

# **mitsubishi**

**PERSONAL MACHINE CONTROLLER**

**MODEL W (FCUA-MP200/MP205)**

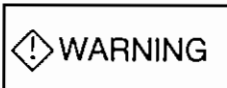
**INSTRUCTION MANUAL**

Thank you for purchasing the Mitsubishi Motion Controller/Personal Machine Controller. This instruction manual describes the handling and precautions of this unit. Incorrect handling will lead to unforeseen events, so we ask that you please read this manual thoroughly and use the unit correctly. Please make sure that this manual is delivered to the final user of the unit and that it is stored for future reference.

### Precautions for Safety

Please read this instruction manual and enclosed documents before starting installation, operation, maintenance or inspections to ensure correct usage. Thoroughly understand the machine, safety information and precautions before starting operation.

The safety precautions are ranked as "Warning" and "Caution" in this instruction manual.



When a dangerous situation may occur if handling is mistaken leading to fatal or major injuries.



When a dangerous situation may occur if handling is mistaken leading to medium or minor injuries, or physical damage.

Note that some items described as cautions may lead to major results depending on the situation. In any case, important information that must be observed is described.

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## For Safe Operations

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### 1. Prevention of electric shocks

 WARNING

- Never open the front case or terminal covers while the power is ON or the unit is running, as this may lead to electric shocks.
- Never run the unit with the front case or terminal cover removed. The high voltage terminal and charged sections will be exposed and may lead to electric shocks.
- Never open the front case or terminal cover at times other than wiring work or periodic inspections even if the power is OFF. The insides of the control unit and servo amplifier are charged and may lead to electric shocks.
- When performing wiring work or inspections, turn the power OFF, wait at least ten minutes, and then check the voltage with a tester, etc. Failing to do so may lead to electric shocks.
- Always ground the control unit, servo amplifier and servo motor with Class 3 grounding. Do not ground commonly with other devices.
- The wiring work and inspections must be done by a qualified technician.
- Wire the units after installing the control unit, servo amplifier and servo motor. Failing to do so may lead to electric shocks or damage.
- Never operate the switches with wet hands, as this may lead to electric shocks.
- Do not damage, apply excessive stress, place heavy things on or sandwich the cables, as this may lead to electric shocks.
- Do not touch the control unit, servo amplifier or servo motor terminal blocks while the power is ON, as this may lead to electric shocks.
- Do not touch the internal power supply, internal grounding or signal wires of the control unit and servo amplifier, as this may lead to electric shocks.

### 2. For fire prevention

 CAUTION

- Install the control unit, servo amplifier, servo motor and regenerative resistor on inflammable material. Direct installation on flammable material or near flammable material may lead to fires.
- If a fault occurs in the control unit or servo amplifier, shut the power OFF at the servo amplifier's power source. If a large current continues to flow, fires may occur.
- When using a regenerative resistor, shut the power OFF with an error signal. The regenerative resistor may abnormally overheat due to a fault in the regenerative transistor, etc., and may lead to fires.
- Always take heat measures such as flame proofing for the inside of the control panel where the servo amplifier or regenerative resistor is installed and for the wires used. Failing to do so may lead to fires.

### 3. For injury prevention

#### CAUTION

- Do not apply a voltage other than that specified in the instruction manual on any terminal. Doing so may lead to destruction or damage.
- Do not mistake the terminal connections, as this may lead to destruction or damage.
- Do not mistake the polarity (+/-), as this may lead to destruction or damage.
- The servo amplifier's heat radiating fins, regenerative resistor and servo amplifier, etc., will be hot while the power is ON and for a short time after the power is turned OFF. Do not touch these parts as doing so may lead to burns.
- Always turn the power OFF before touching the servo motor shaft or coupled machines, as these parts may lead to injuries.
- Do not go near the machine during test operations or during operations such as teaching. Doing so may lead to injuries.

### 4. Various precautions

Strictly observe the following precautions.

Mistaken handling of the unit may lead to faults, injuries or electric shocks.

#### (1) System structure

#### CAUTION

- Always install a leakage breaker on the control unit and servo amplifier power source.
- If installation of a magnetic contactor for power shut off during an error, etc., is specified in the instruction manual for the servo amplifier, etc., always install the magnetic contactor.
- Install an external emergency stop circuit so that the operation can be stopped immediately and the power shut off.
- Use the control unit, servo amplifier, servo motor and regenerative resistor with the combinations listed in the instruction manual. Other combinations may lead to fires or faults.
- If safety standards (ex., robot safety rules, etc.) apply to the system using the control unit, servo amplifier and servo motor, make sure that the safety standards are satisfied.
- If the operation during a control unit or servo amplifier error and the safety direction operation of the control unit differ, construct a countermeasure circuit externally of the control unit and servo amplifier.
- In systems where coasting of the servo motor will be a problem during emergency stop, servo OFF or when the power is shut OFF, use dynamic brakes.
- Make sure that the system considers the coasting amount even when using dynamic brakes.
- In systems where perpendicular shaft dropping may be a problem during emergency stop, servo OFF or when the power is shut OFF, use both dynamic brakes and magnetic brakes.
- The dynamic brakes must be used only during emergency stop and errors where servo OFF occurs. These brakes must not be used for normal braking.
- The brakes (magnetic brakes) assembled into the servo motor are for holding applications, and must not be used for normal braking.
- Construct the system so that there is a mechanical allowance allowing stopping even if the stroke end limit switch is passed through at the max. speed.

 CAUTION

- Use wires and cables that have a wire diameter, heat resistance and bending resistance compatible with the system.
- Use wires and cables within the length of the range described in the instruction manual.
- The ratings and characteristics of the system parts (other than control unit, servo amplifier, servo motor) must be compatible with the control unit, servo amplifier and servo motor.
- Install a cover on the shaft so that the rotary parts of the servo motor are not touched during operation.
- There may be some cases where holding by the magnetic brakes is not possible due to the life or mechanical structure (when the ball screw and servo motor are connected with a timing belt, etc.). Install a stopping device to ensure safety on the machine side.

## (2) Parameter settings and programming

 CAUTION

- Set the parameter values to those that are compatible with the control unit, servo amplifier, servo motor and regenerative resistor model and the system application. The protective functions may not function if the settings are incorrect.
- The regenerative resistor model and capacity parameters must be set to values that conform to the operation mode, servo amplifier and servo power unit. The protective functions may not function if the settings are incorrect.
- Set the mechanical brake output and dynamic brake output validity parameters to values that are compatible with the system application. The protective functions may not function if the settings are incorrect.
- Set the stroke limit input validity parameter to a value that is compatible with the system application. The protective functions may not function if the setting is incorrect.
- Set the servo motor encoder type (increment, absolute position type, etc.) parameter to a value that is compatible with the system application. The protective functions may not function if the setting is incorrect.
- Set the servo motor capacity and type (standard, low-inertia, flat, etc.) parameters to values that are compatible with the system application. The protective functions may not function if the settings are incorrect.
- Set the servo amplifier capacity and type parameters to values that are compatible with the system application. The protective functions may not function if the settings are incorrect.
- Use the program commands for the program with the conditions specified in the instruction manual.
- Set the sequence function program capacity setting, device capacity, latch validity range, I/O assignment setting, and validity of continuous operation during error detection to values that are compatible with the system application. The protective functions may not function if the settings are incorrect.
- Some devices used in the program have fixed applications, so use these with the conditions specified in the instruction manual.
- The input devices and data registers assigned to the link will hold the data previous to when communication is terminated by an error, etc. Thus, an error correspondence interlock program specified in the instruction manual must be used.
- Use the interlock program specified in the special function unit's instruction manual for the program corresponding to the special function unit.

### (3) Transportation and installation

#### ⚠ CAUTION

- Transport the product with the correct method according to the weight.
- Use the servo motor suspension bolts only for the transportation of the servo motor. Do not transport the servo motor with machine installed on it.
- Do not stack products past the limit.
- When transporting the control unit or servo amplifier, never hold the connected wires or cables.
- When transporting the servo motor, never hold the cables, shaft or detector.
- When transporting the control unit or servo amplifier, never hold the front case as it may fall off.
- When transporting, installing or removing the control unit or servo amplifier, never hold the edges.
- Install the unit according to the instruction manual in a place where the weight can be withstood.
- Do not get on or place heavy objects on the product.
- Always observe the installation direction.
- Keep the designated clearance between the control unit or servo amplifier and control panel inner surface or the control unit and servo amplifier, control unit or servo amplifier and other devices.
- Do not install or operate control units, servo amplifiers or servo motors that are damaged or that have missing parts.
- Do not block the intake/outtake ports of the servo motor with cooling fan.
- Do not allow conductive matter such as screw or cutting chips or combustible matter such as oil enter the control unit, servo amplifier or servo motor.
- The control unit, servo amplifier and servo motor are precision machines, so do not drop or apply strong impacts on them.
- Securely fix the control unit and servo amplifier to the machine according to the instruction manual. If the fixing is insufficient, these may come off during operation.
- Always install the servo motor with reduction gears in the designated direction. Failing to do so may lead to oil leaks.
- Store and use the unit in the following environmental conditions.

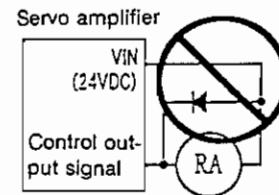
Environment	Conditions	
	Control unit/servo amplifier	Servo motor
Ambient temperature	0°C to +55°C (With no freezing)	0°C to +40°C (With no freezing)
Ambient humidity	According to each instruction manual.	80%RH or less (With no dew condensation)
Storage temperature	According to each instruction manual.	-20°C to +65°C
Atmosphere	Indoors (where not subject to direct sunlight). No corrosive gases, flammable gases, oil mist or dust must exist.	
Altitude	1000m or less above sea level.	
Vibration	According to each instruction manual.	

- When coupling with the synchronization encoder or servo motor shaft end, do not apply impact such as by hitting with a hammer. Doing so may lead to detector damage.
- Do not apply a load larger than the tolerable load onto the servo motor shaft. Doing so may lead to shaft breakage.
- When not using the unit for a long time, disconnect the power line from the control unit or servo amplifier.
- Place the control unit and servo amplifier in static electricity preventing vinyl bags and store.
- When storing for a long time, contact the Service Center or Service Station.

#### (4) Wiring

##### ⚠ CAUTION

- Correctly and securely wire the wires. Reconfirm the connections for mistakes and the terminal screws for tightness after wiring. Failing to do so may lead to run away of the servo motor.
- After wiring, install the protective covers such as the terminal covers to the original positions.
- Do not install a phase advancing capacitor, surge absorber or radio noise filter (option FR-BIF) on the output side of the servo amplifier.
- Correctly connect the output side (terminals U, V,W). Incorrect connections will lead the servo motor to operate abnormally.
- Do not connect a commercial power supply to the servo motor, as this may lead to trouble.
- Do not mistake the direction of the surge absorbing diode installed on the DC relay for the control signal output of brake signals, etc. Incorrect installation may lead to signals not being output when trouble occurs or the protective functions not functioning.
- Do not connect or disconnect the connection cables between each unit, the encoder cable or sequence expansion cable while the power is ON.
- Securely tighten the cable connector fixing screws and fixing mechanisms. Insufficient fixing may lead to the cables coming off during operation.
- Do not bundle the power line or cables.



#### (5) Trial operation and adjustment

##### ⚠ CAUTION

- Confirm and adjust the program and each parameter before operation. Unpredictable movements may occur depending on the machine.
- Extreme adjustments and changes may lead to unstable operation, so never make them.

#### (6) Usage methods

##### ⚠ CAUTION

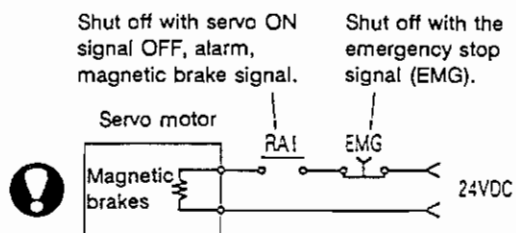
- Immediately turn OFF the power if smoke, abnormal sounds or odors are emitted from the control unit, servo amplifier or servo motor.
- Always execute a test operation before starting actual operations after the program or parameters have been changed or after maintenance and inspection.
- The units must be disassembled and repaired by a qualified technician.
- Do not make any modifications to the unit.
- Keep the effect of magnetic obstacles to a minimum by installing a noise filter or by using wire shields, etc. Magnetic obstacles may affect the electronic devices used near the control unit or servo amplifier.
- Use the units with the following conditions.

Item	Conditions
Input power	According to the separate instruction manual.
Input frequency	According to the separate instruction manual.
Tolerable momentary power failure	According to the separate instruction manual.

## (7) Remedies for errors

### ⚠ CAUTION

- If an error occurs in the self diagnosis of the control unit or servo amplifier, confirm the check details according to the instruction manual, and restore the operation.
- If a dangerous state is predicted in case of a power failure or product failure, use a servo motor with magnetic brakes or install a brake mechanism externally.
- Use a double circuit construction so that the magnetic brake operation circuit can be operated by emergency stop signals set externally.
- If an error occurs, remove the cause, secure the safety and then resume operation.
- The unit may suddenly resume operation after a power failure is restored, so do not go near the machine. (Design the machine so that personal safety can be ensured even if the machine restarts suddenly.)



## (8) Maintenance, inspection and part replacement

### ⚠ CAUTION

- Perform the daily and periodic inspections according to the instruction manual.
- Perform maintenance and inspection after backing up the program and parameters for the control unit and servo amplifier.
- Do not place fingers or hands in the clearance when opening or closing any opening.
- Periodically replace consumable parts such as batteries according to the instruction manual.
- Do not touch the lead sections such as ICs or the connector contacts.
- Do not place the control unit or servo amplifier on metal that may cause a power leakage or wood, plastic or vinyl that may cause static electricity buildup.
- Do not perform a megger test (insulation resistance measurement) during inspection.
- When replacing the control unit or servo amplifier, always set the new unit settings correctly.
- After maintenance and inspections are completed, confirm that the position detection of the absolute position detector function is correct.
- Do not short circuit, charge, overheat, incinerate or disassemble the batteries.
- The electrolytic capacitor will generate gas during a fault, so do not place your face near the control unit or servo amplifier.
- The electrolytic capacitor and fan will deteriorate. Periodically change these to prevent secondary damage from faults. Replacements can be made by the Service Center or Service Station.

## (9) Disposal

### ⚠ CAUTION

- Dispose of this unit as general industrial waste.
- Do not disassemble the control unit, servo amplifier or servo motor parts.
- Dispose of the battery according to local laws and regulations.



## (10) General cautions

### CAUTION

All drawings provided in the instruction manual show the state with the covers and safety partitions removed to explain detailed sections. When operating the product, always return the covers and partitions to the designated positions, and operate according to the instruction manual.

# CONTENTS

<b>1. Introduction</b> .....	<b>1-1</b>
1.1 Introduction of this instruction manual .....	1-1
1.2 General specifications of each unit .....	1-2
<b>2. Connection of System and Each Unit</b> .....	<b>2-1</b>
2.1 System diagram .....	2-1
2.1.1 FCUA-MP200/MP200W .....	2-1
2.1.2 FCUA-MP205/MP205W .....	2-2
2.2 Control unit part names .....	2-3
2.3 Remote I/O unit part names .....	2-4
2.4 Servo drive unit part names .....	2-5
2.4.1 MDS-A-SVJ/MR-J-B .....	2-5
2.4.2 MR-H-B .....	2-6
<b>3. Starting Procedures</b> .....	<b>3-1</b>
3.1 Confirmation of connections .....	3-1
3.2 Setting of unit switches .....	3-1
3.2.1 Control unit setting switches .....	3-1
3.2.2 Remote I/O unit setting switch .....	3-2
3.2.3 Servo drive unit setting switches .....	3-3
3.3 Power ON and parameter settings .....	3-4
3.3.1 Checks before turning the power ON .....	3-4
3.3.2 Starting up with control unit as a single unit .....	3-4
3.3.3 Starting up of the entire unit after connection .....	3-4
3.3.4 Initialization of memory .....	3-5
3.3.5 Mounting check .....	3-5
3.3.6 Parameter settings .....	3-6
3.3.7 Control unit's rotary switch settings and operations .....	3-8
3.4 Peripheral devices .....	3-9
3.5 Built-in PLC development procedure .....	3-10
3.5.1 Built-in PLC development procedure using PLC development tool ..	3-10
3.5.2 Built-in PLC development procedure using MELSEC peripheral device .....	3-12
3.6 Motion program development procedure .....	3-13
3.6.1 Development procedure .....	3-13
3.6.2 Creation of new file .....	3-14
3.6.3 Correction of file .....	3-15

<b>4. Explanation of Parameters</b> .....	<b>4-1</b>
4.1 List of common parameters .....	4-1
4.2 List of axis parameters .....	4-4
4.3 List of MP200 servo parameters .....	4-7
4.4 List of MP205 servo parameters .....	4-11
4.5 List of sampling parameters .....	4-17
4.6 Cautions for setting gear ratio etc. ....	4-18
4.6.1 Conditions for setting gear ratio, etc. ....	4-18
4.6.2 Setting method for belt drive, etc. ....	4-18
<b>5. Alarms and Warnings</b> .....	<b>5-1</b>
5.1 Classification of alarms .....	5-1
5.2 Classification of warnings .....	5-1
5.3 Display of alarms and warnings .....	5-2
5.4 List of alarms .....	5-3
5.4.1 (1E) : MP200/205 system errors .....	5-3
5.4.2 (2E) : MP200 servo alarms .....	5-5
5.4.3 (2E) : MP205 servo alarms .....	5-7
5.4.4 (3E) : MP200/205 operation errors .....	5-9
5.4.5 (4E) : MP200/205 command errors .....	5-10
5.4.6 (5E) : MP200/MP205 motion program errors .....	5-14
5.4.7 (6E) : MP200/205 communication errors .....	5-17
5.5 List of warnings .....	5-18
5.5.1 (1F) : MP200/205 system warnings .....	5-18
5.5.2 (2F) : MP200 servo warnings .....	5-19
5.5.3 (2F) : MP205 servo warnings .....	5-20
5.5.4 (3F) : MP200/205 operation warnings .....	5-21
<b>6. Appendix</b> .....	<b>6-1</b>
6.1 List of MP200 standard servo parameter settings per motor .....	6-1
6.2 List of motion program functions .....	6-3
6.3 List of command functions .....	6-5

## 1. Introduction

### 1.1 Introduction of this instruction manual

This instruction manual is for the Machine controller Model W (FCUA-MP200/MP200W and FCUA-MP205/MP205W).

The FCUA-MP200 or MP200W is the control unit that uses the MDS-A-SVJ type servo drive unit.

The FCUA-MP205 or MP205W is the control unit that uses the MR-J-B and MR-H-B type servo drive unit (MELSERVO).

The W at the end of each controller's model name indicates the single-phase AC100V power receiving type. (If W is not indicated, the model is a single-phase AC200/220V power receiving type.)

Confirm the control unit model name on the rating nameplate found on the side of the control unit.

Refer to the MDS-A-SVJ, MR-J-B and MR-H-B type servo drive unit instruction manuals for details on each unit.

This instruction manual describes the various settings, starting procedures, parameters, alarms and warnings, etc., for the machine controller.

This built-in PLC development procedures are also described in this instruction manual. However, this function is provided only in the Japanese environment at this time. Consult with the setup maker for details on editing the built-in PLC.

The following instruction manuals are also available.

Document name	Document No.	Remarks
Model W Instruction Manual	BNP-B2106*(ENG)	This instruction manual
Model W Setup Software Manual	BNP-B2066C(ENG)	
MDS-A-SVJ SERIES SERVO MAINTENANCE AND ADJUSTMENT MANUAL	BNP-B2057*(ENG)	Document exclusive for MP200
MELSERVO-J-B SPECIFICATIONS AND INSTRUCTION MANUAL	IB(NA)67218	Document exclusive for MP205
MELSERVO-H-B SPECIFICATIONS AND INSTRUCTION MANUAL	IB(NA)67217	Document exclusive for MP205

\*1 : MS-DOS is a registered trademark of Microsoft Corporation.

\*2 : Windows is a trademark of Microsoft Corporation.

\*3 : PC-9801 Series is a registered trademark of NEC Corp.

## 1.2 General specifications of each unit

Unit name		Control unit		Expansion unit
Unit model		FCUA-MP200/205	FCUA-MP200W/205W	FCUA-EX1□□
General specifications	Working ambient temperature	0 to 55°C		
	Storage ambient temperature	-20 to 65°C		
	Working ambient humidity	40 to 75%RH (with no dew condensation)		
	Storage ambient humidity	40 to 90%RH (with no dew condensation)		
	Vibration resistance	0.6G or less (during operation)		
	Shock resistance	3.0G or less(during operation) / 10G or less(during transportation)		
	Working atmosphere	No corrosive gases or dust		
	Power noise	1kV (P - P)		
Power supply specifications	Power voltage	Single-phase AC200V to AC230V	Single-phase AC100V	(Supplied from control unit)
		-15% +10%		
		50/60Hz ±5%		
	Tolerable momentary power failure time	20msec		—
Consumed power	0.04kVA		(Including control unit)	
Heat radiation amount	16W			

Unit name		Remote I/O unit	
Unit model		FCUA-DX100	FCUA-DX110/DX120/DX130
General specifications	Working ambient temperature	0 to 55°C	
	Storage ambient temperature	-20 to 65°C	
	Working ambient humidity	40 to 75%RH (with no dew condensation)	
	Storage ambient humidity	40 to 90%RH (with no dew condensation)	
	Vibration resistance	0.5G or less (during operation)	
	Shock resistance	3.0G or less (during operation) / 10G or less (during transportation)	
	Working atmosphere	No corrosive gases or dust	
	Power noise	1kV (P - P)	
Power supply specifications	Power voltage	DC24V ±5% Ripple ±5% (P - P)	
	Tolerable momentary power failure time	—	
	Consumed power	24V 0.7A <Note 1>	24V 1.5A <Note 1>
Heat radiation amount	60W <Note 2>	110W <Note 2>	

< Note 1 > Only the control circuit consumption.

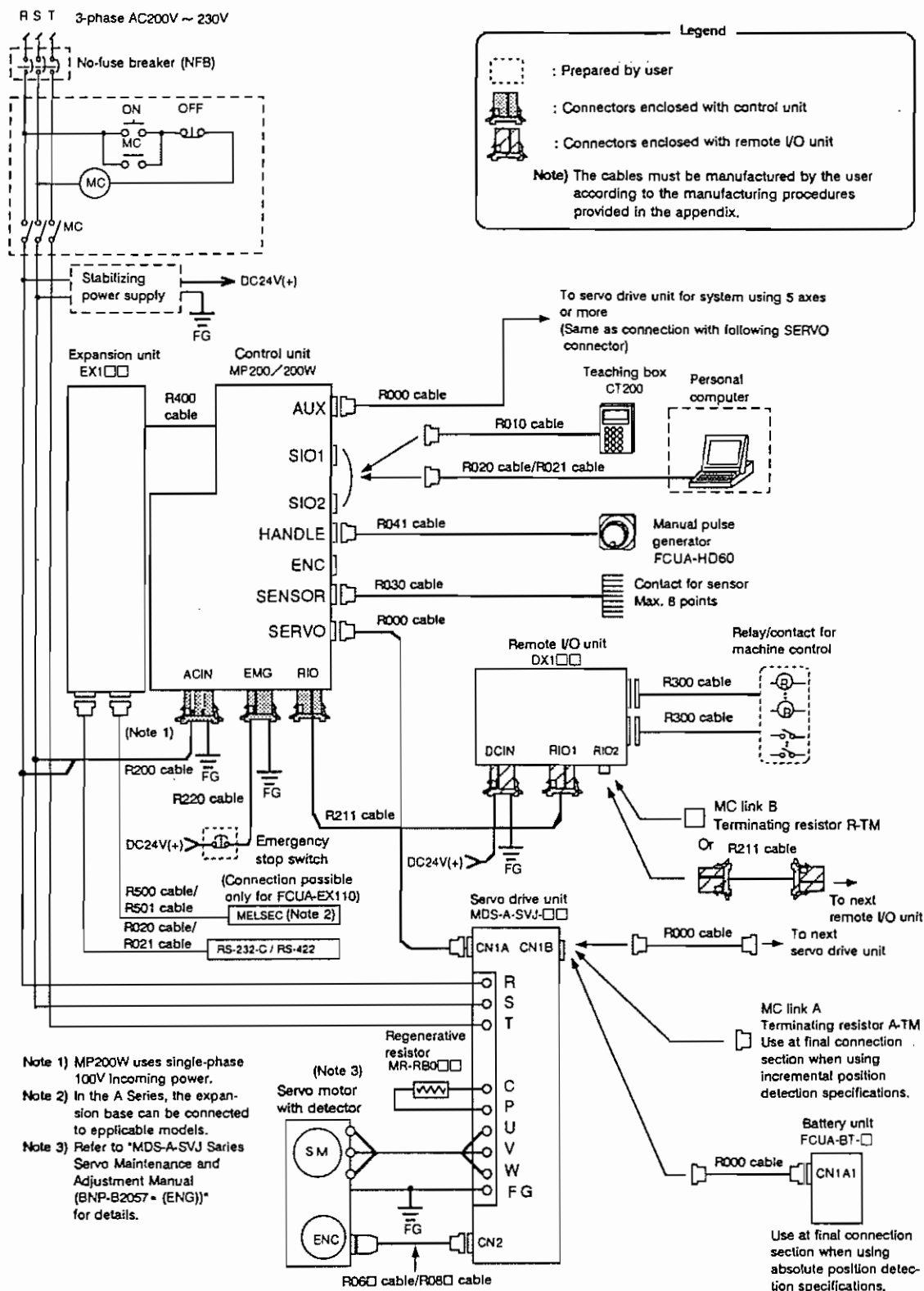
< Note 2 > During full point operation of machine input/output interface circuit.

Unit name	Servo drive unit		
Unit model	MDS-A-SVJ	MR-J-B	MR-H-B
General specifications	Refer to the "Servo Maintenance and Adjustment Manual" (BNP-B2057*(ENG)).	Refer to the "Specifications and Instruction Manual" (IB(NA)67218).	Refer to the "Specifications and Instruction Manual" (IB(NA)67217).

## 2. Connection of System and Each Unit

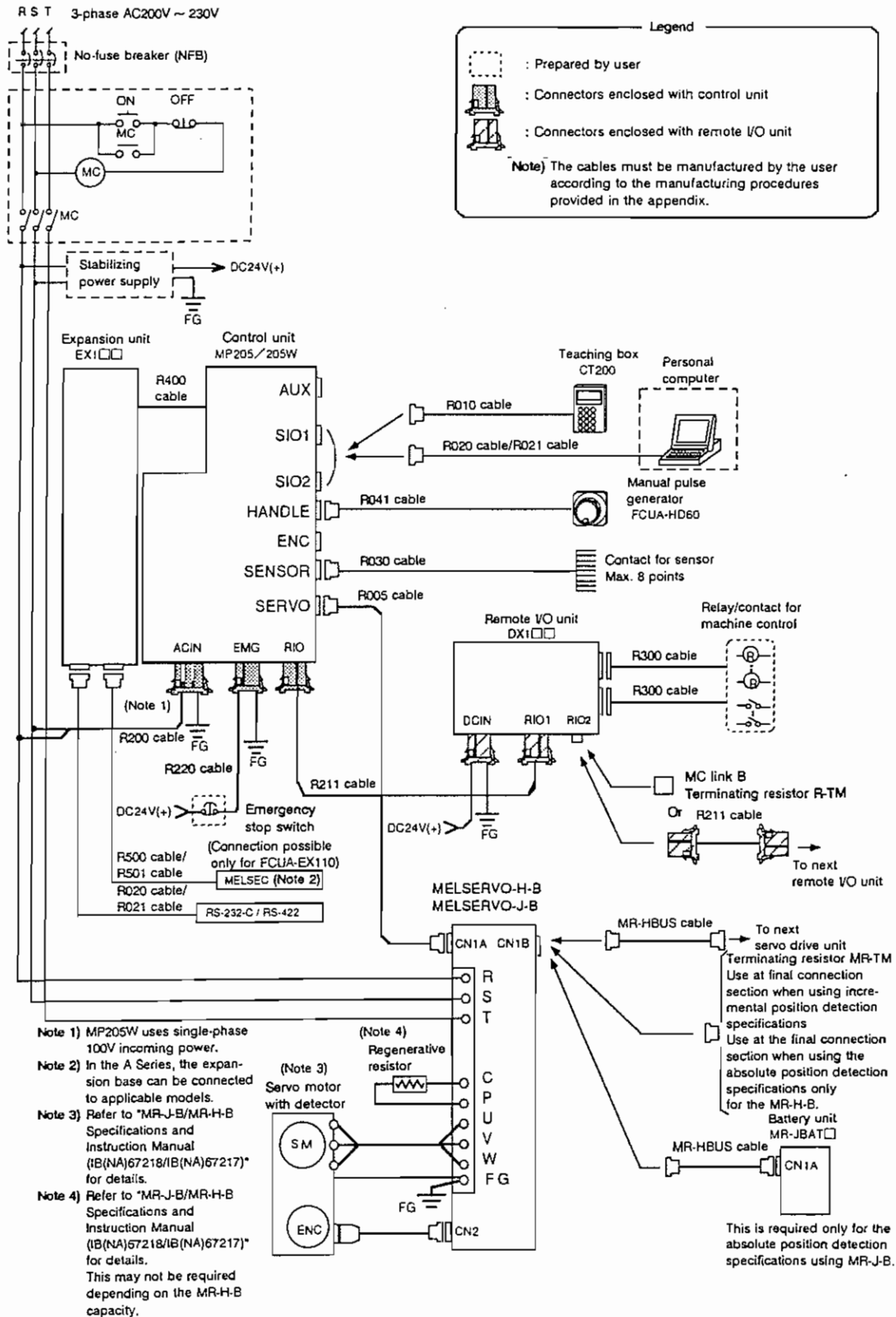
### 2.1 System diagram

#### 2.1.1 FCUA-MP200/MP200W

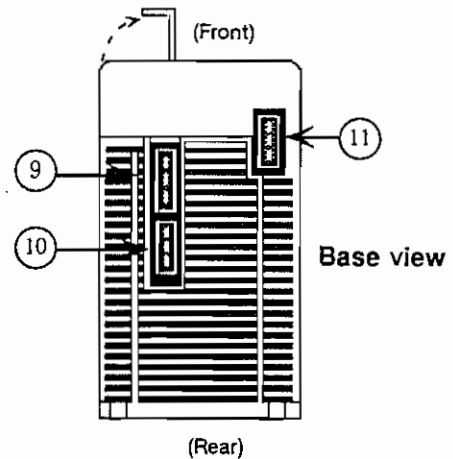
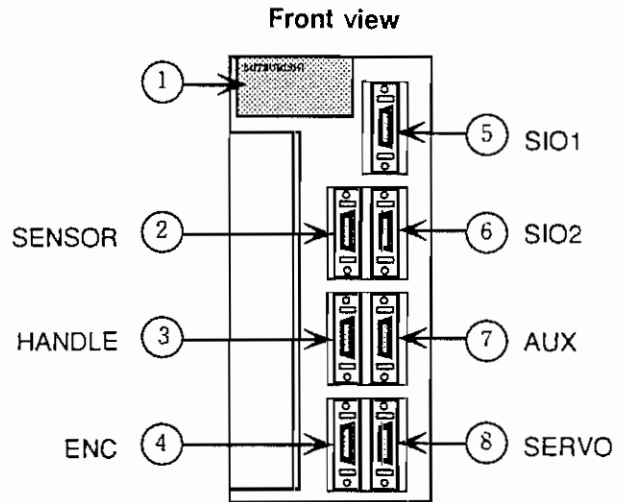
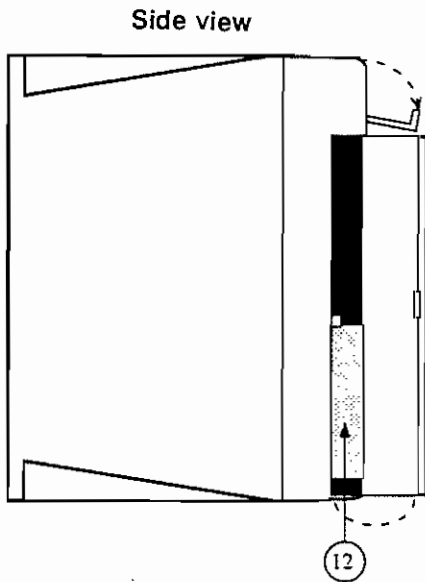


## 2. Connection of System and Each Unit

### 2.1.2 FCUA-MP205/MP205W



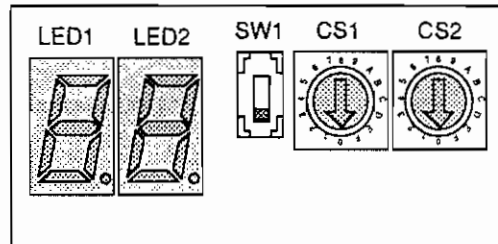
2.2 Control unit part names



- ① Switching window (display, switches)
- ② Sensor signal (skip) connection connector
- ③ Not used
- ④ Not used
- ⑤ Teaching box connection connector or personal computer connection connector
- ⑥ Servo drive unit connection (MC link A) connector
- ⑦ Servo drive unit connection (MC link A) connector
- ⑧ Power input connector
- ⑨ Emergency stop signal connection connector
- ⑩ Remote I/O unit connection (MC link B) connector
- ⑪ Data saving battery

MP200/MP205 has a single-phase AC200/220V incoming power  
 MP200W/MP205W has a single-phase AC100V incoming power

Drawing of inside of switching window

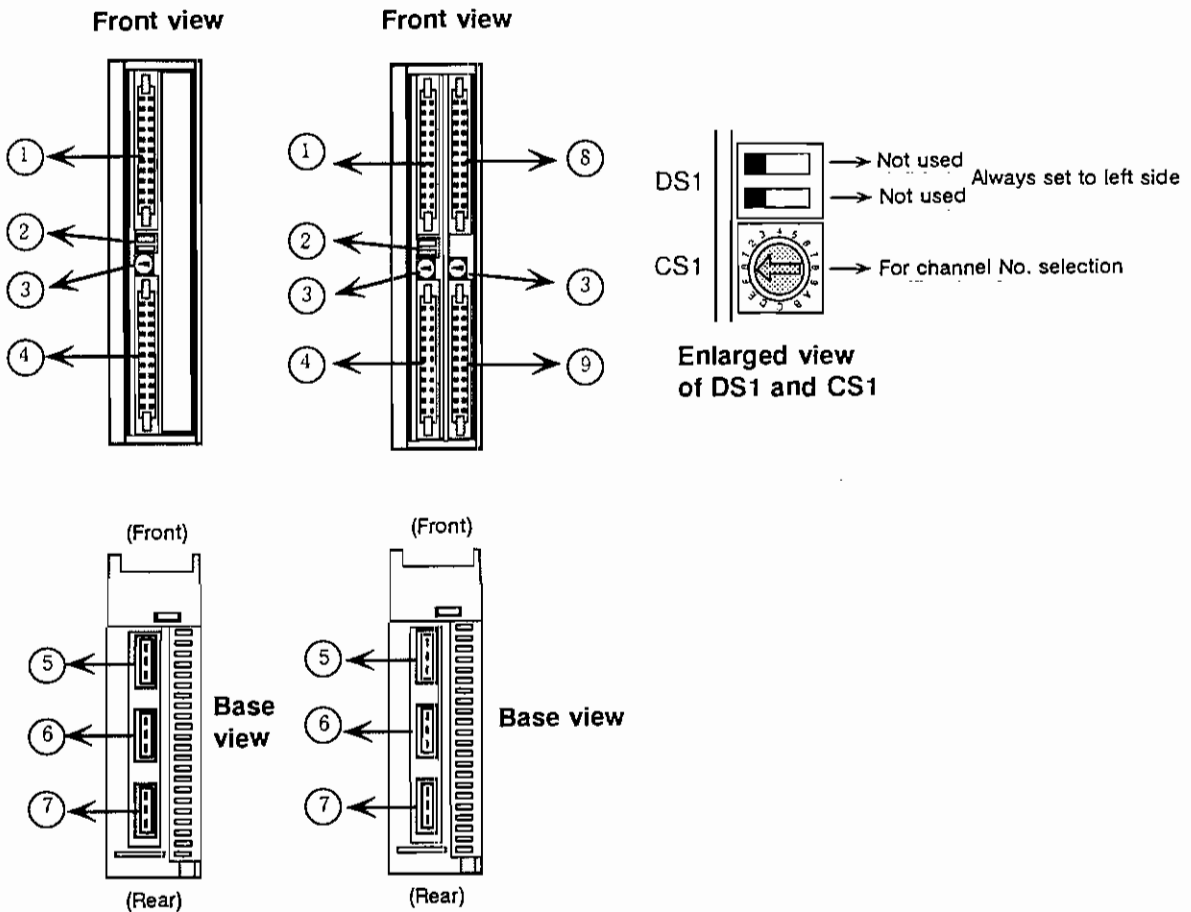


LED (Display) : Indicates the operation state.  
 SW1 (Slide switch) : Normally set to the bottom side.  
 CS1,2 (Rotary switch): Changes the operation state.



2.3 Remote I/O unit part names

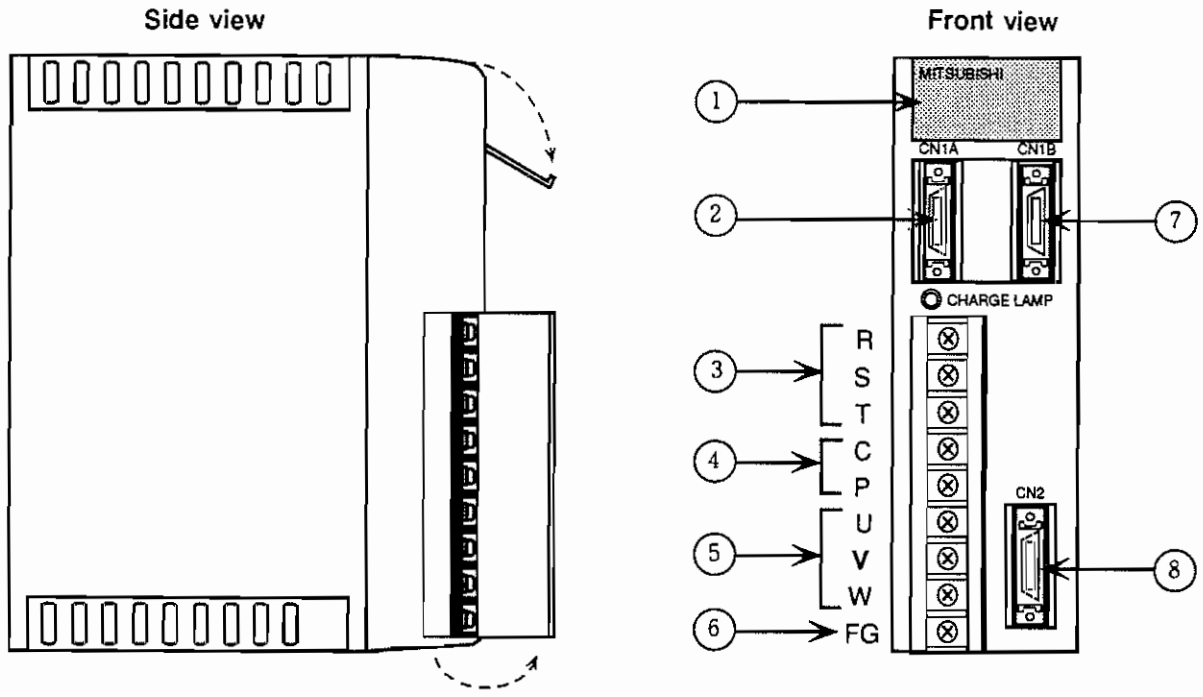
FCUA-DX100    FCUA-DX110/DX120/DX130



- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>① DI-L<br/>(Machine input signal connector)</li> <li>② DS1<br/>(Not used. Fixed to left side)</li> <li>③ CS1<br/>(Channel No. changeover switch)</li> <li>④ DO-L<br/>(Machine output signal connector)</li> <li>⑤ RIO1<br/>(Serial connection connector #1)</li> </ul> | <ul style="list-style-type: none"> <li>⑥ RIO2<br/>(Serial connection connector #2)</li> <li>⑦ DCIN<br/>(DC-24V power input connector)</li> <li>⑧ DI-R<br/>(Machine input signal connector)</li> <li>⑨ DO-R<br/>(Machine output signal connector)</li> </ul> |
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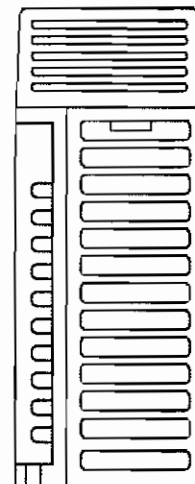
2.4 Servo drive unit part names

2.4.1 MDS-A-SVJ/MR-J-B

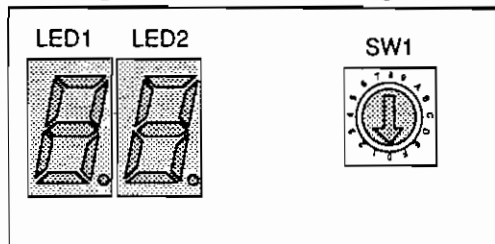


- ① Switching window  
(display, axis selection switch)
- ② Communication cable connection connector  
(Connect with the control unit or servo drive unit.)
- ③ AC200V power input terminal
- ④ Regenerative resistor connection terminal
- ⑤ Motor drive line connection terminal
- ⑥ Grounding terminal
- ⑦ Communication cable or terminating resistor connection connector  
(Connect with the servo drive unit, battery unit or terminating resistor)
- ⑧ Motor detector connection connector

Base view

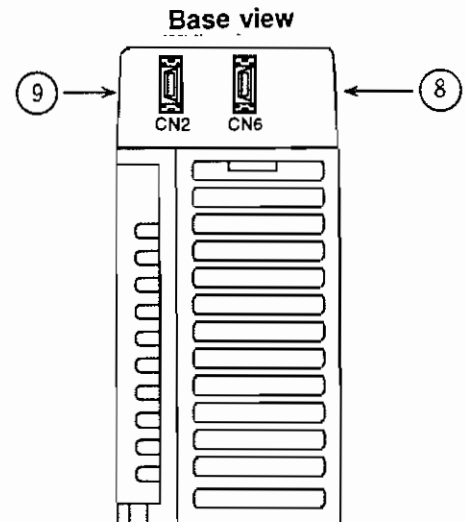
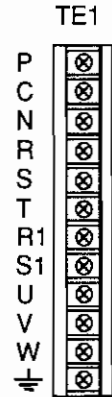
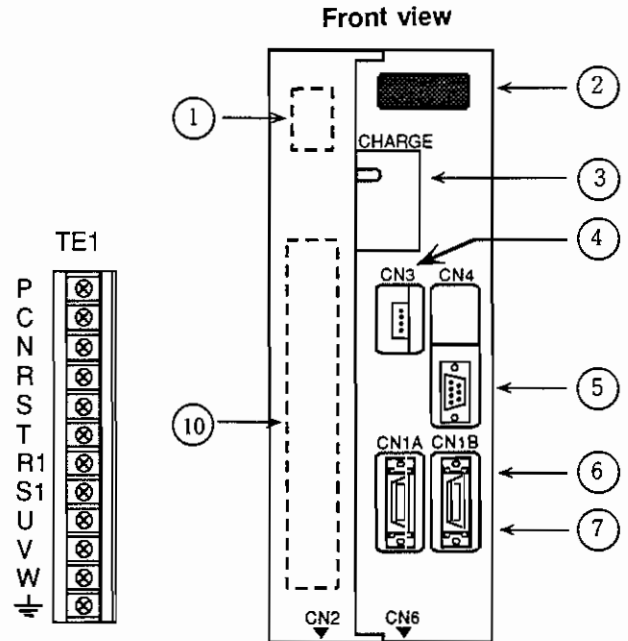
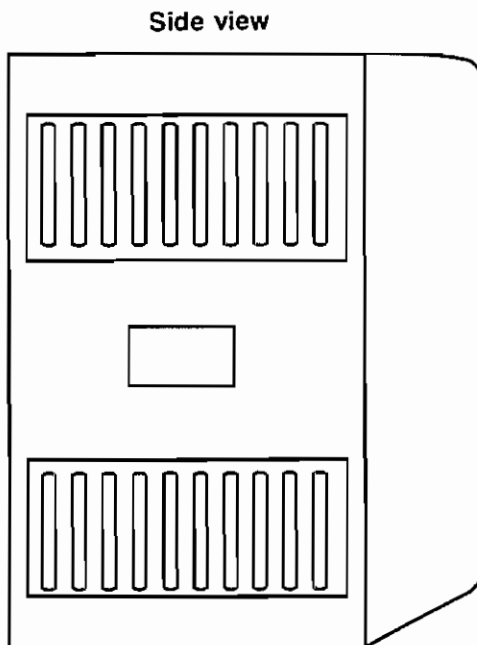


Drawing of inside of switching window



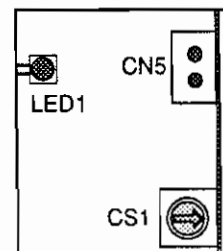
LED (display) : Displays the operation state  
 SW1 (rotary switch): Used to set the axis No.

### 2.4.2 MR-H-B



- ① Absolute position detector battery holder
- ② Display section
- ③ Switch cover
- ④ CN3 analog monitor output connector
- ⑤ CN4 parameter unit connection connector
- ⑥ CN1A communication cable connection connector  
(Connect with the control unit or servo drive unit)
- ⑦ CN1B communication cable or terminating resistor connection connector  
(Connect with servo drive unit or terminating resistor)
- ⑧ CN6 external input/output signal connection connector
- ⑨ CN2 motor detector connection connector
- ⑩ TE1 main circuit terminal block

**Drawing of inside of switch cover**



- LED1 : Main circuit charge LED
- CS1 : Used to set the axis No. (rotary switch)
- CN5 : Absolute position detector battery connection connector

### 3. Starting Procedures

#### 3.1 Confirmation of connections

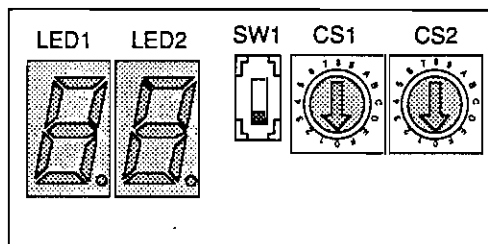
Refer to sections 2.1 to 2.4 and confirm that each unit is connected correctly. Make sure that the input power and connection connector positions, etc., are not mistaken. It is recommended that the servo motor drive line be disconnected until the setting of the parameters, etc., is completed. Falling prevention measures should be taken if the axis may drop due to the machine structure.

#### 3.2 Setting of unit switches

##### 3.2.1 Control unit setting switches

A slide switch (SW1) and two rotary switches (CS1, CS2) are located in the window on the upper part of the control unit's front panel.

Drawing of inside of switching window



Set SW1 to the "bottom". Do not use the unit with this switch set to the "top".

CS1 is used to select the peripheral device connected to the control unit. Refer to Table 3.2.1 and section 3.4 Peripheral devices for the setting details.

CS2 is normally set to "0 to 2". Refer to Table 3.2.2 for the setting details.

Table 3.2.1 Control unit (CS1) details

CS1	Device connected to control unit's SIO1 connector	Device connected to control unit's SIO2 connector
0	<ul style="list-style-type: none"> <li>Personal computer (Setup software or user created screen software)</li> </ul>	<ul style="list-style-type: none"> <li>Personal computer (MELSEC ladder development software)</li> <li>MELSEC peripheral device</li> </ul>
1	<ul style="list-style-type: none"> <li>Personal computer (Setup software or user created screen software)</li> </ul>	<ul style="list-style-type: none"> <li>Teaching box</li> </ul>
2	<ul style="list-style-type: none"> <li>Teaching box</li> </ul>	<ul style="list-style-type: none"> <li>Personal computer (MELSEC ladder development software)</li> <li>MELSEC peripheral device</li> </ul>
3	<ul style="list-style-type: none"> <li>Teaching box</li> </ul>	<ul style="list-style-type: none"> <li>Personal computer (Setup software or user created screen software)</li> </ul>

**Table 3.2.2 Control unit (CS2) details**

CS2	Operation	Application
0	<ul style="list-style-type: none"> <li>The system is started without the built-in ladder</li> </ul>	Same as left
1	<ul style="list-style-type: none"> <li>The system is started with the built-in ladder stored in the ROM.</li> </ul>	<ul style="list-style-type: none"> <li>This is selected when the ladder developed is written into the ROM and used.</li> <li>Only uploading of the ladder file is possible between the personal computer and ROM.</li> </ul>
2	<ul style="list-style-type: none"> <li>The system is started with the built-in ladder stored in the RAM.</li> </ul>	<ul style="list-style-type: none"> <li>This is selected mainly for ladder development.</li> <li>Uploading and downloading of the ladder file is possible between the personal computer and RAM.</li> </ul>
3	<ul style="list-style-type: none"> <li>The hardware mounting check mode is started.</li> </ul>	<ul style="list-style-type: none"> <li>This is selected when a remote I/O unit or servo drive unit is connected for the first time to the control unit.</li> <li>The connection state of each unit is automatically set in the parameters.</li> </ul>
4~6	<ul style="list-style-type: none"> <li>The emergency stop state and built-in ladder STOP state is held, and all of the 7-segment LEDs are lit.</li> <li>Refer to switch 7 for switch 6.</li> </ul>	<ul style="list-style-type: none"> <li>Check of 7-segment LED display.</li> </ul>
7	<ul style="list-style-type: none"> <li>If the switch is set to 6 after turning the power ON with switch 7, all data such as files that is registered will be initialized.</li> </ul>	<ul style="list-style-type: none"> <li>This is used mainly to initialize the memory during set up.</li> </ul>
8~F	<ul style="list-style-type: none"> <li>This is the maintenance mode used exclusively by the maker.</li> </ul>	<ul style="list-style-type: none"> <li>All of the internal data may be cleared, so never use this setting.</li> </ul>

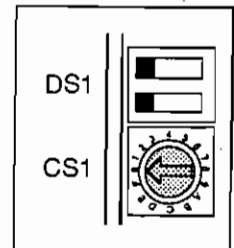
#### 3.2.2 Remote I/O unit setting switch

A lever switch (DS1) and rotary switch (CS1) are located in the middle of the remote I/O unit's front panel.

Both of the DS1 levers should be set and fixed to the "OFF: left" side.

Refer to Table 3.2.3 for the '0 to 7' setting of CS1. Note that the output (DO) on the PCB to the right facing the front of the DX110/120 is a 16-point output.

Make sure that the CS1 setting Nos. are not duplicated with other CS1 setting Nos.



**Table 3.2.3 Remote I/O unit (CS1) details**

CS1 setting No.	Input device No. (DI)	Output device No. (DO)	
	Both unit upper left connector (DI-L) and upper right connector (DI-R)	Unit lower left connector (DO-L)	Unit lower right connector (DO-R)
0	X00 to X1F	Y00 to Y1F	Y00 to Y0F
1	X20 to X3F	Y20 to Y3F	Y20 to Y2F
2	X40 to X5F	Y40 to Y5F	Y40 to Y4F
3	X60 to X7F	Y60 to Y7F	Y60 to Y6F
4	X80 to X9F	Y80 to Y9F	Y80 to Y8F
5	XA0 to XBF	YA0 to YBF	YA0 to YAF
6	XC0 to XDF	YC0 to YDF	YC0 to YCF
7	XE0 to XFF	YE0 to YFF	YE0 to YEF

#### 3.2.3 Servo drive unit setting switches

##### 1) For MDS-A-SVJ

The rotary switch for setting the axis No. is located in the window on the front of the servo drive unit. Refer to Table 3.2.4 and set the axis No. The unit will not function properly if the same axis No. is set in duplicate. Take care not to mistake the rotary switch settings.

Drawing of inside of servo drive unit switching window

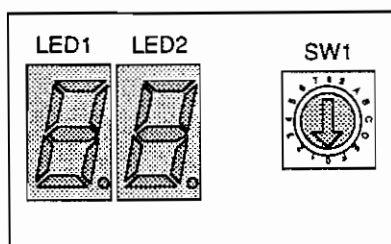


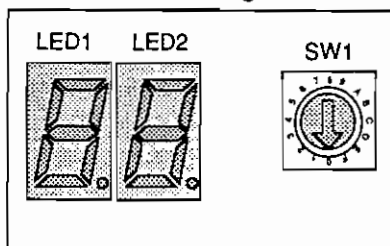
Table 3.2.4 Servo drive unit setting switch details

Name of connection connector on control unit side	SW1 setting	Axis No.
SERVO (for Axis No. 1 to 4)	0	No. 1 axis
	1	No. 2 axis
	2	No. 3 axis
	3	No. 4 axis
	F	Selection of not-used axis
AUX (for Axis No. 5 to 8)	0	No. 5 axis
	1	No. 6 axis
	2	No. 7 axis
	3	No. 8 axis
	F	Selection of not-used axis

##### 2) For MR-J-B or MR-H-B

The rotary switch for setting the axis No. is located in the window on the upper side of the front of MR-J-B and in the switch cover on the front of MR-H-B. Refer to Table 3.2.5 and set the axis No. The unit will not function properly if the same axis No. is set in duplicate. Take care not to mistake the rotary switch settings.

Drawing of inside of MR-J-B switching window



Internal drawing of MR-H-B switch cover

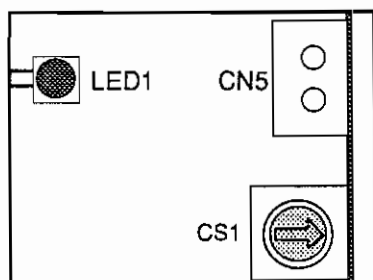


Table 3.2.5 Servo drive unit (SW1/CS1) details

Name of connection connector on control unit side	SW1/CS1 setting	Axis No.
SERVO	0	No. 1 axis
	1	No. 2 axis
	2	No. 3 axis
	3	No. 4 axis
	4	No. 5 axis
	5	No. 6 axis
	6	No. 7 axis
	7	No. 8 axis

### 3.3 Power ON and parameter settings

#### 3.3.1 Checks before turning the power ON

Always check the cable connections, etc., before turning the power ON. Take special care to the connection state of the power supply system.

Refer to section 3.2 and recheck the connection state and switch settings for the remote I/O unit and servo drive unit. If there are any mistakes in the setting switch settings, the mounting check in the next section will not take place correctly.

#### 3.3.2 Starting up with control unit as a single unit

When testing the parameter settings or the created motion program or when developing software for the personal computer to be connected to the machine controller, starting up the control unit as a single unit instead of connecting it to the machine is handy. If the control unit is not to be used as a single unit, proceed with the work in section 3.3.3.

The procedures for starting up with the control unit as a single unit is as follows.

- (1) Initialize the memory (section 3.3.4).
  - The system has been initialized before factory shipment.
- (2) Execute the mounting check (section 3.3.5).
  - The mounting check for the control unit as a single unit has been executed before factory shipment.
- (3) Set the control unit's rotary switch CS2 to "0" with the power turned OFF, and then turn the power ON.
- (4) If DC24V is input to the control unit's connector EMG (when not in the emergency stop state), "— —" will display on the control unit's 7-segment LED. After approx. 12 seconds, the display will change to a flicker, indicating that the system is operating normally.  
If DC24V is not input to the connector EMG (when in the emergency stop state), "3E" and "E7" will display on the LED. Refer to the Alarm warning list for the other display details.
- (5) Set the parameters (section 3.3.6).

#### 3.3.3 Starting up of the entire unit after connection

Use the following procedure to start up when the remote I/O unit and servo drive unit, etc., are connected.

- (1) Initialize the memory (section 3.3.4).
  - The system has been initialized before factory shipment.
- (2) Execute the mounting check (section 3.3.5).
  - The mounting check for the control unit as a single unit has been executed before factory shipment, so always execute the mounting check with the remote I/O unit and servo drive unit, etc., connected.
- (3) Set the parameters (section 3.3.6).

### 3.3.4 Initialization of memory

Initialization of the memory will initialize all data registered in the control unit. The parameters will also be set to the default setting values, and the data set with the mounting check in the next section will also be initialized.

Initialize the memory in the following cases.

- When the control unit power is turned ON for the first time.
- When the parameter details have been destroyed.

Initialize the memory with the following procedure.

- (1) Set the control unit's rotary switch CS2 to "7" with the power turned OFF.
- (2) When the power is turned ON, " : : : " will display on the 7-segment LED. (The display will not flicker.)
- (3) Without turning the power OFF, set the control unit's rotary switch CS2 to "6".
- (4) The 7-segment LED display will change to "AC". (The display will not flicker.)
- (5) After approx. 23 sec., the LED's "AC" display will flicker. The initialization of the memory is completed when the flicker starts.
- (6) Turn the power OFF, and set the control unit's rotary switch CS2 to "0 to 2" or "3".

Refer to the section "3.3.7 Control unit's rotary switch settings and operations" for details on setting each rotary switch.

### 3.3.5 Mounting check

The mounting check is used to check the connection state of the remote I/O unit and servo drive unit when the power is turned ON. The mounting state is set in parameter Nos. 1011 to 1018 and 2000.

Execute the mounting check in the following cases.

- When the control unit power is turned ON for the first time.
- When the No. of connected remote I/O units has been changed.
- When the No. of connected servo drive units has been changed.
- When the parameter details have been destroyed.
- When the system has been initialized in the previous section.

The mounting check must also be executed when starting the control unit as a single unit such as in section 3.3.2.

Execute the mounting check with the following procedure.

- (1) Set the control unit's rotary switch CS2 to "3" with the power turned OFF.
- (2) When the power is turned ON, "HC" will display on the 7-segment LED. (The display will not flicker.)
- (3) After approx. 10 seconds, the LED's "HC" display will flicker. The mounting check is completed when the flicker starts.
- (4) Turn the power OFF, and set the control unit's rotary switch CS2 to "0 to 2".

Refer to the section "3.3.7 Control unit's rotary switch settings and operations" for details on setting each rotary switch.



#### 3.3.6 Parameter settings

The parameters are set using a personal computer that can run the optional Model W setup software or with the teaching box. Refer to the section "4. Explanation of parameters" for details on the parameters.

The parameters that must be confirmed when starting up are listed below. Note that some parameters differ between the MP200 and MP205.

##### 1) MP200 and MP205 common parameters

Parameter class	Parameter No.	Parameter details	Parameter default setting value
Common parameters	1000	Number of control axis	2: 2 axes
	1000~1007	Number of axis No.1 ~ 8	X, Y, Z, A, B, C, U, V
Axis parameters Setting is required for each axis.	2002	Rotary axis	0: Linear axis
	2004	Max feed	5000 (mm/min) Set so that the motor's rated max. speed is not exceeded.
	2010	Reference point is the position on power-on	0: Zero point initialization is required. When using the control unit as a single unit, set to 1.
	2014	Return direction	0: Return in + direction from near-point dog.

##### 2) MP200 exclusive parameters

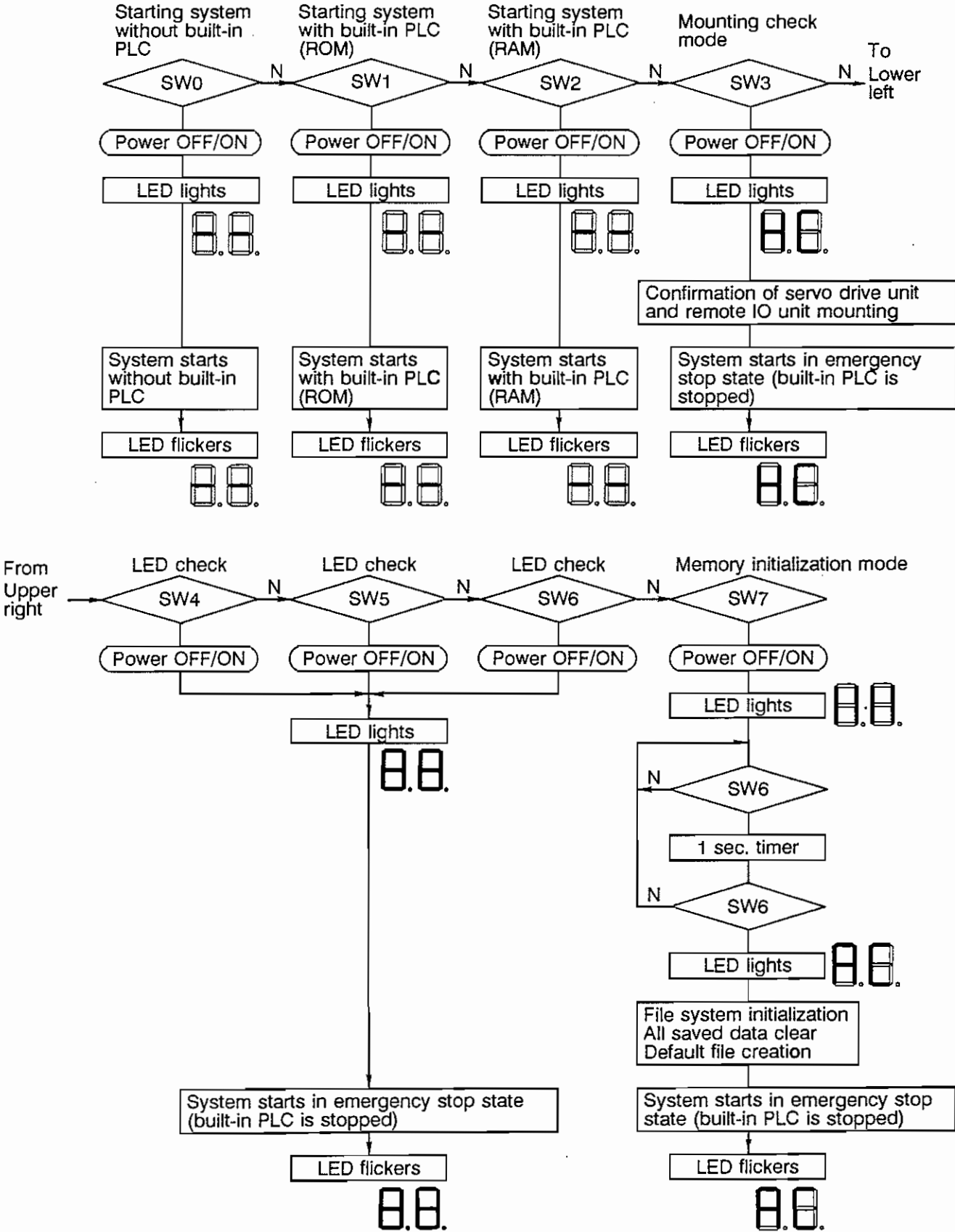
Parameter class	Parameter No.	Parameter details	Parameter default setting value	
Axis parameters	2001	Direction of motor rotation	0: CW rotation looking from motor load side during + direction command.	
Servo parameters	2201	Motor gear ratio	1	
	2202	Machine gear ratio	1	
	2217	Servo specification	0000	
	2218	Ball screw pitch	10 (mm)	
	2219	Position sensor resolution	8	Servo motor Setting for HA-FH13 (Always set according to motor being used.)
	2220	Speed sensor resolution	8	
	2225	Motor type	227D	
	2236	Power supply type	1000	

3) MP205 exclusive parameters

Parameter class	Parameter No.	Parameter details	Parameter default setting value
Axis parameters	2150	Motor gear ratio	1
	2151	Machine gear ratio	1
	2152	Ball screw pitch (mm)	10 (mm)
Servo parameters	2201	Amplifier setting	0000
	2202	Regenerative resistance	0000
	2203	Motor type	3
	2204	Motor capacity	0010
	2205	Rotation speed	3
	2206	Encoder feedback pulse	1
	2207	Spin direction	0: CCW rotation looking from motor load side during + direction command.

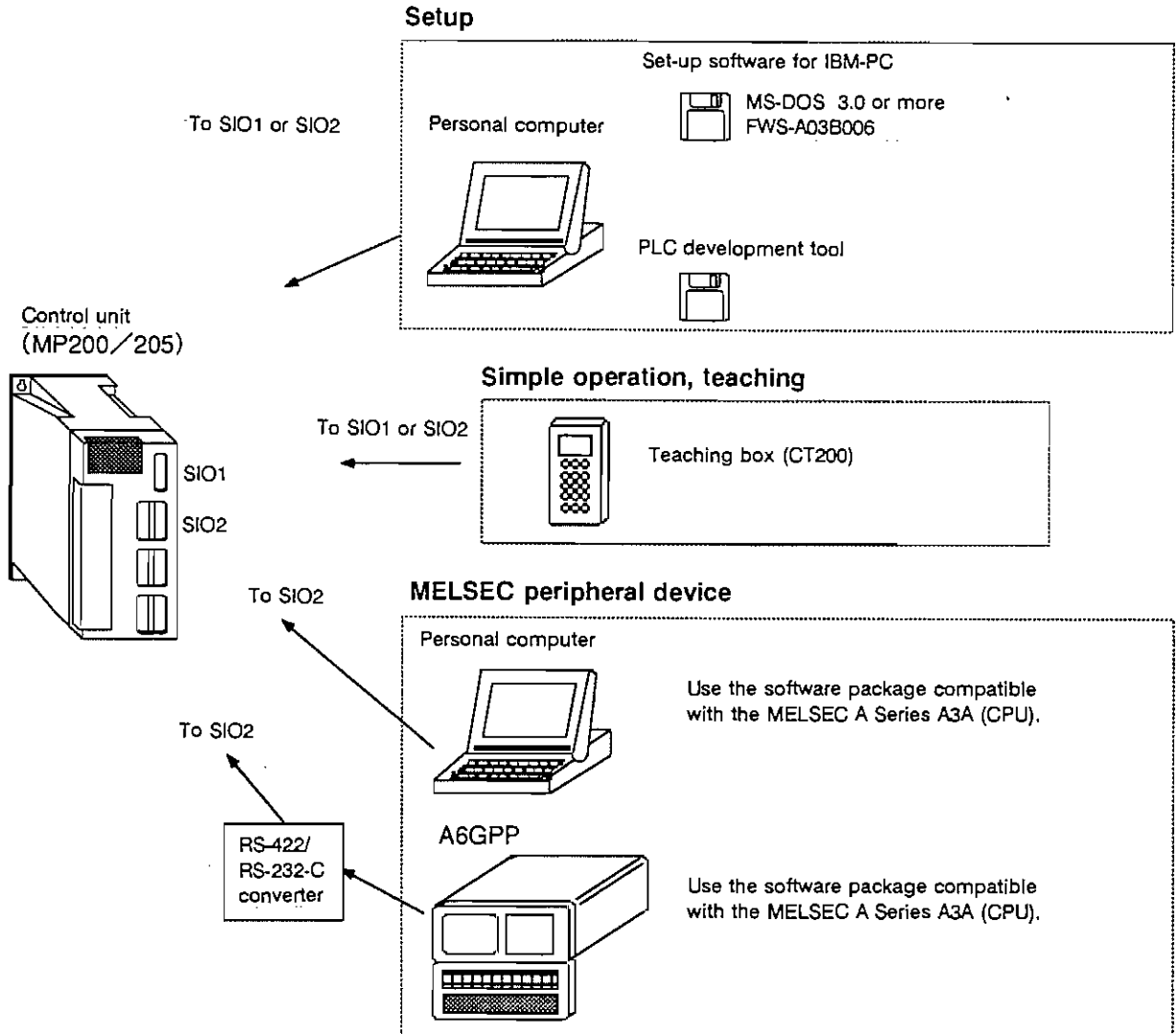
3.3.7 Control unit's rotary switch settings and operations

The setting and operation of the control unit's rotary switch CS2 are as follows.



3.4 Peripheral devices

The following peripheral devices can be connected to the machine controller Model W to develop the motion program and develop the built-in PLC, etc.



The combination of the connected devices is changed over with the control unit's rotary switch CS1. (The power must be turned OFF and ON after changing.)

CS1 setting	SIO1 connected device	SIO2 connected device
0	Setup software	MELSEC peripheral device
1	Setup software	Teaching box
2	Teaching box	MELSEC peripheral device
3	Teaching box	Setup software

When connecting an exclusive screen (user created software) with the command function's communication procedure, connect to the places for the setup software shown on the left.

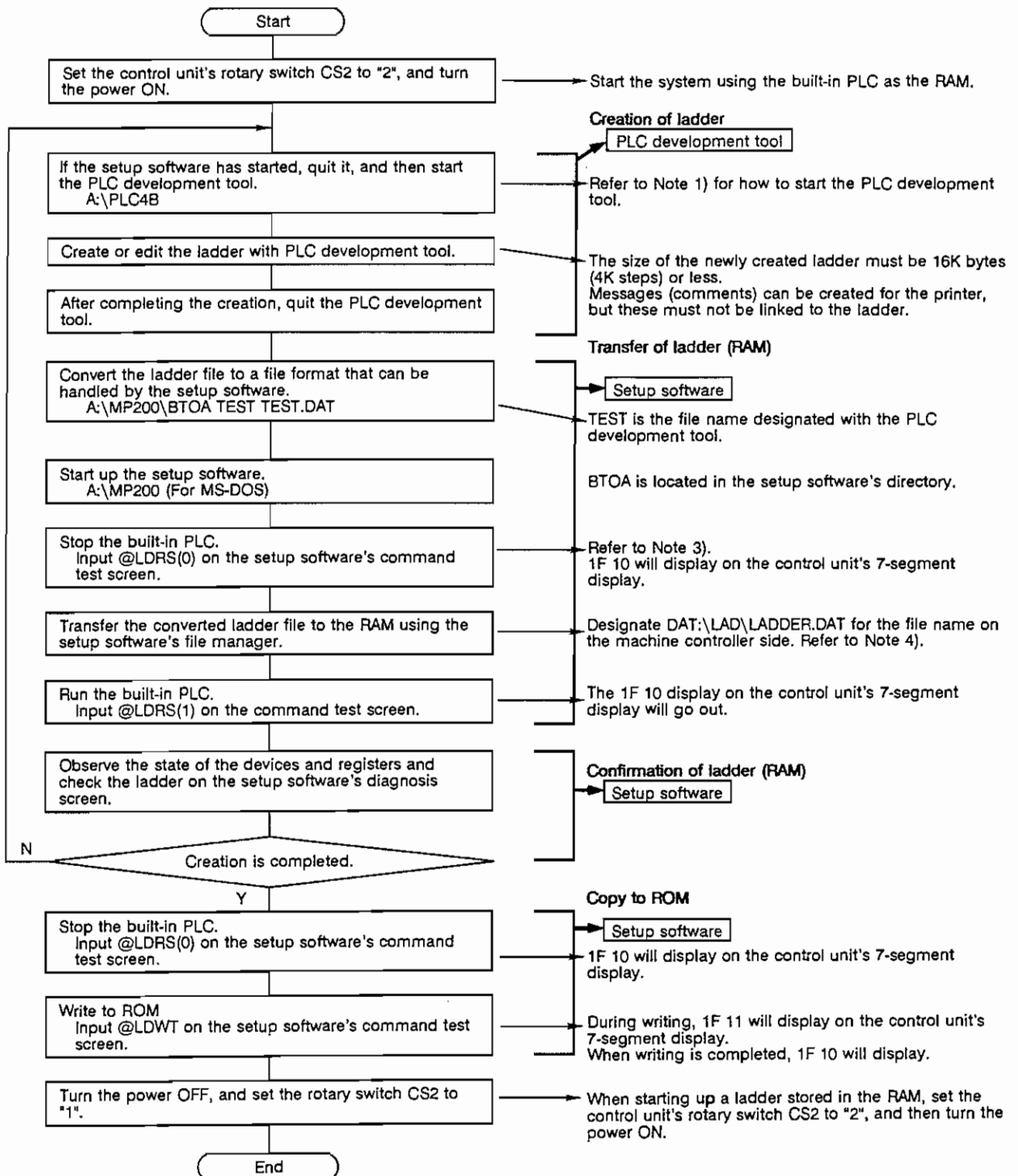
**Note 1)** The setup software and MELSEC peripheral device cannot be run simultaneously with one personal computer. To change, the control unit's rotary switch must be changed and the power must be turned OFF and ON.

**Note 2)** The PLC development tool ( ) does not have a function for communication with the control unit. The setup software is used for inputting and outputting the ladder.

3.5 Built-in PLC development procedure

3.5.1 Built-in PLC development procedure using PLC development tool

The following procedure is used to develop the built-in PLC with the PLC development tool ( ). Refer to the PLC Program Development Manual (Personal Computer Section) ( ) for details on operating the PLC development tool.



### 3. Starting Procedures

**Note 1)** A main memory of 2MB is required in the personal computer to use the PLC development tool. Change the CONFIG.SYS so that memory management software such as the EMS driver is not started when the personal computer is started. Note that the PLC development tool will not run on Windows.

**Note 2)** The PLC development tool does not have on-line communication functions such as ladder monitor.

**Note 3)** The running and stopping of the ladder and writing to ROM on the command test screen is done as shown below. The command test screen is located in the setup software's diagnosis tools. (Refer to the section on the diagnosis tool's command test in the Setup Software Manual.)

Set the command to the transmitted in the command input column, and then press the ENTER key. The example shows for writing to the ROM.

Command test	
Command input	
Execution	@LDWT
Command answer	
@LDWT = GD	

**Note 4)** The ladder file is transferred with the following procedure. The cursor can be moved to each No. position with the TAB key. To return, press the SHIFT + TAB key. (Refer to the section of file operation in the Setup Software Manual. In the MS-DOS setup software, the file manager is located in the automatic operation tools or diagnosis tools.)

**①** Set the transmission origin to the personal computer using the ↑ ↓ keys.

**②** Select the directory C:\ with the ↑ ↓ keys and press the ENTER key.

**③** Select the file TEST.DAT (file name converted with BTOA) with the ↑ ↓ keys and press the ENTER key.

**④** Select the directory LAD with the ↑ ↓ keys and press the ENTER key.

**⑤** Set the transmission destination to the machine controller with the ↑ ↓ keys.

**⑥** Select the drive DAT: with the ↑ ↓ keys.

**⑦** Select the file LADDER.DAT with the ↑ ↓ keys and press the ENTER key.

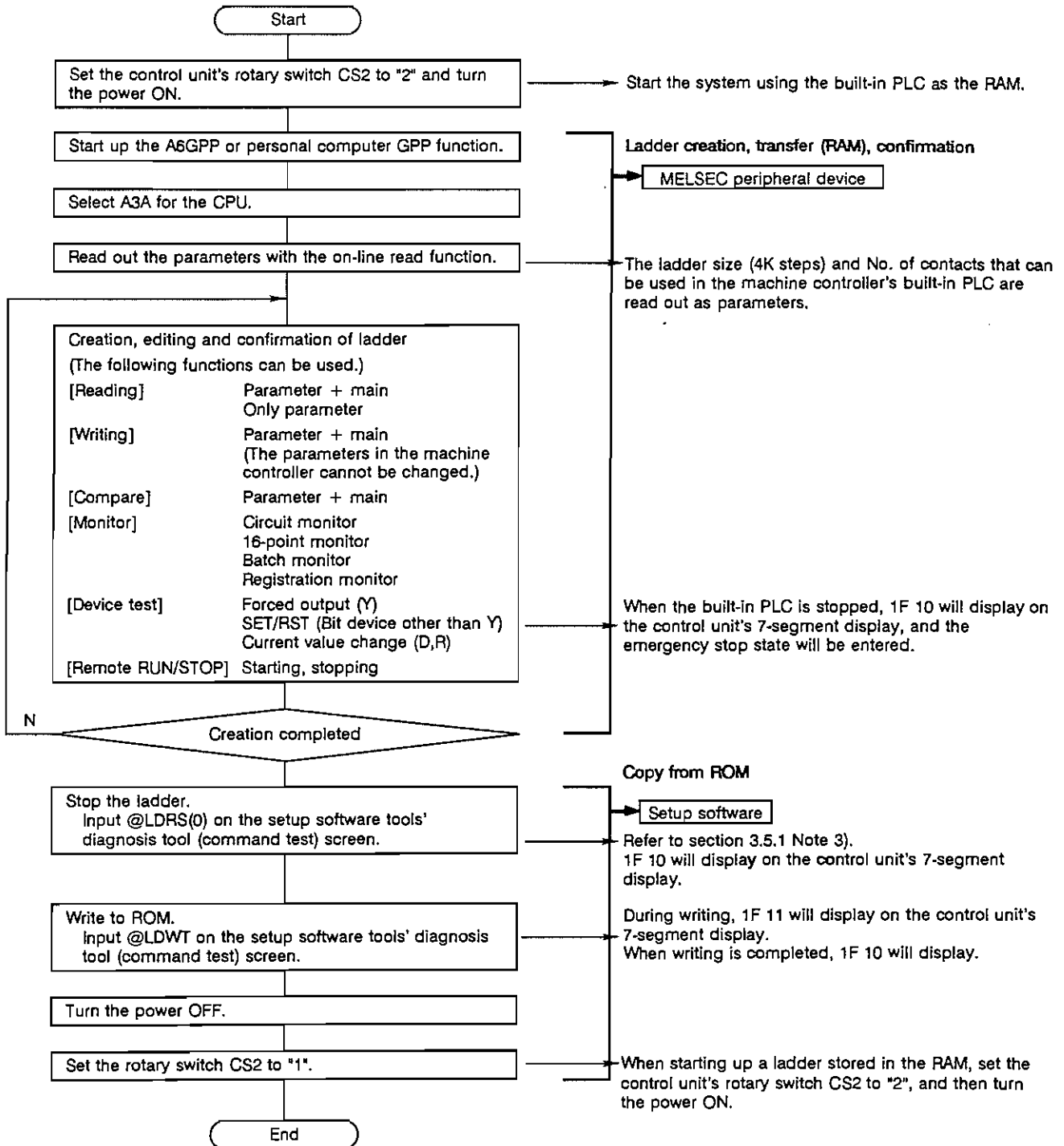
**⑧** Select <C/Copy> and press the ENTER key. Select <Execute copy> and press the ENTER key. Select "Y" for "Overwrite?" and press the ENTER key.

**Note 5)** If the control unit's rotary switch CS2 is set to 1 (when ladder is started with ROM system), a communication error will occur when the ladder file created with the setup tool is transmitted to the control unit's ladder file (DAT:\LAD\LADDER.DAT).

**Note 6)** If the control unit's rotary switch CS2 is set to 1 (when ladder is started with ROM system), the details of the ROM will be read out when the ladder file (DAT:\LAD\LADDER.DAT) is transmitted from the control unit with the setup tool.

#### 3.5.2 Built-in PLC development procedure using MELSEC peripheral device

The procedure for developing the built-in PLC with the MELSEC peripheral device connected is as follows. Refer to the MELSEC Peripheral Device Interface Manual (BNP-B2100) for details on the MELSEC peripheral device connections.



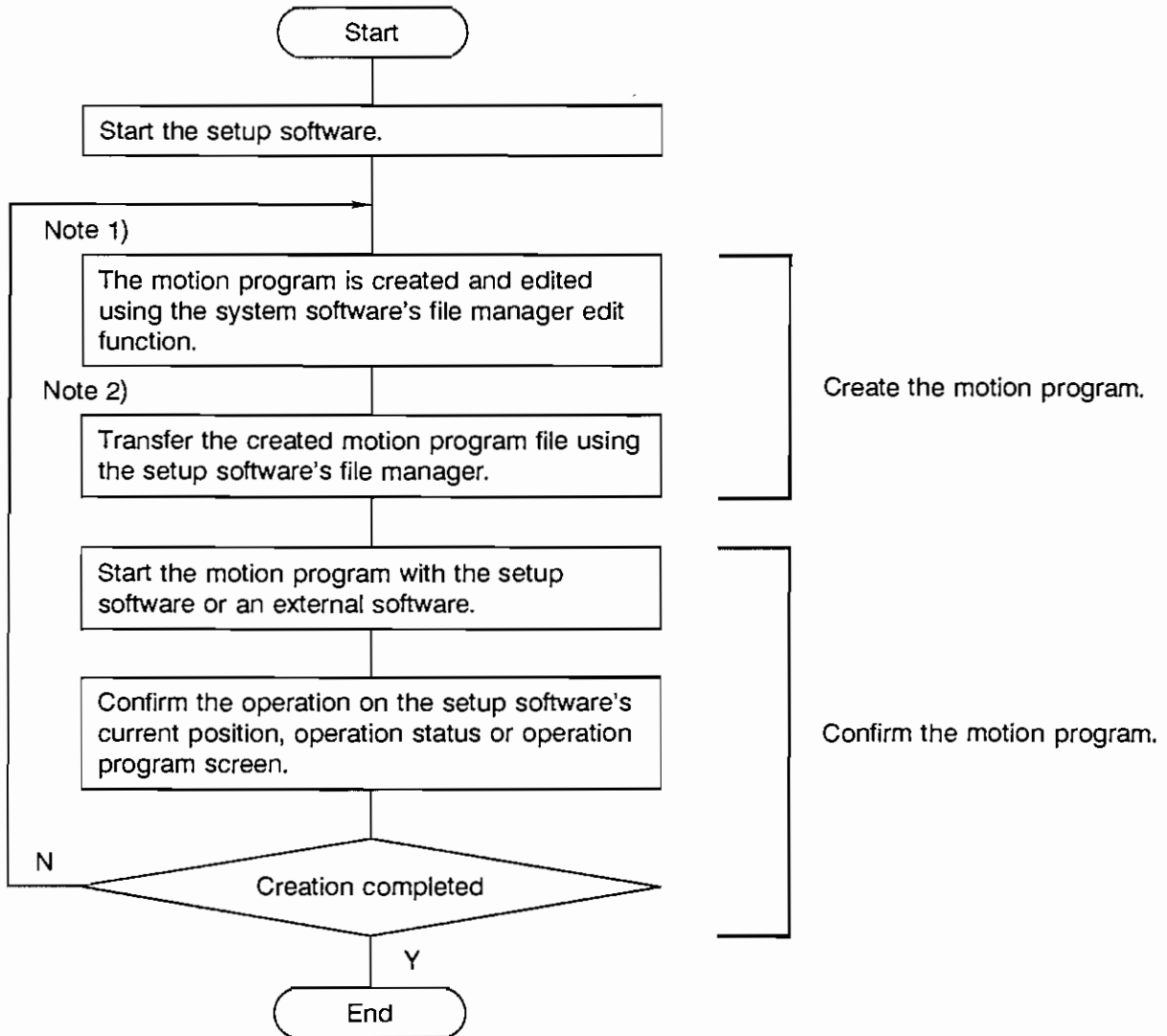
**Note 1)** If the control unit's rotary switch CS2 is set to "1" (when the system is started using the built-in PLC as the ROM), a PC communication error will occur when writing of the ladder is attempted.

**Note 2)** If the control unit's rotary switch CS2 is set to "1" (when the system is started using the built-in PLC as the ROM), the ROM details will be read out when reading of the ladder is attempted.

3.6 Motion program development procedure

3.6.1 Development procedure

The motion program is developed using the setup software. The procedure is as follows. Refer to the Setup Software Manual (BNP-B2066C (ENG)) for details on operating the setup software.



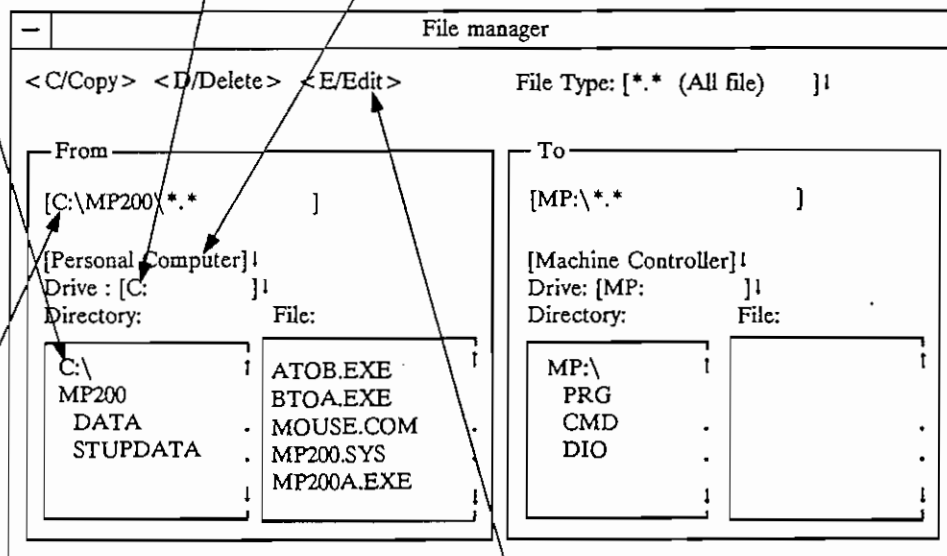
**Note 1)** The setup software's file manager screen edit function can be used to directly call and edit files in the machine controller. In this case, the file does not need to be transferred to the machine controller.



3.6.2 Creation of new file

The procedure for creating a new file using the setup software's file manager screen edit function is as follows.

- (1) Select the edit target with the **↓** and **↑** keys.
- (2) Change the drive using the **↓** and **↑** keys.
- (3) Move the highlight display to select the directory for creating the new file, and then press the **ENTER** key.



- (4) Input the new file name in the From display column.
- (5) Move the focus to **<E/Edit>**, and press the **ENTER** key.
- (6) A confirmation screen will display. Confirm the name of the file to be edited, and if correct, move the focus to **<Execute>**, and press the **ENTER** key. The editing will start.
- (7) When editing starts, the Edit screen will appear, so correct or add the program.

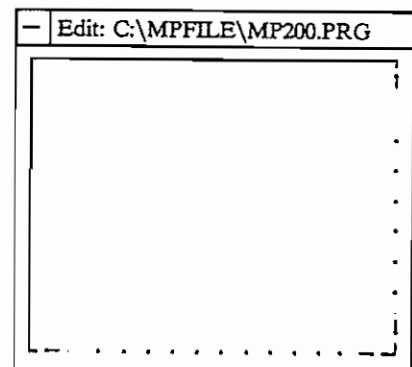
In this Edit screen, the character highlighted with the **SHIFT** key + arrow keys (**↑**, **↓**, **←**, **→**) can be operated as follows.

Copy to clipboard with **CTRL** key + **C** key.

Paste to clipboard with **CTRL** key + **X** key.

Pasting from the clipboard is executed with the **CTRL** key + **V** key.

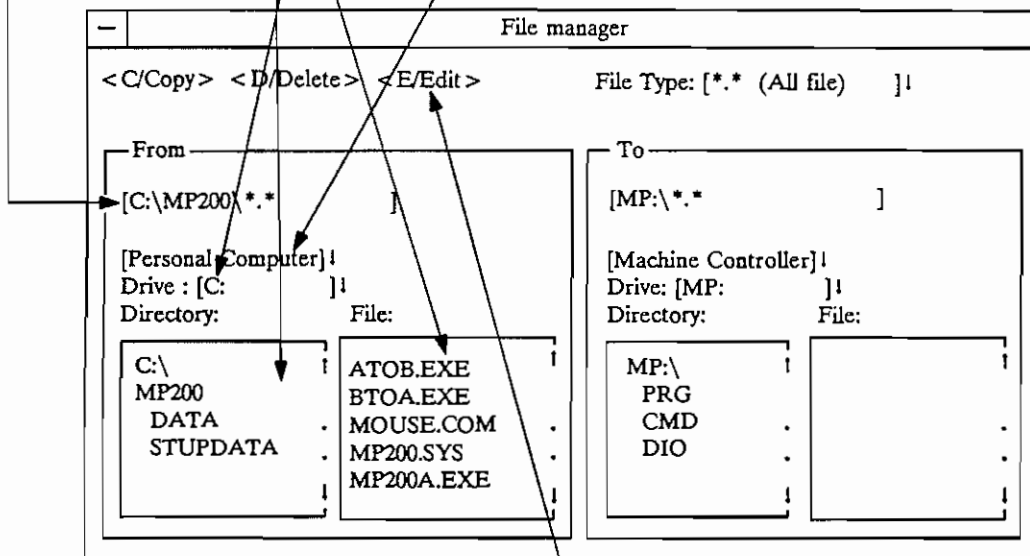
- (8) When the correction and addition of the program are completed, press **CTRL** + **F4** to close the screen.



3.6.3 Correction of file

The procedure for correcting the file using the setup software's file manager screen edit function is as follows.

- (1) Select the edit target with the **↑** and **↓** keys.
- (2) Change the drive using the **↑** and **↓** keys.
- (3) Move the highlight display to select the directory and file, and then press the **ENTER** key.
- (4) Confirm that the display in the From display column is correct.



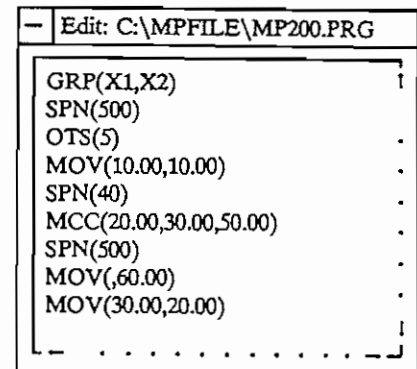
- (5) Move the focus to **<E/Edit>**, and press the **ENTER** key.
- (6) A confirmation screen will display. If the name of the file to be edited is correct, move the focus to **<Execute>**, and press the **ENTER** key. The editing will start.
- (7) When editing starts, the Edit screen will appear, so correct or add the program. In this Edit screen, the character highlighted with the **SHIFT** key + arrow keys (**↑**, **←**, **→**, **↓**) can be operated as follows.

Copy to clipboard with **CTRL** key + **C** key.

Paste to clipboard with **CTRL** key + **X** key.

Pasting from the clipboard is executed with the **CTRL** key + **V** key.

- (8) When the correction and addition of the program are completed, press **CTRL** + **F4** to close the screen. If the file has been corrected, a confirmation screen will appear.



## 4. Explanation of Parameters

The following parameters are used for the machine controller Model W.

- (1) Common parameters
- (2) Axis parameters (per axis)
- (3) Servo parameters (per axis)
- (4) Sampling function parameters

Each parameter can be read and write as a file or one by one from the personal computer.

Each parameter is automatically set to the default setting value at shipment and when started up after system initialization.

### 4.1 List of common parameters

<b>Caution</b>	Common for MP200/MP205
----------------	------------------------

<b>Changing method</b>	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	Details	Changing method	Setting procedure	Data format	Default setting value	Setting range
1000	Number of control axes	PR	Set the No. of axes to be controlled.	Decimal	2	1 to 8
1001	Name of axis No.1	PR	Set the axis names for the No. 1 to 8 axes. (Set with alphanumeric characters.) If the same name is given to multiple axes, a system error will occur when the power is turned ON.	Character string	X	1 to 6 characters
1002	Name of axis No.2				Y	
1003	Name of axis No.3				Z	
1004	Name of axis No.4				A	
1005	Name of axis No.5				B	
1006	Name of axis No.6				C	
1007	Name of axis No.7				U	
1008	Name of axis No.8				V	
1011	IO card number No.1	PR	This parameter stores the unit ID of the mounted remote IO unit. This parameter is automatically set when the power is turned ON in the mounting check mode, so it does not need to be set.	Hex.	0	0 to 01FF
1012	IO card number No.2					
1013	IO card number No.3					
1014	IO card number No.4					
1015	IO card number No.5					
1016	IO card number No.6					
1017	IO card number No.7					
1018	IO card number No.8					
1031	Manual operation feed of 1st		The manual feedrate is set in steps of 1 to 5. This parameter corresponds to the external signal MSPD1 to 3 codes.	Decimal	100	0 to 240000 (mm/min)
1032	Manual operation feed of 2nd				500	
1033	Manual operation feed of 3rd				1000	
1034	Manual operation feed of 4th				5000	
1035	Manual operation feed of 5th				10000	

## 4. Explanation of Parameters

Caution	Common for MP200/MP205
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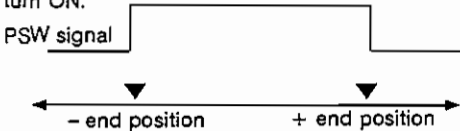
Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	Details	Changing method	Setting procedure	Data format	Default setting value	Setting range
1036	Handle/step magnification of 1st		The handle and step magnification is set in steps of 1 to 5. This parameter sets the movement amount per handle or step pulse. This parameter corresponds to the external signal MP1 to 2 codes.	Decimal	1	0 to 1000 (μm)
1037	Handle/step magnification of 2nd				10	
1038	Handle/step magnification of 3rd				100	
1039	Handle/step magnification of 4th				1000	
1041	Program feed of 1st		The feedrate is set in steps of 1 to 5 with the motion program. This parameter sets the speed No. 1 to 5 speed of the SPD command issued in the motion program.	Decimal	100	0 to 24000 (mm/min)
1042	Program feed of 2nd				500	
1043	Program feed of 3rd				1000	
1044	Program feed of 4th				5000	
1045	Program feed of 5th				10000	
1050	Number of effective axes for point data	PR	The No. of axes using point data is set.	Decimal	8	1 to 8
1060	SIO Baud rate		The communication baud rate for the serial port SIO1 is set. The setting range is 300 to 9600bps. If a value other than 300, 600, 1200, 2400, 4800 or 9600 is set, 9600bps will be used.	Decimal	9600	300 to 9600 (bps)
1061	SIO Character length		The bit length of one character is set.	Decimal	7	7 or 8 bit
1062	SIO Parity		The parity of the serial port SIO1 is set. 0 is no parity, 1 is even parity, and 2 is odd parity.	Decimal	2	0 to 2
1063	SIO Stop bit		The stop bit of the serial port SIO1 is set.	Decimal	1	1 or 2
1070	Ladder through put		The time assigned to ladder processing is changed with a % unit. If there are few control axes, the performance of the ladder process can be improved. (If set too high, the flickering of the control unit's 7-segment display may stop, or the communication with the personal computer may not be done correctly.)	Decimal	100	40 to 150 (%)
1081 ~ 1088			The inclined constant speed acceleration/ deceleration method and time constant acceleration/ deceleration method are set per operation No. 0: Inclined constant speed acceleration/ deceleration method 1: Time constant acceleration/ deceleration method	Decimal	0	0 or 1

## 4. Explanation of Parameters

<b>Caution</b>	Common for MP200/MP205
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<b>Changing method</b>	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	Details	Changing method	Setting procedure	Data format	Default setting value	Setting range
1101 ~ 1132	Program file name of code 1 ~ 32		The name of the motion program file corresponding to the external signal or the program designated code (signal name PRG11 ~ 18, PRG21 ~ 28 ~ PRG81 ~ 88) from the ladder is set. An extension (.PRG) is not set for the file name. If the setting value is not set, the code designated with the signal will select the motion program (ex., 10.PRG) to be used as the file name. There are 32 of these parameters (codes are 1 to 32). If the code is 33 or higher, the file name (ex., 33.PRG) will be selected.	Character string	Not set	0 to 8 characters
1201 ~ 1264	Axis Number of position switch 1 ~ 64		The axis No. to check the position switch (signal name PSW1 ~ 64) position is set. If 0 is set, the position switch will be invalid.	Decimal	0	0 to 8
1301 ~ 1364	- edge of position switch 1 ~ 64		The minus end position for turning ON the position switch (signal name PSW1 ~ 64) is set in 1301 ~ 1364. The + end position is set in 1401 ~ 1464. If the axis set in 1201 ~ 1264 is between the - end position and + end position, the PSW1 ~ 64 signal will turn ON. 	Decimal	0	-99999999 to 99999999 ( $\mu$ m)
1401 ~ 1464	+ edge of position switch 1 ~ 64			Decimal	0	-99999999 to 99999999 ( $\mu$ m)

## 4. Explanation of Parameters

### 4.2 List of axis parameters

The axis parameters are provided per axis. The parameter Nos. are the same for each axis.

Caution	Common for MP200/MP205 Note: 2001 is exclusive for MP200	Changing method	PR	Control unit power must be turned OFF/ON after setting
			No mark	The power does not need to be turned OFF/ON

No.	Details	Changing method	Setting procedure	Data format	Default setting value	Setting range
2000	Axis mounted amplifier	PR	1 is set for the axis on which an amplifier is mounted, and 0 is set for the axis not having an amplifier mounted. This is automatically set when the power is turned ON in the mounting check mode. If this parameter and the actual mounting state differ, a system error will occur.	Decimal	0	0 or 1
2001	Direction of motor rotation	PR	Looking at the motor shaft from the load side, the following is set. 0: Motor CW rotation during + movement command 1: Motor CCW rotation during + movement command	Decimal	0	0 or 1
2002	Rotary axis	PR	0 is set for a linear axis, 1 is set for the rotary axis of which a movement direction is designated during the positioning command, and 2 is set for the rotary axis that takes a short cut (rotary axis short cut) during the positioning command.	Decimal	0	0 to 2
2003	Clamp data of rotary axis	PR	The coordinate value per rotary axis rotation is set. This is set when the rotation of the rotary table is a value other than 360°.	Decimal	360000	0 to 100000000 (μm)
2004	Max feed		The max. feedrate during the feed command is set. Calculate the motor speed from the machine gear ratio and pitch, and set so that the max. motor speed does not exceed the rated speed.	Decimal	5000	1 to 240000 (mm/min)
2005	Command unit for programming	PR	The unit of the decimal point digit of the position commanded with the motion program is set.	Decimal	1000	1 to 100000 (μm)
2006	Acceleration/deceleration time constant 1st		The acceleration/deceleration time when the axis moves at the max. feedrate (parameter 2004) is set. The time constant 1 is set so that the max. acceleration speed (max. feedrate/time constant 1) does not exceed the max. torque of the servomotor. Time constants 2 and 3 are set to the smallest value where vibration does not occur during acceleration/deceleration.	Decimal	100	0 to 30000 (msec)
2007	Acceleration/deceleration time constant 2nd				30	0 to 1000 (msec)
2008	Acceleration/deceleration time constant 3rd				10	0 to 700 (msec)
2010	Reference point is the position on power-on	PR	This is set to 1 when the position where the power is turned ON is to be the reference point. 0 is set for the axis that uses dog-type reference point return and for the absolute value detection system axis.	Decimal	0	0 or 1

## 4. Explanation of Parameters

Caution	Common for MP200/MP205
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Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	Details	Changing method	Setting procedure	Data format	Default setting value	Setting range
2011	Reference point offset	PR	The position from the reference point to the machine zero point (coordinate value 0) is set.	Decimal	0	-99999999 to 99999999 ( $\mu\text{m}$ )
2012	Grid interval	PR	The interval of the positions (grid points) to be the reference for the reference point and absolute value reference position is set. Normally, 1 of the position integer per motor rotation is set.	Decimal	10000	500 to 40000 ( $\mu\text{m}$ )
2013	Reference point shift amount		This is set when the reference point is to be shifted from the grid point.	Decimal	0	0 to 65535 ( $\mu\text{m}$ )
2014	Return direction		This direction for executing positioning to the reference point during dog-type reference point return is set. If the direction is -, set 0, and if +, set 1.	Decimal	0	0 or 1
2015	Creeping feed		The feedrate for positioning to the reference point after detecting the near-point dog during dog-type reference point return is set.	Decimal	100	1 to 240000 (mm/min)
2016	Grid mask amount		If the position where the near-point dog is detected and the grid point are near when executing dog-type reference point return, the distance to mask from the position where the near-point dog was detected to the grid point is set to avoid inconsistency in the reference point.	Decimal	0	0 to 65535 ( $\mu\text{m}$ )
2017	Absolute reference point offset	PR	The distance from the absolute value detection system's absolute position reference position to the reference point is set.	Decimal	0	-99999999 to 99999999 ( $\mu\text{m}$ )
2020	Absolute reference point setting mode		0 is set when setting the reference point to a random point, 1 is set when the grid point nearest to the random point on the + side is to be used as the reference position, 2 is set when the grid point nearest to the random point on the - side is to be used as the reference position, and 3 is set when the position dog-type reference point return to is to be used as the reference position.	Decimal	0	0 to 3
2021	Max. absolute error on power-on	PR	The tolerable movement amount from when the power is turned OFF to when it is turned ON again in the absolute value detection system is set. If the tolerable value is exceeded, the signal (AERR) will be output. When set to 0, the error will not be checked.	Decimal	0	0 to 99999999 ( $\mu\text{m}$ )
2030	Error correction during servo off execution		1 is set if the coordinates are to be updated with the motor movement amount during servo OFF, and 0 is set when the motor is to be rotated by the movement amount at servo ON.	Decimal	0	0 or 1

## 4. Explanation of Parameters

<b>Caution</b>	Common for MP200/MP205 No.2150~2154: Exclusive for MP205
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<b>Changing method</b>	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	Details	Changing method	Setting procedure	Data format	Default setting value	Setting range
2031	Coordinate selection of position switch		0 is set when the position switch position check is to be executed with a command value to the servo drive unit, and 1 is set when it is to be executed with the servo motor feedback.	Decimal	0	0 or 1
2032	Upper limit by software		The limit value of the + side movement command is set.	Decimal	0	
2033	Lower limit by software		The limit value of the - side movement command is set. If the same value as the upper limit value is set, the soft limit will not be applied.	Decimal	0	-99999999 to 99999999 ( $\mu\text{m}$ )
2034	Backlash compensation amount		This is set when the machine backlash is to be compensated.	Decimal	0	0 to 10000000 ( $\mu\text{m}$ )
2035	Drop compensation amount ( $\mu\text{m}$ )		The operation end or control axis reassembly when the current limit is applied during torque limiting, or the movement command from the actual machine position during torque limit skip is set. When a minus value is set, the command will be issued in the stopper direction, and when a plus value is set, the command will be issued in the escape direction.	Decimal	0	-10000 to 10000 ( $\mu\text{m}$ )
2036	Pitch error compensation division interval		The interval of the compensation data setting position is set when executing pitch error compensation.	Decimal	1	1 to 9999999 ( $\mu\text{m}$ )
2150	Motor gear ratio	PR	The motor side gear ratio is set.	Decimal	1	1 to 32767
2151	Machine gear ratio	PR	The machine side gear ratio is set.	Decimal	1	1 to 32767
2152	Ball screw pitch (mm)	PR	The movement amount (mm) per ball screw rotation is set.	Decimal	10	1 to 32767
2153	Limit value in effective of torque limit (+)		The torque limit value for when the torque limit command is executed is set in a % to the rating. The normal torque limit value is set with the servo parameters.	Decimal	300	0 to 300
2154	Limit value in effective of torque limit (-)			Decimal	300	0 to 300



4.3 List of MP200 servo parameters

The servo parameters for the MP200 (MDS-A-SVJ) will be explained in this section. Refer to the next section for the MP205 (MR-J-B/MR-H-B) servo parameters.

Servo parameters are provided for each axis. Note that the parameter No. is the same for each axis. Refer to the Servo Maintenance and Adjustment Manual (BNP-B2057) for details and setting of the servo parameters.

Caution	Exclusive for MP200
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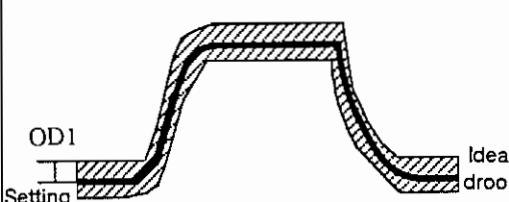
Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	No. (Parameter abbr.)	Parameter name	Changing method	Setting procedure	Standard setting value	Setting range
2201	SV001 (PC1)	Motor gear rati	PR	The No. of gear teeth on the motor side is set. Set so that PC1 and PC2 have the smallest integer ratio.	Machine specifications	1 to 30
2202	SV002 (PC2)	Machine gear ratio	PR	The No. of gear teeth on the machine side is set. Set so that PC1 and PC2 have the smallest integer ratio.	Machine specifications	1 to 30
2203	SV003 (PGN1)	Position loop gain 1		The position loop gain is set. The min. setting unit is 1. Normally set this to 33.0.	33	1 to 200 (1/sec)
2204	SV004 (PGN2)	Position loop gain 2		Set this with SV057:SHGC when using SHG control. Set to 0 when not using SHG control.	0	1 to 200 (1/sec)
2205	SV005 (VGN1)	Speed loop gain 1		The speed loop gain is set. The standard setting is 150, but when increased the response will improve but vibration and noise will increase.	150	1 to 500
2208	SV008 (VIA)	Speed loop advance compensation		The speed loop integral gain is set.	1364	1 to 9999 (0.0687 rad/sec)
2209	SV009 (IQA)	Current loop q-axis lead compensation		The current control gain is set. The setting data is fixed according to the motor being used. (Refer to the section "6.1 MP200 List of standard servo parameter settings per motor".)	Motor specifications	1 to 20480
2210	SV010 (IDA)	Current loop d-axis lead compensation				1 to 20480
2211	SV011 (IQG)	Current loop q-axis gain				1 to 2560
2212	SV012 (IDG)	Current loop d-axis gain				1 to 2560
2213	SV013 (ILMT1)	Current limit value 1		The normal current limit value is set. (The current limit is for both the ± directions.) Set with a percentage (%) to the rated current. Set to 500 when the driver's max. torque is to be used.	500	1 to 500 (%)
2214	SV014 (ILMT2)	Current limit value 2		The current limit value for the absolute position initial setting (stopper) is set. (The current limit is for both the ± directions.) Set with a percentage (%) to the rated current. Set to 0 when not using.	0	0 to 500 (%)

## 4. Explanation of Parameters

Caution	Exclusive for MP200
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Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	No. (Parameter abbr.)	Parameter name	Changing method	Setting procedure	Standard setting value	Setting range
2216	SV016 (LMC1)	Lost motion Compensation gain 1		This is set when the protrusions (caused by the non-sensitive range due to friction, torsion, backlash, etc.) that occur at the quadrant changeover.		
				Type 1 (When SV027: SSF1-bit 8 is set to 1)	0	0 to 200 (%)
				The protrusions are eliminated with this type of compensation during low-speed compensation. The compensation gain will be 0 when set to 0. When set to 100, 100% compensation will be executed.		
				Type 2 (When SV027: SSF1-bit 9 is set to 1)	0	0 to 100 (%)
				This type is used when sufficient compensation is not achieved with type 1. The gain is set with a percentage (%) to the rated current. Compensation will not be executed when 0 is set. Set a value that is double the current % on the SERVO MONITOR screen when using for JOG feed (approx. F1000).		
				The related parameters are SV041:LMC2 and SV027:SSF1.		
2217	SV017 (SPEC)	Servo specifications	PR	The servo system specifications are set with bits. (Refer to the section "6.1 MP200 List of standard servo parameter settings per motor".)	0	HEX
2218	SV018 (PIT)	Ball screw pitch	PR	The pitch of the ball screw is set.	Machine specifications	1 to 50 (mm)
2219	SV019 (RNG1)	Position sensor resolution	PR	The value that is four times the No. of pulses (k pulses) per rotation of the detector used for position control is set. (Refer to the section "6.1 MP200 List of standard servo parameter settings per motor".)	Detector	1 to 1000 kp/rev
2220	SV020 (RNG2)	Speed sensor resolution	PR	The No. of pulses per rotation of the motor end detector is set. When using the semi-closed specifications RNG1 = RNG2.	Detector	1 to 1000 kp/rev
2221	SV021 (OLT)	Overload time constant		The overload (OL1) detection time constant is set. (1 sec unit)	60	1 to 18000 (sec)
2222	SV022 (OLL)	Overload detection level		The overload (OL1) current detection level is set with a percentage (%) to the stall rating.	150	1 to 500 (%)
2223	SV023 (OD1)	Excessive error width 1		<p>The excessive error width during servo ON is set.</p> <p>Setting expression:</p> $OD1 = OD2 = \frac{F}{60 \cdot PGN1} \cdot 0.5 \text{ (mm)}$ 	Machine specifications	1 to 32767 (mm)

## 4. Explanation of Parameters

Caution	Exclusive for MP200
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Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	No. (Parameter abbr.)	Parameter name	Changing method	Setting procedure	Standard setting value	Setting range
2224	SV024 (INP)	In-position width		The in-position width is set. ( $\mu\text{m}$ )	50	0 to 32767 ( $\mu\text{m}$ )
2225	SV025 (MTYP)	Motor type	PR	(Refer to the section "6.1 MP200 List of standard servo parameter settings per motor".)		HEX
2226	SV026 (OD2)	Excessive error width 2		The excessive error width during servo OFF is set. (Normally, the same data as OD1 is set.)	Machine specifications	0 to 32767 (mm)
2227	SV027 (SSF1)	Servo function 1		This is used to select the servo functions.	Machine specifications	HEX
2232	SV032 (TOF)	Torque offset compensation gain		The unbalanced torque amount of the shaft having an unbalanced torque such as a vertical axis is set with a percentage (%) to the rated current. This is used when the SSF1 lost motion compensation 1 and 2 are set. View the current load (%) on the I/F DIAG screen SERVO MONITOR, and feed the axis low-speed JOG (approx. F200) in the + and - directions. If the current load is positive check the max. value, and if negative check the min. value. Set the average value of the + and - direction values.	0	-100 to 100 (%)
2236	SV036 (PTYP)	Power supply type	PR	The regenerative option resistor type is set. (Refer to the section "6.1 MP200 List of standard servo parameter settings per motor".)	0	HEX
2238	SV038 (FHZ)	Resonance precession filter frequency		The vibration frequency to be suppressed when the machine vibrates is set. Note that the frequency is 100Hz or higher. Set to 0 when this is not being used.	0	100 to 3000 (Hz)
2240	SV040 (LMCT)	Lost motion compensation dead area		The non-sensitive width for the lost motion compensation is set. Note that when 0 is set, the setting will be $2\mu\text{m}$ .	0	0 to 100 ( $\mu\text{m}$ )
2241	SV041 (LMC2)	Lost motion compensation gain 2		The lost motion compensation gain is set.	Type 1 0 Type 2	-1 to 200% -1 to 100%
2249	SV049 (PGN1SP)	Spindle sync position loop gain 1		The position loop gain for when the spindle is moved with the position loop and the servo is synchronized such as during synchronous tapping is set.	15	1 to 200 (1/sec)
2250	SV050 (PGN2SP)	Spindle sync position loop gain 2		This is used when SHG control is used for spindle synchronization control. Set to 0 when not using.	0	0 to 200 (1/sec)
2253	SV053 (OD3)	Excessive error width 3		The excessive error width for special movements such as stopper is set.	0	0 to 32767 (ms)
2255	SV055 (EMGDT)	Deceleration max delay time		The max. deceleration stop time is set. When this time is passed, the deceleration stop will be terminated, and the hardware dynamic brakes will be applied. When set to 0, the setting will be 2000msec.	0	0 to 5000 (ms)
2256	SV056 (EMGT)	Deceleration time constant		The deceleration stop time constant is set. Normally the "acceleration/deceleration time constant for rapid traverse" is set. When 0 is set, step stopping will be applied.	0	0 to 5000 (ms)

## 4. Explanation of Parameters

Caution	Exclusive for MP200
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Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	No. (Parameter abbr.)	Parameter name	Changing method	Setting procedure	Standard setting value	Setting range
2257	SV057 (SHGC)	High gain control constant		This is set when using SHG control. Set to 0 when not using.	0	0 to 200 (1/sec)
2258	SV058 (SHGCSP)	Spindle sync high gain control constant		This is set when using SHG control for the spindle synchronization control. Set to 0 when not using.	0	0 to 200 (1/sec)
2261	SV061 (DAINO)	D/A output channel-1 data number		The output data No. for the D/A output function is set.	0	0 to 7
2263	SV063 (DAIMPY)	DA output channel-1 multiplying factor		The output data scale for the D/A output function is set.	0	0 to 127

4.4 List of MP205 servo parameters

Servo parameters are provided for each axis. Note that the parameter No. is the same for each axis. MR-J-B Specifications and Instruction Manual (IB(NA)67208) and MR-H-B Specifications and Instruction Manual (IB(NA)67207) for details and setting of the servo parameters.

Caution	Exclusive for MP205
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Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	No. (Parameter abbr.)	Parameter name	Changing method	Setting procedure	Standard setting value	Setting range												
2201	NO.1 (AMS)	Amplifier setting	PR	The absolute position detection system is selected. 0000h: Absolute position system invalid 0001h: Absolute position system valid (When using absolute position detector)	0000h	0000h or 0001h												
2202	NO.2 (REG)	Regenerative resistance	PR	The regenerative option and external dynamic brakes are selected.  <table border="1" style="margin-left: 20px;"> <tr> <td>0</td> <td>0</td> </tr> </table> <p style="margin-left: 40px;">The regenerative option is selected 0: When the capacity is 11kW or less and no external options are used, and when the enclosed regenerative resistor is used for 11kW or more. 1: FR-RC, FR-BU type brake unit 2: MR-RB013 3: MR-RB033 5: MR-RB32 6: MR-RB34 7: MR-RB54 8: MR-RB30 9: MR-RB50 B: MR-RB31 C: MR-RB51 E: When the capacity is 11kW or more, and the enclosed regenerative resistor is cooled with a fan to improve the capacity.</p> <p style="margin-left: 20px;">The external dynamic brake is selected. 0: No external dynamic brake used. 1: External dynamic brake used.</p>	0	0	0000h	0000h to 010Eh										
0	0																	
2203	NO.3 (MTY)	Motor type	PR	The motor type is selected.  <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Setting value</th> <th>Motor type</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>HA-SH standard</td> </tr> <tr> <td>1</td> <td>HA-LH low inertia</td> </tr> <tr> <td>2</td> <td>HA-UH flat</td> </tr> <tr> <td>3</td> <td>HA-FH compact</td> </tr> <tr> <td>5</td> <td>HA-MH ultra-compact</td> </tr> </tbody> </table>	Setting value	Motor type	0	HA-SH standard	1	HA-LH low inertia	2	HA-UH flat	3	HA-FH compact	5	HA-MH ultra-compact	3	0 to 3
Setting value	Motor type																	
0	HA-SH standard																	
1	HA-LH low inertia																	
2	HA-UH flat																	
3	HA-FH compact																	
5	HA-MH ultra-compact																	

## 4. Explanation of Parameters

Caution	Exclusive for MP205
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Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	No. (Parameter abbr.)	Parameter name	Changing method	Setting procedure	Standard setting value	Setting range																						
2204	NO.4 (MCA)	Motor capacity	PR	The motor's output capacity is set. Setting value = Motor's output capacity(kW) × 100 Ex. The HA-FH63 has a capacity of 600W, so the setting value is 0060.	0010	0000 to 2200																						
2205	NO.5 (MTR)	Rotation speed	PR	The motor's rated speed is set. Setting value = Motor's rated speed (rpm) × 10 <sup>-3</sup> <table border="1" style="margin: 5px auto;"> <thead> <tr> <th>Motor type</th> <th>Rated speed (rpm)</th> <th>Setting value</th> </tr> </thead> <tbody> <tr> <td>HA-FH</td> <td>3000</td> <td>3</td> </tr> <tr> <td rowspan="3">HA-SH</td> <td>1000</td> <td>1</td> </tr> <tr> <td>2000</td> <td>2</td> </tr> <tr> <td>3000</td> <td>3</td> </tr> <tr> <td>HA-LH</td> <td>2000</td> <td>2</td> </tr> <tr> <td>HA-UH</td> <td>2000</td> <td>2</td> </tr> <tr> <td>HA-MH</td> <td>3000</td> <td>3</td> </tr> </tbody> </table>	Motor type	Rated speed (rpm)	Setting value	HA-FH	3000	3	HA-SH	1000	1	2000	2	3000	3	HA-LH	2000	2	HA-UH	2000	2	HA-MH	3000	3	3	1 to 3
Motor type	Rated speed (rpm)	Setting value																										
HA-FH	3000	3																										
HA-SH	1000	1																										
	2000	2																										
	3000	3																										
HA-LH	2000	2																										
HA-UH	2000	2																										
HA-MH	3000	3																										
2206	NO.6 (FBP)	Encoder feedback pulse	PR	The value is set according to the No. of feedback pulses per detector rotation. <table border="1" style="margin: 5px auto;"> <thead> <tr> <th>Motor type</th> <th>No. of feedback pulses</th> <th>Setting value</th> </tr> </thead> <tbody> <tr> <td>HA-MH</td> <td rowspan="2">8192</td> <td rowspan="2">1</td> </tr> <tr> <td>HA-FH</td> </tr> <tr> <td>HA-SH</td> <td rowspan="3">16384</td> <td rowspan="3">0</td> </tr> <tr> <td>HA-LH</td> </tr> <tr> <td>HA-UH</td> </tr> </tbody> </table>	Motor type	No. of feedback pulses	Setting value	HA-MH	8192	1	HA-FH	HA-SH	16384	0	HA-LH	HA-UH	1	0 or 1										
Motor type	No. of feedback pulses	Setting value																										
HA-MH	8192	1																										
HA-FH																												
HA-SH	16384	0																										
HA-LH																												
HA-UH																												
2207	NO.7 (POL)	Spin direction	PR	The motor's rotation direction is set. 0: Counterclockwise (CCW) looking from load end with + movement command 1: Clockwise rotation (CW) looking from machine end with + movement command	0	0 or 1																						
2208	NO.8 (ATU)	Auto tuning	PR	The automatic tuning function is selected. 0000h: Automatic tuning is valid during use of interpolation axis control with position control (MR-HB only) 0001h: Automatic tuning valid during normal use 0002h: Automatic tuning invalid	0001h	0000h to 0002h																						

## 4. Explanation of Parameters

Caution	Exclusive for MP205
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Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	No. (Parameter abbr.)	Parameter name	Changing method	Setting procedure	Standard setting value	Setting range																																											
2209	NO.9 (RSP)	Servo response setting		<p>The automatic turning response is set.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Machine type</th> <th rowspan="2">Setting value</th> <th colspan="3">Details</th> <th rowspan="2">Guideline for position setting time For <math>GDL^2/GDM^2 \leq 5</math></th> </tr> <tr> <th>Response</th> <th>Guideline for applicable machine rigidity</th> <th>Guideline for load inertia <math>GDL^2/GDM^2</math></th> </tr> </thead> <tbody> <tr> <td rowspan="4" style="text-align: center;">Normal</td> <td>0001h</td> <td>Low response</td> <td rowspan="2" style="text-align: center;">Low rigidity to Medium rigidity to High rigidity</td> <td rowspan="4" style="text-align: center;">1 to 10 times</td> <td>50 to 300 msec.</td> </tr> <tr> <td>0002h</td> <td rowspan="2" style="text-align: center;">Medium response</td> <td>10 to 70 msec.</td> </tr> <tr> <td>0003h</td> <td rowspan="2" style="text-align: center;">High response</td> <td>10 to 30 msec.</td> </tr> <tr> <td>0004h</td> <td></td> <td></td> </tr> <tr> <td rowspan="4" style="text-align: center;">Friction is high (MR-HB only)</td> <td>0008h</td> <td>Low response</td> <td rowspan="2" style="text-align: center;">Low rigidity to Medium rigidity to High rigidity</td> <td>70 to 400 msec.</td> </tr> <tr> <td>0009h</td> <td rowspan="2" style="text-align: center;">Medium response</td> <td>10 to 100 msec.</td> </tr> <tr> <td>000Ah</td> <td rowspan="2" style="text-align: center;">High response</td> <td>10 to 50 msec.</td> </tr> <tr> <td>000Bh</td> <td></td> <td></td> </tr> <tr> <td>000Ch</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><b>Note)</b> To change the setting value, observe the motor or machine vibration and stopping settling when stopped or just before stopping, and increase the setting value in order from the low response side.</p>	Machine type	Setting value	Details			Guideline for position setting time For $GDL^2/GDM^2 \leq 5$	Response	Guideline for applicable machine rigidity	Guideline for load inertia $GDL^2/GDM^2$	Normal	0001h	Low response	Low rigidity to Medium rigidity to High rigidity	1 to 10 times	50 to 300 msec.	0002h	Medium response	10 to 70 msec.	0003h	High response	10 to 30 msec.	0004h			Friction is high (MR-HB only)	0008h	Low response	Low rigidity to Medium rigidity to High rigidity	70 to 400 msec.	0009h	Medium response	10 to 100 msec.	000Ah	High response	10 to 50 msec.	000Bh			000Ch					0001h	0000h to 000Ch
Machine type	Setting value	Details					Guideline for position setting time For $GDL^2/GDM^2 \leq 5$																																										
		Response	Guideline for applicable machine rigidity	Guideline for load inertia $GDL^2/GDM^2$																																													
Normal	0001h	Low response	Low rigidity to Medium rigidity to High rigidity	1 to 10 times	50 to 300 msec.																																												
	0002h	Medium response			10 to 70 msec.																																												
	0003h		High response		10 to 30 msec.																																												
	0004h																																																
Friction is high (MR-HB only)	0008h	Low response	Low rigidity to Medium rigidity to High rigidity	70 to 400 msec.																																													
	0009h	Medium response		10 to 100 msec.																																													
	000Ah		High response	10 to 50 msec.																																													
	000Bh																																																
000Ch																																																	
2210	NO.10 (TLP)	CW torque limit value		The torque for forward power running is set. The setting value is the value when the rated torque is 100%.	100 (%)	0 to 300																																											
2211	NO.11 (TLM)	CCW torque limit value		The torque for forward regeneration is set. The setting value is the value when the rated torque is 100%.	100 (%)	0 to 300																																											
2212	NO.12 (DG2)	Load inertia ratio		The value that is 10 times the load moment of inertia ratio for the motor is set. Note that when the automatic tuning function is valid, the automatic tuning results will automatically be set. <b>(Note)</b>	30	0 to 1000																																											
2213	NO.13 (PG1)	Position loop gain 1		The position loop gain is set. When the gain is increased, the follow-up to the position command will improve. Note that when the automatic tuning function is valid, the automatic tuning results will automatically be set.	70 (rad/sec)	4 to 1000																																											
2214	NO.14 (VG1)	Velocity loop gain 1		This parameter normally does not need to be changed. When increased, the response will improve but vibration and noise will increase. Note that when the automatic tuning function is valid, the automatic tuning results will automatically be set.	1200 (rad/sec)	20 to 5000																																											
2215	NO.15 (PG2)	Position loop gain 2		The position loop gain is set. This is set when the position response to load disturbance is to be increased. When increased, the response will improve but vibration and noise will increase. Note that when the automatic tuning function is valid, the automatic tuning results will automatically be set.	25 (rad/sec)	1 to 500																																											

**(Note)** When setting the load inertia ratio from the control unit side, a value that is 10 times the moment of inertia ratio to the motor is set, but when set with the parameter unit for the MR-H-B, the actual moment of inertia ratio to the motor is set.

## 4. Explanation of Parameters

Caution	Exclusive for MP205
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Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	No. (Parameter abbr.)	Parameter name	Changing method	Setting procedure	Standard setting value	Setting range																		
2216	NO.16 (VG2)	Velocity loop gain 2		This is set when vibration occurs in a constant rigidity machine or machine with large backlash, etc. When increased, the response will improve but vibration and noise will increase. Note that when the automatic tuning function is valid, the automatic tuning results will automatically be set.	600 (rad/sec)	20 to 8000																		
2217	NO.17 (VIC)	Velocity integration compensation		The integration compensation time constant is set. Note that when the automatic tuning function is valid, the automatic tuning results will automatically be set.	20 (msec)	1 to 1000																		
2218	NO.18 (NCH)	Notch filter		<p>The notch frequency is set according to the machine system's resonance frequency.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Setting value</th> <th style="text-align: center;">Notch frequency (Hz)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">Not used</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">1125</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">750</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">562</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">450</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">375</td> </tr> <tr> <td style="text-align: center;">6</td> <td style="text-align: center;">321</td> </tr> <tr> <td style="text-align: center;">7</td> <td style="text-align: center;">281</td> </tr> </tbody> </table>	Setting value	Notch frequency (Hz)	0	Not used	1	1125	2	750	3	562	4	450	5	375	6	321	7	281	0	0 to 7
Setting value	Notch frequency (Hz)																							
0	Not used																							
1	1125																							
2	750																							
3	562																							
4	450																							
5	375																							
6	321																							
7	281																							
2219	NO.19 (FFC)	Feed forward gain		<p>The feed forward gain for position control is set. When 100% is set, the operation will take place at the constant speed, but the remaining pulse will 0. Note that the overshoot will increase during sudden acceleration/deceleration. (As a guideline, when FFC = 100 the acceleration/deceleration time to the rated speed will be 1 sec. or more.)</p> <p><b>Note)</b> Always invalidate the automatic tuning function when this parameter is set. (Set parameter 2208 to 0002h.)</p>	0 (%)	0 to 100																		
2220	NO.20 (INP)	In-position range		The range of the remaining pulses that output the in-position to the control unit is set.	100 (pulse)	0 to 50000																		
2221	NO.21 (MBR)	Solenoid brake out		The delay time to shutting the base off from the solenoid brake operation is set. (MR-H-B only)	100 (msec)	0 to 1000																		



## 4. Explanation of Parameters

Caution	Exclusive for MP205
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Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	No. (Parameter abbr.)	Parameter name	Changing method	Setting procedure	Standard setting value	Setting range																				
2222	NO.22 (MOD)	Monitor output mode select		<p>Settings are made for the monitor output.</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">0 0</div> <div style="margin-left: 10px;"> <p>Monitor 2 output selection (MR-H-B only)</p> <p>0: Motor speed (<math>\pm</math> output)</p> <p>1: Torque (<math>\pm</math> output)</p> <p>2: Motor speed (+ output)</p> <p>3: Torque (+ output)</p> <p>4: Current command output (<math>\pm</math> output)</p> <p>5: Command pulse frequency (<math>\pm</math> output)</p> <p>6: Remaining pulse 1/1 (<math>\pm</math> output)</p> <p>7: Remaining pulse 1/4 (<math>\pm</math> output)</p> <p>8: Remaining pulse 1/16 (<math>\pm</math> output)</p> <p>9: Remaining pulse 1/32 (<math>\pm</math> output)</p> </div> </div> <p>Monitor 1 output selection The items are the same as the monitor 2 output selection. (Note that the remaining pulses apply only to MR-H-B.)</p> <p><b>Output range</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Details</th> <th style="text-align: center;">MR-H-B</th> <th style="text-align: center;">MR-J-B</th> <th style="text-align: center;">MR-J-B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Speed (at max. speed)</td> <td style="text-align: center;">8(V)</td> <td style="text-align: center;">4(V)</td> <td style="text-align: center;">2.5<math>\pm</math>2 (V)</td> </tr> <tr> <td style="text-align: center;">Torque (at max. torque)</td> <td style="text-align: center;">8(V)</td> <td style="text-align: center;">4(V)</td> <td style="text-align: center;">2.5<math>\pm</math>2 (V)</td> </tr> <tr> <td style="text-align: center;">Command FAT (at 400kpps)</td> <td style="text-align: center;">8(V)</td> <td style="text-align: center;">4(V)</td> <td style="text-align: center;">2.5<math>\pm</math>2 (V)</td> </tr> <tr> <td style="text-align: center;">Remaining pulses 1/1 (at 2048)</td> <td style="text-align: center;">11.6(V)</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> </tbody> </table>	Details	MR-H-B	MR-J-B	MR-J-B	Speed (at max. speed)	8(V)	4(V)	2.5 $\pm$ 2 (V)	Torque (at max. torque)	8(V)	4(V)	2.5 $\pm$ 2 (V)	Command FAT (at 400kpps)	8(V)	4(V)	2.5 $\pm$ 2 (V)	Remaining pulses 1/1 (at 2048)	11.6(V)	-	-	0001h	0000h to 0909h
Details	MR-H-B	MR-J-B	MR-J-B																							
Speed (at max. speed)	8(V)	4(V)	2.5 $\pm$ 2 (V)																							
Torque (at max. torque)	8(V)	4(V)	2.5 $\pm$ 2 (V)																							
Command FAT (at 400kpps)	8(V)	4(V)	2.5 $\pm$ 2 (V)																							
Remaining pulses 1/1 (at 2048)	11.6(V)	-	-																							
2223	NO.23 (OP1)	Option function 1	PR	<p>The low-acoustic mode is selected.</p> <p>0000h: Low-acoustic mode invalid</p> <p>0030h: Low-acoustic mode valid</p> <p><b>Note)</b> When the low-acoustic mode is valid, the continuous output capacity will decrease.</p>	0000h	0000h or 0030h																				
2224	NO.24 (OP2)	Option function 2	PR	<p>The no motor operation (test operation) is selected.</p> <p>0000h: No motor operation invalid</p> <p>0100h: No motor operation valid</p>	0000h	0000h or 0100h																				
2225	NO.25 (OP3)	Fixed parameter	PR		0000h																					
2226	NO.26 (OP4)	Fixed parameter	PR		0000h																					
2227	NO.27 (MO1)	Monitor output 1 offset		The offset value for the monitor output 1 is set.	0 (mV)	-9999 to 9999																				

## 4. Explanation of Parameters

Caution	Exclusive for MP205
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Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	No. (Parameter abbr.)	Parameter name	Chang- ing method	Setting procedure	Standard setting value	Setting range
2228	NO.28 (MO2)	Monitor output 2 offset		The offset value for the monitor output 2 is set. (MR-H-B only)	0 (mV)	-9999 to 9999
2229	NO.29 (MOA)	Before alarm data		<p>The data before an alarm is selected.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;"> <span style="border: 1px solid black; padding: 2px 5px;">0</span> </div> <p style="margin-left: 40px;">↓</p> <p style="margin-left: 40px;">Data selection 2</p> <ul style="list-style-type: none"> <li>0: Motor speed (<math>\pm</math> output)</li> <li>1: Torque (<math>\pm</math> output)</li> <li>2: Motor speed (+ output)</li> <li>3: Torque (+ output)</li> <li>4: Current command output (<math>\pm</math> output)</li> <li>5: Command pulse frequency (<math>\pm</math> output)</li> <li>6: Remaining pulse 1/1 (<math>\pm</math> output)</li> <li>7: Remaining pulse 1/4 (<math>\pm</math> output)</li> <li>8: Remaining pulse 1/16 (<math>\pm</math> output)</li> <li>9: Remaining pulse 1/32 (<math>\pm</math> output)</li> </ul> <p style="margin-left: 40px;">↙</p> <p style="margin-left: 40px;">Data selection 1</p> <p style="margin-left: 40px;">The items are the same as the data selection 2.</p> <p style="margin-left: 40px;">↓</p> <p style="margin-left: 40px;">Sampling time selection</p> <ul style="list-style-type: none"> <li>0: 1.77 (msec.)    3: 14.2 (msec.)</li> <li>1: 3.55 (msec.)    4: 28.4 (msec.)</li> <li>2: 7.11 (msec.)</li> </ul>	0001h	0000h to 0499h
2230	NO.30 (ZSP)	Fixed parameter			50	
2231	NO.31 (ERZ)	Excessive error alarm level		The range for outputting the alarm of excessive remaining pulses is set.	80 (kpulse)	1 to 1000
2232	NO.32 (OP5)	Fixed parameter			0000h	
2233	NO.33 (OP6)	Fixed parameter			0000h	
2234	NO.34 (VP1)	Fixed parameter			0	
2235	NO.35 (TTT)	Fixed parameter			0	
2236	NO.36 (VDC)	Fixed parameter			980	
2237		Reserve				
2238		Reserve				
2239		Reserve				

4.5 List of sampling parameters

Caution	Common for MP200/205
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Changing method	PR	Control unit power must be turned OFF/ON after setting
	No mark	The power does not need to be turned OFF/ON

No.	Details	Changing method	Setting procedure	Data format	Default setting value	Setting range
9000	Number of sampling		The No. of data types for sampling (command function @SAMP command) such as the controller command position is set. A max. of four types of data can be sampled simultaneously.	Decimal	1	0 to 4
9001	Data of sampling information No.0		The data for sampling (command function @SAMP command) such as the controller command position is designated. A max. of four data items can be designated.	Character string	Not set	1 to 7 characters
9002	Data of sampling information No.1					
9003	Data of sampling information No.2					
9004	Data of sampling information No.3					
9005	Sampling time		The sampling time is set.	Decimal	10000	0 to 1000000 (0.1msec unit)
9006	Trigger item		The trigger for starting sampling is set.	Character string	Not set	1 to 8 characters
9007	Trigger delay time		The time to hold the previous data from when the sampling trigger is turned ON is set.	Decimal	0	0 to 1000000 (0.1msec unit)
9008	Trigger axis No.		The axis No. of the item set in 9006 is set.	Decimal	1	1 to 8
9011	Axis number of sampling information No.0		The axis No. of the item set in 9001 is set.	Decimal	1	1 to 8
9012	Axis number of sampling information No.1		The axis No. of the item set in 9002 is set.	Decimal	1	1 to 8
9013	Axis number of sampling information No.2		The axis No. of the item set in 9003 is set.	Decimal	1	1 to 8
9014	Axis number of sampling information No.3		The axis No. of the item set in 9004 is set.	Decimal	1	1 to 8

4.6 Cautions for setting gear ratio etc.

**Caution**  
The ball screw pitch\* is parameter 2218 for MP200, and parameter 2152 for MP205.

4.6.1 Conditions for setting gear ratio, etc.

Set the motor side gear ratio, machine side gear ratio and ball screw pitch\* so that (Expression 1) and (Expression 2) below are satisfied.

$$\text{Parameter 2150 (Motor gear ratio)} \times \boxed{\text{Parameter 2218/2152 (Ball screw pitch*)}} \times 2 \leq 32767 \quad \text{..... (Expression1)}$$

$$\text{Parameter 2151 (Machine gear ratio)} \times \text{Encoder resolution} / 1000 \leq 32767 \quad \text{..... (Expression2)}$$

↳ Resolution per motor model { HA-FH 8192  
HA-SH 16384

If the above conditions are not satisfied, the following will occur.

$$\text{Parameter 2150 (Motor gear ratio)} / \text{parameter 2151 (Machine gear ratio)} \times \boxed{\text{Parameter 2218/2152 (Ball screw pitch*)}} = \text{Movement amount per motor rotation} \quad \text{..... (Expression3)}$$

Thus, set each parameter value so that (Expression 1) and (Expression 2) are satisfied.

**Example 1)** When gear ratio is 144:4205 for rotary axis

Parameter 2150 (motor gear ratio)	144	
Parameter 2151 (machine gear ratio)	4205	
$\boxed{\text{Parameter 2218/2152}}$ (ball screw pitch*)	360	← For the rotary axis, the ball screw pitch is 360°.

Thus, the following occurs and (Expression 1) and (Expression 2) are not satisfied.

$$144 \times 360 \times 2 = 103680 > 32767$$

$$4205 \times 8192/1000 = 34447.360 > 32767$$

In this case, the movement amount per motor rotation is  $144/4205 \times 360^\circ$  so, the machine side gear ratio and ball screw pitch are divided as follows.

Parameter 2150 (motor gear ratio)	144	
Parameter 2151 (machine gear ratio)	841	$\frac{144 \times 360}{4205} = \frac{144 \times 72}{841}$
$\boxed{\text{Parameter 2218/2152}}$ (ball screw pitch*)	72	

Thus, (Expression 1) and (Expression 2) are satisfied.

$$144 \times 72 \times 2 = 20736 < 32767$$

$$841 \times 8192/1000 = 6889.472 < 32767$$

4.6.2 Setting method for belt drive, etc.

For belt drive, etc., each parameter is obtained from the movement amount per motor rotation so that (Expression 3) above is satisfied.

Next, confirm that the obtained parameter satisfies (Expression 1) and (Expression 2) above.


**Example 2)** When movement amount per motor rotation is 201/99mm for belt drive.

Parameter 2150 (motor gear ratio)	201	
Parameter 2151 (machine gear ratio)	99	
$\boxed{\text{Parameter 2218/2152}}$ (ball screw pitch*)	1	

## 5. Alarms and Warnings


### 5.1 Classification of alarms

The alarms that occur in the machine controller are classified as shown below. Refer to the List of alarms for details on each alarm.

Order or priority	Class No.	Alarm class	Details	Affect on operation	Cancel method
High  Low	1E	System error	The system cannot operate properly due to amplifier not being mounted or error in file system.	Operation is not possible.	Setup again or reset the parameters. Then turn the power ON again.
	2E	Servo alarm	Alarm that occurs in the drive unit.	Operation stops with the alarm.	Reset or turn the power ON again.
	3E	Operation error	The operation is not possible due to a cause other than the motion program such as the stored stroke limit.	Operation stops with the alarm.	Reset the operation.
	4E	Command error	Error in the command function that occurs when a command function is selected from the motion program operation.	Operation stops with the alarm.	Reset the operation, and review the motion program.
	5E	Motion program error	Error in the motion program.	Operation stops with the alarm.	Reset the operation, and review the motion program.
	6E	Communication error	Error in the communication with the personal computer.	A breakage in the wire during the remote state will lead to emergency stop.	Canceled when the correct data is received from the personal computer.

### 5.2 Classification of warnings

The warnings that occur in the machine controller are classified as shown below. Refer to the List of warnings for details on each warning.

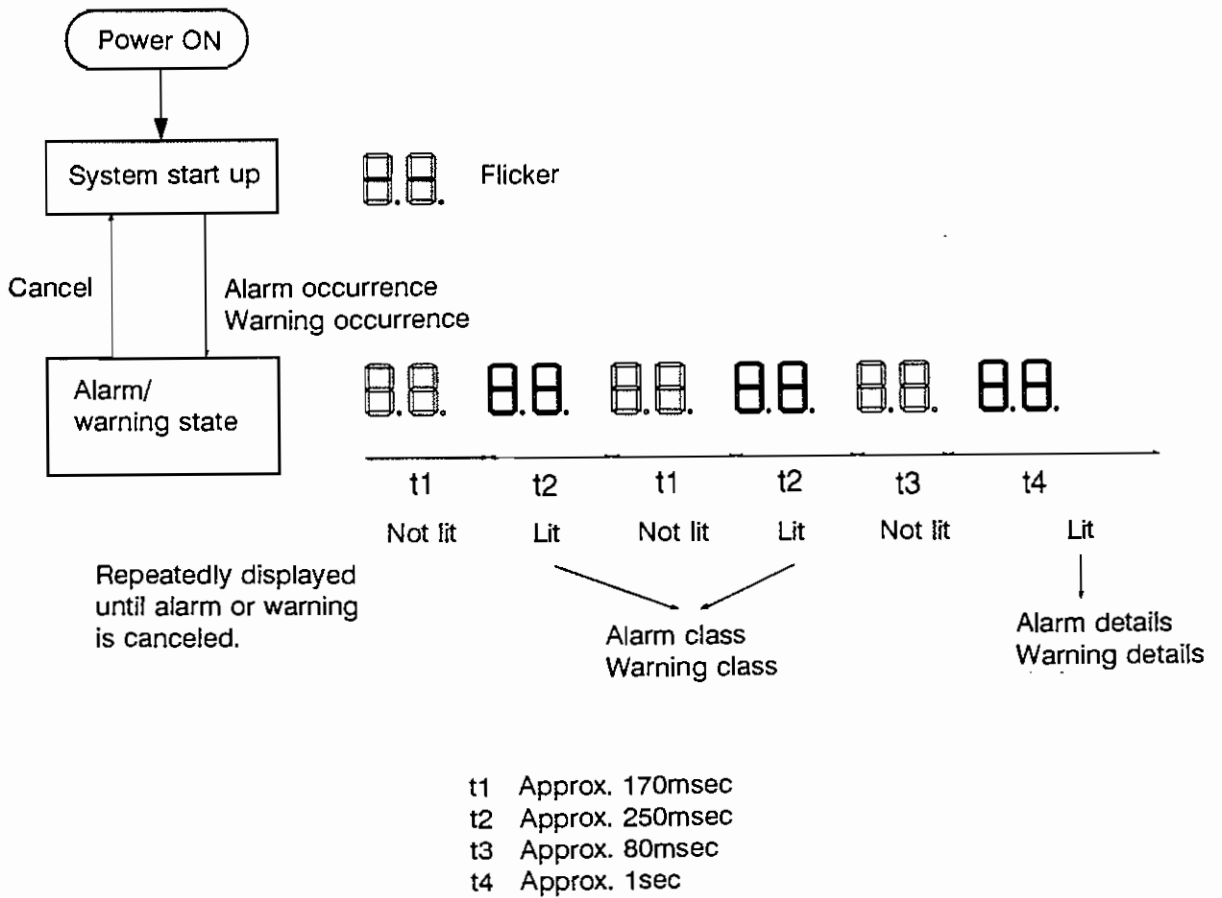
Order or priority	Class No.	Alarm class	Details	Affect on operation	Cancel method
High  Low	1F	System warning	Warning such as battery alarm	Starting of operation may not be possible in some cases. Refer to the List of warnings.	Cancel the cause of the warning. Refer to the List of warnings.
	2F	Servo warning	Warning that occurs in the drive unit		
	3F	Operation warning	Alarm that prevents operation due to cause other than motion program such as interlock axis found.		

5.3 Display of alarms and warnings

When an alarm or warning occurs, the machine controller will display the class No. and details No. of the alarm or warning on the control unit's 7-segment LED.

If multiple alarms or warnings occur, the details of all alarms and warnings will be displayed in order of priority.

Refer to the List for the meanings of the Nos.



## 5.4 List of alarms

## 5.4.1 (1E) : MP200/205 system errors

## (1E) : File related errors

No.	Details	Meaning	Cancel method
1	File system error	There is an error in the file system.	The power must be turned ON in the system initialization mode and all files initialized.

## (1E) : Parameter related errors

No.	Details	Meaning	Cancel method
10	No parameter file	There is an error in the file system.	The power must be turned ON in the system initialization mode and all files initialized.
11	File read/write error	There is an error in the file system.	The power must be turned ON in the system initialization mode and all files initialized.
12	Parameter error	The axis name is duplicated.	Change so that the axis name is not duplicated.

## (1E) : Hardware mounting related errors

No.	Details	Meaning	Cancel method
20	Servo drive unit not mounted	The servo drive unit is not mounted.	Check the connection state. Turn ON the power in the hardware mounting check mode or set parameter (No. 2000), and set the mounting unit.
21	Remote IO unit not mounted (also occurs during wire breakage)	The remote IO unit is not mounted or there is a wire breakage.	Check the connection state. Turn ON the power in the hardware mounting check mode or set parameter (Nos. 1011 ~ 1018), and set the mounting unit.

## (1E) : Ladder related error

No.	Details	Meaning	Cancel method
7D	Ladder object illegal	The ladder is not correctly loaded.	Download the ladder file into the RAM or write it into the FROM.

(1E) : Errors related to communication with servo drive unit

No.	Details	Meaning	Cancel method
F6	CRC error	There is an error in the communication with the servo.	Check the connection cable between the servo drive unit and controller for breakage or damage.
F7	Communication timing error		
F8	Data ID error		
F9	No. of communication frames error		

(1E) : Error interrupt

No.	Details	Meaning	Cancel method
FA	Watch dog	There is an error in the system.	Turn the power ON again.
FB	Exceptional interrupt		

(1E) : Other error

No.	Details	Meaning	Cancel method
F0 to FF	There is an error in the system.		Turn the power ON again.



## 5.4.2 (2E) : MP200 servo alarms

No.	Details	Meaning	Cancel method
12	Memory error	The memory on the servo drive unit's control PCB is not operating correctly.	When a servo alarm occurs, confirm the operation state and the display on the servo drive unit's 7-segment LED to confirm the axis, etc., where the alarm is occurring, and then refer to the Troubleshooting section of the Servo Drive Maintenance Manual (BNP-B2057).
13	Software process error	The software data processing did not end within the correct time.	
16	Magnetic pole position detection error	One of the differential inputs of the magnetic pole position detection signal's U, V or W phase were both set to "H" or "L".	
17	AD converter error	The AD converter for current detection did not function correctly during initialization.	
20	No signal detection 1	One of the differential inputs of the motor end installed detector's A, B or C phase signals were both set to "H" or "L".	
25	Absolute position lost	The absolute position data in the absolute value detector was lost.	
28	Absolute position overspeed	Overspeed occurred while the HA-FH motor detector was being initialized.	
29	Absolute position detector circuit error	A hardware error occurred in the position detector side circuit of the absolute value detector. (Alarm output from absolute value detector)	
2B	Detector CPU error	The CPU in the detector side circuit is not functioning correctly.	
2C	Detector LED error	An error occurred in the detector LED.	
2F	Serial detector communication error	An error occurred in the serial communication with the detector.	
30	Over-regeneration	Overheating of the regenerative resistor was detected.	
31	Overspeed	The motor speed reached 1.2 times of the rated speed.	
32	Power module overcurrent	An overcurrent was detected in the IPM used for the servo drive's main circuit.	
33	Overvoltage	The base voltage in the driver exceeded 400V.	

## (2E) : MP200 servo alarms

No.	Details	Meaning	Cancel method
34	CRC error	An error occurred in the communication with the control unit.	When a servo alarm occurs, confirm the operation state and the display on the servo drive unit's 7-segment LED to confirm the axis, etc., where the alarm is occurring, and then refer to the Troubleshooting section of the Servo Drive Maintenance Manual (BNP-B2057).
35	Data error		
37	Parameter error	The servo parameters transmitted from the control unit during initialization of the driver were illegal.	
38	Protocol error 1	An error occurred in the communication with the control unit.	
39	Protocol error 2		
3A	Overcurrent	An excessive current flowed to the motor.	
3B	Power module overheat	Overheating of the IPM used in the servo drive's main circuit was detected.	
42	Feedback error 1	A skip occurred in the detector's feedback pulses.	
46	Motor overheat	The thermal protector for the motor or detector tripped.	
50	Overload 1	The overload level (parameter OLL) of the motor current flowed for longer than the overload time constant (parameter OLT).	
51	Overcurrent 2	A current command that was 95% or more of the max. output current continued for 1 sec. or more.	
52	Excessive error 1	The actual position to the command during servo ON exceeded the excessive error width (parameter OD1).	
53	Excessive error 2	The actual position to the command during servo OFF exceeded the excessive error width 2 (parameter OD2).	
88	Watch dog	An error occurred in the servo drive unit.	

## 5.4.3 (2E) : MP205 servo alarms

No.	Details	Meaning	Cancel method
10	Undervoltage	The input power voltage (RST) was 160V or less, or a momentary power failure occurred.	When a servo alarm occurs, confirm the operation state and the display on the servo drive unit's 7-segment LED to confirm the axis, etc., where the alarm is occurring, and then refer to the Troubleshooting section of the MR-J-B/H-B Specifications and Instruction Manual (IB(NA)67208/IB(NA)67207).
12	Memory error 1	An error was detected in the PCB memory.	
13	Clock error	An error was detected in the PCB.	
14	Watch dog	A watch dog error was detected.	
15	Memory error 2	An error was detected in the PCB memory.	
16	Detector error 1	Correct communication with the motor detector was not possible.	
17	PCB error	An error was detected in the PCB element.	
19	Memory error 3	An error was detected in the PCB memory.	
20	Detector error 2	An error was detected in the detector and detector cable.	
24	Ground fault	A ground fault was detected in the motor drive (UVW).	
25	Absolute position lost	The absolute position data was lost due to a drop in the battery voltage.	
30	Regeneration error	A regenerative resistor overload or regenerative circuit error caused by an excessive regeneration frequency was detected.	
31	Overspeed	It was detected that the motor speed exceeded the tolerable speed.	
32	Overcurrent	An overcurrent was detected in the motor drive (UVW).	
33	Overvoltage	An excessive converter voltage was detected.	
34	CRC error	A communication error in the bus cable was detected.	
35	Command data error	A command exceeding the response performance of the servo drive unit was detected.	

## (2E) : MP205 servo alarms

No.	Details	Meaning	Cancel method
36	Transmission error	An error in the bus cable or PCB was detected.	When a servo alarm occurs, confirm the operation state and the display on the servo drive unit's 7-segment LED to confirm the axis, etc., where the alarm is occurring, and then refer to the Troubleshooting section of the MR-J-B/H-B Specifications and Instruction Manual (IB(NA)67208/IB(NA)67207).
37	Parameter error	Data exceeding the setting range was detected during the parameter check at power ON or resetting.	
42	Feedback error	An error in the detector's signal was detected.	
45	Main circuit element overheat	Abnormal overheating in the servo drive unit was detected.	
46	Motor overheating	Abnormal overheating of the motor was detected.	
50	Overload 1	Overload 1 (An overload current of approx. 200% was flowed continuously.)	
51	Overload 2	Overload 2 (The max. current flowed for several seconds.)	
52	Excessive error	The position deflection (difference between command position and actual machine position) was larger than the parameter setting value.	
8E	RS-232-C error	An error in the RS-232-C communication was detected.	

## 5.4.4 (3E) : MP200/205 operation errors

No.	Details	Meaning	Cancel method
3	Soft limit	The soft limit was applied during the motion program operation or point command operation.	Reset the motion program operation or point command operation.
4	Reference point return not possible	Reference point return was attempted when the absolute value reference position was not set or the absolute value was lost in the dog-less absolute value detection system.	Reset the motion program operation, and set the absolute value reference position.
5	Ready OFF axis found	Ready OFF was entered during axis movement.	Reset the operation. During manual operation, this error can be canceled by turning the axis start OFF.
7	Stroke end	The stroke end was reached during axis movement.	Reset the operation. During manual operation, this error can be canceled by turning the axis start OFF.
11	Z-phase not passed	During dog-type reference point return, the reference pulse (Z-phase) of the detector was not detected even once after the power was turned ON.	When using the motion program, reset the operation. During manual operation, turn the axis start OFF, and move the axis in the + or - direction until the motor rotates at least once, and then execute reference point return.
12	Handle/step magnification zero	The handle/step magnification setting value is zero.	Set the handle/step magnification in parameter (No. 1036 to 1039).
20	Point command axis selection is duplicate or illegal	An axis that is already operating was selected during the start of point command operation.	Check the state of the point command's operation axis selection signal.
21	No. of point command axes illegal	Four or more axes were selected for the operation axis during the start of the point command operation.	Check the state of the point command's operation axis selection signal.
22	Reference point return incomplete	Point command operation was started when reference point return was incomplete.	Execute reference point return.
23	Point command operation command range over.	The point data value exceeded the range of $-99999.999(\mu\text{m})$ to $99999.999(\mu\text{m})$ .	Set the point data value so that the range of $-99999.999(\mu\text{m})$ to $99999.999(\mu\text{m})$ is not exceeded.
2E	Point data axis illegal	An axis other than the No. of point data axes was selected at the start of the point command operation.	Check the state of the point command's operation axis selection signal.
E7	Emergency stop	The emergency stop state was entered.	Cancel the emergency stop switch. If the emergency stop was caused by another alarm, cancel that alarm.

5.4.5 (4E) : MP200/205 command errors

Note) These alarms are displayed only when a command is issued from the motion program.

(4E) : General command function

No.	Details	Meaning	Cancel method
1	Argument format illegal	The command argument is illegal.	Check the details of the motion program.
2	Command name illegal	The command name is illegal.	Check the details of the motion program.
3	Syntax error	The format following \$ is illegal.	Check the details of the motion program.
4	Input procedure error	A command that cannot be used in the motion program was issued.	Check the details of the motion program.
5	Local state	A command that cannot be used in the local state was issued.	Issue a remote command in the motion program.
6	External signal valid	A command that validates the external signal even in the remote state was issued.	Validate the command in the remote state. Add required signal name to the MP:\DIO\REMOTE.DEF file.
7	1st argument illegal	The 1st argument of the command is illegal.	Check the details of the motion program.
8	2nd argument illegal	The 2nd argument of the command is illegal.	Check the details of the motion program.
9	3rd argument illegal	The 3rd argument of the command is illegal.	Check the details of the motion program.
0A	4th argument illegal	The 4th argument of the command is illegal.	Check the details of the motion program.
0B	5th argument illegal	The 5th argument of the command is illegal.	Check the details of the motion program.
0C	6th argument illegal	The 6th argument of the command is illegal.	Check the details of the motion program.
0D	7th argument illegal	The 7th argument of the command is illegal.	Check the details of the motion program.
0E	8th argument illegal	The 8th argument of the command is illegal.	Check the details of the motion program.

(4E) : Program/manual operation related

No.	Details	Meaning	Cancel method
20	Reset state	Starting of the motion program (\$\$STRT) was not possible because of the reset state.	Cancel the reset state. Reset the motion program that caused the alarm.
21	Reset wait state	Starting of the motion program (\$\$STRT) was not possible because reset was not input once after the power was turned ON.	Always input reset after turning the power ON. Reset the motion program of the designated operation No.
22	No axis name	There was no argument (axis name) when a command (\$\$PLUS, \$\$MINS, etc.) requiring an axis name was issued.	Check the details of the motion program.
23	Axis in operation found	When the manual mode changeover (\$\$FEED, \$\$HNDL, etc.) was executed, an axis moving in another manual mode was found. When axis start (\$\$PLUS, \$\$MINS) was executed, an axis operating in the manual, motion program or point command was designated.	Changeover the manual mode when not operating in another manual mode. During axis start, start an axis that is not operating already.

(4E) : Other control functions

No.	Details	Meaning	Cancel method
30	Not in sampling	When sampling cancel (\$\$SMCN) was executed, sampling was not being done.	Cancel during sampling.
31	Sampling parameter illegal	When the sampling command (\$\$SAMP) was issued, the sampling parameter was illegal.	Check parameter (No. 9000 to ).
32	In-sampling	The sampling command (\$\$SAMP) was issued during sampling.	Start sampling after sampling is completed.
33	Command file busy	When command file execution (\$\$EXEC) was issued, it was already being executed.	Do not issued multiple execution commands simultaneously.
34	Not initialization mode	When the absolute position reference setting (\$\$ZSET) was executed, the initialization mode was not entered.	Command the initialization setting mode before executing absolute position reference setting (\$\$ZSET).
35	Amplifier not mounted	When the absolute position reference setting (\$\$ZSET) was executed, the servo drive unit was not correctly mounted.	Check the connection state of the servo drive unit, or execute the mounting check and then set the servo drive unit connected.

## (4E) : Other control functions

No.	Details	Meaning	Cancel method
36	Axis in movement	When the absolute position reference setting (\$ZSET) was executed, an axis was moving.	Stop the axis before executing absolute position reference setting (\$ZSET).
37	Absolute value encoder data read failure	When the absolute position reference setting (\$ZSET) was executed, the reading of the reference position from the servo drive unit failed.	Check for a breakage or possible breakage in the cable between the servo drive unit and controller.
38	Z-phase not passed	When the absolute position reference setting (\$ZSET) was executed, the detector's Z-phase was not passed even once after the power was turned ON.	When executing manual operation, turn the axis start OFF, and move the axis in the + or - direction so that the motor rotates at least once. Then execute absolute position reference setting (\$ZSET).
39	Servo drive unit type illegal	Absolute position reference setting (\$ZSET) was executed with a servomotor axis not compatible with the absolute value system.	Check the specifications.
3A	Not absolute value detection system	Absolute position reference setting (\$ZSET) was executed for an axis of which the servo parameter was not set for the absolute value detection system.	Check the servo parameters.
3E	In-amplifier servo OFF	When random reference point setting (\$RFST) was executed, the axis was in the servo OFF state.	Execute the random reference point setting in the servo ON state.
3F	Absolute value detection system	Random reference point setting (\$RFST) was executed for an axis of which the servo parameter was not set for the absolute value detection system.	Random reference point setting cannot be executed in the absolute value detection system.

## (4E) : Variable related

No.	Details	Meaning	Cancel method
40	Writing prohibited variable	A variable that cannot be written was commanded during the \$WRIT or \$DSET command.	Check the details of the motion program.
41	Data range over	The range of the data being set was exceeded during the \$WRIT or \$DSET command.	Check the details of the motion program.



(4E) : File operation related

No.	Details	Meaning	Cancel method
50	File area size over	The file data area became full during file copy (\$COPY).	Delete unnecessary files. The copied file is copied only half way, so delete it once.
51	File name illegal	The argument (file name) was illegal when a command (\$EXEC, \$DELETE, etc.) using a file name as an argument was executed.	Check the details of the motion program.
52	File name duplicate	A file with the copy destination file name existed during file copy (\$COPY).	Check the details of the motion program.
53	File in use	Deletion (\$DELETE) of a file in use by the motion program file that is running etc., was attempted.	Do not delete a file in use.
54	File format error	The copy source format was illegal when copying to a file such as a parameter file or point data file for which the file format is determined.	Confirm the format of the copy source file.
55	File operation illegal.	Copying to a file that cannot be copied was attempted during file copy (\$COPY).	Review the copy destination file name.
56	Ladder running	Copying (\$COPY) of a ladder object file was attempted while the ladder was running.	Stop the ladder and then copy.
57	Reading sampling data	Copying (\$COPY) of a sampling data file was attempted while uploading the sampling data file.	Wait for the uploading of the sampling data to finish and then copy.

(4E) : Other errors

No.	Details	Meaning	Cancel method
F0 to F2	There is an error in the command function.		Turn the power ON again.
F3	File system error	There is an error in the file system.	The power must be turned ON in the system initialization mode and all files initialized.

## 5.4.6 (5E) : MP200/MP205 motion program errors

No.	Details	Meaning	Cancel method
1	File system error	There is an error in the file system.	The power must be turned ON in the system initialization mode and all files initialized.
2	The file name is illegal or does not exist	The file name for the started motion program is illegal or the file does not exist.	Check the name of the file to be started, or download the file to be started.
3	Syntax error	The motion program description details are illegal.	Check the details of the motion program.
4	Command parameter illegal	There is an illegal expression in the ( ) data of the command, or the command range is illegal.	Check the details of the motion program.
5	No. of simultaneous operation axes over	Simultaneous operation or independent operation of the designated No. of axis is not possible. (The max. of eight axis is already being controlled including those for other operations.)	Change so that the max. No. of simultaneously controlled axes is eight.
6	Axis name illegal	The axis name commanded in GRP is illegal.	Check the parameter (No. 1000 to 1008) and the motion program.
7	No. of simultaneous operations over	Simultaneous operation was commanded for more than eight axes.	Change so that the max. No. of simultaneously controlled axes is eight.
8	Group setting illegal	The operation axis is not commanded, or an operation axis was commanded for an axis already operating.	If an operation axis is not commanded, use the operation axis command (GRP). Make sure that the operation axes are not duplicated.
9	Simultaneous operation not possible	A command (ZRN command, etc.) that cannot be used for simultaneous operation was issued for simultaneous operation.	Issue each operation axis command in order so that the command is not issued during simultaneous operation. The PARA, PTOP, PEND commands can also be used.
10	PEND without PARA	PEND was issued when there is no PARA command.	Issue the PARA command.
11	PTOP without PARA	PTOP was issued when there is no PARA command.	Issue the PARA command.
12	PARA without PEND	There is no PEND command after the PARA command.	Issue the PARA command.
13	PARA format error	The command following the PARA command is not PTOP, or there is only one PTOP command.	Issue PTOP after the PARA command. Issue two or more PTOP commands.

## (5E) : MP200/MP205 motion program errors

No.	Details	Meaning	Cancel method
14	Label name illegal or does not exist	The label commanded with the CALL or GSUB command is not found.	Correctly described the label name.
15	WEND without WHILE	There is no WHILE command before the WEND command.	Issue the WHILE command.
16	WHILE without WEND	There is no WEND command after the WHILE command.	Issue the WEND command.
17	RETN without CALL (GSUB)	A RETN command was found when not in the subprogram or subroutine.	When operating with the main program, issue the STOP command for the end of the program.
18	CALL (GSUB) without RETN	There is no RETN command in the subprogram or subroutine.	Check the motion program.
19	Calculation results exceed range	The calculation results exceeded the range of the program variable.	Review the calculation so that the results enter the range.
20	Zero division	The denominator of the division expression is 0.	Change so that the denominator of the division expression is not 0.
21	Variable illegal or does not exist	The variable No. is illegal.	Check the variable No.
22	Coordinate system not defined	An axis movement command was issued when the machine coordinates were not established.	When using the incremental detector system, make sure that reference point return is executed after the power is turned ON. When using the absolute value detector system, the absolute value's reference position has been lost so reset the reference position.
23	Command not possible	The details of the motion program description are illegal.	Check the motion program.
24	Command not possible	A STOP command was issued between the PARA and PEND commands.	Do not issue the STOP command between the PARA and PEND commands.
25	Simultaneous command not possible	A command that cannot be issued simultaneously was issued several times on one line.	Divide into several lines and then command.
26	[ ], operation repetition over	The ( ) or operation repetition was exceeded.	Divided into several lines by substituting into a variable once, etc., and then calculated.
27	Subprogram, WHILE nesting over	The No. of subprogram or subroutine calls or WHILE statement nests was exceeded.	Make sure that the subprogram or subroutine call does not exceed four nests. Make sure that the WHILE statement does not exceed two nests.

## (5E) : MP200/205 motion program errors

No.	Details	Meaning	Cancel method
29	Simultaneous start illegal	The synchronization No. did not match operation No. during the SYNC command.	Check the motion program.
2A	Can't execute operation	The feedrate is 0, the circular command axis is illegal or the signal output command is illegal.	Check the motion program.
2b	Operation illegal during speed reference axis designation mode	All speed reference axes are not movement axes.	Check the motion program.
2C	Command not possible during direct operation	A command that cannot be executed during direct operation was sent from the personal computer.	Issue commands that can be executed during direct operation.
2E	Point data axis illegal	An axis other than the point data axis No. set with the point data was commanded in the point operation.	Check the motion program.
2F	Interrupt positioning data illegal	The command value for the movement amount during the interrupt positioning is smaller than the min. movement amount after sensor input.	Set the movement amount for interrupt positioning to be larger than the min. movement amount after sensor input.

### 5.4.7 (6E) : MP200/205 communication errors

No.	Details	Meaning	Cancel method
1	Driver related error	There is an error in the communication driver.	Turn the power ON again.
2	Check sum error	The check sum of the communication data from the personal computer is illegal.	Check the data sent from the personal computer.
3	Framing error	The personal computer's communication environment settings and machine controller's communication parameters do not match. There is an error in the connection state.	Check the connection state with the personal computer.
4	Overrun error		
5	Parity error	The personal computer's communication environment settings and machine controller's communication parameters do not match. There is an error in the connection state.	Check the connection state with the personal computer.
6	Hardware error		
7	Time out	The data transmission was halted for five or more seconds during transmission of the data from the personal computer.	Check the data sent from the personal computer.
8	Wire breakage	The cable between the personal computer and machine controller has a broken wire. The emergency stop state will be entered during remote operation.	Reconnect with the personal computer's AC100V plug disconnected, and then restart the computer, or turn the external signal's remote command (RMOT) OFF.

5.5 List of warnings

5.5.1 (1F) : MP200/205 system warnings

No.	Details	Meaning	Cancel method
1	Battery drop	The voltage of the backup battery has dropped.	Replace the battery.
2	Battery error	The voltage of the backup battery has dropped. The backed up data may be destroyed.	Replace the battery.
10	PLC STOP	The built-in PLC is stopped. The emergency stop state will be entered.	Start up the PLC from the personal computer
11	Writing PLC FROM	The RAM ladder is being written to FROM. The PLC will be stopped, and the emergency stop state will be entered.	The warning will be canceled when the writing is completed.
20	Absolute position reference point not set	The absolute position for the absolute position detection system has been lost.	Set the absolute position reference position.
30	MELSEC communication time out	The FROM command or TO command was not issued for 500msec or more in the MELSEC ladder. (The machine controller will enter the emergency stop state.)	The ladder is stopped or the bus cable connection is defective, etc. The emergency stop state will be canceled when the correct ladder is run. (The warning display will be canceled when the power is turned ON again.)
31	MELSEC side alarm	An alarm has occurred in the MELSEC side. This alarm may also occur if the bus cable is disconnected. (The machine controller will enter the emergency stop state.)	Cancel the MELSEC side alarm, and run the ladder to cancel the emergency stop state. (The warning display will be canceled when the power is turned ON again.)
32	Bus connection system error	The data in the EX100 unit has been destroyed for some reason. (The machine controller will enter the emergency stop state.)	The emergency stop state will be canceled when the MELSEC power is turned ON again. (The warning display will be canceled when the power is turned ON again.)

## 5.5.2 (2F) : MP200 servo warnings

No.	Details	Meaning	Cancel method
93	Absolute position fluctuation	When the controller power was turned ON, the absolute position data had fluctuated so the absolute value counter could not be set.	When a servo warning occurs, confirm the operation state and the display on the servo drive unit's 7-segment LED to confirm the axis, etc., where the warning is occurring, and then refer to the Troubleshooting section of the Servo Drive Maintenance Manual (BNP-B2057).
9F	Battery voltage drop	The voltage of the battery supplied to the absolute value detector has dropped.	
E0	Over-regeneration warning	A level that is 80% of the over-regeneration alarm was detected. (If operation is continued, the over-regeneration alarm may occur.)	
E1	Overload warning	A level that is 80% of the overload 1 alarm was detected. (If operation is continued, the overload 1 alarm may occur.)	
E2	Absolute position counter warning	The absolute position counter value is illegal.	
E4	Parameter error warning	A parameter exceeding the setting range was set. The illegal parameter will be ignored, and the value before the illegal parameter was set will be held.	
E7	Emergency stop	The unit is in the emergency stop state.	

## 5.5.3 (2F) : MP205 servo warnings

No.	Details	Meaning	Cancel method
92	Battery wire breakage warning	A wire in the battery connected to the detector is broken.	When a servo alarm occurs, confirm the operation state and the display on the servo drive unit's 7-segment LED to confirm the axis, etc., where the alarm is occurring, and then refer to the Troubleshooting section of the MR-J-B/H-B Specifications and Instruction Manual (IB(NA)67208/IB(NA)67207).
96	Zero point setting mistake	The servo deviated from the in-position state after the absolute position initialization command was received.	
9F	Battery warning	The battery voltage has dropped.	
E0	Over-regeneration warning	The regenerative resistor load reached 85% of the alarm level.	
E1	Overload warning	85% of the overload alarm level was reached.	
E3	Absolute position counter warning	There is an error in the absolute position counter's back up data.	
E5	Abs. time out warning	A time out error occurred during transmission of the absolute data.	
E6	Servo emergency stop	An emergency stop signal was input in the servo drive unit.	
E7	PC emergency stop	The machine controller has entered the emergency stop state.	
E9	Main circuit OFF warning	The servo ON signal was turned ON while the servo drive unit's main circuit power was OFF.	



5.5.4 (3F) : MP200/205 operation warnings

No.	Details	Meaning	Cancel method
1	Interlock axis found	The interlock state was entered during axis movement.	Cancel the interlock signal.
2	Feedrate zero	The axis movement was commanded when the feedrate was zero.	During manual operation or point command operation from the PLC, set the manual feedrate parameter. During the motion program operation, set the motion program operation feedrate with a parameter or check the speed command value in the motion program.
3	Soft limit	The soft limit was applied during manual operation.	Turn the axis start OFF, and move the axis to outside of the soft limit range with manual operation.
4	Reference point return not possible	Reference point return was attempted when the absolute value reference position was not set or the absolute value was lost in the dog-less absolute value detection system.	Turn the axis start OFF, and set the absolute value reference position.
6	Servo OFF axis found	Servo OFF was entered during axis movement.	The warning will be canceled when servo OFF is canceled, and operation will resume. If the operation is reset, the warning will be canceled and operation will end.
7	Stroke end	The stroke end was reached.	After resetting the operation or turning the axis start OFF, move the axis to outside of the stroke end range with manual operation.
8	In-manual interrupt	The motion program was started while the manual operation mode with the manual interrupt function.	Stop the manual axis movement, and then start the motion program.
10	No manual mode	Manual axis start was attempted when the manual mode was not set.	Turn the axis start OFF once, enter the manual mode, and then turn the axis start ON again.
11	Manual mode duplicate	The manual mode has been set simultaneously.	Use only one manual mode.
12	Axis start switch duplicate	Both the + and - axis start switches are ON or starting of an axis already in operation was attempted.	Turn either the + or - axis start switch OFF.
13	No. of point designation operation axes is 4 axes or more	The No. of axes for point command operation is set to 4 axes or more.	Set the No. of point command operation axes to 3 axes or less.
30	All systems starting	Manual operation was attempted when 8 axes are operating.	Wait for the operation of other axes to stop, or terminate the operation of another axis.

## 6. Appendix

## 6.1 List of MP200 standard servo parameter settings per motor

<b>Caution</b>	Exclusive for MP200
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Motor series name			HA-FE□ series						HA-FH□-Y series						HA-ME□ series				
Rated speed			3000 (r/min)						3000 (r/min)						3000 (r/min)				
System specifications			Incremental						Absolute						Incremental				
Motor model/capacity kW			FE 053	FE 13	FE 23	FE 33	FE 43	FE 63	FH 053	FH 13	FH 23	FH 33	FH 43	FH 63	ME 053	ME 13	ME 23	ME 43	ME 73
Parameter No.	Abbr.		0.05	0.1	0.2	0.3	0.4	0.6	0.05	0.1	0.2	0.3	0.4	0.6	0.05	0.1	0.2	0.4	0.75
2201	SV001	PC1	Set according to machine specifications.																
2202	SV002	PC2	Set according to machine specifications.																
2203	SV003	PGN1	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
2204	SV004	PGN2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2205	SV005	VGN1	15	15	15	15	15	15	15	15	15	15	15	15	8	8	8	8	8
2206	SV006		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2207	SV007		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2208	SV008	VIA	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364
2209	SV009	IQA	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
2210	SV010	IDA	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
2211	SV011	IQG	256	256	512	512	768	768	256	256	512	512	768	768	256	256	512	512	512
2212	SV012	IDG	256	256	512	512	768	768	256	256	512	512	768	768	256	256	512	512	512
2213	SV013	ILMT1	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
2214	SV014	ILMT2	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
2215	SV015		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2216	SV016	LMC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2217	SV017	SPEC	0000	0000	0000	0000	0000	0000	0080	0080	0080	0080	0080	0080	0000	0000	0000	0000	0000
2218	SV018	PIT	Set according to machine specifications.																
2219	SV019	RNG1	4	4	4	4	4	4	8	8	8	8	8	8	4	4	4	4	4
2220	SV020	RNG2	4	4	4	4	4	4	8	8	8	8	8	8	4	4	4	4	4
2221	SV021	OLT	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
2222	SV022	OLL	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
2223	SV023	QD1	Set according to machine specifications.																
2224	SV024	INP	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
2225	SV025	MTYP	337C	337D	337E	337F	3370	3371	227C	227D	227E	227F	2270	2271	339C	339D	339E	3390	3391
2226	SV026	OD2	Set according to machine specifications.																
2227	SV027	SSF1	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
2228 to 35	SV028 to 35		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2236	SV036	PTYP	Select the regenerative option resistor. None: 1000 MR-RB013: 1100 MR-RB033: 1200																
2237 to 48	SV037 to 48		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2249	SV049	PGN1SP	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
2250 to 64	SV050 to 64		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<b>Caution</b>	Exclusive for MP200
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Motor series name			HAC-E30/E33 series										HAC-A33 series							
Rated speed			3000 (r/min)					2000 (r/min)					3000 (r/min)			2000 (r/min)				
System specifications			Incremental										Absolute							
Motor model/capacity kW			HA 053	HA 13	HA 23N	HA 33N	HA 43N	HA 83N	HA 93N	HA 40N	HA 80N	HA 100N	HA 23N	HA 33N	HA 43N	HA 83N	HA 93N	HA 40N	HA 80N	HA 100N
Parameter No.	Abbr.		0.05	0.1	0.3	0.45	0.5	1.0	1.5	0.5	1.0	2.0	0.3	0.45	0.5	1.0	1.5	0.5	1.0	2.0
2201	SV001	PC1	Set according to machine specifications.																	
2202	SV002	PC2	Set according to machine specifications.																	
2203	SV003	PGN1	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
2204	SV004	PGN2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2205	SV005	VGN1	70	70	70	70	100	100	150	100	100	150	70	70	100	100	150	100	100	150
2206	SV006		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2207	SV007		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2208	SV008	VIA	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364
2209	SV009	IQA	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
2210	SV010	IDA	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
2211	SV011	IQG	256	256	256	256	256	256	256	512	512	256	256	256	256	256	256	512	512	256
2212	SV012	IDG	256	256	256	256	512	512	512	512	512	512	256	256	512	512	512	512	512	512
2213	SV013	ILMT1	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
2214	SV014	ILMT2	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
2215	SV015		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2216	SV016	LMC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2217	SV017	SPEC	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0080	0080	0080	0080	0080	0080	0080	0080
2218	SV018	PIT	Set according to machine specifications.																	
2219	SV019	RNG1	10	10	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
2220	SV020	RNG2	10	10	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
2221	SV021	OLT	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
2222	SV022	OLL	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
2223	SV023	OD1	Set according to machine specifications.																	
2224	SV024	INP	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
2225	SV025	MTYP	338C	338D	*XX6E	*XX6F	*XX80	*XX81	*XX8A	*XX00	*XX01	*XX02	226E	226F	2280	2281	228A	2200	2201	2202
2226	SV026	OD2	Set according to machine specifications.																	
2227	SV027	SSF1	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
2228	SV028 to 35		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2236	SV036	PTYP	Select the regenerative option resistor. None: 1000 MR-RB013: 1100 MR-RB033: 1200																	
2237	SV037 to 46		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2247	SV047		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
2248	SV048		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2249	SV049	PGN1SP	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
2250	SV050 to 64		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

\* : For the XX of "XX□□", set 00 for the E30 Series motor, and 22 for the E33 Series motor.

## 6.2 List of motion program functions

Section No.	Sub-section No.	Function	Language	Argument 1	Argument 2	Argument 3	Argument 4
Move axis	Operation axis	Operation axis command	GRP	No. 1 axis name	No. 2 axis name	No. 3 axis name	--
	Axis movement command	Positioning	MOV	No. 1 axis position	No. 2 axis position	No. 3 axis position	--
		Reference point return	ZRN	--	--	--	--
	Speed command	Parameter designated speed	SPD	Parameter No.	--	--	--
	Program stopping	Program stopping	STOP	--	--	--	--
Various control functions	Position command unit	Absolute value command	AST	--	--	--	--
		Incremental value command	IST	--	--	--	--
	Axis movement command	Circular interpolation (CW)	MCW	No. 1 axis position	No. 2 axis position	Radius	--
		Circular interpolation (CCW)	MCC	No. 1 axis position	No. 2 axis position	Radius	--
	Timer	Timer	TIM	Time	--	--	--
	Speed command	Feedrate command	SPN	Feedrate	--	--	--
		Speed reference axis designation	SPA	Axis name	Axis name	Axis name	--
		Speed reference axis designation cancel	SPC	--	--	--	--
	External signal output	Data output	OTD	Code No.	Code	--	--
		Signal output	OTS	Signal No.	--	--	--
	Point command	Positioning	PMV	Start point No.	End point No.	--	--
		Position setting	PST	Point No.	No. 1 axis position	No. 2 axis position	No.3 axis position
		Current position read-in	PRD	Point No.	--	--	--
	Skip	Skip command	SKP	Signal No.	--	Skip method	--
		Skip interrupt	SKP	Signal No.	Interrupt program	Skip method	--
		Skip command cancel	SKF	Signal No.	--	--	--
	Torque limit	Torque limit	TLM	No. 1 axis ON/OFF	No. 2 axis ON/OFF	No. 3 axis ON/OFF	--
		Torque limit skip	TSK	--	--	--	--
		Torque limit skip interrupt	TSK	Interrupt program	--	--	--
		Torque limit skip cancel	TSF	--	--	--	--
	Interrupt positioning	Interrupt positioning	IMV	Signal No.	Movement amount	--	--
	Deceleration check	Deceleration check mode	PCM	Mode	--	--	--
		Deceleration check command	PCK	--	--	--	--
Deceleration check command OFF		PCF	--	--	--	--	
Program gathering	Subprogram control	Subprogram call	CALL	Program	--	--	--
		Subroutine call	GSUB	Label	--	--	--
		Return from subprogram	RETN	--	--	--	--

Section No.	Sub-section No.	Function	Language	Argument 1	Argument 2	Argument 3	Argument 4	
Move axis simultaneously or in parallel	Simultaneous operation	Simultaneous operation	GRP:GRP	No. 1 axis position	No. 2 axis position	No. 3 axis position	--	
	Parallel operation	Start of independent operation	PARA	Mark	--	--	--	
		Top of independent operation	PTOP	Mark	--	--	--	
		End of independent operation	PEND	Mark	--	--	--	
Simultaneous start	Synchronous command	SYNC	Synchronous No.	--	--	--		
Execute operation, etc.	Pre-read command	Pre-read command	QMCR	Mode	--	--	--	
	Operation command	Variable command	#	--	--	--	--	
		Definition, replacement	=	--	--	--	--	
		Addition	+	--	--	--	--	
		Subtraction	-	--	--	--	--	
		Multiplication	*	--	--	--	--	
		Division	/	--	--	--	--	
		Remainder	MOD	--	--	--	--	
		Logical OR	OR	--	--	--	--	
		Exclusive OR	XOR	--	--	--	--	
		Logical AND	AND	--	--	--	--	
	Absolute value	ABS()	Numerical value, variable, operation expression	--	--	--		
	Function	Sine	SIN()	Numerical value, variable, operation expression	--	--	--	
		Cosine	COS()		--	--	--	
		Tangent	TAN()		--	--	--	
		Reverse tangent	ATAN()		--	--	--	
		Reverse cosine	ACOS()		--	--	--	
		Square root	SQR()		--	--	--	
		Decimal → hexadecimal conversion	BIN()		--	--	--	
		Hexadecimal → decimal conversion	BCD()		--	--	--	
		Round up	RND(), ROUND()		--	--	--	
		Discard	FIX()		--	--	--	
		Count up	FUP()		--	--	--	
		Natural logarithm	LOG()		--	--	--	
		Exponential	EXP()		--	--	--	
	Control commands	Unconditional branching	GOTO	--	--	--	--	
		Branch	IF condition expression THEN ELSE					
		Repeat	WHILE condition expression ~ WEND					
	Condition expressions	Equal	=	--	--	--	--	
		Not equal	<>, ><	--	--	--	--	
		Exceeding	>	--	--	--	--	
		Less than	<	--	--	--	--	
		Equal or more than	>=, = >	--	--	--	--	
Equal or less than		<=, = <	--	--	--	--		

## 6.3 List of command functions

Function	Command	Message	Argument 1	Argument 2	Argument 3	Argument 4	Remarks	*1	Command source		
									*2	*3	*4
Remote/ local change- over	Remote command	@RMOT	—	—	—	—		○	○	○	○
	Local command	@LOCL	—	—	—	—		○	○	○	○
Motion program operation	Operation start	@STRT	Operation No.	Program name	—	—		×	○	○	○
	Single block operation	@BLOK	Operation No.	(ON)/(OFF)	—	—		×	○	○	○
	Override	@OVRD	Operation No.	Override value	—	—		×	○	○	○
	Reset	@RSET	Operation No.	—	—	—		×	○	○	○
	Direct operation	@DRCT	Operation No.	Mode	—	—		×	○	○	○
	Direct operation command	@[Operation No. ] program command							○	○	×
Manual operation	Infinite feed mode	@FEED	—	--	—	--		×	○	○	○
	Handle feed	@HNDL	—	--	—	--		×	○	○	○
	Step feed	@STEP	—	--	—	--		×	○	○	○
	Dog-type reference point return	@ZRTN	--	--	—	--		×	○	○	○
	Manual speed selection	@MSPD	Speed No.	—	—	—		×	○	○	○
	Multiplication selection	@MPLY	Multiplication No.	—	--	—		×	○	○	○
	Axis start +	@PLUS	Axis name	Axis name	Axis name	Axis name	Up to 8 axes possible	×	○	○	○
	Axis start -	@MINS	Axis name	Axis name	Axis name	Axis name	Up to 8 axes possible	×	○	○	○
	Axis start OFF	@AXOF	Axis name	Axis name	Axis name	Axis name	Up to 8 axes possible	×	○	○	○
	Manual reset	@MRST	--	--	—	--		×	○	○	○
Other control functions	Command file execution	@EXEC	File name	Response file name	—	—		○	○	×	○
	Ladder FROM write	@LDWT	—	—	--	--		○	○	×	×
	Ladder start stop	@LDRS	Mode	—	—	—		○	○	×	×
	Initialization mode	@STUP	—	--	—	--		○	○	○	○
	Reference position setting	@ZSET	Axis name	—	—	—		○	○	○	○
	Reference position cancel	@ZCAN	Axis name	—	—	—		○	○	○	○
	Initialization mode OFF	@STUF	--	--	—	--		○	○	○	○
	Random reference point setting	@RFST	Axis name	—	—	—		○	○	○	○
	Reference point cancel	@RCAN	Axis name	—	--	—		○	○	○	○
	Sampling start	@SAMP	—	--	—	--		○	○	○	○
	Sampling stop	@SMCN	—	--	—	--		○	○	○	○
	Current position point setting	@PNST	Point No.	—	--	—		○	○	○	○

Note) \*1: Command validity during local \*2: Communication (PC) \*3: Command file \*4: Motion program

Function	Command	Message	Argument 1	Argument 2	Argument 3	Argument 4	Remarks	*1	Command source		
									*2	*3	*4
Control state output	Remote/local state	@CSTS	—	—	—	—		○	○	○	×
	Motion program operation state	@RSTS	Operation No.	—	—	—		○	○	○	×
	Axis operation state	@XSTS	Axis name	Axis name	Axis name	Axis name	Up to 8 axes possible	○	○	○	×
	Override value read	@RDOV	Operation No.	—	—	—		○	○	○	×
	Manual speed setting read	@RDMS	—	—	—	—		○	○	○	×
	Magnification read	@RDMP	—	—	—	—		○	○	○	×
	Counter read	@RDPT	Variable name	—	—	—		○	○	○	×
	Program execution position	@SEKP	Operation No.	—	—	—		○	○	○	×
	Alarm state read	@ALRM	—	—	—	—		○	○	○	×
	Warning state read	@WRNG	—	—	—	—		○	○	○	×
	Point No. read	@PTNO	Operation No.	—	—	—		○	○	○	×
	Incremental/absolute mode read	@INCM	Operation No.	—	—	—		○	○	○	×
Axis No. read	@AXNO	Operation No.	—	—	—		○	○	○	×	
File operation	File input	@DNLD	File name	—	—	—		○			
		@FILE	—	—	—	—		○			
		data						○			
		@EOF	—	—	—	—		○			
	File output	@UPLD	File name	—	—	—		○	○	×	×
	File delete	@DELE	File name	—	—	—		○	○	○	○
	File copy	@COPY	File name	File name	—	—		○	○	○	○
Directory information	@DIRR	Directory name	Format No.	—	—		○	○	×	×	
File information	@FILR	File name	Format No.	—	—		○	○	×	×	
Variable	Variable read	@READ	Variable class	Variable name				○	○	○	×
	Variable write	@WRIT	Variable class	Variable name	Setting data			○ *5	○	○	○
	Variable set	@DSET	Variable class	Variable name	Storage destination variable class	Storage designation variable class		○ *5	○	○	○
	Forced output	@DOUT	Variable name	Signal data	Mode	—		○	○	○	○

**Note)** \*1: Command validity during local \*2: Communication (PC) \*3: Command file \*4: Motion program \*5: (Signal ×)

## Revision History

Sub-No.	Revision date	Revision details
*	August 1995	First edition

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