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

MOTOMAN INSTRUCTIONS
- MOTOMAN XXXXXX INSTRUCTIONS
- ROBOT CONTROLLER INSTRUCTIONS
- ROBOT CONTROLLER OPERATOR'S MANUAL
- ROBOT CONTROLLER MAINTENANCE MANUAL

The operator’s manual above corresponds to specific usage. Be sure to use the appropriate manual.
MANDATORY

- This system manual provides an overview of the Pro-Face with High Speed Ethernet Server system. It gives general information about the system, a description of its major components, and the procedures for installation, system operation, and programming. Be sure to read and understand this manual thoroughly before installing and operating the Pro-Face with High Speed Ethernet Server system.

- General items related to safety are listed in Section 2 of the Robot Controller Manual. To ensure correct and safe operation, carefully read the Robot Controller Manual before reading this manual.

CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure that 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 a 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 will void product’s warranty.
We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems (ANSI/RIA R15.06-2012). You can obtain this document from the Robotic Industries Association (RIA) at the following address:

Robotic Industries Association
900 Victors Way
P.O. Box 3724
Ann Arbor, Michigan 48106
TEL: (734) 994-6088
FAX: (734) 994-3338
www.roboticsonline.com

Ultimately, well-trained personnel are the best safeguard against accidents and damage that can result from improper operation of the equipment. The customer is responsible for providing adequately trained personnel to operate, program, and maintain the equipment. NEVER ALLOW UNTRAINED PERSONNEL TO OPERATE, PROGRAM, OR REPAIR THE EQUIPMENT!

We recommend approved Yaskawa training courses for all personnel involved with the operation, programming, or repair of the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the Yaskawa Pro-Face with High Speed Ethernet Server display.

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

**WARNING**
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.

**CAUTION**
Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.

**MANDATORY**
Always be sure to follow explicitly the items listed under this heading.

**PROHIBITED**
Must never be performed

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 “CAUTION” and “WARNING.”

---

**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 cabinet of the Robot Controller after use.

The Programming Pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.

- Read and understand the Explanation of Warning Labels in the Robot Controller Manual before operating the Pro-Face with High Speed Ethernet Server.
Definition of Terms Used Often in This Manual

The Motoman manipulator is an Yaskawa industrial robot product.

The manipulator usually consists of the controller, the Programming Pendant, and supply cables.

In this manual, the equipment is designated as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX100, FS100, etc Controller</td>
<td>Robot Controller</td>
</tr>
<tr>
<td>DX100, FS100, etc, Programming Pendant</td>
<td>Programming Pendant</td>
</tr>
<tr>
<td>Cable between the manipulator and the</td>
<td>Manipulator cable</td>
</tr>
<tr>
<td>controller</td>
<td></td>
</tr>
<tr>
<td>Menu</td>
<td>The menus displayed on screen are</td>
</tr>
<tr>
<td></td>
<td>denoted with { }, ex. {TOOL}.</td>
</tr>
<tr>
<td>Button</td>
<td>The buttons, check boxes, radio</td>
</tr>
<tr>
<td></td>
<td>buttons displayed on screen are</td>
</tr>
<tr>
<td></td>
<td>denoted with [ ]. ex. [Close]; [Sync]</td>
</tr>
<tr>
<td></td>
<td>check box; [Fast] radio button.</td>
</tr>
</tbody>
</table>

Description of the Operation Procedure

In the explanation of the operation procedure, the expression “Select • • •” means the following operations:

• To move the cursor to the object item and left-click on it with the mouse.
• To pick out the object item by the tab key and press the [Enter] key.

(In case of selecting a menu, use arrow keys instead of the tab key to pick out the object item, then press the [Enter] key.)

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and TM are omitted.
Explanation of Warning Labels

The following warning labels are attached to the manipulator (refer to Fig. 1). Always follow the warnings on the labels.

Also, an identification label with important information is placed on the body of the manipulator. Prior to operating the manipulator, confirm the contents.

Figure 1: Warning Labels Location
# Table of Contents

1 Introduction ..................................................................................................................................... 1-1
   1.1 System Requirements ........................................................................................................ 1-2
   1.2 About This Document ........................................................................................................ 1-2
      1.2.1 Major Components ............................................................................................... 1-3
      1.2.2 Optional Equipment .............................................................................................. 1-3
   1.3 Reference Documentation ................................................................................................. 1-3
   1.4 Customer Support Information ........................................................................................... 1-4

2 Installation and Setup ......................................................................................................................... 2-1
   2.1 Equipment Description ..................................................................................................... 2-1
      2.1.1 Pro-face Operator Station ..................................................................................... 2-1
   2.2 Installation ..................................................................................................................... 2-2
      2.2.1 Pro-face Operator Station Installation .................................................................. 2-2
      2.2.2 Cable Connections (Standard) ............................................................................. 2-2
      2.2.3 Cable Connections (Ethernet Hub/Switch Option) ................................................ 2-3
   2.3 PC Setup ........................................................................................................................... 2-4
      2.3.1 Pro-face Software Setup ....................................................................................... 2-4
      2.3.2 Configure Network Settings (for Optional Ethernet Transfer) ................................ 2-6
   2.4 Robot Parameters ............................................................................................................. 2-9
      2.4.1 Robot Parameters ................................................................................................. 2-9
   2.5 Custom Control Example ................................................................................................. 2-10

3 Programming ................................................................................................................................... 3-1
   3.1 EtherNet ............................................................................................................................ 3-1
   3.2 Compact Flash / USB ........................................................................................................ 3-1
      3.2.1 Load Program onto CF/USB Card ........................................................................ 3-1
      3.2.2 Transfer Program to Display ............................................................................... 3-3
1 Introduction

The Pro-face operator station is part of the Yaskawa family of standardized solutions. It is a fully integrated hardware/software system, supported by Yaskawa. The Pro-face operator interface is mounted in a NEMA enclosure and is available as a stand-alone pedestal or fence mount unit. High Speed Ethernet Server (HS-EServer) is used to communicate directly with the robot controller.

Fig. 1-1: Pro-Face with High Speed Ethernet Server
1.1 System Requirements

Pro-Face with High Speed Ethernet Server works with a DX100 robot controller or newer. System requirements are shown in the table below:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact Flash memory card (ATA Flash)</td>
<td>64 MB (or larger)</td>
</tr>
<tr>
<td>Pro-face Software</td>
<td>Version 3.1 or greater</td>
</tr>
<tr>
<td>HS-EServer Software Option</td>
<td>High Speed Ethernet Server</td>
</tr>
<tr>
<td>Ethernet Cable</td>
<td>8 pin shielded Ethernet cable with M12 connectors (male to male)</td>
</tr>
<tr>
<td></td>
<td>Note: If using a networking hub/switch, you will need industrial Ethernet straight cable (category 5 or more) with RJ-45 LAN connectors.</td>
</tr>
</tbody>
</table>

1.2 About This Document

This manual is intended as an introduction and quick-start guide for personnel who are familiar with the operation of their Yaskawa robot model, Pro-face software, and robot programming.

This Quick Start Guide provides a description of functionality, usage instructions, as well as application examples for the Pro-face operator interface. For detailed information on specific system components, please refer to the documentation package included with your system.

This manual documents a standard Motoman system. If your system is custom or modified, please use this manual in conjunction with the drawings, schematics, and parts listing (Bill of Material) for your specific system. The drawings, schematics, and parts listing are included in the documentation package supplied with your Motoman system.

This manual contains the following sections:

* chapter 1 “Introduction”
  This section provides general information about the Pro-Face with High Speed Ethernet Server display, a list of reference documents, and customer support contact information.

* chapter 2 “Installation and Setup”
  This section provides installation procedures for the Pro-Face with High Speed Ethernet Server display.

* chapter 3 “Programming”
  This section provides a quick start overview of loading programs to the Pro-Face with High Speed Ethernet Server display.
1.2.1 Major Components

The Pro-Face with High Speed Ethernet Server system includes the following major components:

- Pro-face operator station (pedestal or fence mount)
- Robot controller connector plate
- High-speed Ethernet Server software option

1.2.2 Optional Equipment

The following optional equipment is available for use with the Pro-Face with High Speed Ethernet Server system:

- Pro-face GP-Pro Ex software
- Ethernet hub
- 8 pin Ethernet M12 cable shielded (male to male)
- Development computer

1.3 Reference Documentation

For additional information on individual components of the Pro-Face with High Speed Ethernet Server system, refer to the following documentation that is included with your system:

- Motoman Robot Controller HS-EServer Manual
- Motoman Manipulator Manual
- Motoman Robot Controller Manual
- Motoman Robot Controller Maintenance Manual
- Motoman Operator’s Manual for your Application
- Motoman Robot Controller Concurrent I/O Manual
- Motoman Robot Controller Independent/Coordinated Control Function Manual
- Motoman INFORM User’s Manual Robot Controller
- Vendor manuals for system components not manufactured by Motoman
1.4 Customer Support Information

If you need assistance with any aspect of your Pro-Face with High Speed Ethernet Server system, please contact Yaskawa Customer Support at the following 24-hour telephone number:

(937) 847-3200

For routine technical inquiries, you can also contact Yaskawa Customer Support at the following e-mail address:

techsupport@motoman.com

When using e-mail to contact Yaskawa Customer Support, please provide a detailed description of your issue, along with complete contact information. Please allow approximately 24 to 36 hours for a response to your inquiry.

Please use e-mail for routine inquiries only. If you have an urgent or emergency need for service, replacement parts, or information, you must contact Yaskawa Customer Support at the telephone number shown above.

Please have the following information ready before you call:

• System
  Pro-Face with High Speed Ethernet Server
• Robots
  HP165, HP20, etc.
• Primary Application
  Select (MAIN MENU) > (SYSTEM INFO) > (VERSION) - APPLI:
• Controller
  DX100, FS100, etc...
• Software Version
  Select (MAIN MENU) > (SYSTEM INFO) > (VERSION) - SYSTEM:
• Robot Serial Number
  Located on a data plate on the rear of each robot arm
• Robot Sales Order Number
  Located on a data plate on the front door of the controller
The instructions given in this section are general guidelines for installing Pro-Face with High Speed Ethernet Server. Refer to relevant vendor component manuals for specific installation information (see section 1.3).

All system components and most hardware items required for installation of the Pro-face operator interface are included with your shipment. There are, however, some required items that the customer must supply, such as typical installation and maintenance tools and special anchor bolts (for pedestal unit).

2.1 Equipment Description

2.1.1 Pro-face Operator Station

The Pro-face operator interface is mounted in a NEMA enclosure and is available as a stand-alone pedestal or fence mount unit. Both the 6" and 10.4" units provide a bright, crisp, and clear QVGA display with a wide angle viewing area, and a high resolution no-grid analog resistive touch screen for high level screen clarity. For more detailed information, refer to the Pro-face documentation included with your system.

- **Controller Cable Connector**
  Provides power for the unit and E-Stop and Cycle Start signal connections.

- **M12 Industrial Ethernet Connector**
  Provides communication between the robot controller and the Pro-face operator interface.

- **Cycle Start/Cycle Latched**

  The operation of the CYCLE START/CYCLE LATCHED button is dependent on the structure of the Control Master job. Any alteration of the Control Master Job could result in injury to personnel or damage to equipment.

  Pushing the green CYCLE START/CYCLE LATCHED button initiates a positioner sweep cycle if the robots are in HOME (Safe) position. If the CYCLE START/CYCLE LATCHED push button is pressed while the robots are welding, or otherwise not in HOME (Safe) position, the Cycle Start command is “latched” into (stored in) the robot controller circuitry. When the robots return to HOME (Safe) position, the “latched” Cycle Start command is executed and the positioner sweeps. Circuitry in the robot controller prevents the positioner from continuously cycling should the operator depress and hold the CYCLE START/CYCLE LATCHED push button.

- **Emergency Stop (E-STOP)**
  Pressing the red Emergency Stop (E-STOP) button removes servo power and stops all system operation. Brakes are applied to the robot, and all motion is stopped.
2.2 Installation

2.2.1 Pro-face Operator Station Installation

1. Unload the operator station.
2. Remove the protective plastic wrapping from the operator station.
3. Inspect the equipment for shipping damage.
4. Locate the operator station outside your system’s safety fencing and mount to the fence (fence mount unit) or anchor to foundation (pedestal).

**NOTE**

Notify your shipping contractor if you notice any shipping damage.

**CAUTION**

Be absolutely certain of the correct location for the pedestal operator station before securing it with anchor (lag) bolts.

2.2.2 Cable Connections (Standard)

After the Pro-face operator station is anchored in its correct location, locate the interconnect cables for the system and route them according to the system drawings and schematics included in your system documentation package.

A shielded, male-to-male, M12 industrial Ethernet cable (8-Pin) is required for all Ethernet connections. If you are not using a switch/router, you may require a cross-over Ethernet cable. Be sure to ground only one end of the Ethernet cable to avoid ground loop problems.

*Fig. 2-2: Standard Equipment Connections*
2.2.3 Cable Connections (Ethernet Hub/Switch Option)

A managed switch is recommended for use on EtherNet/IP networks with multiple devices. The managed switch should also have IGMP snooping enabled to reduce multicast packet traffic to individual nodes.

**Fig. 2-3: Optional Hub Connections**

Connect the Ethernet hub/switch using industrial Ethernet cable (category 5 or more) to the CN104 RJ-45 LAN connector located on the front face of the YCP01 board inside the CPU rack. Cutouts are available on the sides of the controller cabinet for cable routing to the development computer.

**NOTE**

On the DX100 controller there are two RJ-45 connectors on the front face of the YCP01 board. Use CN104 the bottom one for the Ethernet function. Do not use the CN105 connection because it is for the programming pendant.

**Fig. 2-4: Ethernet Connection on a DX100 Controller**
2.3 PC Setup

2.3.1 Pro-face Software Setup

Install the Pro-face GP-Pro EX software. Refer to Pro-face documentation for PC requirements and detailed instructions.

1. Start the GP-Pro EX software. The Initial Wizard screen appears.
2. Use the drop down menus to select your specific Pro-face model.
3. Configure the Device/PLC (robot controller) as a Yaskawa High Speed Ethernet Server.
4. Click the [New Screen] button to finish the wizard.
5. Click the [Project Window] tab in the bottom left of the screen.

6. Click on the “Device/PLC” link from the menu on the left to configure the communication settings with the robot controller.

- **Device Name**
  Provides a string label for the “Device/PLC” (robot controller). Change this to something meaningful, such as “DX100.”
2.3 PC Setup

**IP Address**

The button next to the Device Name text box allows you to specify the IP address of the robot controller. The robot controller must be set with a static IP address.

It is recommended to ensure that the “Use Multiple Read/Write Command” is NOT checked.

![Individual Device Settings](image)

2.3.2 Configure Network Settings (for Optional Ethernet Transfer)

When connecting a development computer directly to the Pro-face operator interface, you will need to set the computer’s IP address. This is only required when transferring programming directly to the Pro-face unit via a LAN connection. Refer to section 3.2 “Compact Flash / USB” on page 3-1 for instruction on transferring programming using a CF/USB memory card.

The following steps are for demonstration purposes only. Contact your network administrator for specifics regarding your computer network.

1. Open Network Connections in Control Panel.
   
   `{Start} > {Settings} > {Control Panel} > {Network Connections}.`
Installation and Setup

2.3 PC Setup

2. From the Network Connections window, right-click on the desired connection (typically Local Area Connection) and select Properties. The Local Area Connection Properties window appears.

![Fig. 2-5: Local Area Connection Properties Window](image)

3. From the General tab, highlight Internet Protocol (TCP/IP) from the "This connection uses the following items:" list and click on the Properties button. The Internet Protocol (TCP/IP) Properties window appears.

![Fig. 2-6: IP Address Settings](image)
4. Select the [Use the following IP address] radio button. Use the local IP address “192.168.255.xx” (xx is a decimal number from 0 to 255). Set the last bit of the IP address to an known open value and set the Subnet mask as follows:

   IP address: 192.168.255.11  
   Subnet mask: 255.255.255.0  
   Default gateway: Leave blank

5. Select the [Use the following DNS server addresses:] radio button. Leave both addresses blank.

   Preferred DNS server: Leave blank  
   Alternate DNS server: Leave blank

6. Click [OK] and close all open windows.

**NOTE**  
The IP addresses for the PC, robot controller and Pro-face interface must all be set on the same network.
2.4 Robot Parameters

2.4.1 Robot Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS000</td>
<td>2</td>
<td>Allow e-server protocol</td>
</tr>
<tr>
<td>RS005</td>
<td>1</td>
<td>Enable pc-host control</td>
</tr>
<tr>
<td>RS007</td>
<td>0</td>
<td>Only allow pc control when pendant key switch is in REMOTE mode</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Allow READ operations when pendant is in PLAY/TEACH</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Allow READ/WRITE operations when pendant is in PLAY/TEACH</td>
</tr>
<tr>
<td>RS022</td>
<td>1</td>
<td>Allow instance 0 for ordinal index</td>
</tr>
<tr>
<td>RS029</td>
<td>1</td>
<td>Allow upload of jobs and variable modification during robot operation</td>
</tr>
<tr>
<td>RS034</td>
<td>200</td>
<td>Timer to wait for a reply</td>
</tr>
<tr>
<td>RS035</td>
<td>200</td>
<td>Timer for monitoring end of text</td>
</tr>
<tr>
<td>S2C541</td>
<td>0</td>
<td>Allow writing of variables and I/O in PLAY mode</td>
</tr>
<tr>
<td>S2C542</td>
<td>0</td>
<td>Allow writing of variables and I/O during edit-lock status</td>
</tr>
</tbody>
</table>

**NOTE**

When setting 0 to S2C541 (writing is allowed), writing is possible even during the playback operation. However, please be noted that this setting may affect the manipulator’s cycle time due to some writing timings or their frequencies.

The following are the status to which specifying of the “edit-lock status” is permitted by S2C542 parameter.

- During an alarm
- When an external memory device is operated
- When the data transmission function is used
- Specific input EDIT_LOCK (#40064) is turned ON
2.5 Custom Control Example

This section provides one example of how to set up a custom control on your Pro-face HMI to communicate over the HS-EServer. Please refer to the HS-EServer user manual for details on all possible settings.

1. With GP-Pro EX software running, click the [Edit] button at the top of the screen.

2. Choose the [Screen List] tab from the bottom left, and double click on the Base Screen B0001.

3. Select a control (data display, button, lamp, etc.) from the menu bar and add it to the screen.

4. Double click the control. The control configuration window appears.
5. Click on the input address button. The Input Address window appears.

6. Specify the address of the data you want to read/write. Reference the High-Speed Ethernet Server manual for details on all available addresses. The above example will modify the value of robot variable I010.
3 Programming

The Pro-face operator interface is programmed using the GP-Pro EX HMI Development Software. Once a program is created, it can be transferred to the display using either a direct Ethernet connection or indirectly using a Compact Flash or USB card.

3.1 EtherNet

Please refer to section 33.3 “Transferring Project Files via Ethernet” of the Pro-face GP-Pro EX documentation for detailed instructions.

3.2 Compact Flash / USB

3.2.1 Load Program onto CF/USB Card

To load a program into the display using Compact Flash, you must have a CF card formatted as FAT32.

Observe the following precautions when using a CF card.

• Handle compact flash with care to protect the stored data.
• Do not store compact flash where strong static electricity or electronic noise may occur.
• Do not drop or exert any shock or strong force to the compact flash.
• Do not remove the compact flash or turn OFF power when accessing the compact flash (writing-in or reading-out compact flash data). The data in the compact flash may be lost.
• Back up data from the compact flash to other media such as floppy disks or hard disks.

1. Start the GP-Pro EX software.
2. Click the [Transfer Project] button from the top menu. The Transfer Tool window appears.

3. Click the [Memory Loader] button.

4. Click the [Create Backup File] button.

5. Navigate to the drive for your CF card and click OK.

6. Wait for the process to finish.
3.2.2 Transfer Program to Display

1. Turn the robot controller power OFF.
2. Open the operator station enclosure.
3. With a program loaded on the CF/USB card, insert card into the display unit. Do not forcibly insert the card.
4. After inserting the card, be sure to close the cover before starting operation.
5. Turn robot controller power ON.
6. Once the Pro-face unit completes boot-up, touch the top-right then the bottom-left corner, or top-left then bottom-right corner.

7. When transferring project data to the display unit for the first time (for a newly purchased display unit), the “Initial Transfer Mode” screen appears when you turn power ON.
8. Touch [CF/USB] > [CF startup] to launch the Memory Loader Tool.

The Memory Loader Tool launches.
3. Programming

3.2 Compact Flash / USB

9. Touch the [Download (CF->Main Unit)] button.

10. Touch the [Select File] button and select the file you want to transfer and touch [Start].

```
Download (CF->Display)

Warning: Data in the internal memory will be lost.

Path Name: MEMSD21.CPL
Password: 
Please input the password and press the Start switch.

Start
```

11. Enter password (if required) and touch the [Start] button.

**NOTE** Once you start downloading, all project data on the display unit is deleted, including data in internal memory.