

# FS100 OPTIONS INSTRUCTIONS

FOR I/O JOG OPERATION IN PLAY-MODE

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

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MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS

FS100 INSTRUCTIONS

FS100 OPERATOR'S MANUAL

FS100 MAINTENANCE MANUAL

Part Number: 159650-1CD

Revision: 0



## MANDATORY

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

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## Notes For Safe Operation

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

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.



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



## WARNING

- Confirm that no person is present in the manipulator's operating range and that you are in a safe location before:
  - Turning ON the FS100 power.
  - Moving the manipulator with the programming pendant.
  - Running the system in the check mode.
  - Performing automatic operations.

Injury may result if anyone enters the manipulator's operating range during operation. Always press the emergency stop button immediately if there is a problem. The emergency stop button is located on the right of the programming pendant.

- 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.
  - Keep in mind the emergency response measures against the manipulator's unexpected motion toward you.
  - Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

- 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.



WARNING

- 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*




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 FS100 cabinet 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 the Warning Labels in the 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 FS100 controller, manipulator cables, the FS100 programming pendant (optional), and the FS100 programming pendant dummy connector (optional).

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
FS100 controller	FS100
FS100 programming pendant	Programming pendant
Cable between the manipulator and the controller	Manipulator Cable
FS100 programming pendant dummy connector	Programming pendant dummy connector

## FS100

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

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

## 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 the SELECT key is pressed.

## 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.

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# 1 Outline

The I/O JOG function in play mode executes JOG operation by using user input signals instead of the programming pendant.

The axis operation (JOG operation) of the station control group that is not registered in the job under playback operation can be executed by the allocated user input signals.

## 1.1 Operating Conditions

1. The I/O JOG operation is valid only in play mode.
2. The I/O JOG operation is enabled for the station control group that is not registered in the job under playback operation.
3. The I/O JOG operation is enabled when an external manual operation request signal is input to the I/O JOG operation enabled control group. The I/O JOG operation is valid only for one control group.
4. The axes that are enabled for the I/O JOG operation are operated by forward/reverse signals.
5. The motion speed in the I/O JOG operation can be switched in steps: inching, low, middle, high, and ultra-high, in the same way as the teaching manual speed.
6. Only the link coordinate system is used for the motion coordinates.
7. During playback operation, if a job that includes the station control group under the I/O JOG operation is called or jumped, an alarm occurs to stop the operation of the robot/station.
8. The user output signal which indicates that the robot/station is under the I/O JOG operation can be set.
9. The user I/O signals to be used for the I/O JOG operation can be allocated in the setting display. (They can be changed in "Management" mode.)



## 2 Input Signals for I/O JOG Operation

Input Signal	Meaning	Details
User input	External manual operation request (Points for each station)	To validate the external manual operation * Invalid when plural inputs are input.
User input	Motion speed designation (5 points)	To set the motion speed of external manual operation Motion speed: 1(inching) to 5(ultra-high) * When plural speed levels are input, the priority is given to the lowest level.
User input	Forward-direction motion designation (Points for the number of axes of each station)	Forward-direction(+ direction) motion when ON * The axis does not move if the forward-direction and the reverse-direction motion designation signals are input simultaneously.
User input	Reverse-direction motion designation (Points for the number of axes of each station)	Reverse-direction(-direction) motion when ON * The axis does not move if the forward-direction and the reverse-direction motion designation signals are input simultaneously.

### Safety Interlocks



- If the forward/reverse direction motion designation signal is input before the external manual operation request signal, the external manual operation request signal does not validate the external manual operation.
- Turn OFF and ON again the forward/reverse direction motion designation signal to restart the operation after alarm, hold, or emergency stop (Servo OFF).

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**3 Output Signals for I/O JOG Operation**

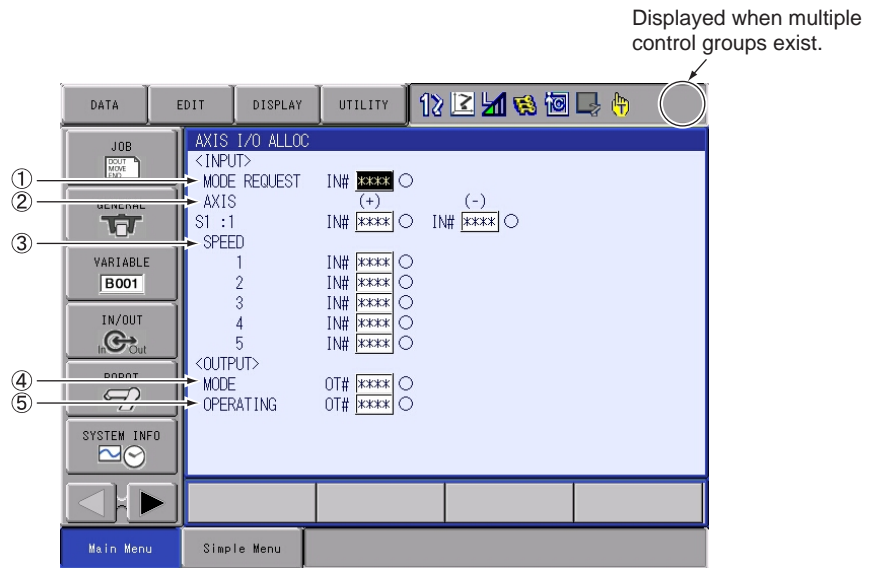
FS100

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**3 Output Signals for I/O JOG Operation**

<b>Output Signal</b>	<b>Meaning</b>	<b>Details</b>
User output	External manual operation enabled (Points for each station)	Indicates that the external manual operation is enabled. * This signal is not output when the external manual operation request signal is input while the servo is off.
User output	During external manual operation (Points for each station)	Indicates that the station is during external manual operation.

## 4 Signal Allocation Setting Display for I/O JOG Operation



- ① MODE REQUEST (external manual operation request)
- ② AXIS (forward/reverse direction motion designation)
- ③ SPEED (motion speed designation)
- ④ MODE (external manual operation enabled)
- ⑤ OPERATING (during external manual operation)



- Reset Signal Number  
Inputting "0" to the signal number resets the signal number and "\*\*\*\*" is displayed.

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