

# FS100 INSTRUCTIONS

FOR MANUAL BRAKE RELEASE

---

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

---

## MOTOMAN INSTRUCTIONS

- FS100 INSTRUCTIONS
- FS100 OPERATOR'S MANUAL
- FS100 MAINTENANCE MANUAL

Part Number: 162181-1CD  
Revision: 2



## MANDATORY

- This manual explains the FS100 Manual Brake Release system. Read this manual carefully and be sure to understand its contents before handling the FS100.
- General items related to safety are listed in *Notes for Safe Operation* and *Explanation of Warning Labels*. To ensure correct and safe operation, carefully read the FS100 Instructions Manual 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 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.



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 play mode.
  - Performing automatic operations.

Injury may result if anyone enters the manipulator's operating range during operation. Press the emergency stop button immediately if there is a problem. The emergency stop button is located on the top 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 there is a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

Before operating the manipulator verify the following:

- Servo power is turned OFF when the emergency stop button is pressed.
- When servo power is turned ON, the servo ON light on the programming pendant turns on.
- When servo power is turned OFF, the servo ON light on the programming pendant turns 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 A: Emergency Stop Button*



- An emergency stop button **MUST** be supplied on the equipment if the programming pendant is not connected or used. Verify that servo power is turned OFF when this emergency stop button is pressed.
- Upon shipment of the FS100, the external emergency stop signal is connected by a jumper in the bypass connector. To use the signal, make sure to supply a new connector, and then input it.

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

**WARNING**

- Before the emergency stop button is released or servo power is turned ON, clear the work cell of all items which could interfere with the operation of the manipulator.

Injury may result from unintentional or unexpected manipulator motion.

*Fig B: Release of Emergency Stop*

**CAUTION**

- Perform the following inspection procedures prior to conducting manipulator teaching. If a problem is found, correct it and take all other necessary actions immediately.
  - Check for problems in manipulator movement.
  - Check for damage to insulation and sheathing of external wires.
- Return the programming pendant to a safe place 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 all Warning Labels before operating the manipulator.

## Definition of Terms Used Often in This Manual

This is a YASKAWA industrial robot product.




The robot assembly usually consists of the manipulator, the FS100 controller, manipulator cables, the FS100 programming pendant (optional), and the FS100 programming pendant bypass connector (optional).

In this manual, the equipment is designated as follows:

<b>Equipment</b>	<b>Manual Designation</b>
FS100 controller	FS100
FS100 programming pendant	Programming pendant
Cables between the manipulator and the controller	Manipulator Cables
FS100 programming pendant bypass connector	Programming pendant bypass connector

## FS100 Manual Brake Release

Descriptions of the programming pendant, buttons, and displays 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 top front 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, or that the item is directly selected by touching the screen.

## 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 and FS100. Fully comply with the precautions on the warning labels.



### WARNING

- The label described below is attached to the manipulator. Observe the precautions on the warning labels.
- Failure to observe this warning may result in injury or damage to equipment.

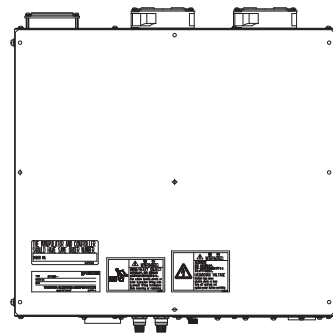


Refer to the manipulator manual for the warning label location.

- The following warning labels are attached to FS100.

Observe the precautions on the warning labels.

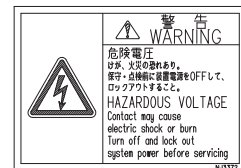
Failure to observe these warnings may result in injury or damage to equipment.



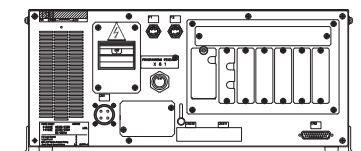
Top View



Heavy Object Warning



Electric Shock Warning



Front View



Electric Shock Warning

## 1 Manual Brake Release Function

The “*Manual Brake Release Function*” is broken down to the following sections:

- “*Outline*”
- “*Activating the Manual Brake Release Function*”
- “*Manual Brake Release Procedure*”
- “*Warning Message*”

### 1.1 Outline

With this function, the brake of each manipulator motor and external axis can be released using the programming pendant.

The following operating conditions must be met to use the manual brake release function:

- FS100 must be started up normally.
- Operating in any mode (REMOTE, PLAY, and TEACH.)
- All security modes (Operation, Edit, and Management.)
- Servo power is OFF.
- No Emergency Stop signal is present.
- The interlock connector FBB-CN210 is connected.

Due to the hardware configuration, brake release can only be performed using the following groups:

- The S-, L-, and U-axes (the first, second, and third axes)
- The R-, B-, and T-axes (the fourth, fifth, and sixth axes)
- The seventh axis (either the E-axis or the first external axis.)
- The eighth axis (either the first or second external axis.)



### CAUTION

Use caution when using this function because the brakes of up to three axes are released.



To restore power to the servo, remove the FBB-CN210 connector after completing a brake release operation.

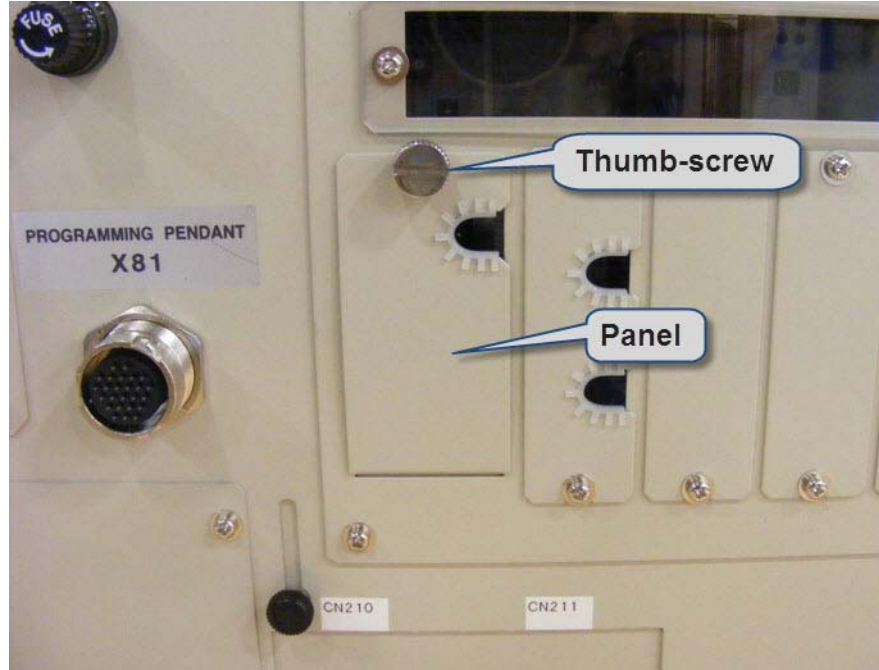


- 1 Manual Brake Release Function
- 1.2 Activating the Manual Brake Release Function

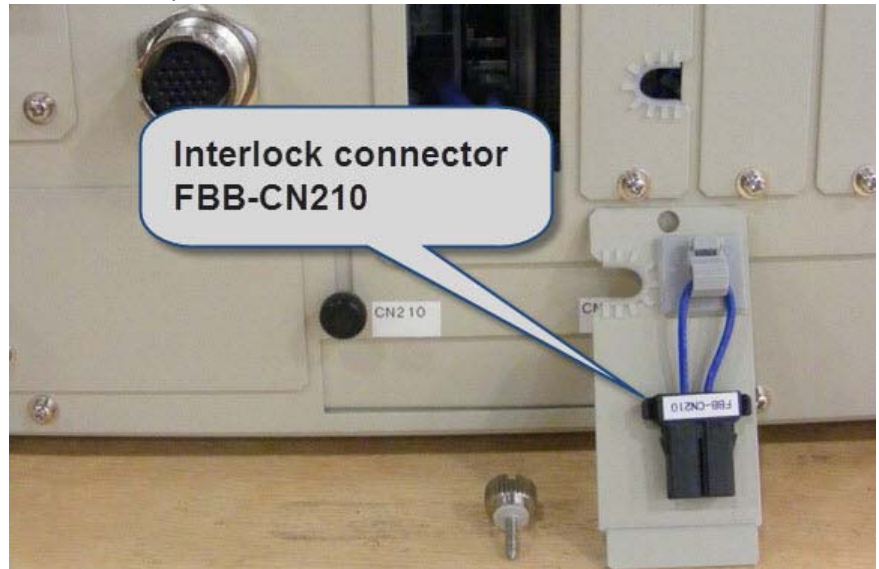
## 1.2 Activating the Manual Brake Release Function

To activate the manual break release feature, follow the directions below:

1. Turn OFF the power to the FS100.
2. Remove the thumb-screw and panel as shown.



3. Remove the interlock connector labeled FBB-CN210, and then re-install the panel.



FS100

- 1 Manual Brake Release Function
- 1.2 Activating the Manual Brake Release Function

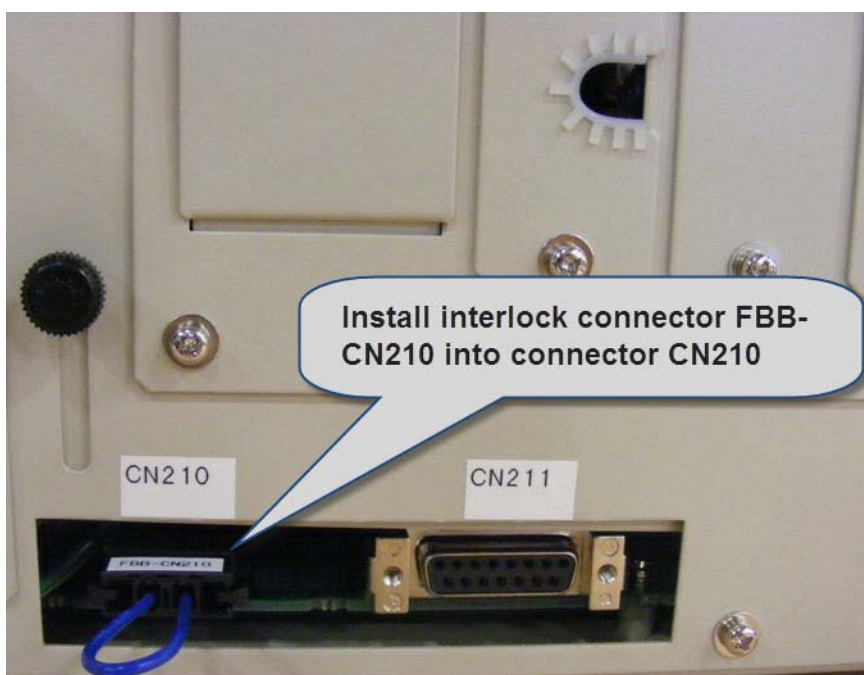
4. Loosen the thumb-screw located next to the CN210 label, and raise the door.



### 1.2.1 Single Robots:

5. Install the interlock connector FBB-CN210 into connector CN210 as shown below.

OR

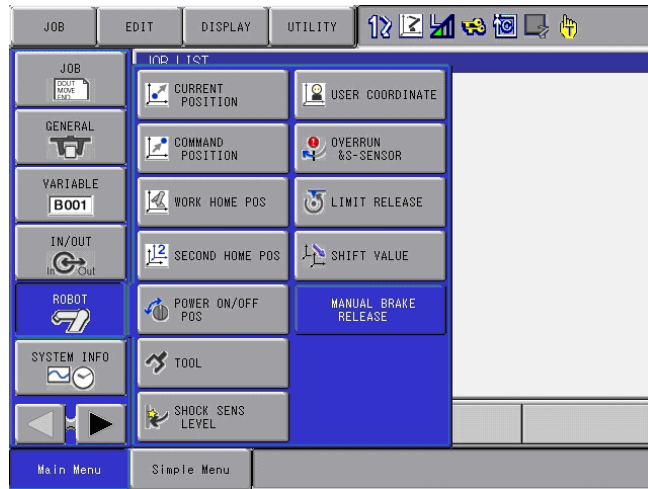


### 1.2.2 Dual Robots:

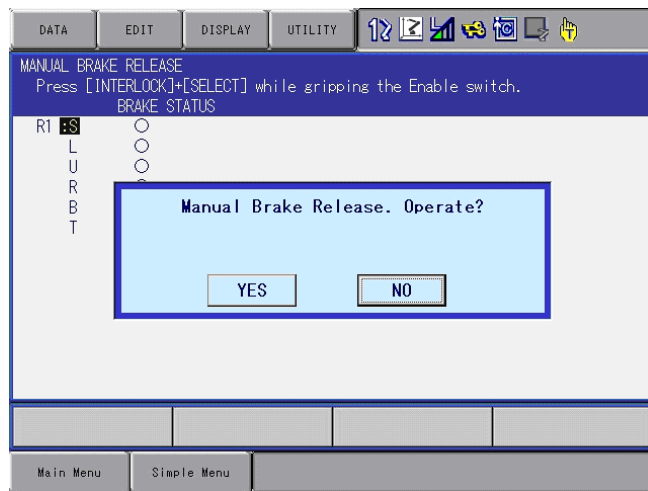
5. For dual robot controllers (such as DRC's, SDA5F, SDA10F, and SDA20F) there are two CN210 connectors, one for each robot or group of axes. Install FBB-CN10 into the controller of the robot or group of axes that needs to be released. If two FBB-CN210's are available, they can both be installed, making all axes available for release at the same time.

### 1.3 Manual Brake Release Procedure

1. Select {ROBOT} under the main menu, then select the submenu {MANUAL BRAKE RELEASE}.



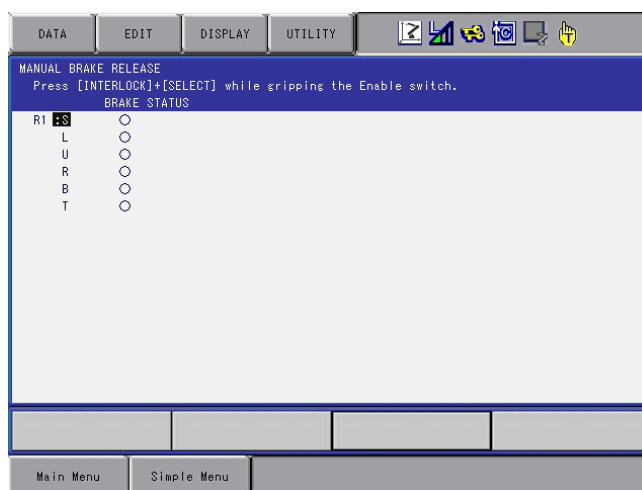
2. Select {YES}.



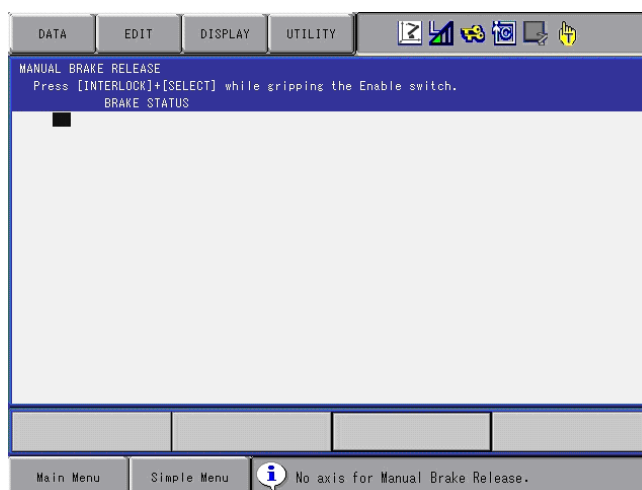
- When the manual brake release menu is selected, a warning message appears to prevent improper operation.

1 Manual Brake Release Function  
 1.3 Manual Brake Release Procedure

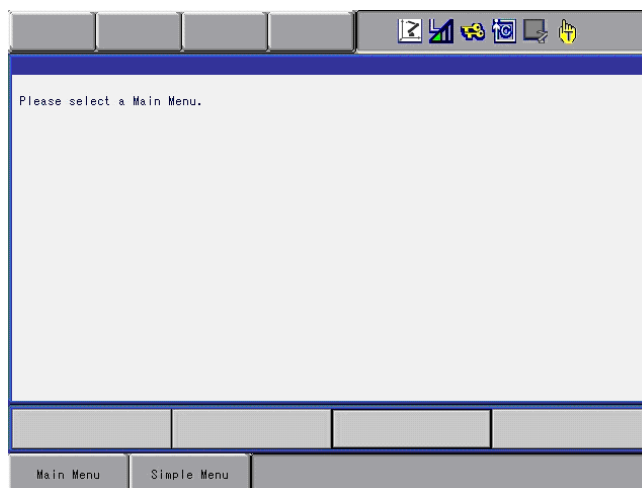
- Select {YES} to display the MANUAL BRAKE RELEASE window.



- If the interlock connector, FBB-CN210, is not installed, the following window appears.




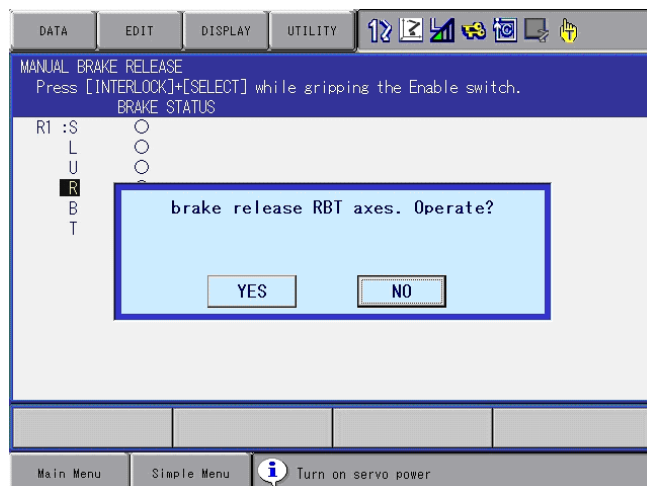
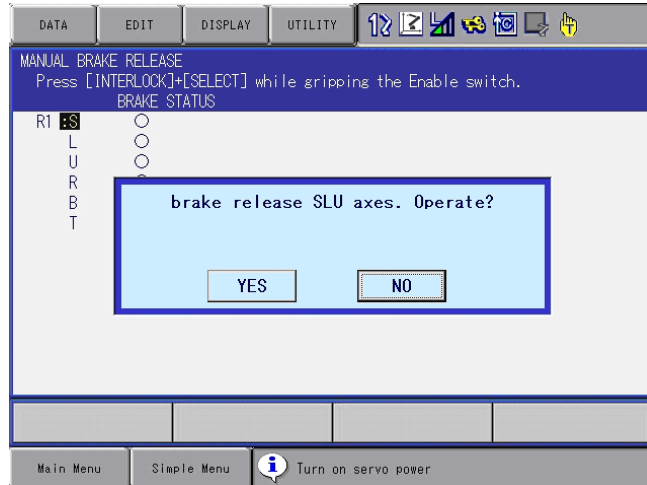
- Select {NO} to display the following window. The same window is displayed if the interlock connector is removed while the MANUAL BRAKE RELEASE window is being displayed.



## 1 Manual Brake Release Function

### 1.3 Manual Brake Release Procedure

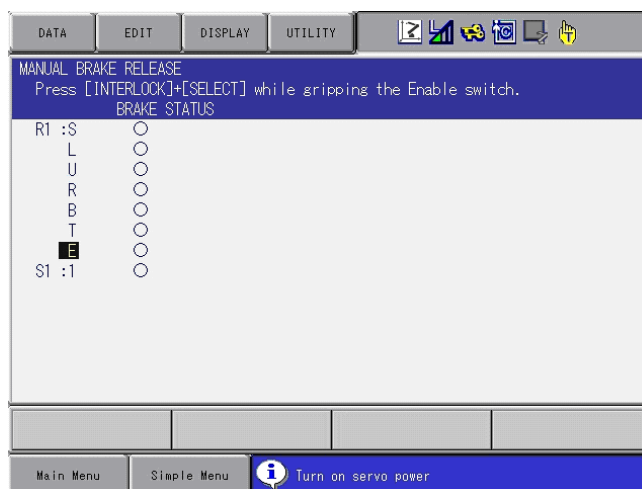
3. Move the cursor to the axis whose brake is to be released. Then press the interlock key  + [SELECT] while gripping the enable switch.
- Since the brakes of multiple axes will be released if the S-, L-, or U-axis (the first, second, or third axis) or the R-, B-, or T-axis (the fourth, fifth, or sixth axes) is selected, one of the following confirmation dialog boxes appears. Proceed to the step 4.



## 1 Manual Brake Release Function

### 1.3 Manual Brake Release Procedure

- If the E-axis, the first external axis, or the second external axis (the seventh or eighth axis) is selected, the brake is released and the BRAKE STATUS is displayed.





BRAKE STATUS ○: Brake locked ●: Brake released


- The brake is locked with one of the following conditions:
  - [SELECT] is released. (See the CAUTION box below.)
  - The emergency stop button on the programming pendant, the FS100 (optional), or the external device is pressed.
  - The enable switch is not in the middle (teach) position.
  - The window is switched from the MANUAL BRAKE RELEASE window to another.
  - The interlock connector FBB-CN210, is removed.



## CAUTION


- The brake is released by pressing the interlock key  + [SELECT] while gripping the enable switch. At this time, note that the brake remains released when the interlock key  is released.

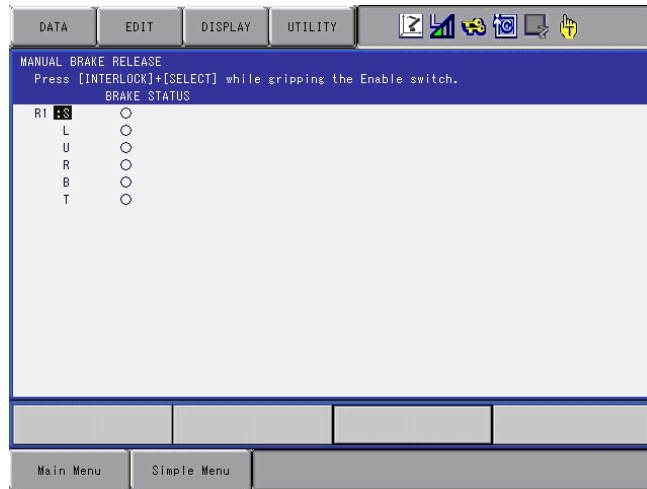
4. Select {YES} in the selection dialog box.
  - Select {NO} or press [CANCEL] to close the confirmation dialog box without releasing the brake.

After that, press the interlock key  + [SELECT] while gripping the enable switch to display the confirmation dialog box again. Proceed to step 4.

## 1 Manual Brake Release Function

### 1.3 Manual Brake Release Procedure

- When {YES} is selected, the brake is not released immediately. Do not move the cursor, and press the interlock key  + [SELECT] while gripping the enable switch again to release the brakes of the three axes including the axis at which the cursor points.





BRAKE STATUS ○: Brake locked ●: Brake released

- When the axis whose brake is to be released is changed by moving the cursor, proceed to the step 3.
- The brake is locked with one of the following conditions:
  - [SELECT] is released. (See the CAUTION box below.)
  - The emergency stop button on the programming pendant, the FS100 (optional), or the external device is pressed.
  - The enable switch is released, or gripped more tightly, so that it is not in the middle (teach) position.
  - The window is switched from the MANUAL BRAKE RELEASE window to another.
  - The interlock connector, FBB-CN210, is removed.



### CAUTION

- The brake is released by pressing the interlock key  + [SELECT] while gripping the enable switch. At this time, note that the brake remains released when the interlock key  is released.

5. After completing the brake release operation, remove connector FBB-CN21. Replace the connector back on the panel for future use.



To restore power to the servo, remove the FBB-CN210 connector after completing a brake release operation.

---

**FS100**

---

**1 Manual Brake Release Function**  
**1.4 Warning Message**

---

## **1.4 Warning Message**

If the manual brake release is performed under one of the following conditions, a warning message appears in the message area on the screen stating that the brakes cannot be released.

- Servo power is turned ON.
- The emergency stop button on the programming pendant is pressed.
- An emergency stop button on the FS100 (optional) is pressed.
- The external emergency stop signal is incoming.
- The interlock connector, FBB-CN210, is not connected.



# FS100

# INSTRUCTIONS

---

## HEAD OFFICE

2-1 Kurosakishiroishi, Yahatanishi-ku, Kitakyushu 806-0004 Japan  
Phone +81-93-645-7745 Fax +81-93-645-7746

YASKAWA America Inc. MOTOMAN Robotics Division  
100 Automation Way, Miamisburg, OH 45342, U.S.A.  
Phone +1-937-847-6200 Fax +1-937-847-6277

YASKAWA Nordic AB  
Verkstadsgatan 2, PO Box 504, SE-385 25 Torsås, Sweden  
Phone +46-480-417-800 Fax +46-486-414-10

YASKAWA Europe GmbH Robotics Div.  
Kammerfeldstr. 1, 80591 Allershausen, Germany  
Phone +49-8166-90-0 Fax +49-8166-90-103

YASKAWA Electric Korea Co., Ltd  
9F, KYOBO Securities Bldg., 26-4, Yeoido-Dong Yeoungseongpo-ku, Seoul, KOREA  
Phone +82-2-784-7844 Fax +82-2-784-8495

YASKAWA Electric (Singapore) PTE Ltd.  
151 Lorong Chuan, #04-02A, New Tech Park, Singapore 556741  
Phone +65-6282-3003 Fax +65-6289-3003

YASKAWA Electric (Thailand) Co., Ltd.  
252/246, 4th Floor, Muang Thai-Phatra Office Tower II Rachadaphisek Road, Huaykwang Bangkok, 10320 Thailand  
Phone +66-2-693-2200 Fax +66-2-693-4200

YASKAWA Shougang Robot Co. Ltd.  
No.7, Yongchang-North Road, Beijing E&T Development Area, China 100176  
Phone +86-10-6788-0548 Fax +86-10-6788-0548-813

YASKAWA ELECTRIC (SHANGHAI) Co., Ltd.  
No.18Xizang Zhong Road, 17F, Harbour Ring Plaza, Shanghai 200001, CHINA  
Phone +86-21-5385-0655 Fax +86-21-5385-2770

YASKAWA Robotics India Ltd.  
#426, Udyog Vihar, Phase- IV, Gurgaon, Haryana, India  
Phone +91-124-475-8500 Fax +91-124-414-8016

---

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