List of Robot Language (INFORM III) Commands

This chapter describes INFORM for the KEYENCE XG-8000 series.

6.4.1 Sensor Commands

**VSTART**

- **Function**
  Executes processing for KEYENCE XG-8000 series.

- **Format**

  ![Diagram of VSTART](image)

- **Explanation**

<table>
<thead>
<tr>
<th>Function tag</th>
<th>Additional tag</th>
<th>Processing details</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIND</td>
<td>FT: FIND TYPE number</td>
<td>Performs taking images and acquiring the detection results. *Maximum number of detection: 20</td>
</tr>
<tr>
<td></td>
<td>MD: FIND MODEL number¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VF#: VISION FILE number</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1 - 32</td>
</tr>
<tr>
<td>1 - 127²)</td>
<td>1</td>
<td>1 - 32</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>1 - 32</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>1 - 32</td>
</tr>
<tr>
<td>SELCND</td>
<td>CND:</td>
<td>Switches to the operation mode.</td>
</tr>
<tr>
<td></td>
<td>0 - 255</td>
<td></td>
</tr>
<tr>
<td>CALIB</td>
<td>CALF#:</td>
<td>&quot;CALF#&quot; data is used to perform the vision calibration. *No reference in this instruction manual.</td>
</tr>
<tr>
<td></td>
<td>1 - 16</td>
<td></td>
</tr>
</tbody>
</table>

¹ If executed using a number not shown in the explanation, an alarm 4124: WRONG EXECUTION OF VISION INST [11] occurs. Set the number described in the explanation only.

² Custom command with a return value set cannot be used.
VWAIT

- **Function**
  Waits for the end of processing for KEYENCE XG-8000 series.

- **Format**
  ![VWAIT Diagram](image)

- **Explanation**
  Waits until the executed VSTART finishes, and then proceeds to the next command. VWAIT is used with VSTART as a set.

### 6.4.2 Usage Example

#### 6.4.2.1 Acquiring the Data by Detecting

- **Robot Job**

  ```
  JOB:KEYENCE_XG_FIND_MD0
  0000  NOP
  0001  '1)Initialize variables
  0002  CLEAR B090 1
  0003  CLEAR I090 1
  0004  CLEAR R090 1
  0005  SUB P[110] P[110]
  0006  '2)VSTART FIND
  0007  VSTART FIND FT=0 MD=0 VF#(1)
  0008  VWAIT
  0009  END
  ```

- **Explanation**
  1. Initializes the variable data of the storage destination. Even without initializing the variables, the VSTART-VWAIT command will overwrite any data. However, by deleting the previous data beforehand, it is possible to confirm whether the data was correctly stored in case of interrupting the job externally. The variable numbers and quantities to initialize are matched to the numbers set in the vision condition file.

  2. For KEYENCE XG-8000 series, taking images and acquiring the detection results are performed with using the currently opened inspection setting. Then, the results are stored in the storage destination set in the "1" vision condition file as specified in "VF#()".
6.4.2.2 Executing a Screen Capture Using Custom Commands

- **Robot Job (Screen capture)**

  ```
  JOB:KEYENCE_XG_FIND_MD2
  0000   NOP
  0001   '1)VSTART FIND
  0002   VSTART FIND FT=9 MD=1 VF#(1)
  0003   VWAIT
  0004   END
  ```

  **Explanation**
  (1) Executes the custom command No. 9 (screen capture) registered to the KEYENCE XG-8000. The screen capture is an example in custom commands. It is also possible to execute processings registered to other command numbers.

  **NOTE**
  With this command, executing a command is only available. Do not set a command to which a return value is set.

6.4.2.3 Switching to the Operation/Stop Mode

- **Robot Job (Operation mode)**

  ```
  JOB:KEYENCE_XG_FIND_MD2
  0000   NOP
  0001   '1)VSTART FIND
  0002   VSTART FIND FT=0 MD=2 VF#(1)
  0003   VWAIT
  0004   END
  ```

- **Robot Job (Stop mode)**

  ```
  JOB:KEYENCE_XG_FIND_MD2
  0000   NOP
  0001   '1)VSTART FIND
  0002   VSTART FIND FT=0 MD=3 VF#(1)
  0003   VWAIT
  0004   END
  ```

  **Explanation**
  (1) Switches the state of the KEYENCE XG-8000 to operation mode (or stop mode).
  In stop mode, other VSTART commands are not received. When there is a case being stop mode by an external operation, switch to operation mode. Switching to operation mode while already in operation mode, an alarm does not occur. Switching to stop mode while already in stop mode, an alarm does not also occur.
6.4.2.4 Switching the Inspection Settings

- **Robot Job**

```
JOB:KEYENCE_XG_SELCND
0000  NOP
0001  '1)VSTART SELCND
0002  VSTART SELCND CND=0
0003  VWAIT
0004  END
```

- **Explanation**

  (1) Loads the inspection setting number "0", which specified in "CND", in the KEYENCE XG-8000 series.
KEYENCE XG-X2000 Series (for Ethernet Connection)

The procedure for connecting the KEYENCE XG-X2000 to the DX200/FS100 using an Ethernet cable (Ethernet) is shown below.

**NOTE**
The vision function does not support communication using EtherNet/IP.

### 7.1 System Configuration

An example of the basic system configuration for KEYENCE XG-X2000 (for Ethernet connection) is shown below.

The following shows the KEYENCE XG-X2000 as an example.

**Fig. 7-1: System Configuration**

![System Configuration Diagram](image)

**Table 7-1: List of Devices**

<table>
<thead>
<tr>
<th>No.</th>
<th>Required device</th>
<th>Model</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sensor controller</td>
<td>XG-X2000</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Camera</td>
<td>XG-035M</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>DX200/FS100</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Power supply (24V)</td>
<td>CA-U3</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Camera cable</td>
<td>CA-CN3</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Ethernet cable</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Monitor (The D-sub terminal is required.)</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Monitor cable (D-sub)</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Mouse</td>
<td>OP-87506</td>
<td>1</td>
</tr>
</tbody>
</table>
### 7.2 Vision System Setup

The KEYENCE XG-X2000 series setup procedures are shown below.

**NOTE**

This procedure is for the KEYENCE XG-X2000 series in the factory settings. Any existing changes to the settings must be returned to the default values before performing this procedure.

#### 7.2.1 System Settings

Perform the system settings.

1. In the System Language of the Start Up Settings, change the language to {English}, and then select {Close}.
2. Select {Global} -> {Communications & I/O} -> {Ethernet (TCP/IP)}.
3. Perform the Ethernet settings as shown below, and then select {OK} at the bottom of the window.

**Table 7-2: Ethernet Settings**

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Setting value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP address</td>
<td>DX200: 192.168.000.010</td>
<td>System default value</td>
</tr>
<tr>
<td></td>
<td>FS100: 010.000.000.010</td>
<td></td>
</tr>
<tr>
<td>Subnet mask</td>
<td>255.255.255.000</td>
<td>System default value</td>
</tr>
<tr>
<td>Default gateway</td>
<td>000.000.000.000</td>
<td>System default value</td>
</tr>
<tr>
<td>Enable BOOTP</td>
<td>(Clear the check box)</td>
<td>System default value</td>
</tr>
<tr>
<td>Port Command &amp; Data Output</td>
<td>08500</td>
<td>System default value</td>
</tr>
<tr>
<td>Start Delimiter</td>
<td>None</td>
<td>System default value</td>
</tr>
<tr>
<td>End Delimiter</td>
<td>CR</td>
<td>System default value</td>
</tr>
<tr>
<td>Use individual delimiters per function</td>
<td>(Clear the check box)</td>
<td>System default value</td>
</tr>
<tr>
<td>CV Compatible Trigger Response</td>
<td>(Clear the check box)</td>
<td>System default value</td>
</tr>
</tbody>
</table>
4. Select {Global} -> {System settings} -> {Startup Settings} at the top of window.

5. Set {Run Mode} for Startup Mode and {Screen} for Startup Screen.

6. Select {Save} at the top of window, and then select {OK}.
7.2.2 Detection Scene Settings

Perform settings for each detection scene.

1. Create detection processing.
2. At the end of the processing flow, select {Output}, and then add the {Data Output} unit.
3. Select the added data output unit.
4. Set {Ethernet (TCP/IP)} for Device.

5. In Output Data, set the data to output in the following order.

   The following shows the {ShapeTrax3} unit as an example. For the other units, when the format of the output data matches, output is available.

   **Table 7-3: Required Data: Data for 1 Workpiece**

<table>
<thead>
<tr>
<th>No.</th>
<th>Output Data and Expression</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>RSLT.N:MS</td>
<td>Number of detections</td>
</tr>
<tr>
<td>1</td>
<td>RSLT.C[0]:MS</td>
<td>Workpiece 0: Correlation value</td>
</tr>
<tr>
<td>2</td>
<td>RSLT.X[0]:MS</td>
<td>The following format is also available: RSLT.XYT[0]:MS</td>
</tr>
<tr>
<td>3</td>
<td>RSLT.Y[0]:MS</td>
<td>Workpiece 0: Y coordinate</td>
</tr>
<tr>
<td>4</td>
<td>RSLT.T[0]:MS</td>
<td>Workpiece 0: Rotation offset amount</td>
</tr>
</tbody>
</table>
Table 7-4: Added Data: When Acquiring 2 or More Workpieces Data

<table>
<thead>
<tr>
<th>No.</th>
<th>Output Data and Expression</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>RSLT.C[1]:MS</td>
<td>Workpiece 1: Correlation value</td>
</tr>
<tr>
<td>6</td>
<td>RSLT.X[1]:MS</td>
<td>Workpiece 1: X coordinate</td>
</tr>
<tr>
<td>7</td>
<td>RSLT.Y[1]:MS</td>
<td>Workpiece 1: Y coordinate</td>
</tr>
<tr>
<td>8</td>
<td>RSLT.T[1]:MS</td>
<td>Workpiece 1: Rotation offset amount</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>4n+1</td>
<td>RSLT.C[n]:MS</td>
<td>Workpiece n: Correlation value</td>
</tr>
<tr>
<td>4n+2</td>
<td>RSLT.X[n]:MS</td>
<td>Workpiece n: X coordinate</td>
</tr>
<tr>
<td>4n+3</td>
<td>RSLT.Y[n]:MS</td>
<td>Workpiece n: Y coordinate</td>
</tr>
<tr>
<td>4n+4</td>
<td>RSLT.T[n]:MS</td>
<td>Workpiece n: Rotation offset amount</td>
</tr>
</tbody>
</table>

**NOTE**
It is possible to acquire the data for up to 20 workpieces (n=19). When adding, be sure to add one workpiece with four data items at a time.

6. Set {Comma} for Data Delimiter.
7. At the bottom of the window, select {Save} to refresh the flow settings, and then select {OK}.
8. At the upper right of window, select {Run Mode} to change Run Mode.
7.3 DX200/FS100 Setup

The DX200/FS100 setup procedures are shown below.

### 7.3.1 Ethernet Settings

Change the IP address of the DX200/FS100.

1. Start in maintenance mode, and then change the setting of the security mode to the management mode.

2. From the Main Menu, select {SYSTEM} - {SETUP}.

3. Enter the IP address:
   - DX200: {OPTION FUNCTION} - {NETWORK} - {HOST SETUP} - {IP ADDRESS}.
   - FS100: {NETWORK} - {IP ADDRESS}.

* This image is for the DX200.
4. DX200: Press [Enter] twice to apply the changes. 
   FS100: Press [Enter] once to apply the changes.

* This image is for the DX200.

### 7.3.2 Parameter Settings

Change the setting of the security mode to the management mode, and then, change the following parameters.

![Image](image)

<table>
<thead>
<tr>
<th>Connection method</th>
<th>Parameter</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEYENCE XG-X2000 series (Ethernet)</td>
<td>RS109</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>RS460</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>RS461</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>RS462</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>RS463</td>
<td>0</td>
</tr>
</tbody>
</table>

When changing the IP address for the KEYENCE XG-X2000 series, enter the IP address into values “RS460 - 463”.

(Ex) When the IP address for the KEYENCE XG-X2000 series is changed to 192.168.255.10, set the values as follows: RS460 = 192, RS461 = 168, RS462 = 255, RS463 = 10.
7.3.3 Vision Condition File Settings

For the data to be detected, perform settings for the vision condition file.

The vision condition file is only applied when the FIND tag of VSTART is set as in chapter 7.4.1 “Sensor Commands”.

1. From the Main Menu on the left window of the Programing Pendant, select [OPTION] - [VISION COND].

2. Select the COORDINATE box to change the setting to [PIXEL].

3. Input the number of workpieces, which the output setting is performed at the vision side, into [RESULT MAX NO].

4. For each variable in <VARIABLE FOR RESULT>, input the variable number that saves the vision result. It is not necessary to enter any numbers when each initial value does not need to be changed.

When the number of workpieces is two or more, the < VARIABLE FOR RESULT > numbers will be used as the first part of a series of numbers for saving data. Confirm that there are enough consecutive empty spaces for the variables.

(Ex) when the RESULT MAX NO. is 5
Data storage location is P110 to 114, I090 to 114, R090 to 94
Confirm that five consecutive variables are available.
7.3.4 Variable Initialization

Perform setting variables for storing detection data.

1. From the Main Menu on the left window of the Programing Pendant, select {VARIABLE} - {POSITION(ROBOT)}.

2. In {Page} - {P=}, input the P variable that was set in chapter 7.3.3 “Vision Condition File Settings”.

3. Select {********} next to the variable number, and then change it to {BASE}.

4. When the number of workpieces is two or more, change all the storage locations to {BASE}.

NOTE
After performing the camera calibration with using the vision system, change {BASE} to {USER}, and change the value to a user coordinate number.
7.4 List of Robot Language (INFORM III) Commands

This chapter describes INFORM for the KEYENCE XG-X2000 series.

7.4.1 Sensor Commands

VSTART

- **Function**
  Executes processing for KEYENCE XG-X2000 series.

- **Format**

- **Explanation**

<table>
<thead>
<tr>
<th>Function tag</th>
<th>Additional tag</th>
<th>Processing details</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIND</td>
<td>FT: FIND TYPE number</td>
<td>Performs taking images and acquiring the detection results. * Maximum number of detection: 20</td>
</tr>
<tr>
<td></td>
<td>MD: FIND MODEL number</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1 - 32</td>
</tr>
<tr>
<td>1 - 127</td>
<td>1</td>
<td>1 - 32</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1 - 32</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1 - 32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SELCND</th>
<th>CND:</th>
<th>Switches to the inspection setting number of &quot;CND&quot;.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 255</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CALIB</th>
<th>CALF#:</th>
<th>&quot;CALF#&quot; data is used to perform the vision calibration. * No reference in this instruction manual.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 If executed using a number not shown in the explanation, an alarm 4124: WRONG EXECUTION OF VISION INST [11] occurs. Set the number described in the explanation only.

2 Custom instruction with a return value set cannot be used.
VWAIT

- **Function**

- **Format**

  ![VWAIT](image)

- **Explanation**
  Waits until the executed VSTART finishes, and then proceeds to the next command. VWAIT is used with VSTART as a set.

### 7.4.2 Usage Example

#### 7.4.2.1 Acquiring the Data by Detecting

- **Robot Job**

  ```
  JOB:KEYENCE_XGX_FIND_MD0
  0000  NOP
  0001 '1)Initialize variables
  0002  CLEAR B090 1
  0003  CLEAR I090 1
  0004  CLEAR R090 1
  0005  SUB P[110] P[110]
  0006 '2)VSTART FIND
  0007  VSTART FIND FT=0 MD=0 VF#(1)
  0008  VWAIT
  0009  END
  ```

- **Explanation**
  1. Initializes the variable data of the storage destination. Even without initializing the variables, the VSTART-VWAIT command will overwrite any data. However, by deleting the previous data beforehand, it is possible to confirm whether the data was correctly stored in case of interrupting the job externally. The variable numbers and quantities to initialize are matched to the numbers set in the vision condition file.

  2. For KEYENCE XG-X2000 series, taking images and acquiring the detection results are performed with using the currently opened inspection setting. Then, the results are stored in the storage destination set in the {1} vision condition file as specified in {VF#(1)}.
7.4.2.2 Performing the Background setting read by Custom Instruction

- **Setting of Custom Instruction of XG-X2000**
  Before performing the teaching, change Custom Instruction Settings as below.

![Custom Instruction Settings](image)

**Table 7-6: Custom Instruction Settings**

<table>
<thead>
<tr>
<th>Name</th>
<th>Commands and Parameters</th>
<th>Reply</th>
</tr>
</thead>
<tbody>
<tr>
<td>C019</td>
<td>BPL,1,1</td>
<td>Single response</td>
</tr>
<tr>
<td>C021</td>
<td>BPW</td>
<td>Single response</td>
</tr>
</tbody>
</table>

- Load the inspection setting number 1 by background.
  Change the last parameters 1 if load other inspection setting number.

- In case of the use of 2 or more inspection setting number, change commands and parameters of other names and call the name by VSTART instruction. Variable is not able to use.
7.4 List of Robot Language (INFORM III) Commands

- **Robot Job (Background setting read)**

```plaintext
JOB:KEYENCE_XGX_FIND_MD2
0000 NOP
0001 "1)Background setting read
0002 VSTART FIND FT=19 MD=1 VF#(1)
0003 VWAIT
...(Move to detection point or other instructions)
00X0 "2)Perform detection by current inspection setting number
00X1 VSTART FIND FT=0 MD=0 VF#(1)
00X2 VWAIT
00X3 "3)Background setting switch.
00X4 VSTART FIND FT=21 MD=1 VF#(1)
00X5 VWAIT
00X6 "4)Perform detection by loaded setting (number 1)
00X7 VSTART FIND FT=0 MD=0 VF#(2)
00X8 VWAIT
00X9 END
```

- **Explanation**

1. Perform the custom instruction {19: Background setting read} registered in the KEYENCE XG-X2000. Background setting read is an example of custom instructions. Other operations registered in the other number also can be performed.

2. For KEYENCE XG-X2000 series, taking images and acquiring the detection results are performed with using the currently opened inspection setting. Use the vision condition file of {1}.

3. Perform the custom instruction {21: Background setting switch}. It enables to switch settings in a short time by the background setting read in advance.

4. Perform the taking images and acquiring the detection results with the inspection setting switched. By using the vision condition file of {2}, store the data to different variables from the first time.

**NOTE**

With this command, executing a command is only available. Do not set a command to which a return value is set.
7.4.2.3 Switching to the Operation / Stop Mode

**Robot Job (Operation mode)**

```
JOB:KEYENCE_XGX_FIND_MD2
0000 NOP
0001 '1)VSTART FIND
0002 VSTART FIND FT=0 MD=2 VF#(1)
0003 VWAIT
0004 END
```

**Robot Job (Stop mode)**

```
JOB:KEYENCE_XGX_FIND_MD3
0000 NOP
0001 '1)VSTART FIND
0002 VSTART FIND FT=0 MD=3 VF#(1)
0003 VWAIT
0004 END
```

**Explanation**

1. Switches the state of the KEYENCE XG-X2000 to operation mode (or stop mode). In stop mode, other VSTART commands are not received. When there is a case being stop mode by an external operation, switch to operation mode. Switching to operation mode while already in operation mode, an alarm does not occur. Switching to stop mode while already in stop mode, an alarm does not also occur.

7.4.2.4 Switching the Inspection Settings

**Robot Job**

```
JOB:KEYENCE_XGX_SELCND
0000 NOP
0001 '1)VSTART SELCND
0002 VSTART SELCND CND=0
0003 VWAIT
0004 END
```

**Explanation**

1. Loads the inspection setting number "0", which specified in "CND", in the KEYENCE XG-X2000 series.
# Revision History

## 8.1 Contents

<table>
<thead>
<tr>
<th>Revision No.</th>
<th>Contents</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Edition</td>
<td>The devices, described below, are supported.</td>
<td>Jun 3, 2016</td>
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<tr>
<td></td>
<td>- OMRON FH Series</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(for RS-232C Connections/Ethernet Connections)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- KEYENCE CV-X100/200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(for Ethernet Connection)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- KEYENCE XG-8000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(for Ethernet Connection)</td>
<td></td>
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<tr>
<td>&lt;1&gt;</td>
<td>Added supported devices as follows</td>
<td>Aug 29, 2016</td>
</tr>
<tr>
<td></td>
<td>- OMRON FQ2-S series</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(for Ethernet Connection)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- KEYENCE XG-X2000 series</td>
<td></td>
</tr>
</tbody>
</table>
DX200/FS100 OPTIONS
INSTRUCTIONS
FOR VISION FUNCTION
FOR ADDITIONAL MODELS CONNECTION PROCEDURES

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Specifications are subject to change without notice for ongoing product modifications and improvements.

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