

DX100 OPTIONS INSTRUCTIONS

FOR I/O JOG OPERATION IN PLAY-MODE

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

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS

DX100 INSTRUCTIONS

DX100 OPERATOR'S MANUAL

DX100 MAINTENANCE MANUAL

The DX100 operator's manual above corresponds to specific usage.
Be sure to use the appropriate manual.

Part Number: 158255-1CD

Revision: 0



MANDATORY

- This manual explains the I/O JOG operation in play-mode of the DX100 system. Read this manual carefully and be sure to understand its contents before handling the DX100.
- General items related to safety are listed in the Chapter 1: Safety of the DX100 Instructions. To ensure correct and safe operation, carefully read the DX100 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

Read this manual carefully before installation, operation, maintenance, or inspection of the DX100.

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 when the emergency stop buttons on the front door of the DX100 and the 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 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 DX100 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 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 DX100 and the programming pendant.

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**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 DX100 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 DX100 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 manipulator cables.

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
DX100 Controller	DX100
DX100 Programming Pendant	Programming Pendant
Cable between the manipulator and the controller	Manipulator cable

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Descriptions of the programming pendant keys, 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 []. ex. [ENTER]
	Symbol Keys	The keys which have a symbol printed on them are not denoted with [] but depicted with a small picture. ex. 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, 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.

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

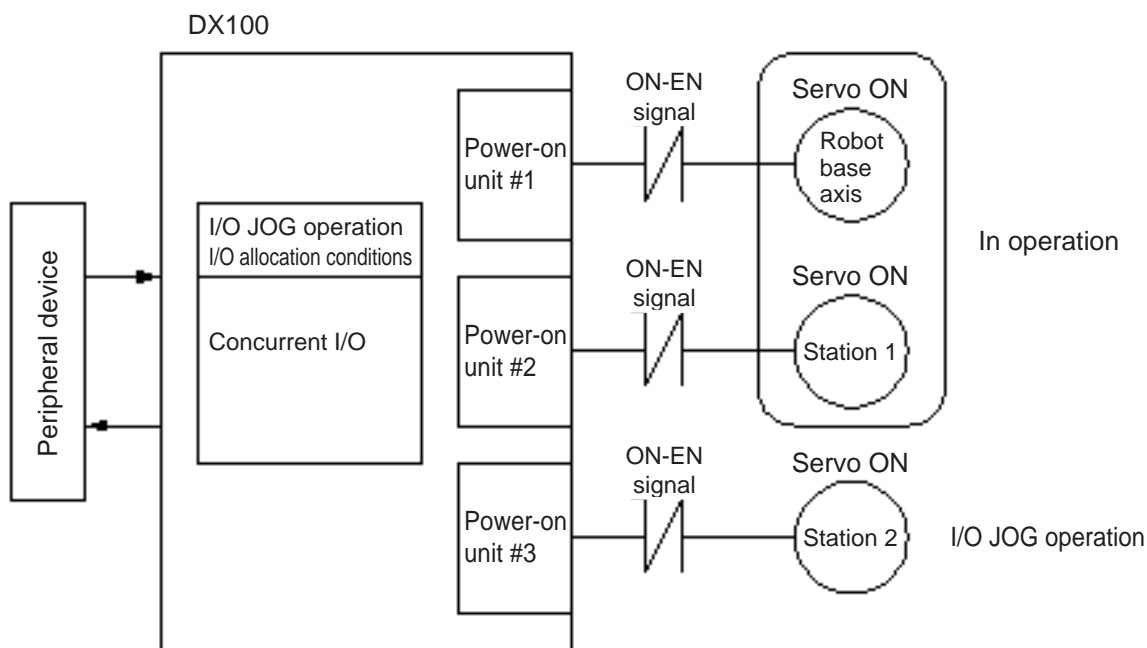
The I/O JOG function in play mode executes JOG operation by using universal input signals instead of the programming pendant.

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 universal 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 universal output signal which indicates that the robot/station is under the I/O JOG operation can be set.
9. The universal 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.)
10. It is recommended to connect a robot/station to each power-on unit. (It is recommended to turn off the servo for the control group that is not operating.)

Fig. 1-1: Outline of I/O JOG Operation



2 Input Signals for I/O JOG Operation

Input Signal	Meaning	Details
Universal input	External manual operation request (Points for each station)	To validate the external manual operation * Invalid when plural inputs are input.
Universal 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.
Universal 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.
Universal 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).

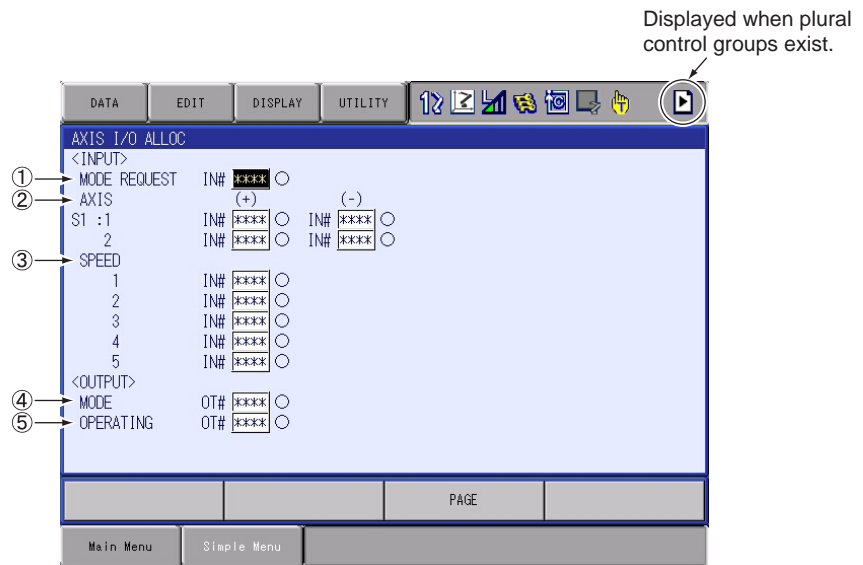
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3 Output Signals for I/O JOG Operation

3 Output Signals for I/O JOG Operation

Output Signal	Meaning	Details
Universal 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.
Universal 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.

5 Servo Power Supply Individual Control Function

5.1 Outline

The servo power supply individual control function is to turn ON/OFF the servo power supply in units of specified control group freely in the robot system with multiple control group configuration.

Using this function, without stopping whole the system operation, the servo power supply only for the control group selected by an operator can be turned OFF. Therefore, the safe operation for removing a workpiece with the system running and maintenance for robot tool, is secured, moreover, the operating efficiency is increased.



The servo power supply individual control function is to control the servo power supply in units of contactor unit. To use this function, use the contactor unit originally designed for separation in units of control group.

5.2 Connection of Signals for Servo Power Supply Individual Control

The servo power supply individual control function turns ON/OFF the servo power supply in units of contactor unit. "ON_EN" signal of power supply contactor unit is used.

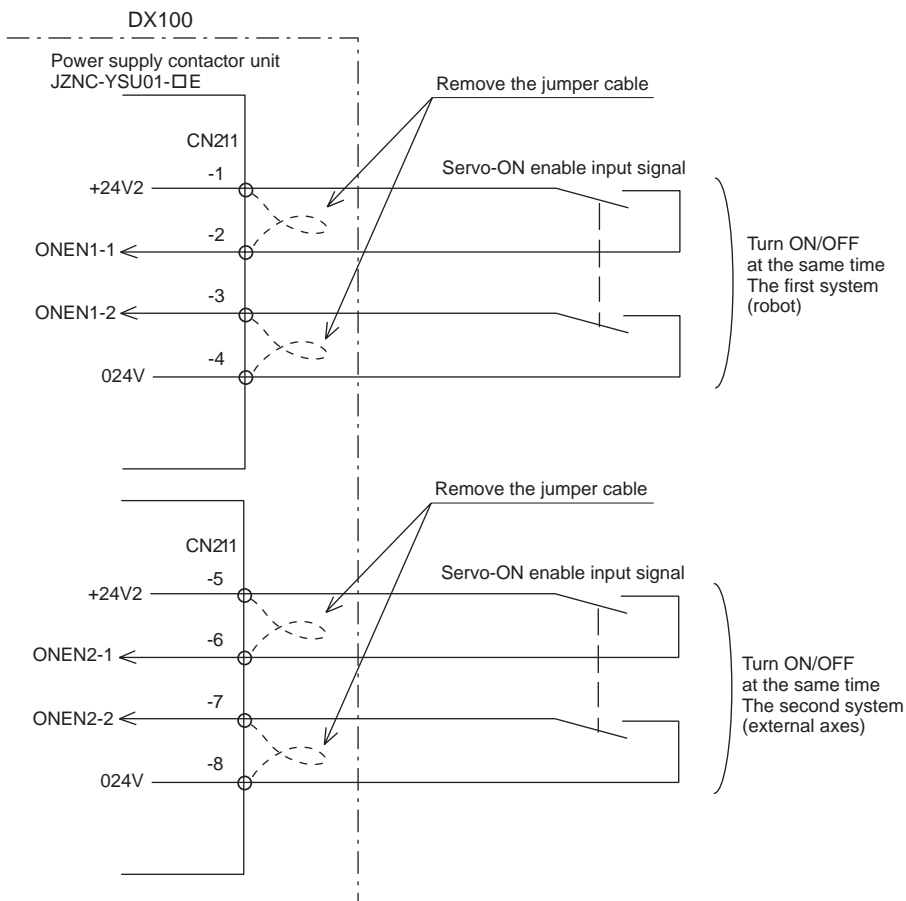
"ON_EN" signals of each power supply contactor unit is connected to the following terminals.

- power supply contactor unit (JZNC-YSU01-□E): 1 to 8 of CN211
- The ON/OFF of the servo power supply for the first system (robot) of the contactor unit is controlled by the "ON-EN" signals of CN211-1 & -2 and -3 & -4.
- The ON/OFF of the servo power supply for the second system (external axes) of the contactor unit is controlled by the "ON-EN" signals of CN211-5 & -6 and -7 & -8.

NOTE For safety reasons, dual circuits are used for the Servo-ON Enable input signals. Connect the signal so that both input signals are turned ON or OFF at the same time.
If only one signal is turned ON, an alarm occurs.

Connect the servo power supply individual control signals in the following manner.

1. Remove the jumpers connected to the above mentioned contactor unit terminals.
2. Connect an output contact such as area sensor to "ON_EN" terminal as shown in the figure below.



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5 Servo Power Supply Individual Control Function



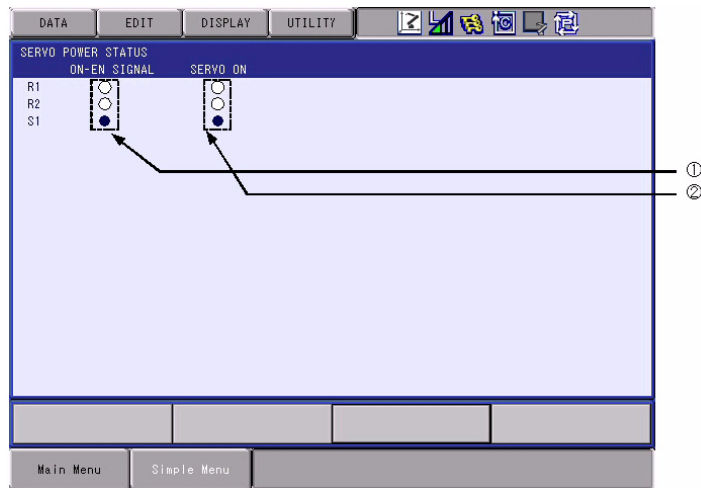
For the wiring termination and connecting method, refer to “WAGO Connector” in “12.3.2 Units and Circuit Boards in the CPU Unit” of DX100 Instructions.

Short-circuited between the above terminals as a standard.

5.3 Confirming Connection

The status of "ON_EN" signals connected to each contactor unit and the servo power supply status can be confirmed on the SERVO POWER STATUS window.

1. Select {IN/OUT} under the main menu.
2. Select {SV POWER STATUS}.
 - The SERVO POWER STATUS window appears.



① ON_EN SIGNAL

Displays the status of "ON_EN" signal of contactor unit connected to each control group.

○: Open (OFF) status

Turns OFF the servo power supply.

●: Closed (ON) status

Turns ON the servo power supply when the servo ON lamp is lit.

② SERVO ON

Displays the status of servo power supplied to each control group.

○: Servo power OFF status

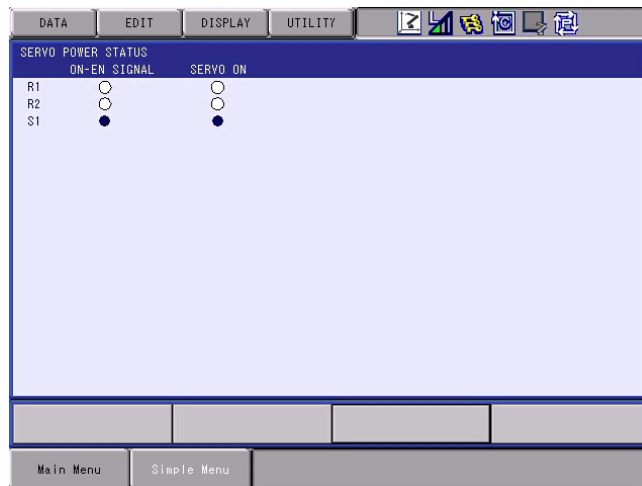
●: Servo power supply ON completed status

5.4 Application Examples

5.4.1 Turning ON Only the Servo Power Supply for the Selected Control Group at Teaching

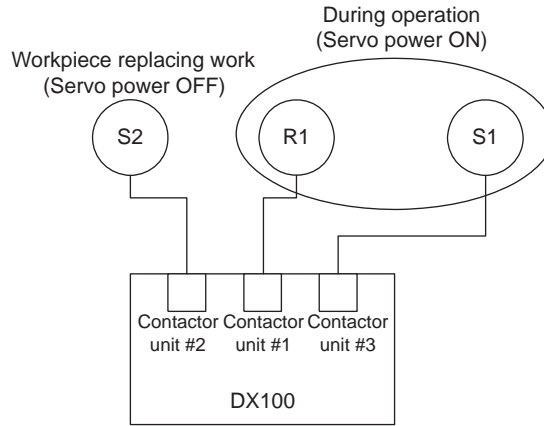
At turning the servo ON, only the servo power supply for the selected control group can be turned ON.

As shown below, when the servo power supply is turned ON with only the "ON_EN" signal of contactor unit connected to S2 set to "ON," the servo power is supplied only to S2.

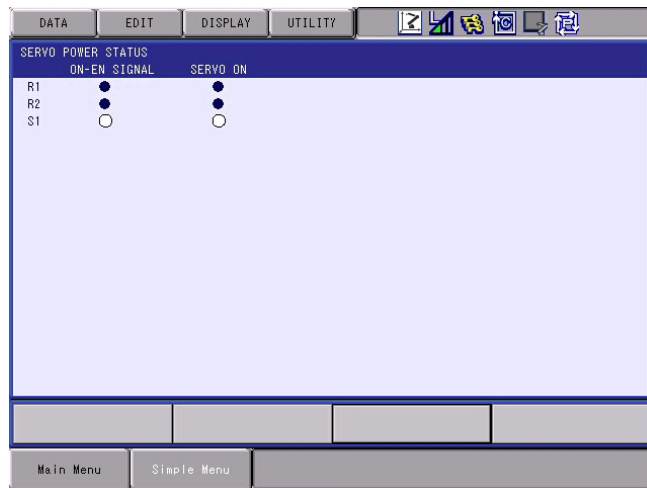


5.4.2 Turning OFF Only the Servo Power Supply for the Selected Control Group at Playback

When an operator touches the positioner in such a case as replacement of workpiece, only the servo power supply for the positioner to be touched can be turned OFF for security.



As shown below, with the “ON_EN” signal of contactor unit connected to S2 set to “OFF,” only the servo power supply to S2 can be turned OFF even during playback operation.



While the servo ON lamp is lit, if “ON_EN” signal is turned ON, the servo power supply for the corresponding control group is turned ON.

NOTE To control individually the servo power supply for a selected control group without stopping whole the system during playback, it is necessary to prepare an application job, using the independent control function.

5.5 System Output Signals

5.5.1 Servo Power ON Status Signal for Each Control Group

The servo power ON status of each control group is output to the following system output signal.

In the standard concurrent I/O ladder, these system output signals are not output externally. When installing an interlock operated by PLC, etc., modify the concurrent I/O ladder so that the system output signals are output externally.

50327	50326	50325	50324	50323	50322	50321	50320
SOUT#256	SOUT#255	SOUT#254	SOUT#253	SOUT#252	SOUT#251	SOUT#250	SOUT#249
Servo power ON status Robot 8	Servo power ON status Robot 7	Servo power ON status Robot 6	Servo power ON status Robot 5	Servo power ON status Robot 4	Servo power ON status Robot 3	Servo power ON status Robot 2	Servo power ON status Robot 1

50337	50336	50335	50334	50333	50332	50331	50330
SOUT#264	SOUT#263	SOUT#262	SOUT#261	SOUT#260	SOUT#259	SOUT#258	SOUT#257
Servo power ON status Station 8	Servo power ON status Station 7	Servo power ON status Station 6	Servo power ON status Station 5	Servo power ON status Station 4	Servo power ON status Station 3	Servo power ON status Station 2	Servo power ON status Station 1

50347	50346	50345	50344	50343	50342	50341	50340
SOUT#272	SOUT#271	SOUT#270	SOUT#269	SOUT#268	SOUT#267	SOUT#266	SOUT#265
Servo power ON status Station 16	Servo power ON status Station 15	Servo power ON status Station 14	Servo power ON status Station 13	Servo power ON status Station 12	Servo power ON status Station 11	Servo power ON status Station 10	Servo power ON status Station 9

50357	50356	50355	50354	50353	50352	50351	50350
SOUT#280	SOUT#279	SOUT#278	SOUT#277	SOUT#276	SOUT#275	SOUT#274	SOUT#273
Servo power ON status Station 24	Servo power ON status Station 23	Servo power ON status Station 22	Servo power ON status Station 21	Servo power ON status Station 20	Servo power ON status Station 19	Servo power ON status Station 18	Servo power ON status Station 17

5.5.2 “During Servo ON” Signal

The system output signal 50073 (during servo ON) is output in connection with the servo ON lamp on the programming pendant.

After the servo power supply is turned ON, even if all the “ON_EN” signals connected to contactor unit are set to “OFF”, the servo ON lamp remains lit and the system output signal “During Servo ON” does not turn “OFF”.

5.6 Operation of Job Without Control Group Specification

When the servo power supply is individually turned OFF where jobs in multiple number of tasks are operated using the independent control function, the job execution of the control group whose servo power supply is turned OFF is interrupted.

The jobs of other control groups continue their execution.

For the jobs without control group specification such as master job, the conditions for execution can be set by the parameter.

Parameter	Contents and Set Value	Initial Value
S2C687 (Condition of execution of job without control group specification)	0: Execution possible only when servo power supply to all the axes have been turned ON 1: Execution possible when servo power supply to any axis is turned ON.	1

DX100 OPTIONS INSTRUCTIONS

FOR I/O JOG OPERATION IN PLAY-MODE

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