

DX200 OPTIONS INSTRUCTIONS

FOR TWIN GUN FUNCTION

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

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS
DX200 INSTRUCTIONS
DX200 OPERATOR'S MANUAL
DX200 MAINTENANCE MANUAL

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

Part Number: 165634-1CD
Revision: 0



MANDATORY

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

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

- Before operating the manipulator, check that servo power is turned OFF pressing the emergency stop buttons on the front door of the DX200 and the programming pendant. 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.

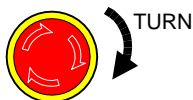
Figure 1: Emergency Stop Button



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

Injury may result from unintentional or unexpected manipulator motion.

Figure 2: Release of Emergency Stop



- Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator:
 - 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.

- 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 of 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 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 front door of the DX200 and the programming pendant.



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 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 DX200 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 controller, the programming pendant, and supply cables.

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
DX200 Controller	DX200
DX200 Programming Pendant	Programming Pendant
Cable between the manipulator and the controller	Manipulator cable

Twin Gun Function

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

Equipment		Manual Designation
Programming Pendant	Character Keys /Symbol Keys	The keys which have characters or its symbol printed on them are denoted with []. ex. [ENTER]
	Axis Keys /Numeric Keys	[Axis Key] and [Numeric Key] 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, ex. [SHIFT]+[COORD]
	Displays	The menu displayed in the programming pendant is denoted with { }. ex. {JOB}

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 bland names for each company or corporation. The indications of (R) and TM are omitted.

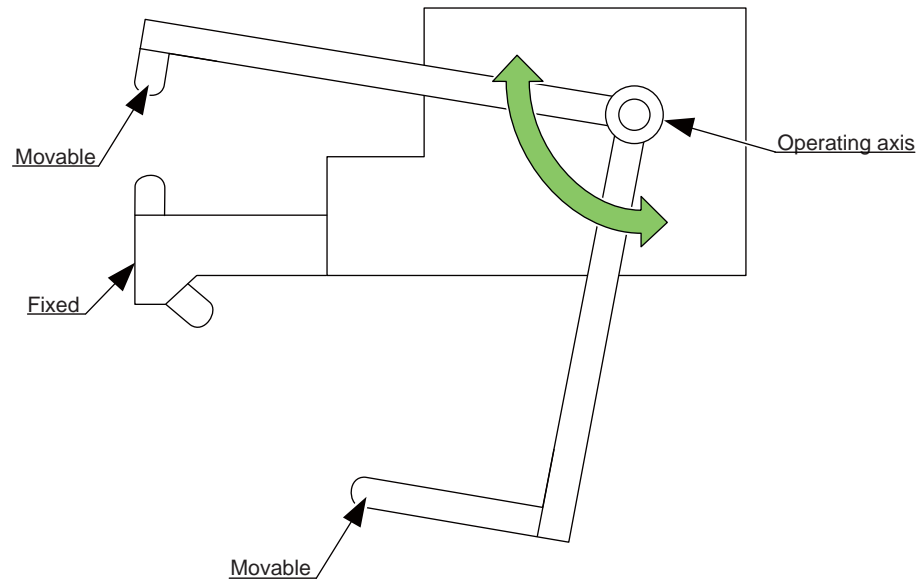
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1 Twin Gun Function

1.1 Twin Gun Function

As illustrated in the figure below, a twin gun has one operating axis and two pairs of electrodes which apply pressure.

Twin gun function is the function that maximizes and controls twin gun performance.



1.2 Outline of Twin Gun Function

In the DX200, a twin gun is treated as a station with one axis, and the station is configured with two guns.

Use an S-axis key to perform JOG operation, etc. since the twin gun is a station with one axis.

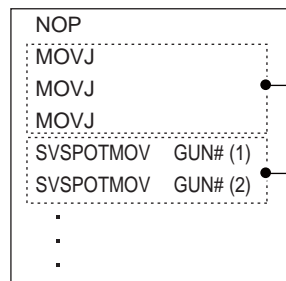
For MOVE instructions, register the instructions in the same manner as a station with one axis.

When applying pressure, select either gun of the twin gun, that applies pressure.

The following show an example of use of the twin gun function in the system with one manipulator and one twin gun.

Configuration of Control Group

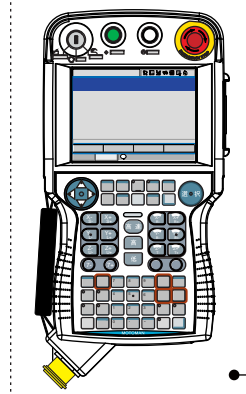
R1 : ES200N-A0*
 S1 : TWIN-GUN



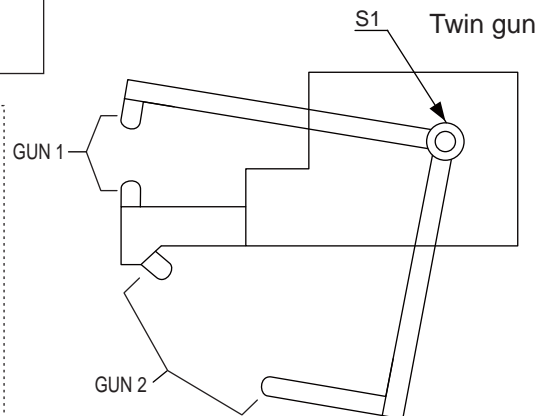
Operates S1 with MOVE instruction.

Selects a gun No. to apply pressure.

Programming Pendant



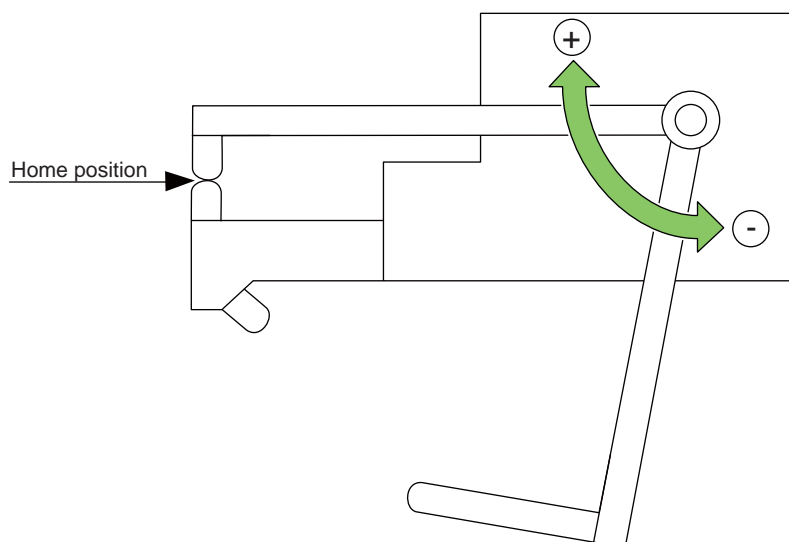
Selects S1 to perform JOG operation with S-axis key.



2 Twin Gun Setup

2.1 Home Position Calibration for Twin Gun

For setting of home position of a twin gun, move the twin gun in the direction of "S -(minus)" as shown in the figure below by JOG operation, and set the position, where one tip is aligned with another tip, as home position.



Home position can also be set to a desired position. If there are means such as an alignment mark, etc. to specify the position of a gun, use the mean and set home position at this position.

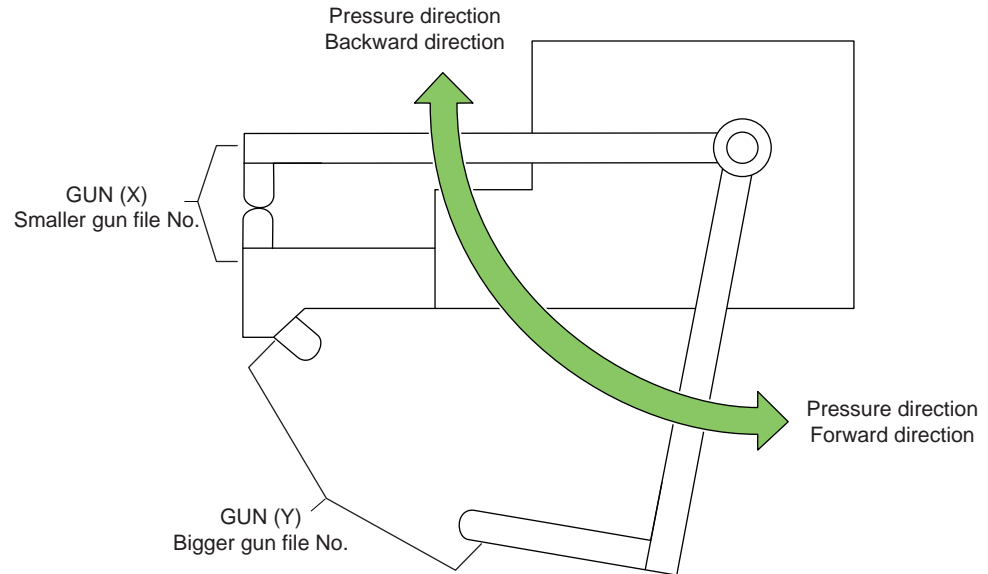


For home position settings, refer to Section 8.1 "Home Position Calibration" of the "DX200 INSTRUCTIONS" (Part No.165557-1CD).

2.2 Settings of Gun Condition File

Twin gun has a gun condition file for each gun; specify gun conditions in the files of both guns.

Gun conditions for each gun of the twin gun can be set in either gun condition file. Conditions of the gun which applies pressure in the forward direction are usually set in the gun condition file of the smaller file number.



Pressure directions of two guns of the twin gun are different. (Forward/Backward direction)

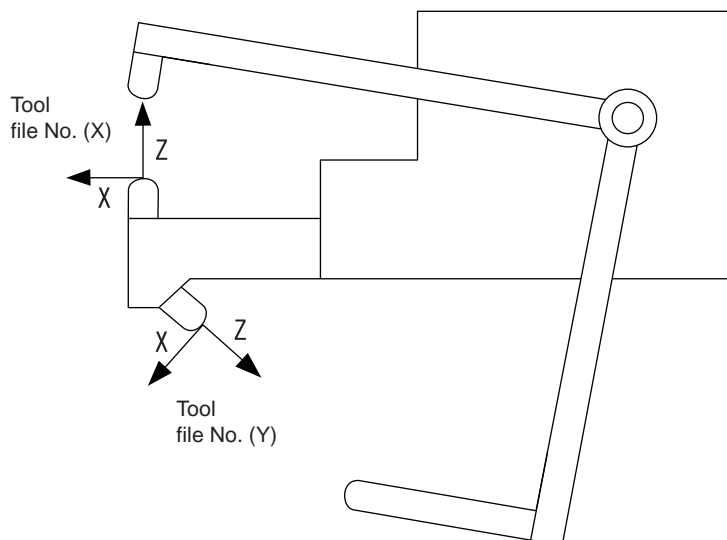
When setting the gun condition files of both guns, perform the settings with attention to the pressure direction.



For details on settings of gun condition files, see Section 9.4.1 "Gun Condition Files" of "DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN" (Part No. 165557-1CD).

2.3 Settings of Tool File of when a Twin Gun is Mounted on the Manipulator

Taking each fixed tip of a twin gun as TCP (tool tip position), set positional data in any two tool files so that the Z-axis direction of the tool coordinates faces the movable side electrode.



In case of using a twin gun mounted on the manipulator, also change a tool file to the tool file corresponding to the twin gun when applying pressure.



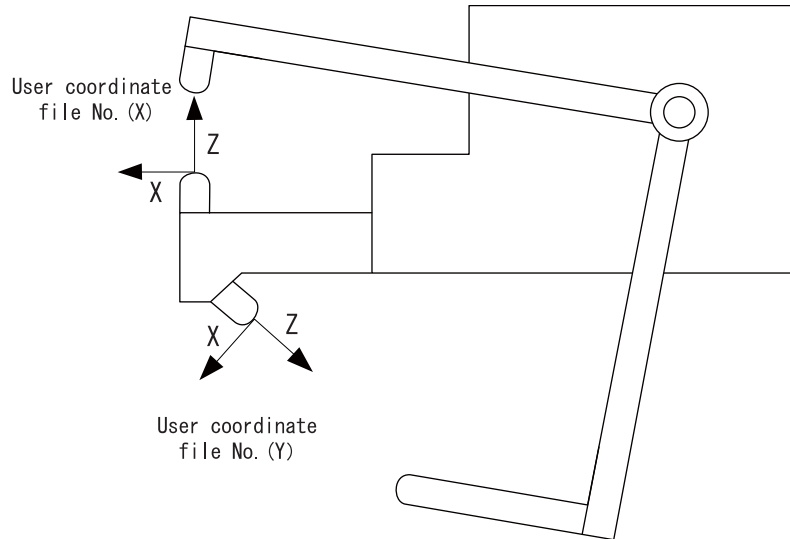
For details on the tool file, see Section 8.3 "Tool Data Setting" in the "DX200 INSTRUCTIONS" (Part No. 165557-1CD).



For details on settings of the gun condition file, see Section 9.4.3 "Gun Condition File" in the "DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN" (Part No. 165297-1CD).

2.4 Settings of Tool File of when Twin Gun is Fixed

Taking each fixed tip of a twin gun as a home position of the user coordinates, set positional data in any two user coordinate files so that the Z-axis direction of the user coordinates faces the movable side electrode.



After selecting {FIXED} to the setting figure of the gun condition files, assign numbers of the set user coordinates files.

For details, see Section 9.12.5 "Electrode Wear Compensation for Fixed Gun" in the DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN (Part No. 165297-1CD).



For details on the user coordinates, see Section 8.8 "User Coordinates Setting" in the "DX200 INSTRUCTIONS" (Part No. 165557-1CD).

3 Preparing of Twin Gun Job

3.1 Registration of MOVE Instructions

Perform teaching of MOVE instructions: MOVJ, MOVL, MOVC, etc. for a twin gun in the same manner as the usual station with one axis.

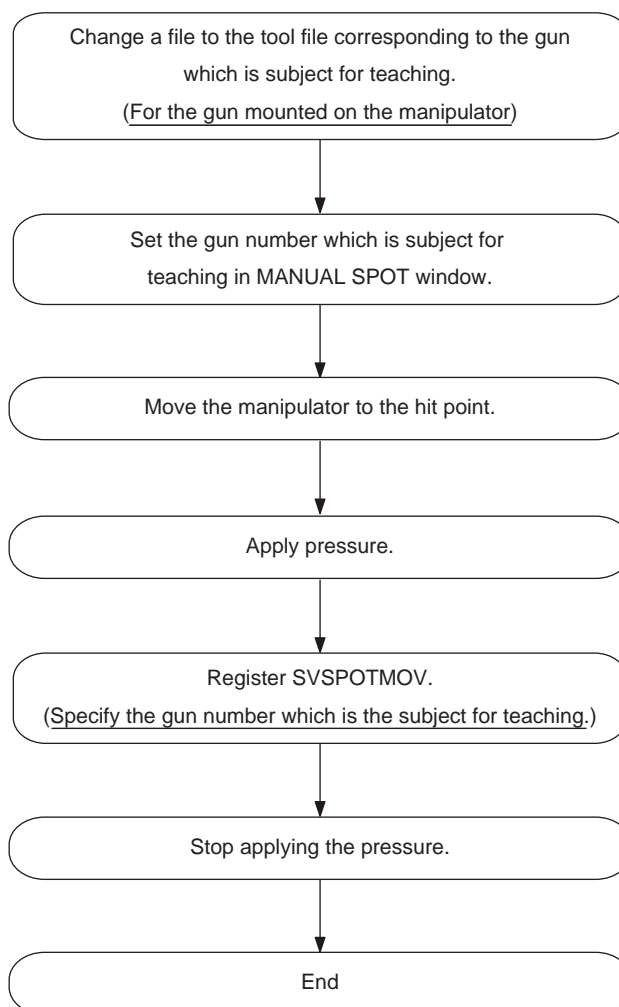
3.2 Operation Flow Chart of Hit Points Teaching

When applying pressure with a twin gun, specify a gun number to be the subject to PRESSURE instructions: SVSPOTMOV, SVGUNCL, etc., then apply pressure.



To register a PRESSURE instruction with a twin gun mounted on the manipulator, also change a file to the tool file corresponding to the subject twin gun.

The following show the operation flow chart to perform pressure teaching of SVSPOTMOV with a twin gun mounted on the manipulator.



3.3 Job Example for a Twin Gun Mounted on the Manipulator

The following show a job example which is created with the gun mounted on the manipulator.

```

NOP
MOVJ                (TOOL#(1))
MOVJ                (TOOL#(1))
SVSPOTMOV  GUN#(1)  (TOOL#(1))  ← Specifies the gun for teaching.
MOVJ                (TOOL#(2))  ← Changes the tool.
MOVJ                (TOOL#(2))
SVSPOTMOV  GUN#(2)  (TOOL#(2))  ← Specifies the gun for teaching.
MOVJ                (TOOL#(1))  ← Changes the tool.
MOVJ                (TOOL#(1))
MOVJ                (TOOL#(1))
SVGUNCL   GUN#(1)   ← Specifies the gun for teaching.
MOVJ                (TOOL#(2))  ← Changes the tool.
SVGUNCL   GUN#(2)   ← Specifies the gun for teaching.
END

```

3.4 Job Example for Fixed Twin Gun

The following show a job example which is created with the fixed gun.

```

NOP
MOVJ
MOVJ
SVSPOTMOV  GUN#(1)   ← Specifies the gun for teaching.
MOVJ
MOVJ
SVSPOTMOV  GUN#(2)   ← Specifies the gun for teaching.
MOVJ
MOVJ
MOVJ
SVGUNCL   GUN#(1)   ← Specifies the gun for teaching.
MOVJ
SVGUNCL   GUN#(2)   ← Specifies the gun for teaching.
END

```

DX200 OPTIONS INSTRUCTIONS

FOR TWIN GUN FUNCTION

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