

mitsubishi

**General-Purpose Motion Controller
MR-P20**

Instruction Manual

Thank you for purchasing the Mitsubishi General-Purpose Motion Controller MR-P20. This manual explains the machine and handling manners. The handling of this machine is simple, but mistaken operations will cause trouble. Please read this manual before use to ensure long use of the machine. Please include this manual when shipping out the machine.

Manuals related to the Motion Controller MR-P20

In addition to this instruction manual, the following manuals have been prepared for the MR-P20. For detailed functions and specifications of the machine, please refer to the enclosed operation manual I "Functions and motion program section". When developing the built-in sequencer, please refer to the operation manual II "Built-in sequencer (PLC) programming section".

Manual Name	Contents
Motion Controller MR-P20 Instruction Manual	Installation, setup, daily maintenance and simple operations of the unit.
Motion Controller MR-P20 Operation Manual I "Functions and motion program section"	Detailed explanations of the above, standard functions and motion program.
Motion Controller MR-P20 Operation Manual II "Built-in sequencer (PLC) programming section"	For development of the built-in sequencer (PLC).
Serial Transmission Module MR-P20 Instruction Manual	Handling and operation of the MR-P20SIO
Handy Programming Unit MR-P20PRU Instruction Manual	Handling and operation of the MR-P20PRU

Cautions for application of this manual

This manual corresponds to versions following the MR-P20 Software Version B0 (produced after April 1991).

When using software earlier than the version A□,

1. The MR-P20SIO and MR-P20PRU cannot be used.
2. Some functions such as the tool offset, torque limitation, synchronous (heavy weight) operation are not included.
3. The system start-up methods may differ.

Please use the instruction manual that is included in the unit you have purchased. Confirmation of the software version can be carried out on the CRT alarm screen (second page on the alarm screen in the MR-P20CRT). (MAIN)

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Inspection when Unpacking

1. Inspection when Unpacking

Confirm that the products are those that were ordered.

(1) Inspect the name plate and confirm that the model name is that was ordered.

(2) Confirm whether there were any damages to the unit during transportation.

If there are any unclear points or damages during the above inspection, please contact the dealer, nearest branch of our company or our sales branch.

Table 1 List of Machine Components

Unit	Model name	Module name	Q'ty	Contents
MR-P20	MR-P20-SET	MR-P20CPU	1	CPU module
		MR-P20AVR	1	Power supply module
		MR-P20DIO	1	Machine input/output module (DI/DO)
		MR-P20BSE	1	Base module
		MR-50F(Included connector)	1	Connector for machine input (female)
		MR-50M(Included connector)	1	Connector for machine output (male)
		MR-50W(Included connector)	2	Connector case
		Base installation screws (M5x0.8x10)	4	For base installation
	EARTH BAN D	1	Earth plate D	
		MR-P20DIO (Option for increasing facilities)	1	Machine input/output module (DI/DO) (with connector for machine input/output)
	MR-P20SIO (Option for communication)	1	Serial connection module	
Peripheral device	MR-P20CRT	1	9 inch CRT operation panel, with earth plate E	
	MR-P20PRU	1	Handy programming unit	
	HD-52	1	Manual pulse generator for minute feed	
	RFH-1024-22-1M-68	1	Encoder for synchronous feed (With connector. Connector for MR-P20 side is not included.)	
	MR-P201CD	1	IC card for program saving	
S/W	MR-P20SW01	1	System software for A6GPP	
	MR-P20SW02	1	IC card for PLC development (unnecessary when using A6GPP)	
	MR-P20SWPC	1	System software for personal computer 3.5" FD	
Cable	MR-P20CNS□	1	Connection cable for MR-P20 and CRT operation panel MR-P20 CNS05 (5m) is standard.	
	MR-P20PCBL□	1	MR-P20PCBL2 (2m) is standard.	
	MR-BUS□M	1	Connection cable for MR-P20 and servo amplifier or between servo amplifiers MR-BUS5M (5m), MR-BUS0.5M (0.5m) is standard.	
	MR-SCCBL□M	1	Relay cable for HA-SC servo motor detector (for increment and absolute position) MR-SCCBL5M (5m) is standard.	
	MR-SACBL□M	1	Cable for HA-SA servo motor side increment detector MR-SACBL5M (5m) is standard.	
	MR-SZCBL□M	1	Cable for HA-SA servo motor side absolute position detector MR-SZCBL5M (5m) is standard.	
Connector	RF54	1	Connector for servo amplifier end terminal	
	MR-P20CNA11	1	Connector for manual pulse generator, synchronous encoder	

Inspection when Unpacking

Others

24V power for machine input/output interface (prepared by user)	DC24V \pm 10% The current capacity depends on the load. Refer to Section 4.4.
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Transportation

2. Transportation

Take care not to damage the unit during transportation. Do not place anything on the cover, as it will cause strain and damage.

Installation

3. Installation

3.1 Environmental Conditions

The following are the environmental conditions for the areas where the cabinets and pendants designed and manufactured by the machine maker are installed.

Strictly observe the "cabinet setting conditions" to satisfy the following conditions.

Specifications		Contents
Installation	Ambient temperature	During operation: 0 to 55°C (maximum inside panel 55°C) Note 1. Normally a radiative design of the sealed panel with an outer temperature of 40°C, and inner temperature of 50°C is made. A 5°C allowance is included. 2. Avoid installation in areas with direct sunlight, near heat-emitting units and outdoors. During storage and transportation: -20°C to 60°C.
	Humidity	Relative humidity below 90% Note. When the humidity is high, a defect in insulation and defect in parts may occur. Special de-humidification is not necessary, but avoid installation in areas that are susceptible to humidity.
	Vibration	During operation : 5.88 m/S ² During transport : 34.3 m/S ²
	Atmosphere	Avoid use in areas with high levels of dust and where there are organic and corrosive gases.
Power supply	Voltage	AC 200/220V +10% -15%
	Frequencies	50/60Hz ±1Hz
	Power consumption	Control section: MR-P20 unit 80W Extension DIO 20W MR-P20SIO 12W MR-P20CRT 60W Driving section: Will differ according to the motor used. Refer to the separate servo technical material.
	Instantaneous power failure	Under 15ms (When the power stops at over 15ms, it will be detected on the control unit side, and the power will turn OFF.)

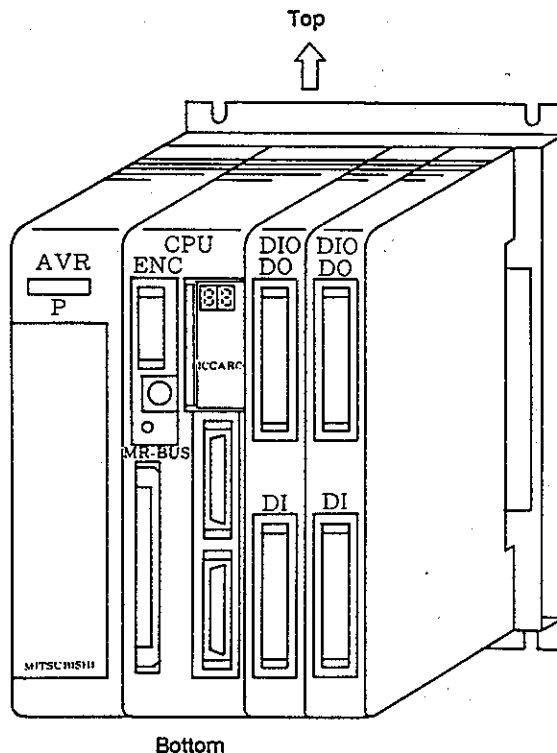
Installation

3.2 Conditions for Installation of the Cabinet

Please confirm that the cabinet and pendant boxes designed and manufactured by the user satisfy the following conditions.

3.2.1 Mounting conditions

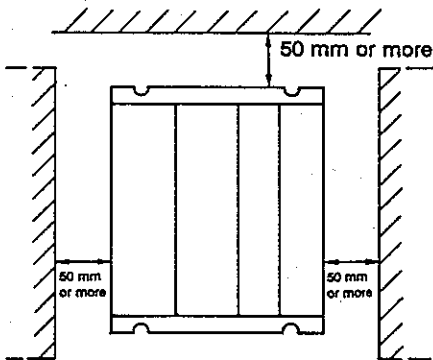
- (1) Please make sure that the cabinet and pendant boxes for the mounting of the main unit and CRT operation panel are enclosed structures.
- (2) Design the cabinet and pendant boxes so that the inner temperature rise will be under 10°C in response to the outer temperature.
Inner cabinet temperature Max. 55°C.
- (3) Accurately seal the cable insertion holes and doors. (dust prevention)
- (4) The CRT operation panel is an anti-dust type structure. However, avoid installation in areas where cutting oil and cutting dust will come in contact.
- (5) Mount the unit etc. in areas where inspections during maintenance and exchanges will be easy.
- (6) Caution that the CRT display on the CRT operation panel may move because of magnetic influences or be damaged from dust from the high voltage parts.
- (7) Install the unit as shown in the diagram below. (strictly observe) Always install on a perpendicular wall as shown below, and do not install sideways or on a level table.



Installation

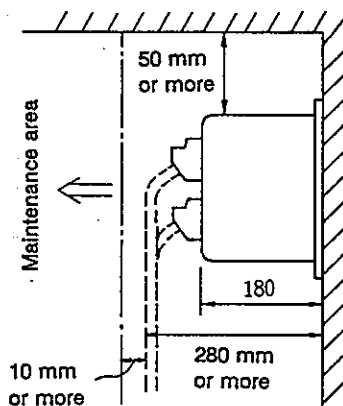
3.2.2 How to mount the MR-P20 main unit

(1) Mounting space (front)



Leave a space of more than 50 mm between the top of this unit, the left/right and cabinet walls and other machines. Space on the bottom will be needed for the treatment of the cables.

(2) Mounting space (side)



When mounting the main unit, leave the front clear of obstacles as a maintenance area. When the door is opened, the main unit can be seen.

3.2.3 Mounting procedure

(1) Mount the main unit in the cabinet after assembly

Securely install with four screws, two locations on both top and bottom.

(Four mounting screws M5 x 0.8 x 10 are included.)

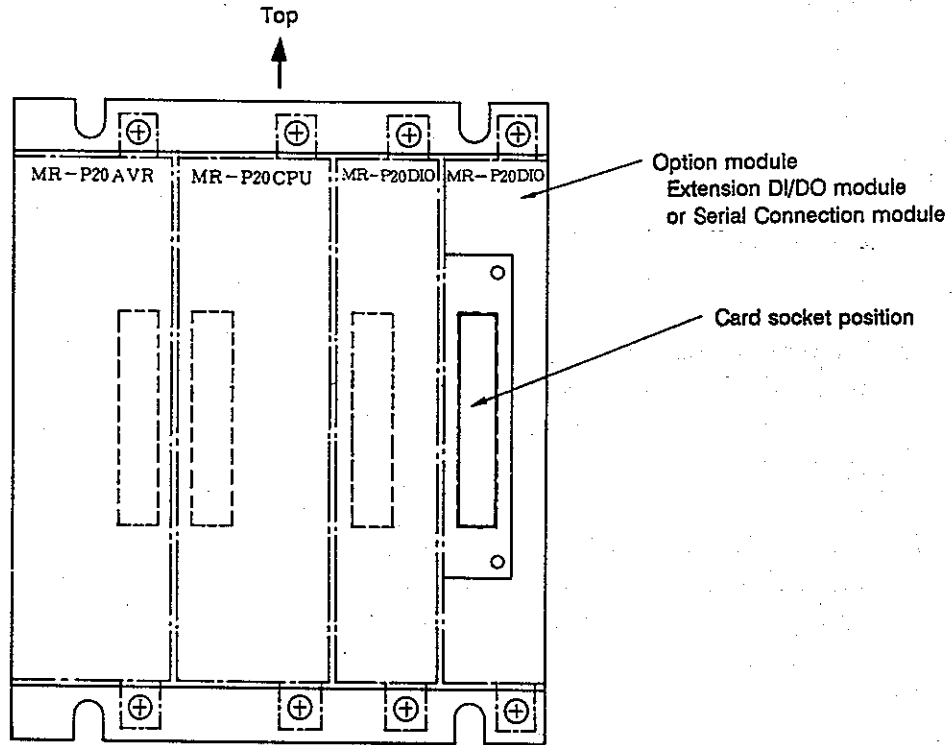
Note: When mounting the extension DI/DO module and SIO module, mount onto the base before mounting the main unit in the cabinet. (Refer to next page.)

(2) Wire the power and connect the cables.

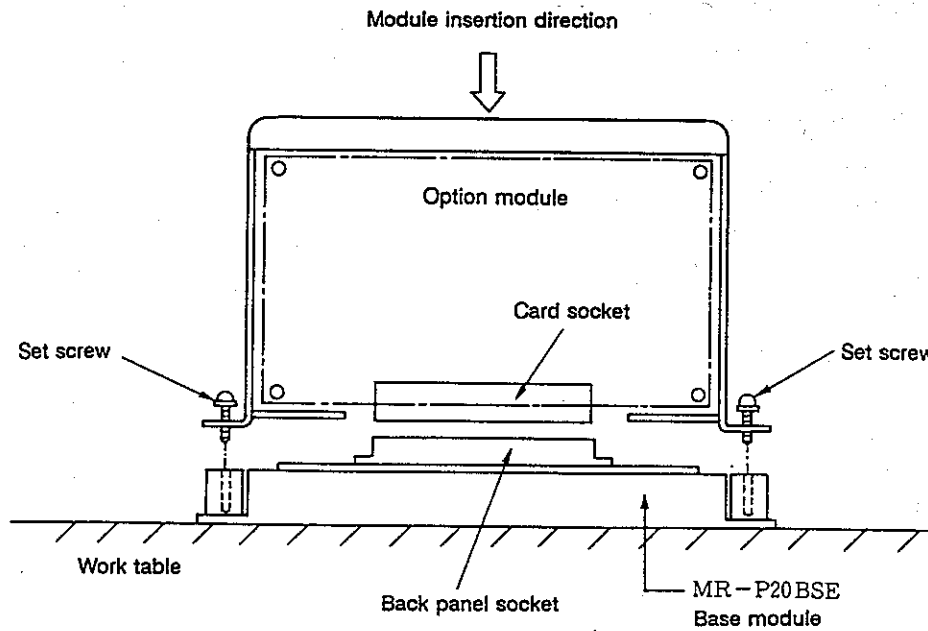
(3) Wire the grounding wire.

Installation

Outline of extension DI/DO module mounting



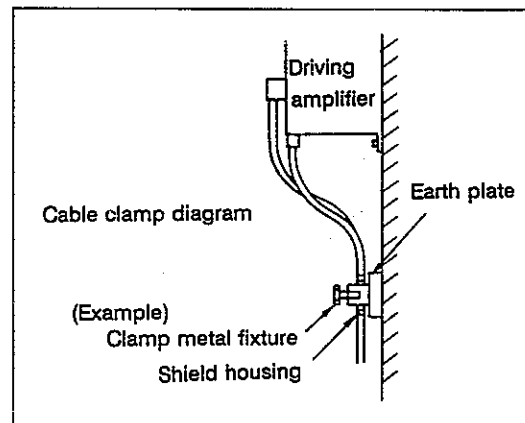
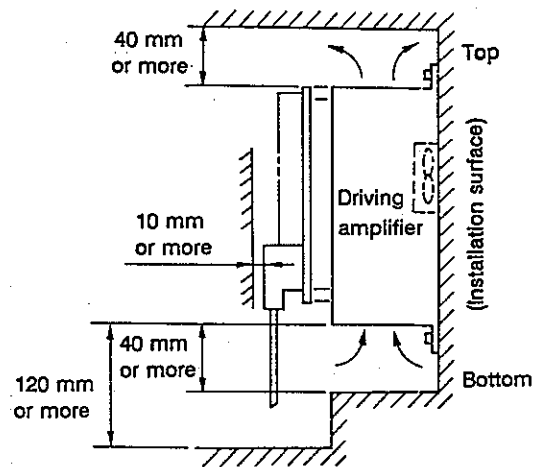
Place the MR-P20 unit on the work table, insert the option module into the right socket, and fix with two set screws on the top and bottom.



Installation

3.2.4 Points of caution during installation of drive amplifier

- (1) The drive amplifier is a wall hanging type so install it vertically and secure with screws or bolts. (Refer to diagram below.)
- (2) Install so that inspection and replacement are easy to carry out. (The space needed around the drive amplifier is shown in the outer dimension diagram.)
- (3) The drive amplifier emits some heat, so install other machines and parts with a clearance to the top, bottom and sides so that the heat will not build up. (lower diagram)
- (4) When air is being circulated inside the cabinet, make sure that it does not blow directly on the drive amplifier. (dirt prevention)
- (5) There regeneration option emits heat. ^(Note) When it is used often, it will become very hot, so do not install it directly onto walls that are weak against heat. In models that use more than two resistors side by side, leave a clearance between each when installing. (over 70 mm as a standard)
- (6) Clamp the bus joint cable (disregard AMP-AMP cables under 1 m) that is pulled into the drive amplifier as shown on the right diagram.



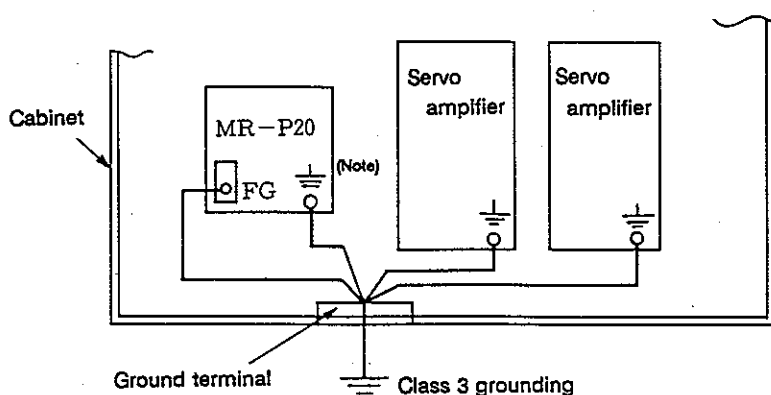
Also clamp the detector cable and detector cable pulled into the detector I/F box when possible. This clamp not only supports the cable but also acts as a cable shield. It is a very important item in the safe operation of the systems such as prevention of mistaken operations caused by noise. Please carry this out.

Note: The regeneration option is a heating element (approx. 100 °C), so install on an area other than the panel when possible. Also take care so that the cables do not touch the regeneration option.

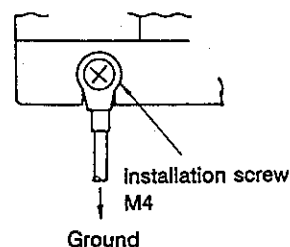
Installation

3.2.5 Grounding

Connect the MR-P20 main unit, drive amplifier to the cabinet ground terminal, and carry out the number three grounding.



Note: Use the base mounting screw for grounding the MR-P20 main unit. (either of the two lower locations)



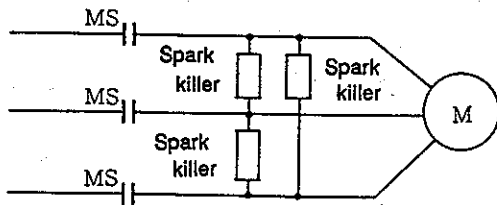
3.2.6 System signal line classification and countermeasures against noise

Group	Signal contents	Noise occurrence frequency	Operating current	Countermeasures against noise
A	AC, DC power lines: Signal lines used for AC motor, DC motor (containing servo motor), AC solenoid, DC solenoid, AC control relay, DC control relay etc.	High	High	Attach a spark killer to AC motor, AC solenoid, AC control relay and diode to DC solenoid, DC control relay. Keep the signal lines apart from signal lines in the BC group or use an electromagnetic shield.
B	Logic signals between unit and machine: Signals contained in cables CMD12 and CFD13.	Medium	Medium	Use a miniature relay for machine interface relay between units and machine. Keep the signal lines apart from signal lines in the A group or use an electromagnetic shield.
C	Signals for the servo detector and handle feed: Signals contained in cables MR-SACBL and CNA11.	Low	Low	Use a shield wire for the detector cable. Keep the signal lines apart from signal lines in the A group or use an electromagnetic shield.

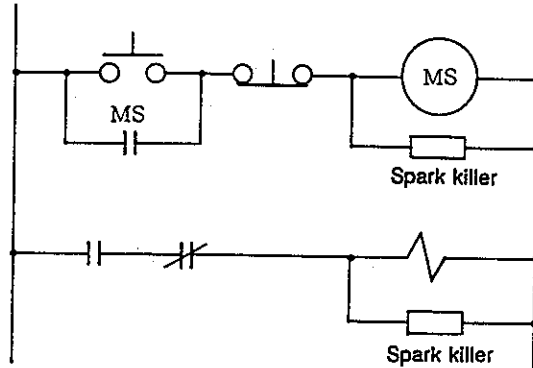
Installation

Refer to the following diagram for the spark killer used in the A group signal lines.

Spark killer use example



Spark killer use example



Use it between motor phases

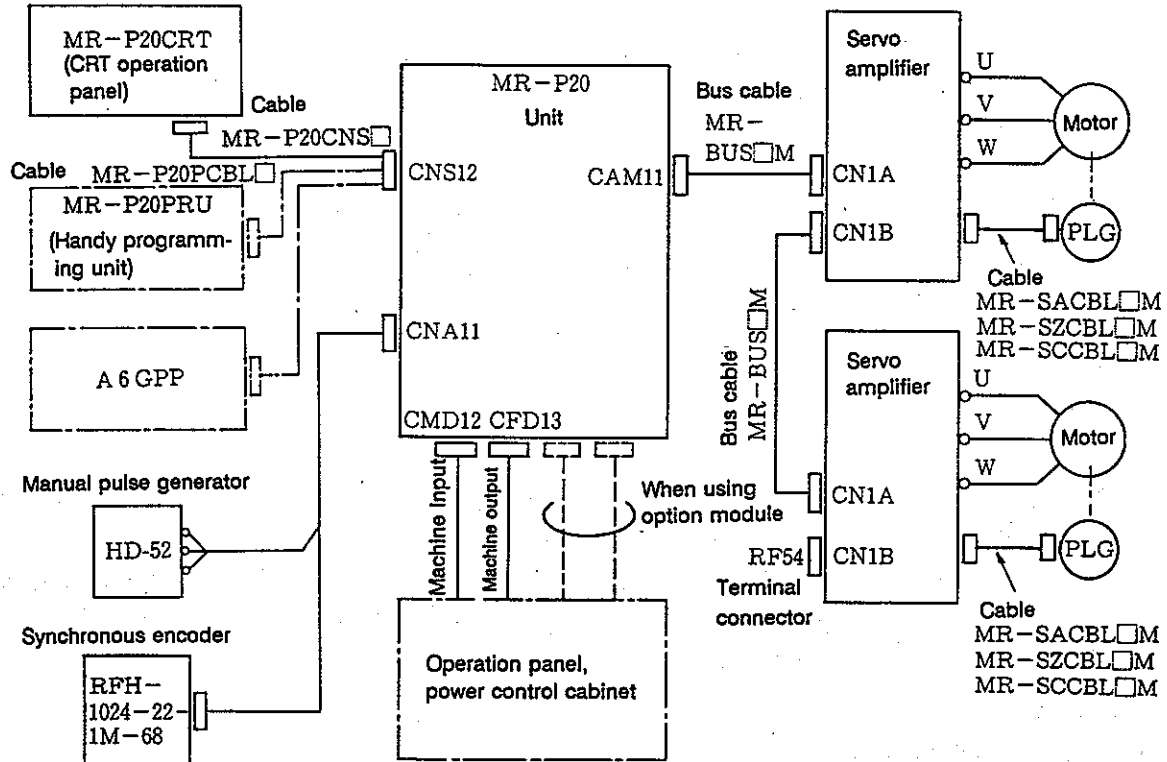
Use it in AC control circuit relay solenoid

Attach a diode to the DC control circuit relay and solenoid in parallel with the coil.
Use a miniature relay such as RD, RP (Mitsubishi), RAB (Daikyo) or MY (Tateishi) for the machine interface relay on the signal lines in group B.

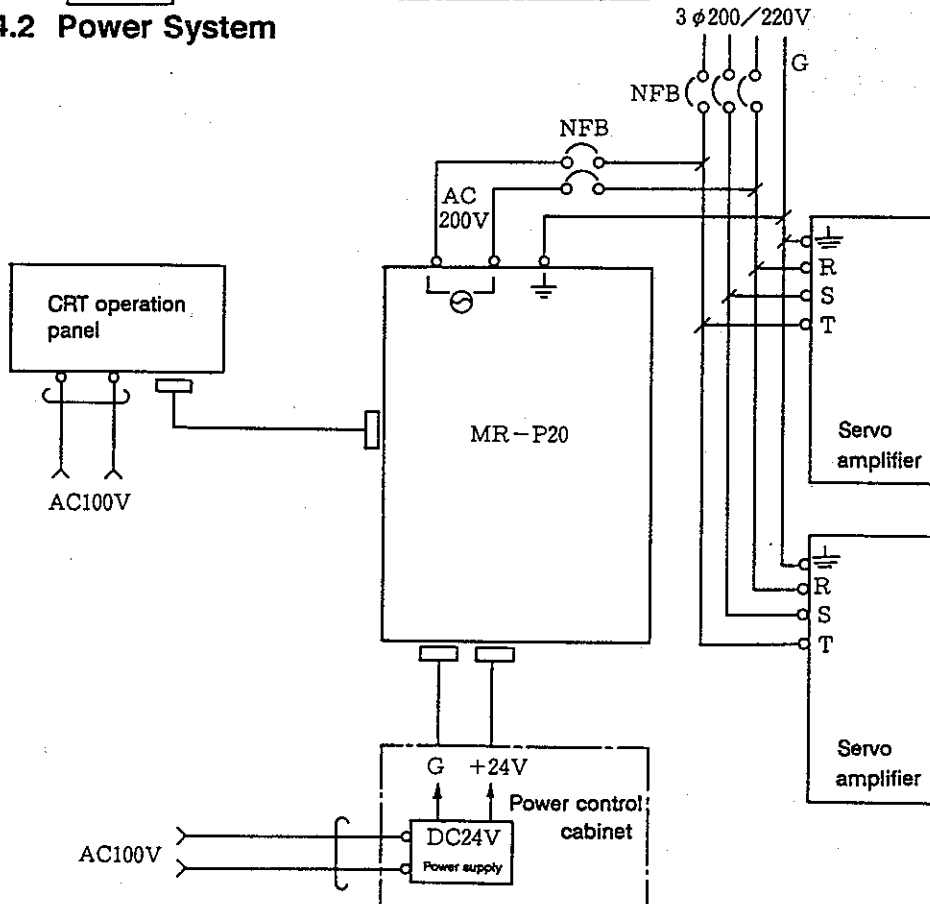
Connection between Machines

4. Connection between Machines

4.1 Cable Connection System

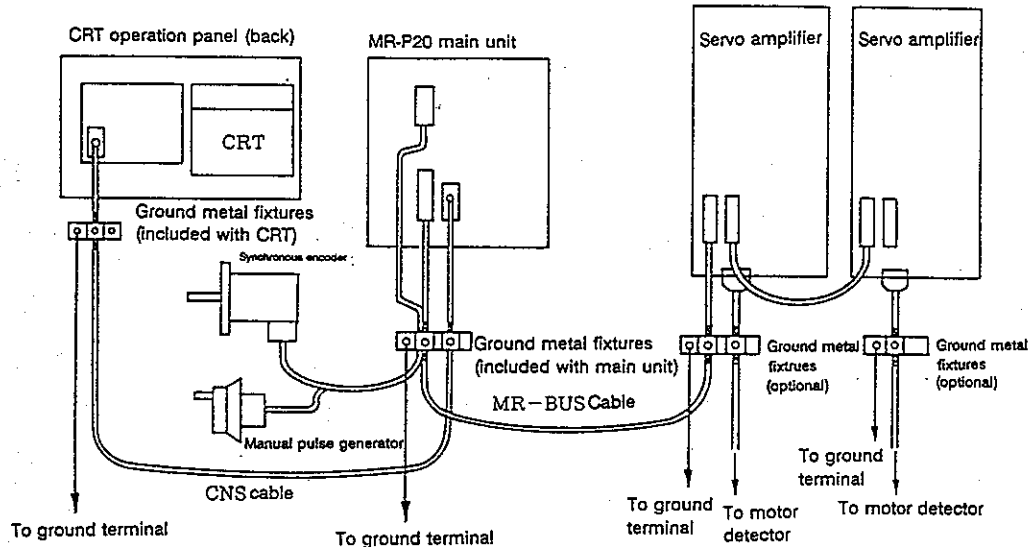


4.2 Power System



Connection between Machines

4.3 Cable Clamp and Shield Ground Treatment



The connection of the shield cable to the MR-P20 main unit and drive amplifier is clamped with the ground metal fixtures at the pull-in port of each unit.

This clamp supports the cables and treats the grounding shield, and is very important for the safe operation of the system. Please carry it out. (One clamp metal fixture is provided for each the main unit and CRT operation panel.)

Remove part of the cable covering and expose the shield housing. Push that part with the cable clamp metal fixture to the ground plate. When the cables are thin, clamp several at a time.

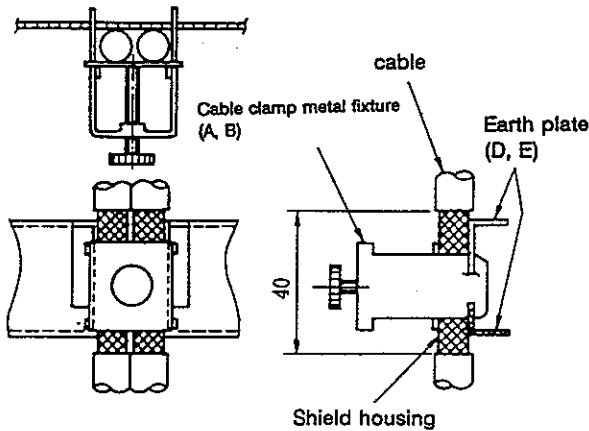


Diagram of clamp parts

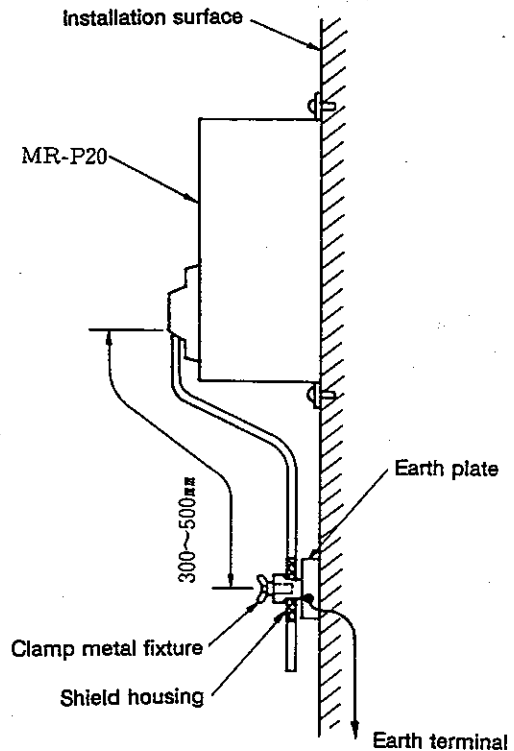


Diagram of the cable clamping

Connection between Machines

4.4 Machine Input/Output Interface

4.4.1 Power for the interface

Prepare a DC24V power supply on the outside.

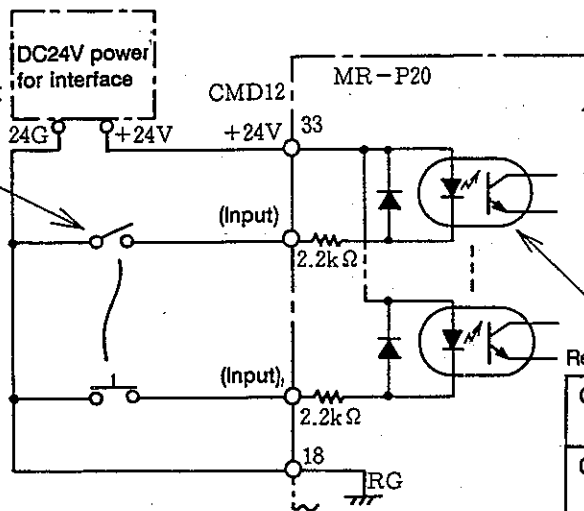
Power supply specifications for interface	Voltage	+24V \pm 10%
	Ripple	Under 10% P-P
	Current capacity	Calculate at 13 mA per one input point and 50 mA per one output point. A derating of approximately 70% is anticipated.

4.4.2 Specifications

(1) Machine input circuit

Input contact capacity

DC30V or more
16mA or more



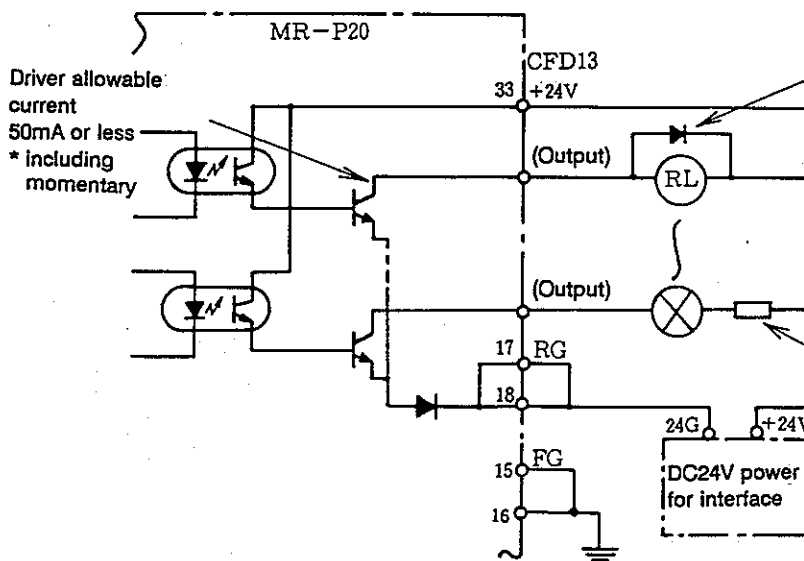
Receiver circuit specifications

Contact on	18V or more, 6mA or more
Contact off	4V or less, 2mA or less

Input signal wave form

Receiver operation delay time	$5\text{ms} \leq T_1, T_2 \leq 10\text{ms}$	
Input signal allowable chattering time	$T_3 < 3\text{ms}$	
Input signal retention time	$T_4 > 30\text{ms}$	

(2) Machine output circuit



Driver allowable current
50mA or less
* including momentary

For inductive loads such as
• relays, connect a diode (voltage resistance 100V or more, 100mA or more) in parallel with the load.
• In case a diode polarity is reversely connected, the module breaks down.

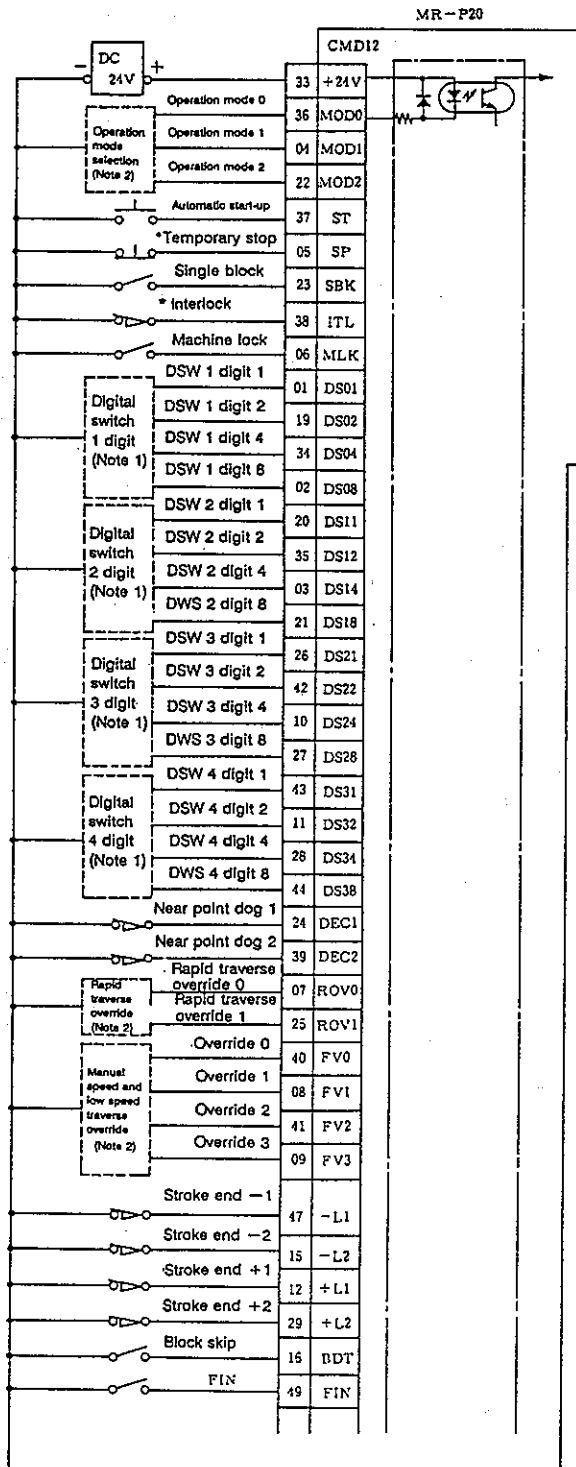
For capacitive loads such as
• lamps, connect a protection resistor (150 Ω) in a series to limit rush current.

Connection between Machines

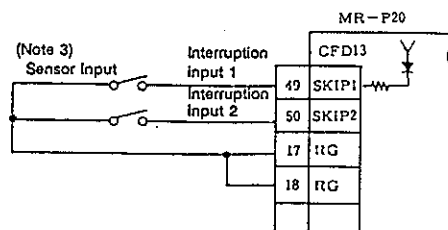
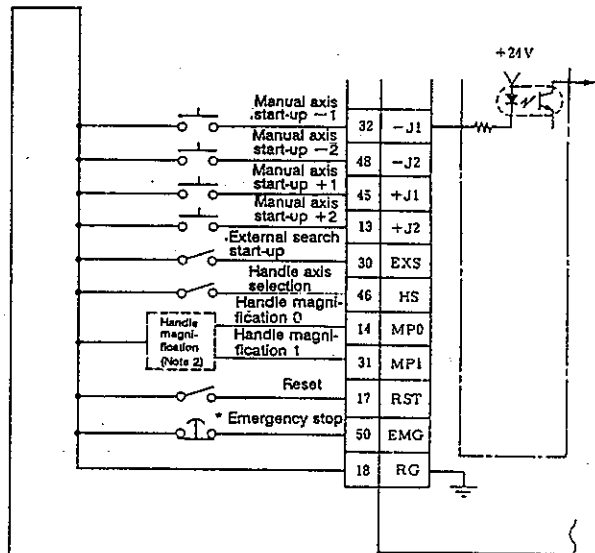
4.5 Machine Input Signals

When using the standard PLC, the following input signals have been attributed to the first DI/DO module. When the user develops the PLC, functions other than the fixed functions (EMG, $\pm L1$, $\pm L2$, DEC1, DEC2) can be attributed freely to 41 points. Please refer to the operation manual II for PLC development. Please refer to appendix 3 for standard PLC attribution for 2 axis independent control.

(1) Example of external connection



- Note 1. Digital switch input (BCD 4 digit) is signal for external search.
- 2. Please refer to the (2) Logical Chart regarding the operation mode selection, etc.
- 3. The sensor input is input from the CFD13 connector.
- 4. The signals with a * are to be used normally closed (b contact.)



Connection between Machines

(2) Input signal logical chart

1) Operation mode selection

	MOD 0	MOD 1	MOD 2
Memory	OFF	OFF	OFF
JOG	ON	OFF	OFF
Handle	OFF	ON	OFF
Step	ON	ON	OFF
Reference point return	OFF	OFF	ON

2) Rapid traverse override

	REV 0	REV 1
1%	ON	ON
25%	OFF	ON
50%	ON	OFF
100%	OFF	OFF

3) Handle feed magnification/
Step feed magnification

	MP 0	MP 1
x 1	OFF	OFF
x 10	ON	OFF
x 100	OFF	ON
x 1000	ON	ON

4) Manual speed and low traverse override

1: ON 0: OFF

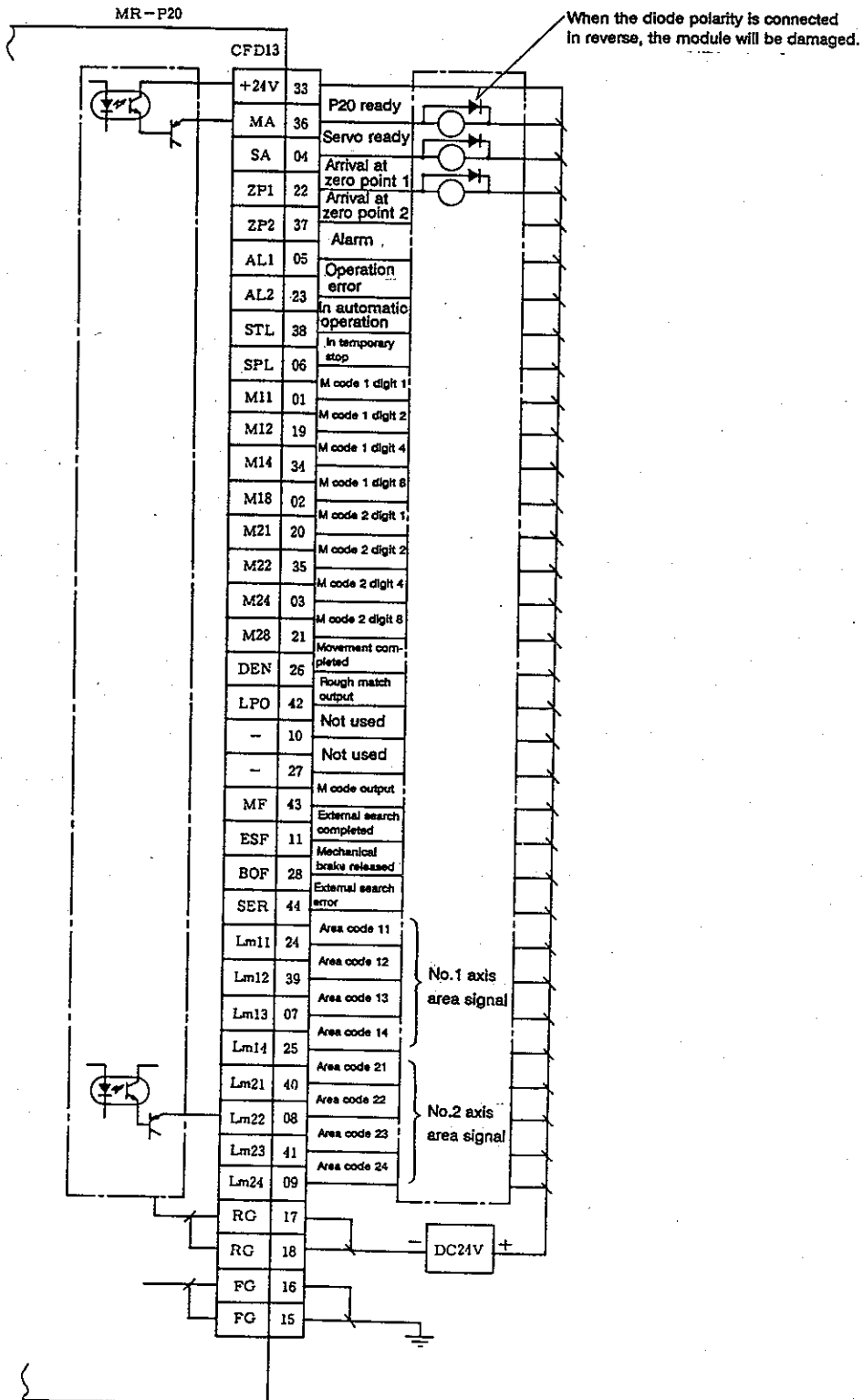
	FV 0	FV 1	FV 2	FV 3	Manual Speed	Low Traverse Override
0	1	1	1	1	0 mm/min.	0 %
1	0	1	1	1	1	10
2	1	0	1	1	3	20
3	0	0	1	1	5	30
4	1	1	0	1	10	40
5	0	1	0	1	30	50
6	1	0	0	1	50	60
7	0	0	0	1	100	70
8	1	1	1	0	300	80
9	0	1	1	0	500	90
10	1	0	1	0	1000	100
11	0	0	1	0	3000	110
12	1	1	0	0	5000	120
13	0	1	0	0	10000	130
14	1	0	0	0	30000	140
15	0	0	0	0	10000	100

Connection between Machines

4.6 Machine Output Signal

When using the standard PLC, the following output signals have been attributed to the first DI/DO module. When the user develops the PLC, functions can be attributed freely to all 31 points. Please refer to the operation manual II for PLC development. Please refer to appendix 3 for standard PLC attribution for 2 axis independent control.

External connection example



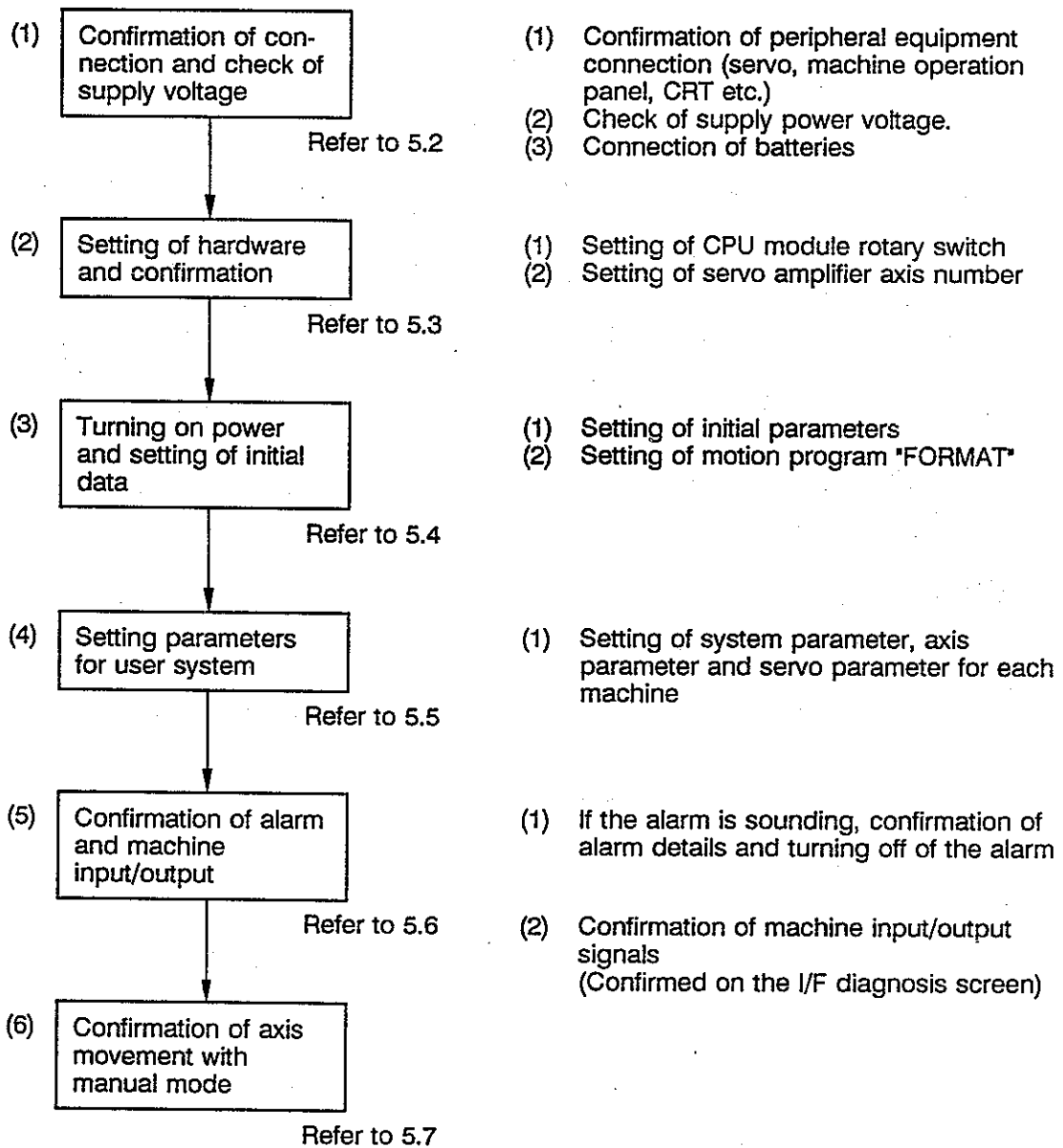
MR-P20 System Start-Up

5. MR-P20 System Start-Up

5.1 Procedure to Start-Up the System

Follow the flowchart below to start-up the system.

It is necessary to enforce and confirm the following (2) hardware setting, (3) initial data setting, and (4) parameter setting when starting up the system for the first time after installation. Refer to 5.2 for details on each operation.



The system start-up procedure explained is for use with normal machine input/output. When creating a user PLC, program the user PLC between (4) and (5). Please refer to the separate material Operation Manual II (Built-in sequencer (PLC) programming section) when creating the user PLC.

MR-P20 System Start-Up

5.2 Confirmation of Connection and Check of Power Voltage

(1) Confirmation of power supply connections

- Check the power supply wires from the MR-P20 main unit power reception terminal and servo amplifier power reception terminal. Refer to 4-2 Power supply general drawing.
- Check the operation wire between the servo amplifier and servo motor.
- Check the grounding wires and ground.

(2) Confirm the cable connections. Refer to the 4-1 Cable connection diagram.

- Check the connection of the servo bus cable between the MR-P20 unit and servo amplifier, and the servo bus cable between the servo amplifiers. Confirm that each connector is fixed with a setting screw.
- Check the terminal connector RF54 on the servo amplifier.
- Check the connection of the machine input/output CMD12 and CFD13 cables.
- Check the DC24V power for the machine input/output circuit.

(Note) When using the expansion DI/DO card, it is necessary to connect DC24V to the expansion card's CMD12 and CFD13.

- Check the cable connection of the serial connection module and sequencer, and personal computer.
- Check the connection of the 9 inch CRT operation panel or A6GPP cable (connector CNS12).
- Check the connection of the manual pulse generator and synchronous encoder cable (connector CNA11).

(3) Voltage check before turning power on

- Check the voltage on each no fuse breaker power reception side.
 - 3 ϕ 200/220V (for servo amplifier,), 1 ϕ 200/220V (for MR-P20 unit)
 - 1 ϕ 100V (for 9 inch CRT operation panel, machine interface DC24V)

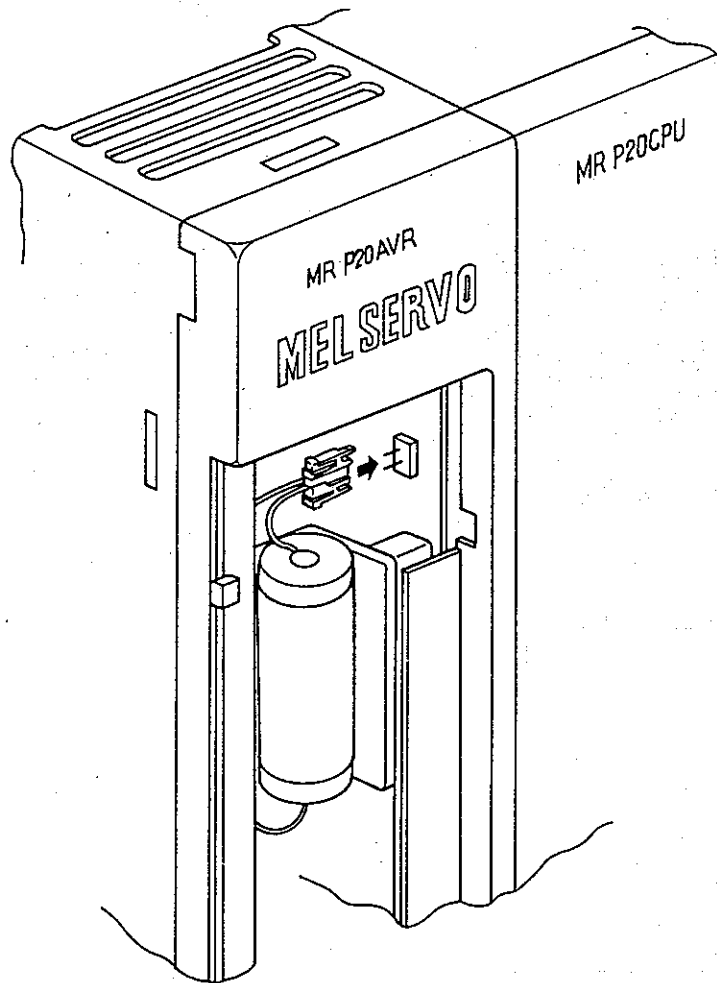
MR-P20 System Start-Up

Connection of the batteries

Batteries are used for backup of the program during power blackouts.

The battery connection wires have been disconnected when shipped from the factory to prevent corrosion during long storage periods. Plug the connection wires to the PCB before operation.

Please refer to 8.3 "Replacing the batteries" for the life of the batteries and caution points during replacement.



Important

Electronic parts that are affected by static electricity are incorporated in the PCB. Please use the handling methods below when directly handling the PCB.

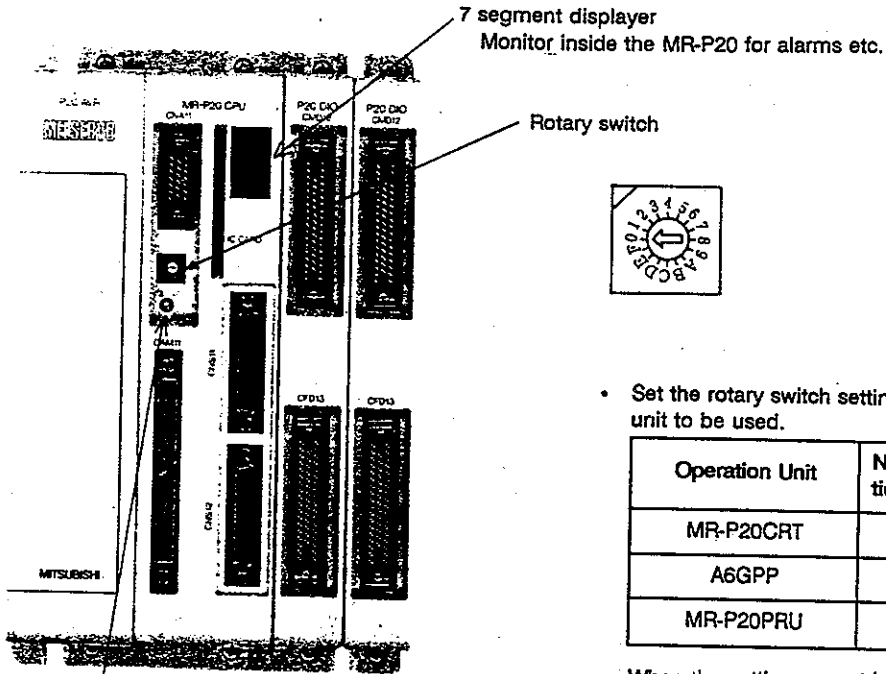
- (1) Earth the worker or work table.
- (2) Do not touch the conductor or electric parts directly.

MR-P20 System Start-Up

5.3 Setting of Hardware and Confirmation

(1) Setting the MR-P20 main unit

Set the rotary switch on the front of the unit to the type of operation unit to be used.

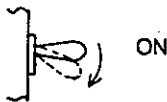


- Set the rotary switch setting to the operation unit to be used.

Operation Unit	Normal Operation Time
MR-P20CRT	0
A6GPP	1
MR-P20PRU	3

- When the setting cannot be matched, use a flat head screwdriver to change the setting.

Reset switch
Push down to ON.

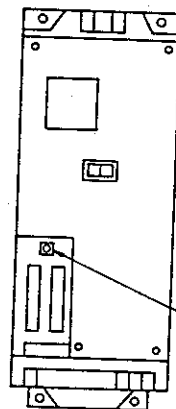
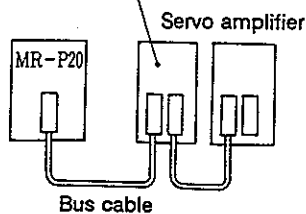


(2) Setting the servo amplifier

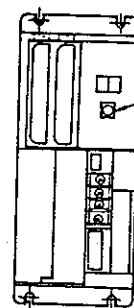
Set the axis selection switch to the "0" or "1" according to the axis number.

Axis Number	Rotary Switch Setting
No.1 axis	0
No.2 axis	1

- Note 1. Set in the same manner for 2 axis independent operation (parameter #1001 = 1)
2. It is not necessary to set the axis number to the axis number on the wire route. The one nearest the controller can be specified as the No.2 axis "1".



(a) MR-SB type amplifier



(b) MR-SD type amplifier

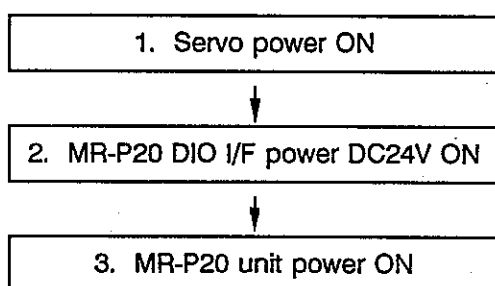
MR-P20 System Start-Up

5.4 Turning on Power and Setting of Initial Data

After confirming connection and setting the hardware, the power is turned ON. Carry out the initial setting after the power has been turned ON. When the initial setting is not carried out, editing of the program and operation cannot be carried out. (This only needs to be set once during the first start-up after the machine has been installed.)

5.4.1 Power ON

Turn ON the power reception circuit no fuse breaker, and turn on the power of each unit. Follow the procedure below to turn ON the power.



- Note
1. The power may be turned on simultaneously.
 2. When the power of the MR-P20 unit is turned ON first, the alarms for (1) amplifier not mounted and (2) DC24V error may go off. In this case, turn the power OFF and ON again or reset the unit.

1. When the power is turned ON, the MR-P20 main unit 7 segment displayer will show .
When is displayed, an alarm has gone off. Refer to 5.6 and 7.3 after initial data setting to release the alarm. Until the servo parameters are set, alarms such as D101 amplifier not mounted will go off.
2. When the MR-P20CART is connected, the initial screen will display on the CRT.

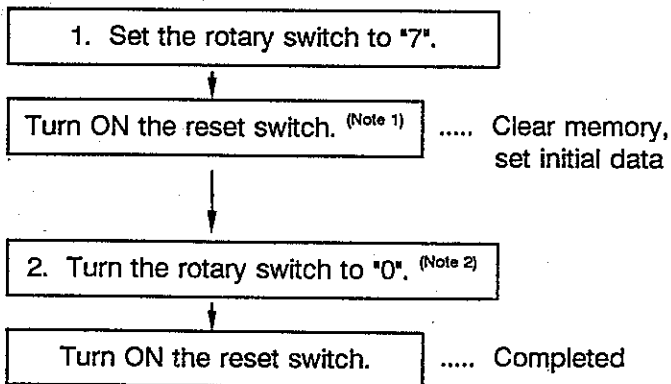
MR-P20 System Start-Up

5.4.2 Initial data setting

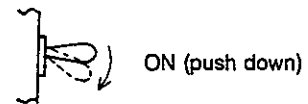
After turning on the power for the first time, the initial setting of the parameter areas in the MR-P20 and the motion area FORMAT setting is carried out.

(1) Initial data setting of the parameters

Using the following procedure, clear the parameter area once, and set the initial data in the memory.



Note 1. Turn ON the MR-P20 reset switch.



- "0" "1" "3" are used according to the type of operation unit used. Refer to 5.3 (1).
- When the initial data is set, the displayer will show .

The initial data for the parameters is shown in Chapter 9 "Parameter" chart. For starting up the system of each machine, refer to 5.5 and 9 "Parameters", and change to parameters that meet the machine and system specifications.

MR-P20 System Start-Up

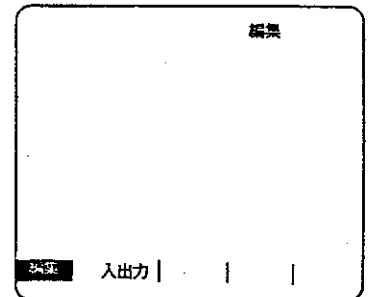
(2) *FORMAT* setting of the motion program



Always set the *FORMAT* before operation. When this operation is not carried out, editing and operation of the motion program will not be possible.

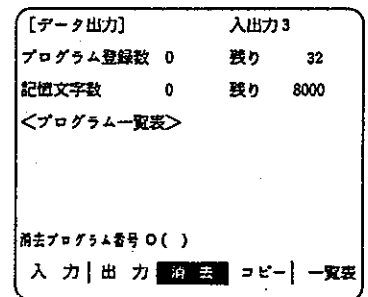
The following shows the procedure for when the CRT operation panel is used. The same procedure is used for use with the A6GPP.

[Operation]


1) Push the  function key.

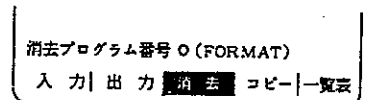


2) Push  with the menu key, and push  with the menu key.

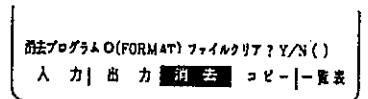


3) Erase all of the program



Set *FORMAT*
Erase program number (FORMAT) 

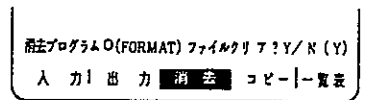


Push the  key. 

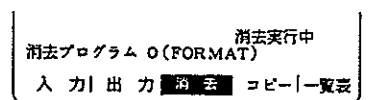


- A confirmation message 「ファイルクリア? Y/N ()」 for erasing will appear.

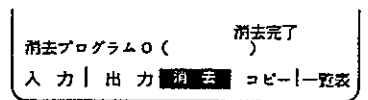
Push the  key. 



Push the  key. 



- Erasing of the program will begin, and the message *ERASING IN PROCESS* 「消去実行中」 will appear.
- When erasing has been carried out properly, the message *ERASE COMPLETE* 「消去完了」 will appear.



MR-P20 System Start-Up

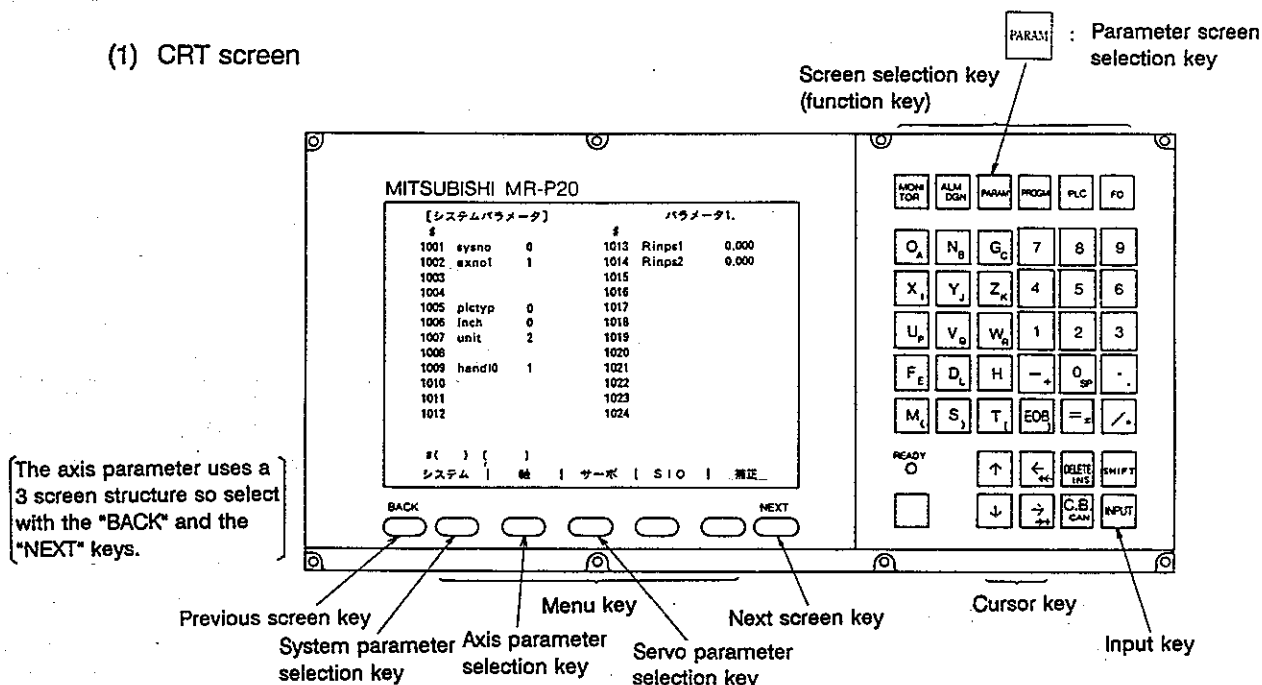
5.5 Setting Parameters for User System

It is necessary to set parameters that meet the machine and servo before operation. Set the parameters according to the specifications and confirm them.

The user parameters are set on the screen of the CRT operation panel, MR-P20 PRU, personal computer (system software MR-P20 SWPC is necessary) or A6GPP (system software MR-P20 SW01 is necessary.)

The following shows the setting procedure using the CRT operation panel.

(1) CRT screen

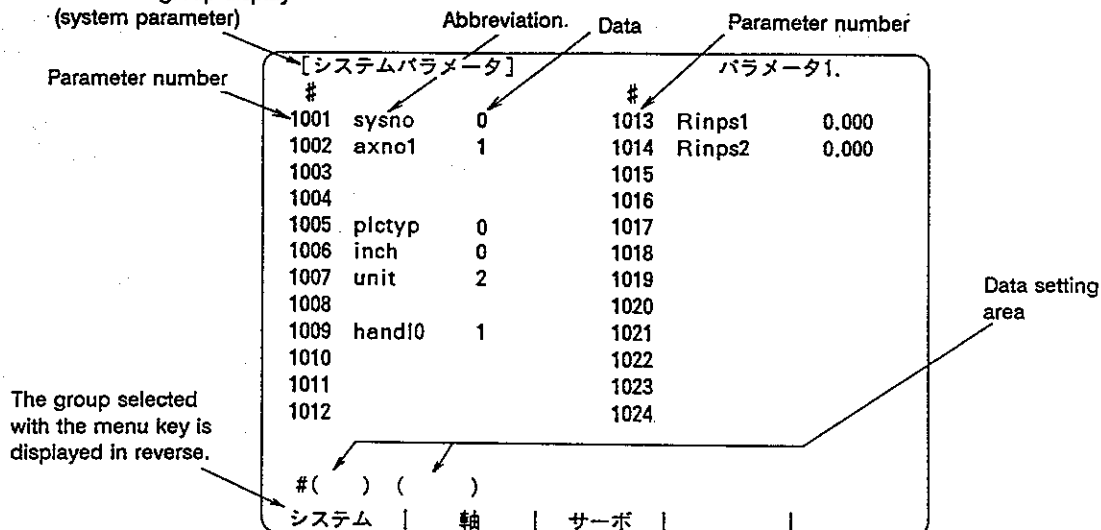


The axis parameter uses a 3 screen structure so select with the "BACK" and the "NEXT" keys.

(2) Basic operations for data setting

[Screen selection] Push the **PARAM** key to select the parameter screen.

Parameter group display (system parameter)



Input the data selection number in the # ().

Move the cursor to the right () and input the new data.

When **INPUT** is pushed, the specified setting number data will be rewritten with the new data.

MR-P20 System Start-Up

IMPORTANT

When the parameter setting has been finished, turn the power OFF once.

When it is only set in the screen, some data will be invalidated. Refer to 9. "Parameters" for the valid and invalid groups.

The items mentioned below are important, and must be set according to the system. Please confirm the other items also. For details on each parameter, refer to 9. "Parameter". It is recommended that the user set values be written in the back of the book.

(1) System parameter

[Screen selection]

Push the **PARAM** key and select the parameter screen.

[Setting the system parameters]

1) #1001 sysno

Set to:

During 2 axes synchronous operation

"0" (initial value)

During 2 axes independent operation

"1"

2) #1002 axno1

For 1 axis servo "0"

For 2 axes servo "1" (initial value)

Note 1. When operation is carried out with only 1 axis connected to the servo, set the sysno = 0, and axno1 = 0. When carrying out 2 axes independent operation, it is necessary to connect both axes to the servo.

2. During 2 axes independent operation (#1001=1), #1002 will forcibly be set to "0".

3) #1005 plctyp

During user PLC development "0" (initial value)

During standard PLC operation "1" (for 2 axes synchronous control)

"2" (for 2 axes independent control)

Note 1. When the user PLC is being developed based on the standard PLC, set to "1" or "2" and turn the power OFF once and turn ON. When the standard PLC has been transferred to the memory, set to "0" again.

2. When using the PLC corresponding to the serial connection option (MR-P20SIO) refer to the MR-P20SIO instruction manual.

[システムパラメータ]					
#	#	#	#	#	#
1001	sysno	0	1013	Rinps1	0.000
1002	axno1	1	1014	Rinps2	0.000
1003			1015	PLaxis	0
1004			1016	PLsft	0
1005	plctyp	0	1017	PLEG1	1
1006	inch	0	1018	PLEG2	1
1007	unit	2	1019	PLdly	0
1008			1020	PLdir	0
1008	handl 0	0	1021	R0unit	1
1010			1022		
1011			1023		
1012			1024		
# () ()					
システム 軸 サーボ SIO 補正					

MR-P20 System Start-Up

(2) Axis parameter

(Axis parameter screen selection)

After calling up the parameter screen, call up the "AXIS PARAMETER" with the menu key. The axis parameter is structured of three screens so use the "BACK" "NEXT" keys to switch-over.

(Setting the parameters)

1) #2003 Hspeed:

Rapid traverse speed (mm/min.)
Setting range: 1 to 100000
Initial value : 100

2) #2006 tc1:

Low traverse acceleration/
deceleration speed time constant
(ms)
Setting range: 1 to 5000
Initial value : 100

3) #2007 tc2:

Rapid traverse acceleration/
deceleration speed time constant
(ms)
Setting range: 1 to 30000
Initial value : 200

4) #2013 G28rap:

Reference point return speed
(mm/min.)
Setting range: 1 to 100000
Initial value : 1000

5) #2022 axcont:

Axis control flag
(HEX setting)

0 0 0 0

Zero point
return direction

Plus ⊕ direction from
near point dog "0".
Minus ⊖ direction from
near point dog "4".

Motor rotation
direction

	Motor rotation direction during ⊕ command	
	CW	CCW
Linear axis	0	2
Rotation axis	1	3

(Note) Refer to Chapter 9 for 3rd, 4th digit setting.

6) #2023 EG1:

Electronic gear numerator

7) #2024 EG2:

Electronic gear denominator
Setting range: 1 to 32767
Initial value : 1

Note: Set EG1 and EG2 in accordance to the machine specifications.
Refer to 9. "Parameter".

[軸パラメータ]			
#		X	Y
2001	axname	X	Y
2002		0	0
2003	Hspeed	1000	1000
2004			
2005	smgtyp	0	0
2006	tc1	100	100
2007	tc2	200	200
2008			
2009	bklash	0	0
2010	noimt	1	1
2011	slmt-	0	0
2012	slmt+	0	0
# () () ()			
システム	軸	サーボ	補正

NEXT

BACK

[軸パラメータ]			
#		<X>	<Y>
2013	G28rap	1000	1000
2014	G28crp	100	100
2015	G28sft	0	0
2016	dogext	0	0
2017			
2018			
2019	zpos1	0.000	0.000
2020	zpos2	0.000	0.000
2021		0	0
2022	axcont	0000	0000
2023	EG1	1	1
2024	EG2	1	1
# () () ()			
システム	軸	サーボ	補正

NEXT

BACK

[軸パラメータ]			
#		<X>	<Y>
2025	ctmax	0.000	0.000
2026	abslmt	0.000	0.000
2027	tc3	200	200
2028	tc4	200	200
2029	lmt1-	0.000	0.000
2030	lmt1+	0.000	0.000
2031	lmt2-	0.000	0.000
2032	lmt2+	0.000	0.000
2033	lmt3-	0.000	0.000
2034	lmt3+	0.000	0.000
2035	lmt4-	0.000	0.000
2036	lmt4+	0.000	0.000
# () () ()			
システム	軸	サーボ	補正

MR-P20 System Start-Up

(3) Servo parameter

(Servo parameter screen selection)

After calling up the parameter screen, call up the "SERVO PARAMETER" with the menu key.

(Setting the parameters)

1) #3001 STY:

Set according to the specifications of the servo in use. (HEX setting)

0 0 0 0

Detector

During use of increment detector "0"

During use of absolute position detector "1"

Regeneration option

None "0"

MR-RB30 "1"

MR-RB50, MR-RB51 "2"

MR-RB100, MR-RB101 "3"

MR-RB082 "4"

MR-RB32 "5"

2) #3002 MSR:

Set according to the type of servo motor in use.

HA-SA standard series "0"

HA-SA low inertia series "1"

HA-SA Flat series "2"

HA-SC series "3"

3) #3003 MTY:

Set according to the rates of the servo motor in use.

(Example)

When using HA-SA 152B

Rate display (rated output, rotation speed)

Set at "152".

4) #3004 ENC:

Set according to the type of detector in use.

Increment detector	3000 p/rev	"0"	} Corresponds to HA-SA series
Absolute position detector	3000 p/rev	"1"	

Increment detector	2000 p/rev	"2"	} Corresponds to HA-SC series
Absolute position detector	4096 p/rev	"3"	

[サーボパラメータ]			
#		<X>	<Y>
3001	STY	0000	0000
3002	MSR	0	0
3003	MTY	0	0
3004	ENC	0	0
3005	INP	100	100
3006	PGU	25	25
3007	VGN	100	100
3008	VIC	20	20
3009	TLP	300	300
3010	TLN	300	300
3011		0000	0000
3012		0000	0000
# () () ()			
システム 軸 サーボ S I O 補正			

MR-P20 System Start-Up

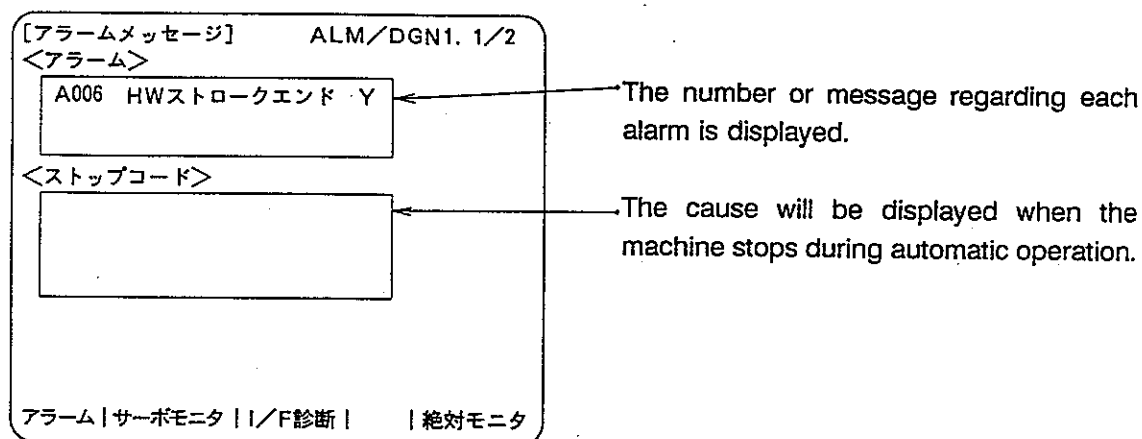
5.6 Confirmation of Alarm and Machine Input/Output Signal

5.6.1 Confirmation and release of alarm

When starting up the MR-P20, the system will start properly if the parameters are set according to the user system as stated in the previous section.

When an alarm sounds in this state, either the parameter setting was mistaken, the user specifications were not followed, or there is a miss in the connections. Confirm the details of each alarm, process each and release the alarm.

Please refer to 7.3 "Alarm Code Chart" for alarm details.



When each alarm is released, the alarm messages on the alarm diagnosis screen will disappear, and the machine will enter the operation possible state (operation ready).

5.6.2 Confirmation of machine input/output signals

Turn ON the emergency stop button for safety, and confirm the MR-P20 in the emergency stop state.

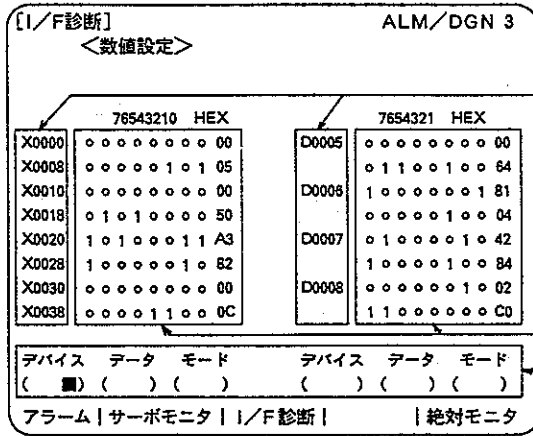
(1) Confirmation of the machine operation input signals

Confirm that the signals from each operation switch on the operation panel are being input into the MR-P20.

MR-P20 System Start-Up

(2) Check with the CRT diagnosis screen

Push the  button on the CRT, and select the I/F diagnosis screen on the menu.

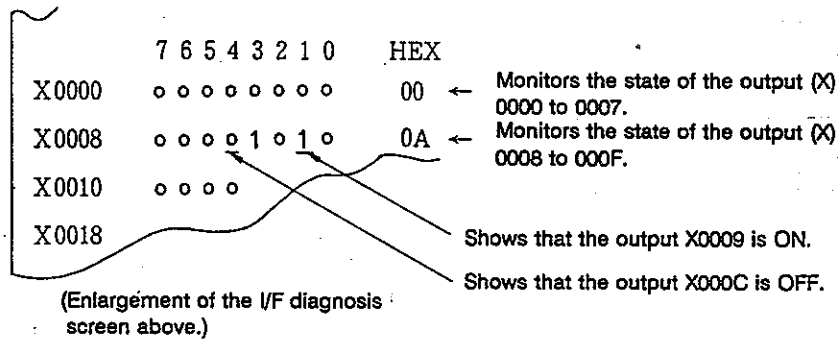


The device number is displayed.

The device data is displayed. The data is displayed with the bit display and a hexadecimal display (HEX).

The data is set.

With the I/F diagnosis screen above, the ON/OFF state of the machine input/output signals can be monitored.



When using the standard PLC, the bit row in the input I/F diagnosis screen is as shown below, so please confirm with ON = 1, and OFF = 0.

	7	6	5	4	3	2	1	0
X 0	Machine lock 6	* Interlock 38	Single block 23	* Temporary stop 5	Automatic start-up 37	Operation mode 2 22	Operation mode 1 4	Operation mode 0 36
X 8	DSW 2 8 21	DSW 2 4 3	DSW 2 2 35	DSW 2 1 20	DSW 1 8 2	DSW 1 4 34	DSW 1 2 19	DSW 1 1 1
X 10	DSW 4 8 44	DSW 4 4 28	DSW 4 2 11	DSW 4 1 43	DSW 3 8 27	DSW 3 4 10	DSW 3 2 42	DSW 3 1 26
X 18	FV 3 9	FV 2 41	FV 1 8	FV 0 40	Rapid traverse override 1 25	Rapid traverse override 0 7	Near point dog *2 39	Near point dog *1 24
X 20	*Emergency stop 50	Reset 17	M completed 49	Block skip 16	Manual axis start-up -2 48	Manual axis start-up -1 32	* Stroke end -2 15	* Stroke end -1 47
X 28	Handle magnification 1 31	Handle magnification 0 14	Handle axis selection 46	External search 30	Manual axis start-up +2 13	Manual axis start-up +1 45	* Stroke end +2 29	* Stroke end +1 12

Note: The * signals are used with the b contact.

MR-P20 System Start-Up

5.7 Start-Up of Absolute Position Detection System

(1) Before start-up

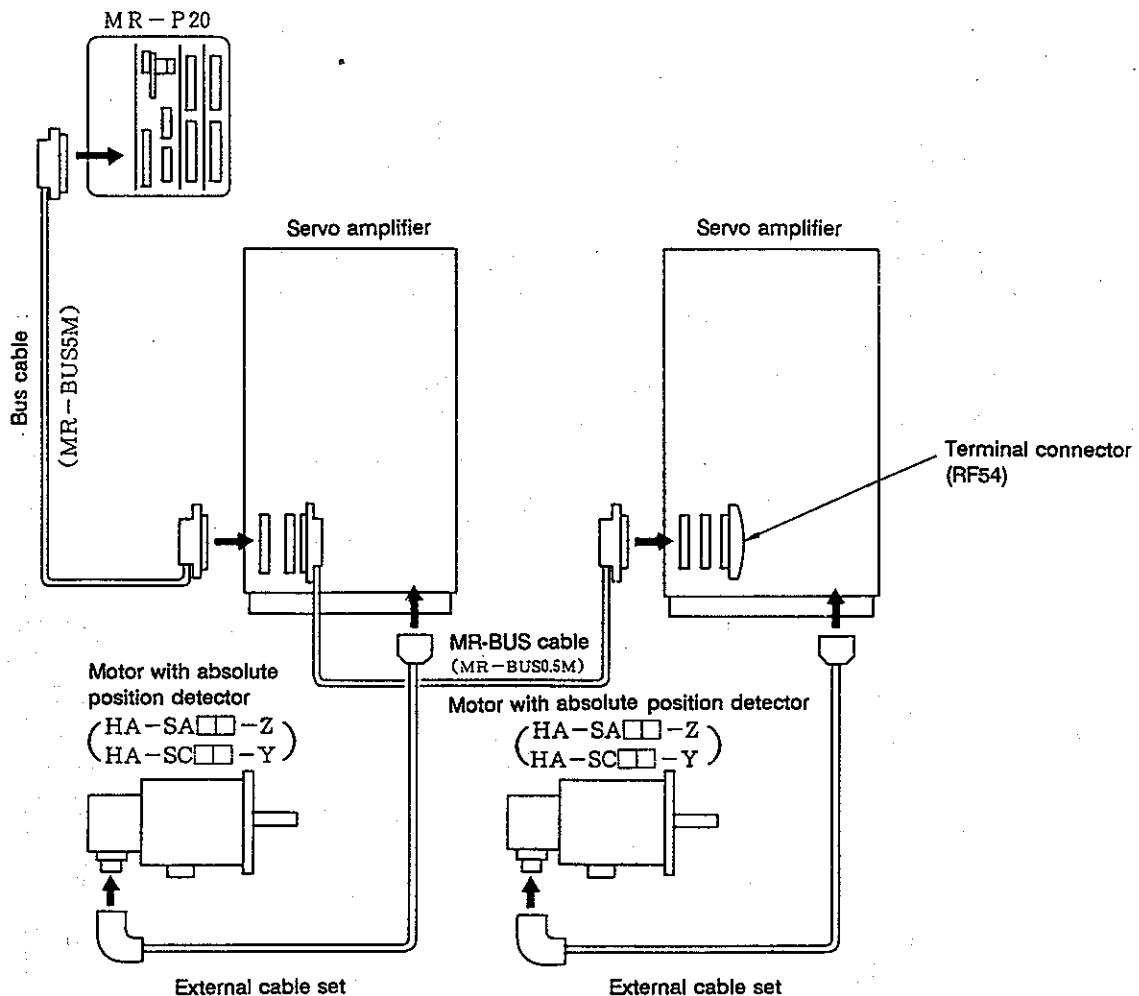
For the absolute position detection system, confirm that the servo amplifier and motor in use meet the absolute position specifications.

For the MR-SB type servo amplifier, an option card is necessary.

[Points of caution for using the absolute position detection system]

- 1) Absolute position detection of the unlimited length position cannot be done.
- 2) The valid stroke of the absolute position detection is under ± 16383 rotations from the machine zero point.
- 3) For the rotation axis, absolute position detection is possible only when the electronic gear EG2/EG1 is a double integral or the integer part is 1.
- 4) The maximum length for the detector cable is 50 m.
- 5) The operation after the zero point return is the same as the increment system.

(2) Connection



MR-P20 System Start-Up

(3) Parameter

Set the servo parameters (refer to 9.3) to the absolute position detection specifications.

#	Name	Description				
3001	STY	<p>Please set when there is an absolute position detection with regeneration (resistivity) option.</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <table border="1" style="border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px; text-align: center;"> </td> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px; text-align: center;">1</td> </tr> </table> </div> <div> <ul style="list-style-type: none"> { 0: Increment system { 1: Absolute position detection system <ul style="list-style-type: none"> { 0: Regeneration option None { 1: Regeneration option MR-RB30 { 2: Regeneration option MR-RB50, MR-RB51 { 3: Regeneration option MR-RB100, MR-RB101 { 4: Regeneration option MR-RB082 { 5: Regeneration option MR-RB32 </div> </div> <p>(Note) The increment system can be operated even when the motor with an absolute position detector is used.</p>	0		0	1
0		0	1			
3004	ENC	<p>Set the detector type.</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <table border="1" style="border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px; text-align: center;">0</td> <td style="width: 20px; text-align: center;">1</td> </tr> </table> </div> <div> <ul style="list-style-type: none"> { 0: Increment detector 3000 P/rev (HA-SA type motor) { 1: Absolute position detector 3000 P/rev (HA-SA-Z type motor) { 2: Increment detector 2000 P/rev (HA-SC type motor) { 3: Absolute position detector 4096 P/rev (HA-SC-Y type motor) </div> </div>	0	0	0	1
0	0	0	1			

Note) After setting the parameters, they will be validated when the power is reset (power OFF - ON)

(4) Servo side setting

Refer to the instruction manual enclosed with the servo in use for setting the servo side such as the setting of the option card for the absolute positioning and setting of axis No.

(5) Setting of machine zero point

When (1) to (4) are carried out, the message "C101 ABS RETURN NOT COMPLETE" will appear.

To validate the absolute positioning system, it is necessary to set the machine zero point with the following methods.

Method 1 : Dog type zero point return Recommended Method

Method 2 : Data set type zero point return

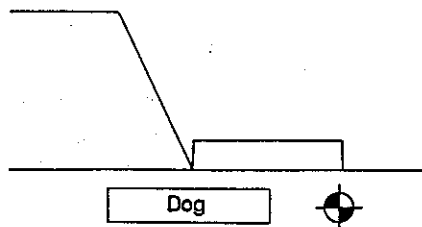
MR-P20 System Start-Up

(5-1) Dog type zero point return

There are the automatic zero point return G28 and manual zero point return in the dog type zero point return methods. Please refer to Chapter 6 "Operations" for operation procedures.

The absolute position detection system will be validated when the zero point return (zero point arrival) has been completed.

The various counters of the sensor at the zero point are displayed on the "ABSOLUTE POSITIONING MONITOR" as shown below. When the absolute position detection system is validated, the ABS COMPLETE will show "1".

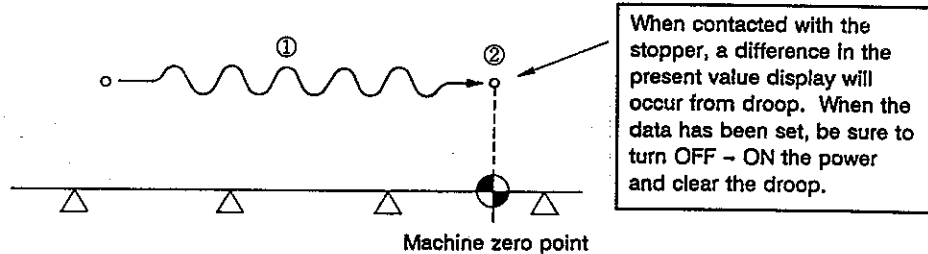


〔絶対位置モニタ〕		
	<X>	<Y>
〔原点〕		
エンコーダ	0	0
レゾルバ	30	10
回転数カウンタ	1 2 5 6	3 3 2 4
〔現在〕		
エンコーダ	0	0
レゾルバ	30	10
回転数カウンタ	1 2 5 6	3 3 2 4
ABS完了	1	0
アラーム サーボモニタ I/F診断 絶対モニタ		

(5-2) Data set type zero point return

The data set type zero point return is a method in which the machine zero point is the point set with data (signals). Follow the procedure below.

- 1) Move to the position that will be the machine zero point with the handle feed or jog feed.



Note 1. When the [PRESENT] encoder counter on the "Absolute positioning monitor screen" shows "*****" during operation 1, move the machine so that it passes through the encoder Z phase.

When operation 2 is carried out with the encoder counter in the "*****" state, operation error "A002 Z PHASE NOT PASSED" will occur.

〔絶対位置モニタ〕		
	<X>	<Y>
〔原点〕		
エンコーダ	0	0
レゾルバ	0	0
回転数カウンタ	0	0
〔現在〕		
エンコーダ	*****	*****
レゾルバ	30	10
回転数カウンタ	1 2 5 6	3 3 2 4
ABS完了	0	0
アラーム サーボモニタ I/F診断 絶対モニタ		

MR-P20 System Start-Up

- 2) When the following key operations are carried out on the "I/F diagnosis screen", the present position will become the machine zero point.

No.1 axis

Y 1 5 0 → 1 → 1 INPUT

(Y150) (1) (1)
 アラーム | サーボモニタ | I/F 診断

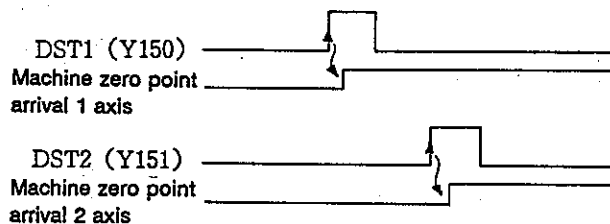
No.2 axis

Y 1 5 1 → 1 → 1 INPUT

(Y151) (1) (1)
 アラーム | サーボモニタ | I/F 診断

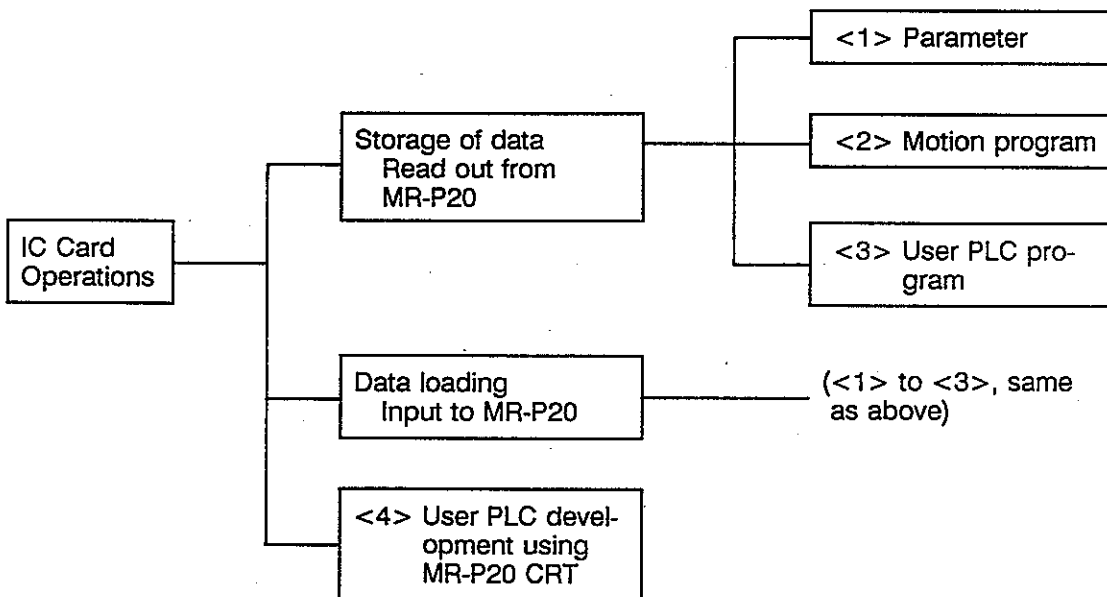
When creating the user PLC, when the following device is turned OFF - ON with the outer signals, that point will become the machine zero point.

Device	Name	Signal Name
Y150	DST1	Data set type zero point 1 axis
Y151	DST2	Data set type zero point 2 axis



5.8 Operation of the IC Card

The IC card (optional) has the following functions.
 Operate on the CRT operation panel or A6GPP.

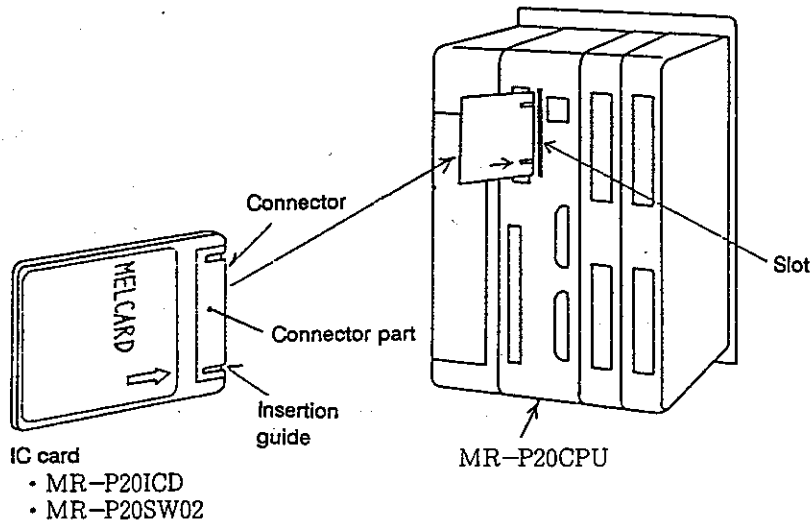


For <1> to <3>, an MR-P20 ICD is needed for each.
 Use the MR-P20SW02 for <4>.

MR-P20 System Start-Up

<Setting the IC card >

Insert into the MR-P20 unit CPU module slot with the guide to the right side in the direction of the arrows. Insert completely to the back.



<Precautions for using the IC card >

- Do not give the IC card strong shocks such as dropping, or bending.
- Do not get the IC card wet.
- Do not place the IC card in direct sunlight or near heating equipment.
- Take care so that dirt or dust does not get into the connector part.
- Do not store the IC card in hot or highly humid places.
- Always store the IC card in a plastic case during transport or storage to prevent static electricity. Do not touch the connector directly.

Operation

6. Operation

6.1 Operation Mode Selection

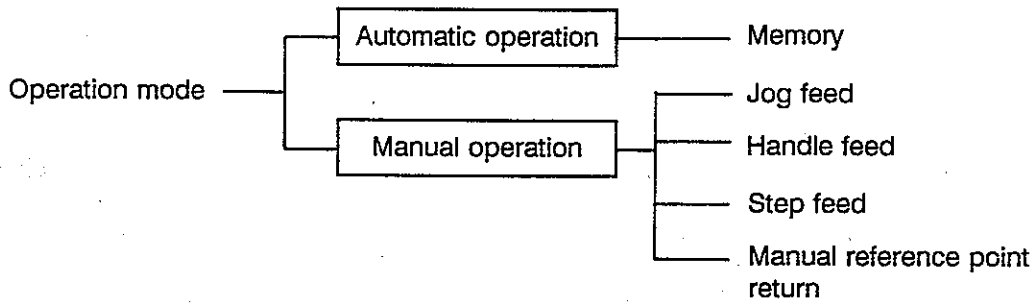
The following five operation modes can be selected in the MR-P20.

Normally select the necessary operation mode from the machine operation panel switches.

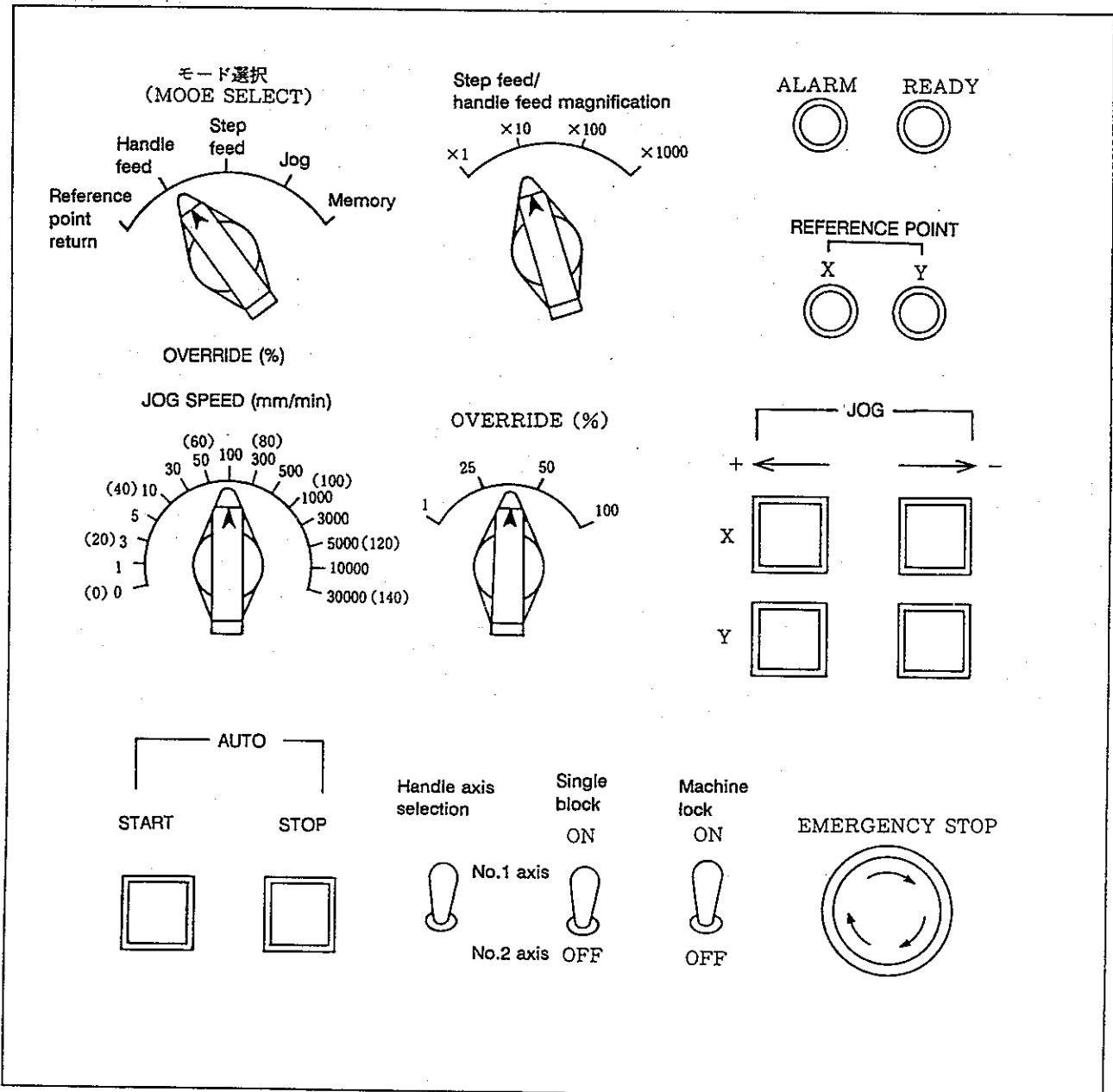
Table 6-1 Operation Mode List

Signal Name	Abbreviation	Function	Operation
Memory	MEM	The memory operation mode is selected. Automatic operation is carried out with the command program in the memory.	<ol style="list-style-type: none"> (1) When the memory mode signal (MEM) is turned ON, the memory operation mode is selected. (2) When the machine is switched over to a different mode during automatic operation, the machine will stop temporarily.
Jog feed	J	The manual continuous feed operation mode is selected. The manual continuous feed carries out operations at the speed selected in manual feed.	When the jog mode signal (J) is turned ON, the jog operation mode is selected. The axis will move while the manual axis start (+J1, +J2, -J1, -J2) signals are ON.
Handle feed	H	The manual handle operation mode is selected. Manual handle feed is carried out.	<ol style="list-style-type: none"> (1) When the handle mode signal (H) is ON, the handle operation mode is selected. (2) The axis to be moved is selected with the handle axis selection input. (3) The feed magnification is selected with the handle feed magnification signal. (4) Minute feed of the axis can be carried out by turning the manual pulse generator.
Step feed	S	The manual operation step feed mode is selected.	<ol style="list-style-type: none"> (1) The step feed mode is selected when the step mode signal (S) is turned ON. (2) When the step feed (S) is turned ON, and the manual axis start (+J1, +J2, -J1, -J2) signal for the axis to be moved is turned ON, the axis will move according to the step feed magnification set at that time.
Manual reference point return	ZRN	This selects the manual reference point return mode in which the machine returns to the set position (reference point).	Select the manual reference point return mode (ZRN) and turn the return axis manual start signal ON, and the machine will return to the reference point.

Operation



Machine operation panel (example)



Operation

6.2 Manual Mode Axis Movement Confirmation

Check the operation preparation (READY) state

Turn ON the power of the whole system. If there are no alarms, the system is in the operation preparation completed state.

Unit Name	Confirmation Item
MR-P20 main unit	The MR-P20-CPU seven segments do not display an alarm (AL).
Servo amp	Confirmation of the servo amp seven segment display. Normal : No.1 axis → d1 No.2 axis → d2
CRT operation panel or A6GPP	There are no alarm messages displayed on the CRT alarm diagnosis (ALM/DGN) screen.

6.2.1 Jog feed

(1) Operation

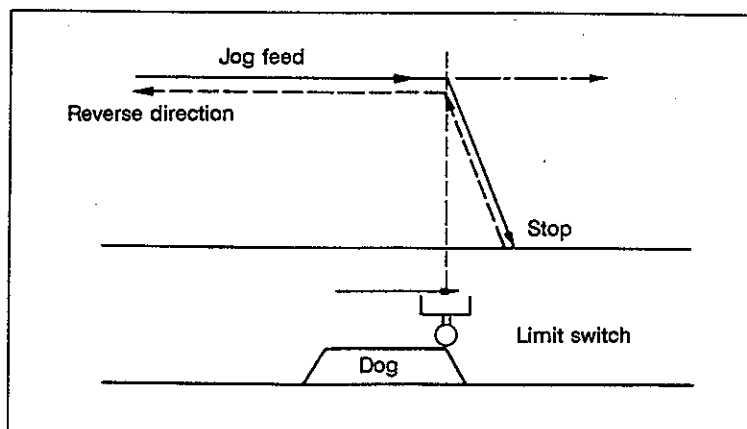
Select the manual (JOG) mode on the operation panel. Set the manual feed speed at a low speed so that it is not dangerous (under 100 mm/min.). Push each axis → JOG switch in the ⊕ direction and ⊖ direction, and confirm that the axis moves in the specified direction.

If the above operations can be carried out normally, gradually increase the speed, and confirm that the operations in the ⊕ and ⊖ directions can be carried out stably.

(2) Stroke end confirmation

When there is a stroke end limit switch installed on the ⊕ end and ⊖ end of the machine stroke, operate the stroke end limit switch in the feed direction during jog feed. Confirm that the axis feed stops.

When the axis stops at the stroke end, also confirm that it can be removed with the reverse direction jog feed order.



Confirm that the limit switches on both sides, operate accurately.

Operation

6.2.2 Step feed

This is used for moving the axis in steps with manual operations. The steps can be selected from 1 pulse, 10 pulses, 100 pulses and 1000 pulses.

Select the step feed mode. The axis will move in steps when the manual axis start signals for the desired axis and direction are turned ON.

The step amount selection is set with the step feed magnification (combined with the handle feed magnification).

Minimum setting unit, for 0.001 mm

x 1 : The axis will move 0.001 mm when the manual axis movement signal is turned ON.

x 10 : The axis will move 0.01 mm when the manual axis movement signal is turned ON.

x 100 : The axis will move 0.1 mm when the manual axis movement signal is turned ON.

x 1000 : The axis will move 1 mm when the manual axis movement signal is turned ON.

6.2.3 Manual handle feed

When the manual pulse generator is turned on the handle feed mode, minute feed of the machine can be carried out. The feed amount per measure can be selected from 1 pulse, 10 pulses, 100 pulses and 1000 pulses.

When the manual pulse generator is turned, the machine will turn in the (+) and (-) direction according to the turning direction.

The relationship of the number of pulses input from the manual pulse generator and the movement amount is as follows.

Movement amount = (handle feed magnification) x (number of pulses) [command unit]

Command unit, for 0.001 mm

x 1 : The machine will move 0.001 mm per measure.

x 10 : The machine will move 0.01 mm per measure.

x 100 : The machine will move 0.1 mm per measure.

x 1000 : The machine will move 1 mm per measure.

Acceleration/deceleration time

Selection of the application of acceleration/deceleration time is carried out with system parameter #1009.

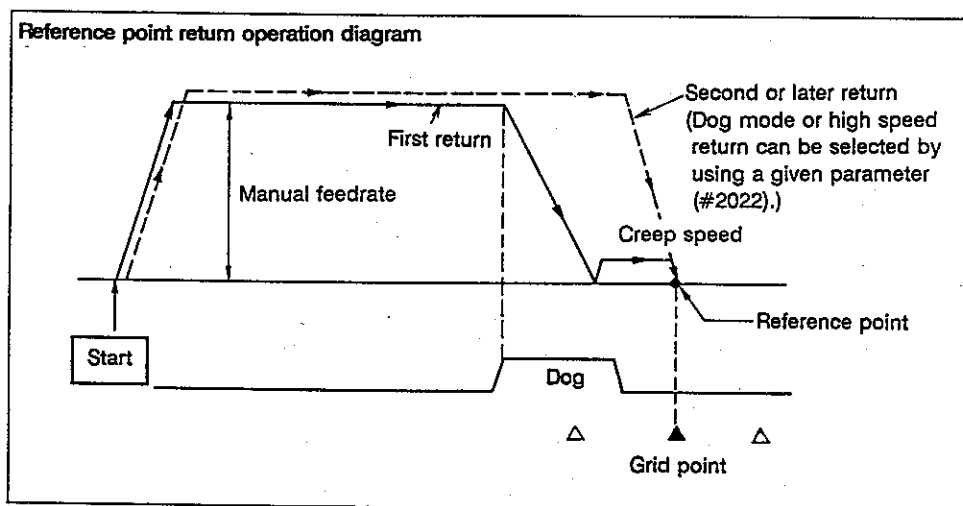
When the automatic acceleration is applied, the acceleration/deceleration time will be that which is set in axis parameter #2006.

Operation

6.2.4 Manual return to reference point

This is used to set a fixed position (reference point) for the machine with manual operations. Select the reference point return mode, and turn ON the manual axis movement signal for the axis reference point direction for returning.

- (1) At the first reference point return with the power ON the dog installed on the machine for setting the fixed position is detected and the reference point is set.
- (2) Keep the start signal ON during the movement of the reference point return, and turn OFF when the zero point is reached.
- (3) The reference point return speed is selected with the manual feed speed.



At the first reference point return with the power ON, the speed decreases when the reference point dog is detected, and moves to the grid point with creep speed (parameter setting), and stops at the first grid point after the dog has been removed.

Operation

6.3 Automatic Operation

6.3.1 Preparation function (G code)

The G code is the basic order for ordering the movement of the motion controller. The functions are as follow.

G Code	Group	Function
G00	1*	Positioning
G01	1	Linear interpolation
G02	1	Circular interpolation CW (clockwise)
G03	1	Circular interpolation CCW (counterclockwise)
G04	0	Dwell (waiting)
G09	0	Exact stop check
G28	0	Return to reference position
G30	0	Return to second reference position
G31	0	Skip
G33	0	Interruption positioning
*G43	6	Tool length offset ⊕
*G44	6	Tool length offset ⊖
*G45	0	Tool offset enlargement ⊕
*G46	0	Tool offset reduction ⊖
*G47	0	Tool offset double enlargement 2 x ⊕
*G48	0	Tool offset double reduction 2 x ⊖
*G49	6	Tool length offset cancel
G53	0	Machine coordinate system command
G90	3*	Absolute command
G91	3	Incremental command
G92	0	Machine coordinate system resetting
G94	5*	Asynchronous feed (feed per minute)
G95	5	Synchronous feed (feed per spindle revolution)

Note 1. The items with a * in the group are in the initial state (selection when power is turned ON).

2. The * items in the G code are special specifications.

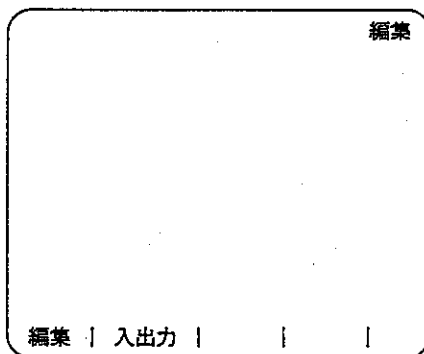
Operation

6.3.2 Creation and registration of the motion program

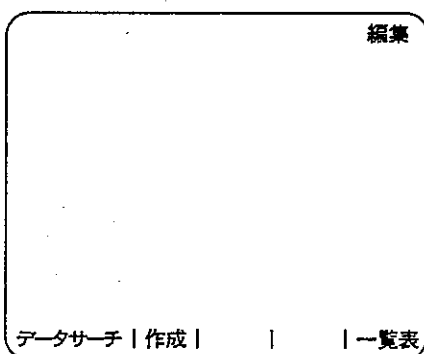
The creation of the motion program is done on the CRT operation panel for the MR-P20, MR-P20PRU or the A6GPP.

(1) Program creation on the CRT operation panel.

Push the **PROGM** function selection key on the CRT operation panel, and select the editing screen.



Press the **編集** (EDIT) menu key.

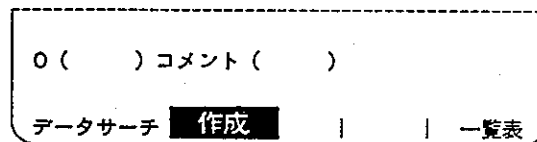


(2) Program creation operations

1.

Push the **作成** (PROGRAM) menu key.

1) The setting for 'PROGRAM' will display.

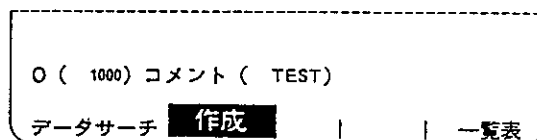


2.

Set the program number to be registered. If necessary, the comments can be set at the same time.

(Example)

○ (1000) コメント (TEST)



Note 1. Up to 32 types of numbers consisting of a maximum five digit number after O (1 to 99999) can be registered.

2. Up to 18 characters can be input in the comment.

3. The above is an example with 1000 set for the program number.

Operation

3.

Push the key.

- 1) When the program number and comment have been registered in the memory, they will appear on the top of the screen.
- 2) At this time the one character "*" will be automatically registered in the memory as data. The screen will show as on the right.

```
O 1000 TEST          編集
%

データサーチ | 作成 | | | 一覧表
```

4. Writing in the program

Follow the program list and input the program while pushing the input key.

```
O 1000
N1 G28 X0 Y0 ;
N2 G00 X-100. Y-100.;
N3 G01 X-300. F2000 ;
N4 Y-300. ;
N5 X-100. ;
N6 Y-100. ;
N7 M02 ;
```

```
O1000 TEST          編集
N1 G 28X 0 Y 0 ;N 2 G 00 X-100.Y-100.
;N 3 G 01 X-300.F 2000 ; N 4 Y-300.;N 5 X
- 100.;N 6 Y- 100.;N 7 M 02 ;□
```

- End of block. Always input the key at the end of the block.
- Always write-in at the end of the program. With the M02 process, the program will return to the top and wait for the next operation.
- Sequence number. A number of a maximum of 5 digits (1 to 99999) following N can be freely set for the block top. It is not necessary.

Push the key.

- 1) The program is written into the memory area.
- 2) The display will change lines per block.

```
O 1000 TEST          編集
□N1 G28 X0 Y0;
N2 G00 X-100.Y-100.;
N3 G01 X-300.F2000;
N4 Y-300.;
N5 X-100.;
N6 Y-100.;
N7 M02;
%
```

The above completes the program creation example for program number 1000.

Operation

6.3.3 Operation program selection

Before operation, it is necessary to select (search) the program that is to be used for operation from the programs stored in memory.

There are two methods to select (search) the program, from the CRT screen and from the machine operation panel (external search).

(1) Program search with the MR-P20CRT

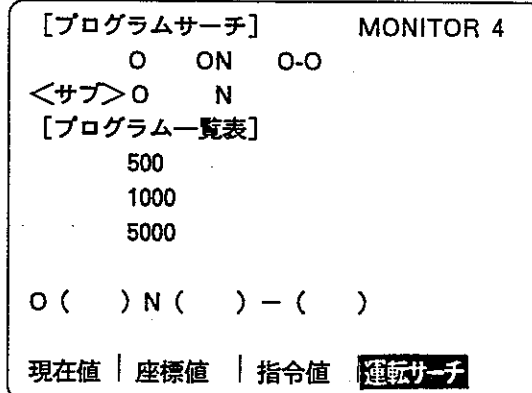
Push the **MONITOR** function key.

The monitor screen will be displayed.

Push the **運転サーチ** (SEARCH) menu key.

The operation search screen will be displayed.

In the operation search screen, it is possible to call out the program number, sequence number and block number for automatic operation from the programs registered in the memory.



The program numbers of the programs stored in the memory (register) are displayed in the "PROGRAM LIST".

(Example)
Calling out the 1000 program.

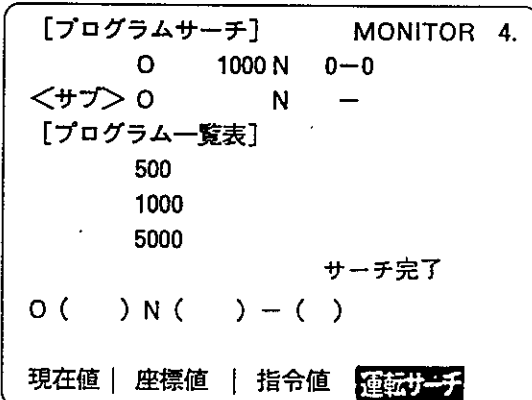
O (1000) N () - ()

O (1000) N () - ()

Push the **INPUT** key.

- 1) Search begins.
- 2) When the specified block number, sequence number, block number is found, the SEARCH COMPLETE (サーチ完了) is displayed. The number that was searched for is displayed in the 0 on the top line of the screen.
- 3) After searching, when the operations on the editing screen are followed, the state where no searching is carried out is entered, and operation cannot be done.
 1. The program searched for is not found.
Alarm "E014 program not found"
 2. The sequence searched for is not found.
Alarm "E013 sequence not found"
 3. Program in operation
Alarm "E021 program in operation". In this case, either finish the program or reset and start search again.

サーチ中
O (1000) N () - ()



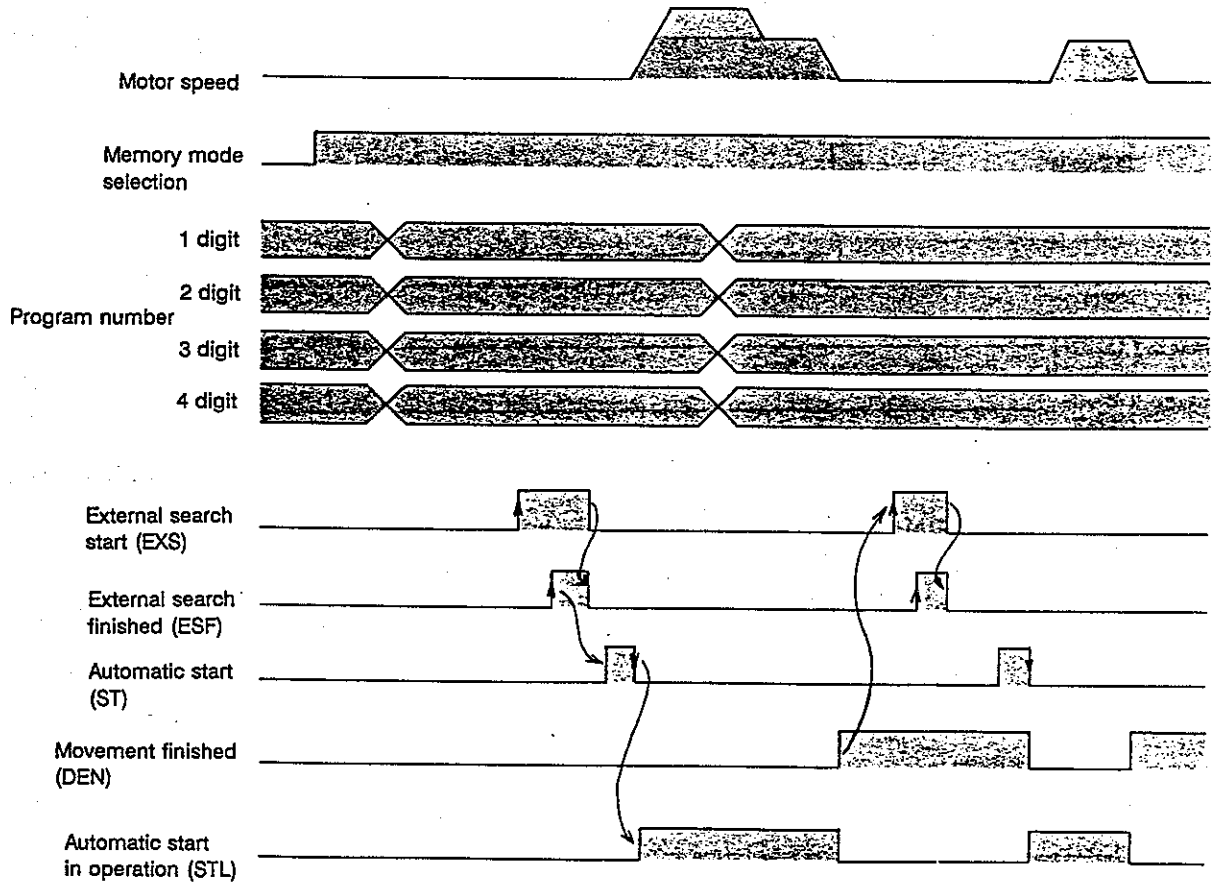
Operation

(2) External program search

In the standard PLC, the program number setting signal (BCD 4 digits) and search start signal are allotted to the machine input interface.

Refer to 4.5 and 5.6.2.

The external program search sequence is displayed below.



Operation

6.3.4 Carry out automatic operation

This explains how to carry out the program after selecting (search) the operation program.

- 1) After the operation mode, select the memory mode.
- 2) When the automatic operation and the start pushbuttons are pushed, operation will begin.

POINT

For the timing of the start-up, when the start pushbutton is turned ON, the operation will start.

- 3) Carry out continuously until the end of the program (M02 command), and the program will end when the M02 order is read-in.

POINT

When the operation program is structured of several blocks, the commands will be carried out continuously from the top block.

6.3.5 Stopping the operation

There are two methods to stop the operation during operation.

- 1) Turn OFF the temporary stop signal.
If the temporary stop signal is turned OFF during operation of the program block, the unit will slow down and stop at that point.
In this case, if the automatic start signal is turned ON again after the temporary stop signal has been turned ON again, the operation will be resumed.
- 2) Turn ON the signal block switch.
The operation will stop when the commands in the program block being carried out are finished. It is possible to stop between the blocks.
When the automatic start signal is turned ON again, the commands for the next block will start.

POINT

When the operation is started with the signal block switch ON, the operation will start after each block has ended. Single block operation can be carried out. Use it for the first operation check etc.

Operation

6.3.6 Changing feed speed

When changing the feed speed during operation.

Positioning (G00 command):

The rapid traverse speed can be changed to four steps, 100%, 50%, 25% and 1% with the rapid traverse override switch.

Low speed feed (G01 command):

The low speed feed can be changed in 10% units from 0 to 140% with the override switch.

(Note) By developing the user PLC, the rapid traverse override can be set in 1% units between 0 to 100%, and the low speed feed to 0 to 300%.

6.3.7 Carrying out only programs without movement of the axis

When the automatic start signal is turned ON with the machine lock switch ON, the program can be carried out. However, with the machine lock the feed axis command is not output, so the axis will not move.

This is used for checking operation programs using the CRT screen.

6.3.8 Interrupting operations

To interrupt during automatic operations,

- 1) Push ON the emergency stop button.

The automatic operation will immediately stop, and enter the emergency stop state. the servo amp will also enter the emergency stop state and the servo lock will be released.

To restart operation, release the emergency stop and begin after the operation ready state is entered.

POINT

When the emergency stop is released, the MR-P20 is reset, and when the operations are restarted, they will begin from the program head. In this case, move the axis to the operation start position before restarting.

- 2) Turn ON the reset switch.

When the reset switch on the CRT operation panel is turned ON, the machine will stop immediately. When reset is used, the servo amp remains in the servo lock state.

Operations can be restarted with the automatic start signal, however the programs will be restarted from the top. It is necessary to return to the start position as done with the restart of the emergency stop.

- 3) Interruption by alarm

When an alarm occurs during automatic operation, the operation will stop immediately. The operation is restarted by removing the cause of the alarm. In this case, push the reset button once and start from the top of the program.

Troubleshooting

7. Troubleshooting

(1) Electrical system

When the power is turned ON, the LED on the MR-P20 main unit, CRT operation panel and servo amp will light or the initial screen will display.

1) MR-P20 main unit

(Normal)

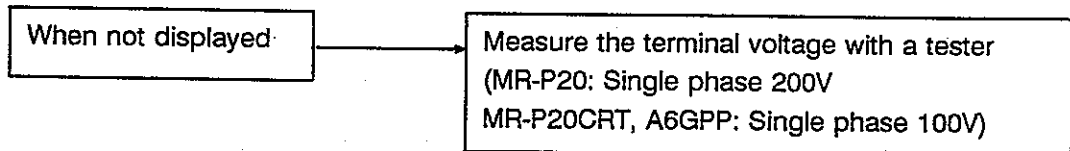


(Error)



2) CRT operation panel, A6GPP

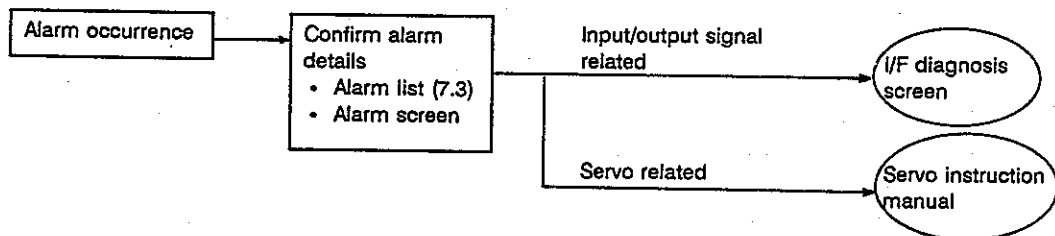
Initial screen



(2) When an alarm is occurring

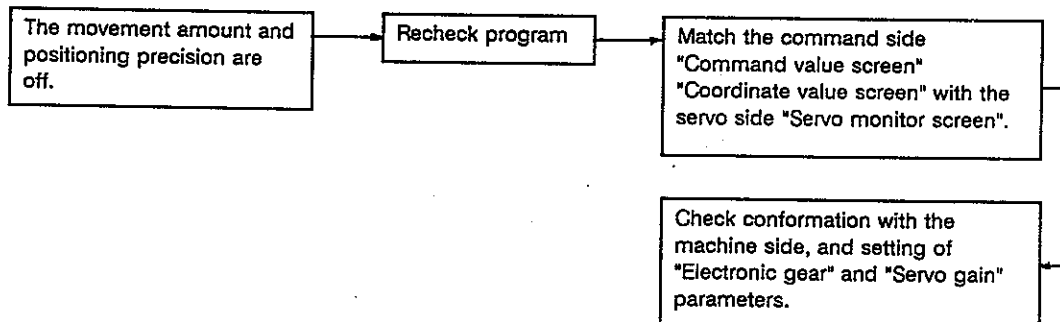
When there is an alarm going in the system or a stop command has been given, the MR-P20 will display the alarm code on the LED.

The MR-P20 and AG6PP will display the alarm code and comment, so follow the instructions to fix.



(3) Amount of movement, positioning precision

First recheck the program. A total check is necessary as the movement amount and positioning precision are related to both the servo side and machine side.



Troubleshooting

7.1 Alarm Outline

The alarms that occur on the MR-P20 and servo amp are grouped and displayed as follows.

Operation error A□□□

Errors regarding operation.

Operation stop (stop) code B□□□

Displays the cause when the machine stops during automatic operation.

Servo alarm C□□□

Alarms which occur on the servo amp side.

System alarm D□□□

Alarms regarding the system.

Operation error message E□□□

Setting operation errors on the CRT operation panel etc.

Emergency stop message F□□□

Displays the cause during emergency stop.

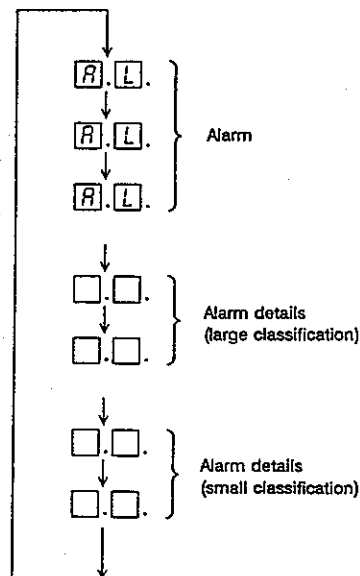
Program error P□□□

Alarm which occurs when there is a mistake in the motion program creation. Occurs during automatic operation.

7.2 Alarm Display

(1) 7 segment display (MR-P20 main unit)

The alarm codes on the MR-P20 main unit are displayed in the 7 segment (2 digit). It is possible to judge alarm details when there is no CRT operation panel.



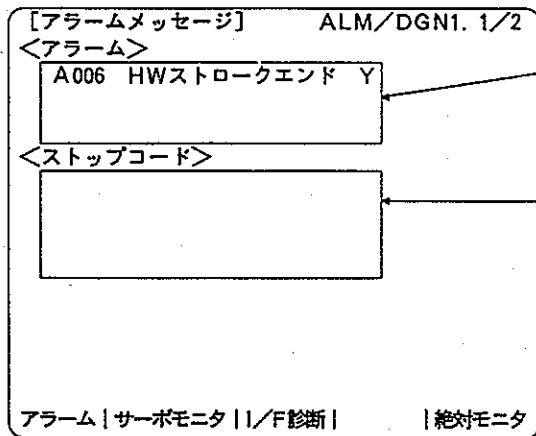
When an alarm has occurred, the alarm code will repeatedly flash on the 7 segment as shown on the left diagram.

Troubleshooting

(2) CRT screen display

When an alarm occurs, the error number and details will be displayed on the CRT operation panel or AG6PP screen. On the alarm screen, up to four types of alarms and stop codes will be displayed, so follow the screen display and release the alarm.

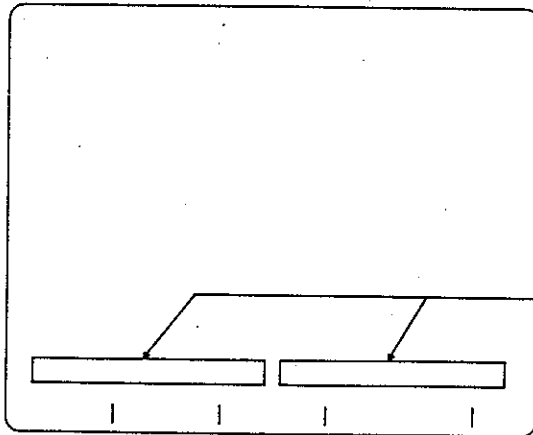
< Alarm screen >



The numbers and messages regarding each alarm will be displayed.
(Up to four types are displayed.)

The cause when the machine stops during automatic operation will be displayed.
(Up to four types are displayed.)

< Other than alarm screen >



Up to two types of error numbers and details will be displayed on the bottom of the screen.

Troubleshooting

7.3 Alarm Code List

Group	Screen Display		Details	7 segment display on MR-P20 main unit
	Error No.	Name		
Operation error	A002	Z相未通過 (軸名称) Z-axis not passed (axis name)	One of the axes did not pass the Z phase on the detector on the initial zero point return after the power was turned ON.	R0 → 02
	A003	原点復帰方向ミス (軸名称) Zero point return direction error (axis name)	When returning manually to the zero point, the direction of the return differed from the axis movement direction designated by the AXIS SELECT key.	R0 → 03
	A004	外部インタロック (軸名称) External interlock (axis name)	The interlock function has been activated (the input is OFF), and one of the axes is interlocked.	R0 → 04
	A005	内部インタロック (軸名称) Internal interlock (axis name)	Internal interlock has been activated.	R0 → 05
	A006	HWストロークエンド (軸名称) HW stroke end (axis name)	The stroke end input signal has turned OFF and one of the axes has slowed down and stopped.	R0 → 06
	A007	SWストロークエンド (軸名称) SW stroke end (axis name)	One of the axes has moved out of the movable area set with the parameters.	R0 → 07
	A101	運転モード無し No operation mode	The operation mode has not been selected.	R1 → 01
	A102	低速オーバライド 0 Low speed override 0	The low speed override input signal is at zero.	R1 → 02
	A103	手動送り速度 0 Manual feed speed 0	The manual feed speed input signal during the jog mode is at zero.	R1 → 03
	A105	同期エンコーダ停止 Synchronous encoder stop	The machine has stopped because the synchronous encoder has stopped during synchronous feed command (G95).	R1 → 05
A106	ハンドル軸番号ミス Handle axis number error	An axis that has not been designated in the specifications during handle feed exists, or the handle feed axis has not been selected.	R1 → 06	
Operation stop (stop) code	B101	軸移動中始動不可 Axis moving, start not possible	Automatic start is not possible as it contacts an axis that is moving.	b1 → 01
	B102	レディオフ始動不可 Ready OFF, start not possible	Automatic start is not possible as the alarm has set off the ready-off.	b1 → 02
	B103	リセット中始動不可 In reset, start not possible	Automatic start is not possible as the reset signal is input.	b1 → 03

Continued on the next page.

Troubleshooting

Group	Screen Display		Details	7 segment display on MR-P20 main unit
	Error No.	Name		
Operation stop (stop) code	B104	一時停止信号オン Temporary stop signal ON	Automatic start is not possible as the temporary stop signal is OFF.	b1→04
	B105	HWストロークエンド HW stroke end	Automatic start is not possible as an axis is at the stroke end.	b1→05
	B106	SWストロークエンド SW stroke end	Automatic start is not possible as an axis has exceeded the movable area set with the parameters.	b1→06
	B107	運転モードミス Operation mode error	Automatic start is not possible as the memory operation mode is not set.	b1→07
	B113	オーバーヒート中 Overheating	Automatic start is not possible as the machine has over-heated.	b1→13
	B201	HWストロークエンド HW stroke end	The movable area has been exceed during automatic operation so the automatic operation has stopped.	b2→01
	B202	SWストロークエンド SW stroke end	The movable area set with parameters has been exceeded during automatic operation, so automatic operation has stopped.	b2→02
	B203	リセット信号オン Reset signal ON	The reset signal has been input (ON) during automatic operation, so automatic operation has stopped.	b2→03
	B204	一時停止信号オン Temporary stop signal ON	The temporary stop signal has been input (OFF) during automatic operation, so automatic operation has stopped.	b2→04
	B205	運転モード変化 Operation mode change	The mode was changed over to manual operation during automatic operation so automatic operation has stopped.	b2→05
	B301	シングルブロックオン Single block ON	An the single block signal is input (ON), the machine has stopped after the execution block has finished.	b3→01
Servo alarm	C010*	サーボ電圧不足(軸名称) Servo voltage insufficient (axis name)	The supply voltage has decreased, or there has been a momentary blackout for more than 15 msec.	C0→10
	C012*	サーボメモリエラー1(軸名称) Servo memory error 1 (axis name)	Error in the servo amp memory.	C0→12
	C013*	サーボクロックエラー(軸名称) Servo clock error (axis name)	Error in the servo amp external clock.	C0→13
	C015*	サーボメモリエラー2(軸名称) Servo memory error 2 (axis name)	Error in the servo amp memory. (Communication memory with MR-P20.)	C0→15

Continued on the next page.

Note. The servo alarms with a * can be reset by turning the power OFF - ON.

Troubleshooting

Group	Screen Display		Details	7 segment display on MR-P20 main unit
	Error No.	Name		
Servo alarm	C016*	サーボ磁極エラー (軸名称) Servo magnetic polarity error (axis name)	Error in the detector's motor magnetic pole signal. (Occurs when the power is turned ON.)	C0→16
	C017*	サーボカードエラー (軸名称) Servo card error (axis name)	Error in the servo amp PCB element.	C0→17
	C020*	サーボ無信号1 (軸名称) Servo no signal 1 (axis name)	The detector connected to the servo amp main card has short circuited or disconnected or the connector is disconnected.	C0→20
	C021*	サーボ無信号2 (軸名称) Servo no signal 2 (axis name)	Error in the signals from the detector (encoder) connected to the absolute position card (MR-RF371).	C0→01
	C022*	サーボ無信号3 (軸名称) Servo no signal 3 (axis name)	Error in the voltage of the detector (resolver) connected to the absolute position card (MR-RF371).	C0→22
	C025*	ABSコンデンサエラー (軸名称) ABS condensor error (axis name)	The voltage in the super condenser inside the absolute position detector has decreased. After releasing the alarm, return to the zero point again.	C0→25
	C030*	サーボ回生異常 (軸名称) Servo regeneration error (axis name)	The regenerator brake resistance has overheated from excessive regeneration of the servo amp.	C0→30
	C031*	サーボ過速度 (軸名称) Servo excessive speed (axis name)	The motor rotation exceeds the rated revolution of 115%.	C0→31
	C032*	サーボ過電流 (軸名称) Servo over current (axis name)	A current exceeding the tolerable value is flowing through the servo amp bus cable.	C0→32
	C033*	サーボ過電圧 (軸名称) Servo over voltage (axis name)	The voltage in the converter bus cable is too high.	C0→33
	C034*	サーボパリティエラー (軸名称) Servo parity error (axis name)	Error in the data received from the MR-P20.	C0→34
	C035*	指令速度過大 (軸名称) Command speed excessive (axis name)	The command speed from MR-P20 is too high.	C0→35
	C036*	転送エラー (軸名称) Transmission error (axis name)	Periodic communication between the MR-P20 and servo amp cannot be carried out.	C0→36
C037*	サーボパラメータエラー (パラメータ番号) (軸名称) Servo parameter error (Parameter No.) (axis name)	The set parameter values are mistaken.	C0→37	

Continued on the next page.

Note. The servo alarms with a * can be reset by turning the power OFF - ON.

Troubleshooting

Group	Screen Display		Details	7 segment display on MR-P20 main unit
	Error No.	Name		
Servo alarm	C045	アンプ過熱(軸名称) Amp overheating (axis name)	The heat sink in the servo amp is over-heated.	C0→45
	C046	モータ過熱(軸名称) Motor overheating (axis name)	The servo amp and regeneration option are over-heated.	C0→46
	C050	サーボ過負荷1(軸名称) Servo over load 1 (axis name)	An overload voltage of approximately 200% is continuously flowing to the motor and servo amp.	C0→50
	C051	サーボ過負荷2(軸名称) Servo over load 2 (axis name)	The motor and servo amp near the maximum torque are overloading.	C0→51
	C052	サーボ誤差過大(軸名称) Servo excessive error (axis name)	The servo amp command pulse and return pulse difference exceeds 65000 pulses.	C0→52
	C055	サーボ外部EMG(軸名称) Servo external EMG (axis name)	The B - R terminals on the terminal block have been released by an emergency stop etc.	C0→55
	C0A0	ABS通信警告1(軸名称) ABS communication alarm 1 (axis name)	Error in the communication between the servo amp and absolute position detector after power has been turned ON, or error in the rotation counter.	C0→A0
	C0A1	ABS通信警告2(軸名称) ABS communication alarm 2 (axis name)	Communication error in the servo amp and absolute position detector during normal operation.	C0→A1
	C0A2	ABSバッテリー警告(軸名称) ABS battery alarm (axis name)	The voltage of the batteries mounted on the absolute position card (MR-RF371) has decreased.	C0→A2
	C0A3	ABS電圧警告(軸名称) ABS voltage alarm (axis name)	The power voltage supplied to the absolute position detector has decreased.	C0→A3
	C0A4	位置ずれ警告(軸名称) Positioning slip alarm (axis name)	Error in the relationship of the feed back position from the encoder and encoder Z-phase. Or the dog type zero point return or data set type zero return is executed two or more times at the absolute position detection after the power is turned on.	C0→A4
	C0E3	ABS回転数警告(軸名称) ABS no. of rotations alarm (axis name)	Error in the absolute position detector rotation counter.	C0→E3
	C0E4	サーボパラ警告 (パラメータ番号)(軸名称) Servo parameter alarm (Parameter No.) (axis name)	The parameter values (#3001 ~) are out of the setting range. (The incorrect parameters are ignored and the values before setting are maintained.)	C0→E4
	C0E5	ABSレゾルバ警告(軸名称) Servo resolver alarm (axis name)	Error in the resolver value at the zero point in the memory of MR-P20.	C0→E5
C0E7	P20非常停止(軸名称) P20 emergency stop (axis name)	Emergency stop signal (EMG) input from the MR-P20 side.	C0→E7	

Continued on the next page.

Troubleshooting

Group	Screen Display		Details	7 segment display on MR-P20 main unit
	Error No.	Name		
Servo alarm	C101	ABS復帰未完 (軸名称) ABS return incomplete (axis name)	The absolute position detection zero point return is not complete.	C1 → 01
	C102	ABSデータ異常 (軸名称) ABS data error (axis name)	Error in the zero point data (encoder, resolver, number of rotations) in the memory of MR-P20.	C1 → 02
System alarm	D001	タイムオーバー Time over	The system processing of the MR-P20 is not being carried out in consistent cycles.	d0 → 01
	D052	バッテリー電圧不足 Battery voltage drop	The battery for maintaining the motion program, parameter and user PLC in memory is drying and the voltage is decreasing.	d0 → 52
	D053	オーバーヒート Overheat	The hardware temperature has risen above the regulations.	d0 → 53
	D054	DIO24V異常 (DIO番号) DIO24V error (DIO signal)	The 24V power used for the DIO input/output is not being output.	d0 → 54
	D101	アンプ未実装 (軸名称) Amp not mounted (axis name)	The servo amps corresponding to the number of control axes are not properly connected.	d1 → 01
	D102	パリティエラー Parity error	Error has been detected in the transfer data for communication with the servo amp.	d1 → 02
	D103	アンプ結合断 Amp disconnected	Communication with the servo amp is not possible.	d1 → 03
	D104	ENC無信号 ENC no signal	Error has been detected in the signals (A, B, Z phase) from the synchronous encoder.	d1 → 04
Operation error message	E001	設定エラー Setting error	The type of data set for the parameter is mistaken. (Example. When only digits can be set, an alphabet letter has been set.)	E0 → 00
	E002	データ範囲オーバ Data range over	The set parameter data exceeds the setting range.	E0 → 02
	E003	該当番号なし No specified number	A parameter number not found on the screen has been selected, and the data is set.	E0 → 03
	E005	設定不可状態 Setting not possible	Input and editing of the user PLC cannot be done from the IC card during operation of the PLC.	E0 → 05
	E010	記憶容量オーバ Memory capacity over	The memory capacity has been filled, and the program cannot be written in.	E0 → 10

Continued on the next page.

Troubleshooting

Group	Screen Display		Details	7 segment display on MR-P20 main unit
	Error No.	Name		
Operation error message	E011	プログラム番号重複 Program No. duplication	When a new program is being created, there is already a program number registered of the same number.	E0→11
	E012	登録本数オーバ Registration number over	32 programs have already been registered. No more can be registered.	E0→12
	E013	該当シーケンスなし No specified sequence	During program search, the sequence number in the specified program is not found.	E0→13
	E014	該当プログラムなし No specified program	During program search, the specified program number is not registered in the memory.	E0→14
	E017	パリティエラー Parity error	A parity error was found while inputting data from the IC card.	E0→17
	E021	プログラム運転中 Program in operation	<ul style="list-style-type: none"> • The program cannot be erased during automatic operation. • The operation search cannot be done during automatic operation. • Changes in the parameter data cannot be made during automatic operation. 	E0→21
	E035	コンペアエラー Compare error	After comparing the IC card and data on the input screen, a miss was found in the data.	E0→35
	E050	ファイルエラー File error	Error in the file system which controls the programs in the memory.	E0→50
	E064	コピー番号エラー Copy no. error	When copying the program, the same number as the specified program number was found in the memory.	E0→64
	E084	入出力実行不可 Input/output not possible	Input/output operations cannot be done during operation of input/output.	E0→84
	E089	データ出力エラー Data output error	The IC card was pulled out with the power ON.	E0→89
E090	データ入力エラー Data input error	The IC card was pulled out with the power ON.	E0→90	
Emergency stop message	F001	PLC停止 (EMG) PLC stop (EMG)	The user PLC has stopped, and the emergency stop state has been activated.	F0→01
	F002	EMG信号入力 EMG signal input	An emergency stop signal has been input from outside, or the power (24V) supplied to the MR-P20 DIO is defective.	F0→02
	F003	PLC非常停止 PLC emergency stop	An emergency stop has been input from the user PLC.	F0→03

Continued on the next page.

Troubleshooting

Group	Screen Display		Details	7 segment display on MR-P20 main unit
	Error No.	Name		
Emergency stop message	F004	サーボ非常停止 Servo emergency stop	Emergency stop state has been activated with a servo alarm.	F0→04
Program error	P010	同時軸数オーバ Synchronous axis no. over	The axis address number specified to the same block exceeds the specifications.	P0→10
	P011	軸名称設定不正 Axis name setting incorrect	An axis address (axis name) not in the parameter settings has been used in the program.	P0→11
	P032	不正アドレス Incorrect address	An address not in the specifications has been used.	P0→32
	P033	フォーマットエラー Format error	The program command format is mistaken.	P0→33
	P034	不正Gコード Incorrect G code	A G code not in the specifications has been used.	P0→34
	P035	指令値オーバ Command value over	Each address setting range has been exceeded.	P0→35
	P036	プログラムエンドエラー Program end error	The (%) code was used during memory operation.	P0→36
	P037	O, N番号ゼロ O, N no. zero	A 0 number has been specified for the program number or sequence number.	P0→37
	P060	補間長さオーバ Interpolation length over	The specified moving distance is too great.	P0→60
	P062	F指令なし No F command	The speed command with F in the low speed mode (G1, G2, G3) has not been made.	P0→62
	P070	円弧終点ずれ大 Circular end point slip great	The start point, end point and center coordinates in the circular command for the center designation (I, J) are mistaken.	P0→70
	P071	円中心計算不能 Circle center calculation not possible	The center of the arc in the radius (R) setting cannot be calculated.	P0→71
	P230	サブプロ多重オーバ Sub program over	There are over four layers in the sub-program nest.	P2→30
	P231	シーケンス番号なし No sequence no.	The sequence number n set in the control command IF sentence (IF () GOTO n) cannot be found.	P2→31

Continued on the next page.

Troubleshooting

Group	Screen Display		Details	7 segment display on MF-P20 main unit
	Error No.	Name		
Program error	P232	プログラム番号なし No program no.	The program number specified in the sub-program call (M98) is not registered.	P2 → 32
	P241	変数番号なし No parameter no.	The specified parameter cannot be used.	P2 → 41
	P242	変数定義=なし No parameter definition	A "=" is not used to define the parameter.	P2 → 42
	P280	(,) 多重度オーバ Multiple (,) over	The parenthesis () in one block are in more than two layers.	P2 → 80
	P281	(,) 数が異なる No. of (,) differ	The number of parenthesis in one block do not match.	P2 → 81
	P282	演算できない Cannot calculate	The calculation method is mistaken.	P2 → 82
	P284	整数値オーバーフロー Integer value overflow	The value of the integers is overflowing in the calculation process.	P2 → 84
	P290	I F文誤り IF sentence mistake	The IF (condition) GOTO sentence is mistaken.	P2 → 90
	P291	WHILE文誤り WHILE sentence mistake	The WHILE (condition) DO to END sentence is mistaken.	P2 → 91
	P293	DO-END多重オーバ DO-END multiple over	The multiplicity of the WHILE (condition) DO to END is exceeding.	P2 → 93
	P294	DO-END対でない DO-END do not match	The DO and END are not paired.	P2 → 94
P430	復帰未完軸あり Axis with incomplete zero return	Automatic operation other than zero point return G28 cannot be carried out on an axis that has not completed zero point return.	P4 → 30	

Maintenance and Inspection

8. Maintenance and Inspection

8.1 Periodic Inspection

The MR-P20 is a stationary model, so daily inspections and care is not necessary but an inspection must be carried out at least once a year.

Points of inspection

- (1) Inspect whether there is any dirt or dust inside and clean.
- (2) Inspect whether the terminal block screws are loose and tighten.
- (3) Inspect whether there are any abnormalities in the parts (color changes from heat, damage, cut wires).
- (4) Use a tester (high resistance range) to test the conductivity of the control circuit, and do not use a megger or buzzer.
- (5) Periodically inspect the cables for scratches and cuts according to the conditions of use.

8.2 Storage

It is not desirable to store the machine without using for long periods, but when not in use, pay attention to the following points.

- (1) Store in a clean and dry place.

Storage Temperature	Storage Humidity
-20°C to +60°C	Under 90% RH

Note 1. Confirm that there is no dew or freezing.

2. The storage temperature is for short periods such as during transportation.

- (2) As the machine is an open structure, make sure that dust does not get inside.
- (3) The life of the batteries when not used is approximately 7 years after shipment from the factory.

8.3 Changing the Batteries

The MR-P20 uses batteries to store the program. The batteries will wear down and must be exchanged with new batteries. The life of the batteries will change according to the conditions of use.

- (1) Model : A6BAT Lithium battery
- (2) Life

When the batteries wear down, the MR-P20 will display an alarm (system alarm D052: battery voltage drop). Replace the batteries within two days after the alarm is displayed. The life of the batteries is approximately five years when used under normal conditions (peripheral temperature 25°C).

Maintenance and Inspection

(3) Replacement procedure

The batteries are connected to the power source module (MR-P20AVR) module. Replace with the following procedure.

1) Confirmation before replacing

The program will be saved for about ten minutes after the battery is removed, however for safety measures, it is recommended that the program be stored in an IC card.

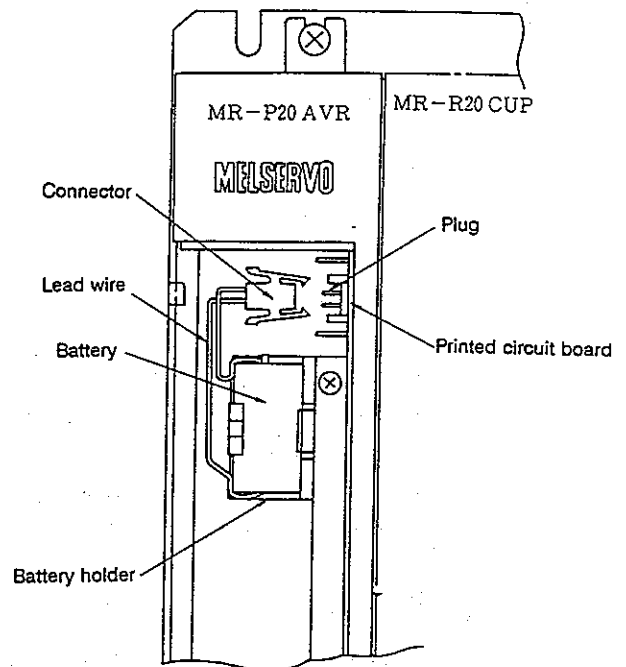
2) Break off the power supply and remove the front cover on the power source module.

3) Remove the battery from the connector. (Hold with your hand and remove.)

4) Remove the battery itself from the battery holder.

5) Place a new battery in the battery holder, and plug the connector in. (It will not plug in the opposite pole).

6) Turn ON the power and confirm the program.



IMPORTANT

There are electronic parts on the printed circuit board that are affected by static electricity. Carry out the following items when directly handling the printed circuit board.

<1> Ground either the worker or work table.

<2> Do not directly touch the conductive parts or electric parts.

Maintenance and Inspection

8.4 Breakdown Diagnosis and Countermeasures

(1) Confirmation of damages

Confirm when, how and what kind of damage occurred.

- When during automatic operation, confirm the program number, sequence number and program details.
- When during manual operation, confirm the operation details (including earlier operations).
- When there are problems in movement amounts, confirm the distance and direction.
- Confirm alarm displays.
- Reconstruct the operation to confirm if the same problem occurs with the same operation.
- Confirm whether the same problem occurs when the conditions are changed. (Try changing override and program details and operation procedures.)

(2) Confirmation of damages with the alarm display

The alarm display is a handy way to confirm the damage situation of the MR-P20. Confirm the details with the alarm list, and correct the problem.

< Alarm display >

When an alarm occurs in the MR-P20, the alarm contents are displayed on the CRT operation panel (or A6GPP). When several alarms occur at once, up to four will be displayed, and when there are more, they are displayed in order of priority. Therefore, when an alarm occurs confirm whether other alarms have not occurred when the alarm has been corrected. Refer to 7.3 for details on the alarms.

Parameter

9. Parameter

9.1 System Parameter

[システムパラメータ]			パラメータ1.		
#			#		
1001	sysno	0	1013	Rinps1	0.000
1002	axno1	1	1014	Rinps2	0.000
1003			1015	PLaxis	0
1004			1016	PLsft	0
1005	plctyp	0	1017	PLEG1	1
1006	inch	0	1018	PLEG2	1
1007	unit	2	1019	PLdly	0
1008			1020	PLdir	0
1009	handl0	1	1021	R0unit	1
1010			1022		
1011			1023		
1012			1024		

システム | 軸 | サーボ | SIO | 補正

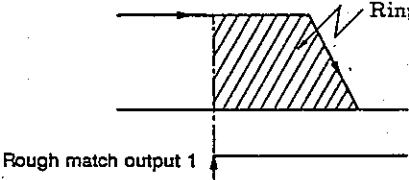
Table 9.1 System Parameter Table

#	Parameter	Description	Setting range (unit)	Initial value
1001	sysno*	Selects between 2 axes simultaneous operation and 2 axes independent operation. 0: 2 axes simultaneous operation 1: 2 axes independent operation Note: When using only one servo axis, set to sysno=0, axno1=0.	0, 1	0
1002	axno1*	Sets the number of controlled axes. 0: 1 axis control 1: 2 axes control Note: When set to #1001=1, #1002=0 (each system one axis control) is automatically set.	0, 1	1
1005	plctyp*	Selects the PLC (sequence) program type. 0: User PLC (The user creates the PLC program.) 1: Standard PLC (2 axes simultaneous operation) [The input/output device attribution is found on 4.5 and 4.6 "Machine input/output interface".] 2: Standard PLC (2 axes independent control) [The input/output device attribution is found on annex 3] 3: Standard PLC (for serial link) [The input/output device attribution is found in the Serial I/O Module instruction manual.] Note: When a user PLC is developed based on the standard PLC, set at "1", "2" or "3", turn the power OFF - ON, and store the standard PLC in memory, then set to "0" again.	0, 1, 2, 3	0

Continued on the next page.

Note: The parameters with a * are validated by turning the power OFF - ON.

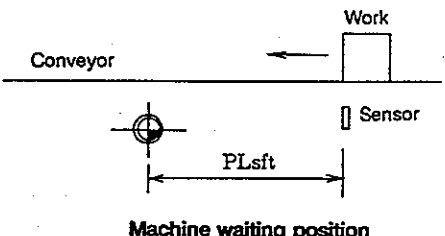
Parameter

#	Parameter	Description	Setting range (unit)	Initial value																
1006	inch*	The program unit is selected from mm or inch. 0: mm 1: inch When using a rotating axis, set the #2022 axcont bit 4 to 1. With this, the setting will be degrees instead of inches or mms, and each coordinate will be a cyclic counter between 0 to 359.999.	0, 1	0																
1007	unit*	Selects the command unit. <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>unit</th> <th>mm</th> <th>inch</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.01</td> <td>0.001</td> <td>0.01</td> </tr> <tr> <td>2</td> <td>0.001</td> <td>0.0001</td> <td>0.001</td> </tr> <tr> <td>3</td> <td>0.0001</td> <td>0.00001</td> <td>0.0001</td> </tr> </tbody> </table>	unit	mm	inch	deg	1	0.01	0.001	0.01	2	0.001	0.0001	0.001	3	0.0001	0.00001	0.0001	1, 2, 3	2
unit	mm	inch	deg																	
1	0.01	0.001	0.01																	
2	0.001	0.0001	0.001																	
3	0.0001	0.00001	0.0001																	
1009	hand10*	Selects whether acceleration/deceleration will be used during handle feed. 0: Acceleration/deceleration used 1: Acceleration/deceleration not used The acceleration/deceleration time is set in #2006.	0, 1	0																
1013	Rinps1	Rough match output 1 When confirmation is to be made before each block is finished, the remaining distance that outputs the rough match signal is set. 	0[mm] to 99999.999[mm] (When the command unit is 0.001 (mm))	0																
1014	Rinps2	Rough match output 2 When carrying out 2 axes independent operation, this is used to set the No.2 rough match signal. At this time, #1013 Rinps1 axis is the parameter for the rough match output.	0[mm] to 99999.999[mm] (When the command unit is 0.001 (mm))	0																
1015	PLaxis	Synchronous (layered) axis setting This sets the axis that calculates the movement amount of the conveyor from the return pulse emitted from the synchronous encoder. 0: No.1 axis (X) 1: No.2 axis (Y)	0, 1	0																

Continued on the next page.

Note: The parameters with a * are validated by turning the power OFF - ON.

Parameter

#	Parameter	Description	Setting range (unit)	Initial value																		
1016	PLsft	<p>Synchronous (layered) shift amount</p> <p>This occurs synchronous positioning in which the PLsft distance is delayed according to the position of the conveyor where the synchronous (layered) start signal is input. Set a value that meets the following conditions to carry out the synchronous operation smoothly.</p> $PLsft \geq \frac{F_{max}}{60} (PLdly + \frac{tcl}{2} + Tp)$ <p>PLsft : Synchronous (layered) shift amount F max : Conveyor's maximum speed PLdly : Sensor delay time tcl : The adjustable speed time constant set with PLaxis Tp : Position loop time constant</p>  <p style="text-align: center;">Machine waiting position</p>	0[mm] to 99999.999[mm] (When the command unit is 0.001 (mm))	0																		
1017 1018	PLEG1 PLEG2	<p>Synchronous encoder gear ratio</p> <p>PLEG1: The conveyor movement amount per one rotation of the synchronous encoder (μm:when command unit is 0.001 mm)</p> <p>PLEG2: The number of pulses (4096) per one rotation of the synchronous encoder</p> <p>Note: Reduce the fractions when setting PLEG1/PLEG2.</p>	1 to 32767 (Decimal)	1																		
1019	PLdly	<p>Synchronous (layered) start delay time</p> <p>Sets the sensor signal for the synchronous (layered) start delay time.</p>	0 to 5000 (msec)	0																		
1020	PLdir	<p>Synchronous encoder rotation direction</p> <p>0: Turns clockwise when looked at from the end of the axis. 1: Turns counterclockwise when looked at from the end of the axis.</p>	0, 1	0																		
1021	R0unit	<p>Sets the output units of the coordinate values output to the R register.</p> <p>Coordinate value output = $\frac{\text{Coordinate value}^{\text{Note 1}}}{R0unit}$</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Coordinate value output</th> <th rowspan="2">R register</th> <th colspan="2">Example of R0 unit setting</th> </tr> <tr> <th>2</th> <th>2000</th> </tr> </thead> <tbody> <tr> <td>Machine value output</td> <td>R0 to R3</td> <td></td> <td></td> </tr> <tr> <td>Absolute value output</td> <td>R8 to R11</td> <td>0.001mm</td> <td>1.000mm</td> </tr> <tr> <td>Present value output</td> <td>R200 to R203</td> <td></td> <td></td> </tr> </tbody> </table> <p style="text-align: center;">(when command unit is 0.001mm)</p> <p>Note 1: The coordinate value is a 0.0005 mm unit when the command unit is 0.001 mm, therefore at R0unit=2, the output unit is 0.001 mm.</p>	Coordinate value output	R register	Example of R0 unit setting		2	2000	Machine value output	R0 to R3			Absolute value output	R8 to R11	0.001mm	1.000mm	Present value output	R200 to R203			1 to 65535	1
Coordinate value output	R register	Example of R0 unit setting																				
		2	2000																			
Machine value output	R0 to R3																					
Absolute value output	R8 to R11	0.001mm	1.000mm																			
Present value output	R200 to R203																					

Parameter

9.2 Axis Parameter

[軸パラメータ]		パラメータ2. 1/3	
#		X	Y
2001	axname	X	Y
2002			
2003	Hspeed	1000	1000
2004			
2005	smgtyp	0	0
2006	tc1	100	100
2007	tc2	200	200
2008			
2009	bklash	0	0
2010	noimt	1	1
2011	slmt-	0.000	0.000
2012	slmt+	0.000	0.000

システム **軸** サーボ | S I O | 補 正

The two axes are displayed simultaneously. The left is axis No.1, and the right axis No.2. There are three screens in total, and each is called out with the **(NEXT)** and **(BACK)** key.

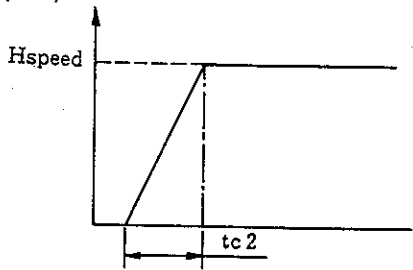
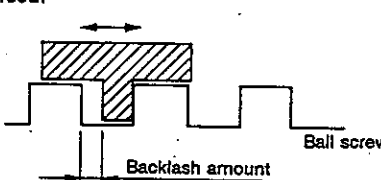
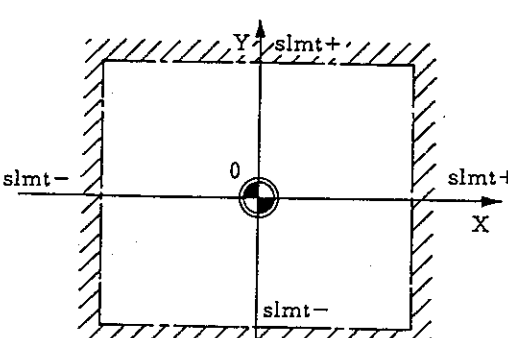
Table 9.2 Axis Parameter Table (Screen No.1)

#	Parameter	Description	Setting range (unit)	Initial value
2001	axname*	Axis name This sets the axis name for each axis. (When 2 axes independent operations are carried out, the same name can be set for both axes.)	X, Y, Z, U, V, W, A, B, C	X, Y
2003	Hspeed	Rapid traverse feed rate The rapid traverse feed rate (maximum speed) for each axis is set. Please set according to the machine specifications.	1[mm/min] to 100000[mm/min] (When command unit is 0.001 [mm].)	1000
2005	smgtyp	Sets the acceleration/deceleration type for the G00 (positioning). 0: The acceleration/deceleration for the G00 is the same. Acceleration/deceleration speed time: set with #2007 tc2 1: For one axis control (system parameter #1002=0), the acceleration/deceleration speed can be set individually. Acceleration time: value set in #2027 tc3 Deceleration time: value set in #2028 tc4	0, 1	0
2006	tc1	Acceleration/deceleration time constant 1 Sets the time for each axis to reach the command speed during low speed feed. <div style="text-align: center;"> </div> [This adjustable speed is used when the speed for the automatic operation G01, G02, G03, G31, G33 is commanded by the F code.]	1 to 5000 [msec]	100

Continued on the next page.

Note: The parameters with a * are validated by turning the power OFF - ON.

Parameter

#	Parameter	Description	Setting range (unit)	Initial value
2007	tc2	<p>Acceleration/deceleration time constant 2</p> <p>Sets the time for each axis to reach the rapid traverse feed rate (maximum speed).</p>  <p>[This adjustable speed is used for the G00, G28, G30 in the manual and automatic operations.]</p>	1 to 30000 [msec]	200
2009	bklash	<p>Backlash correction amount</p> <p>Sets the amount of backlash for correction when the movement direction is reversed.</p> 	0 to 65000 [pulse]	0
2010	noimt	<p>Soft limit invalid</p> <p>Sets the valid/invalid of the soft limit.</p> <p>0: Soft limit valid 1: Soft limit invalid</p> <p>(Select invalid for infinite length positioning.)</p>	0, 1	1
2011 2012	slmt - slmt +	<p>Soft limit</p> <p>Sets the movable area of the machine within the basic machine coordinates.</p>  <p>Note: Set the region on the inner side of the stroke end signal.</p>	-99999.999[mm] to 99999.999[mm] (When command unit is 0.001 [mm].)	0

Parameter

【軸パラメータ】		パラメータ2. 2/3	
#		<X>	<Y>
2013	G28rap	1000	1000
2014	G28crp	100	100
2015	G28sft	0	0
2016	dogext	0	0
2017			
2018			
2019	zpos1	0.000	0.000
2020	zpos2	0.000	0.000
2021			
2022	axcont	0000	0000
2023	EG1	1	1
2024	EG2	1	1

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Push the **NEXT** key and this screen will appear.

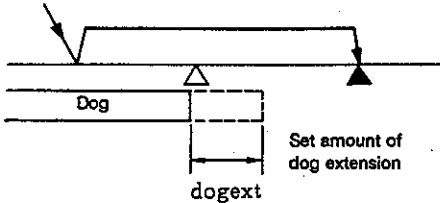
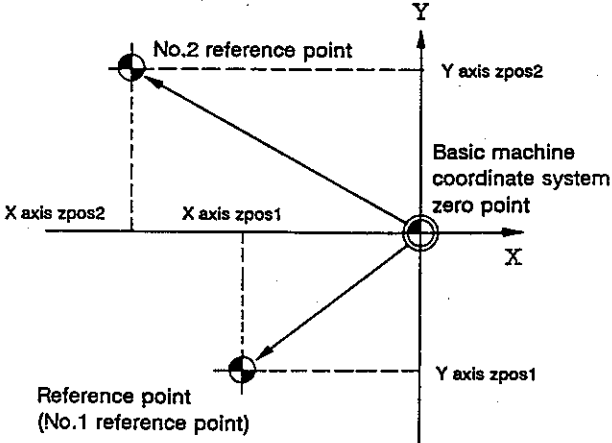
Table 9.3 Axis Parameter Table (Screen No.2)

#	Parameter	Description	Setting range (unit)	Initial value
2013	G28rap	Reference point return speed Sets the feed speed when using the dog type reference point return. (The rapid zero point return feed speed is #2003 Hspeed.)	1[mm/min] to 100000[mm/min] (When command unit is 0.001 [mm].)	1000
2014	G28crp	Reference point return creep speed Sets the creep speed from the deceleration stop to reference point (No.1 reference point) after the dog has been detected in the dog type reference point return.	1[mm/min] to 60000[mm/min] (When command unit is 0.001 [mm].)	100
2015	G28sft	Reference point shift distance Sets the distance from the electrical zero point to the machine reference point (No.1 zero point).	0 to 65000 [pulse]	0

The diagram shows a speed profile for reference point return. It starts with a high-speed ramp labeled G28rap, followed by a low-speed creep labeled G28crp, and finally a stop. A 'Dog' sensor is shown detecting the stop. G28sft is the distance from the electrical zero point to the machine reference point.

Continued on the next page.

Parameter

#	Parameter	Description	Setting range (unit)	Initial value
2016	dogext	<p>Dog extension</p> <p>When there is a electrical zero point near the position where the dog is released in the dog type zero point return, virtual extensions are made so that the Z-axis near the dog is ignored and the dog is released between the Z-axis. The virtual dog length extension is set.</p>  <p>The diagram shows a horizontal line representing a machine bed. A 'Dog' is shown as a rectangular block on the left. A dashed line indicates the 'Set amount of dog extension' labeled 'dogext', which is the distance from the right edge of the dog to the right edge of a virtual extension area. A triangle on the right indicates the dog's release point.</p>	0 to 65000 [pulse]	0
2019	zpos1	<p>Reference point position (No.1 reference point)</p> <p>The first reference point is set based on the basic machine coordinate system (No.1 reference point). The set value will be the coordinate value of the machine zero point in the basic machine coordinates system.</p>  <p>The diagram shows a 2D coordinate system with X and Y axes. The origin is the 'Basic machine coordinate system zero point'. A 'Reference point (No.1 reference point)' is located in the lower-left quadrant. Its coordinates are 'X axis zpos1' (negative) and 'Y axis zpos1' (negative). A 'No.2 reference point' is located in the upper-left quadrant. Its coordinates are 'X axis zpos2' (negative) and 'Y axis zpos2' (positive).</p>	-99999.999[mm] to 99999.999[mm] (When command unit is 0.001 [mm].)	0
2020	zpos2	<p>No.2 reference point positioning</p> <p>Sets the coordinate values of the No.2 reference point in the basic machine coordinates system. (Returns to the No.2 reference point with the G30 command.)</p>	-99999.999[mm] to 99999.999 [mm] (When command unit is 0.001 [mm].)	0

Continued on the next page.

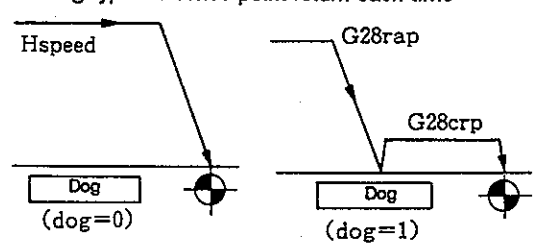
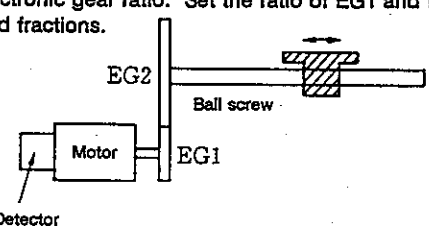
Parameter

#	Parameter	Description	Setting range (unit)	Initial value																																
2022	axcont*	<p>Axis control plug</p> <table style="margin-left: 20px; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">15</td><td style="padding: 2px 5px;">14</td><td style="padding: 2px 5px;">13</td><td style="padding: 2px 5px;">12</td><td style="padding: 2px 5px;">11</td><td style="padding: 2px 5px;">10</td><td style="padding: 2px 5px;">9</td><td style="padding: 2px 5px;">8</td><td style="padding: 2px 5px;">7</td><td style="padding: 2px 5px;">6</td><td style="padding: 2px 5px;">5</td><td style="padding: 2px 5px;">4</td><td style="padding: 2px 5px;">3</td><td style="padding: 2px 5px;">2</td><td style="padding: 2px 5px;">1</td><td style="padding: 2px 5px;">0</td> </tr> <tr> <td style="padding: 2px 5px;">dog</td><td style="padding: 2px 5px;">int abs</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">no zp</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">ccw</td><td style="padding: 2px 5px;">rot</td><td style="padding: 2px 5px;">sv of</td><td style="padding: 2px 5px;">dir</td><td style="padding: 2px 5px;">0</td><td style="padding: 2px 5px;">0</td> </tr> </table> <p>bit2 : dir (reference point direction) Selects whether the reference point (No.1 reference point) position is on the (+) or (-) side of the dog. 0: (+) of the dog 1: (-) of the dog</p> <div style="text-align: center; margin: 10px 0;"> </div> <p>bit3 : svof (revision of servo off difference) Selects whether the coordinate values are to be revised according to the machine movements during servo off. 0: Coordinate values are not revised 1: Coordinate values are revised</p> <p>bit4 : rot (rotating axis) 0: Straight line axis 1: Rotating axis Note: When set to "1", the coordinates will be a cyclic counter of 0 to 359.999.</p> <p>bit5 : ccw (motor ccw) Sets whether the motor turns "ccw" or "cw" when the coordinate is set at (+). 0: ccw 1: cw</p> <p>bit10 : nozp (no reference point) Automatic operation can be carried out without reference point return when the reference point is not set. Reference point return (manual, automatic) cannot be carried out. The basic machine value coordinate will be 0 at the position where the power is turned on. 0: Reference point on 1: Reference point off</p> <p>bit14 : intabs (manual ABS revision) Selects whether the absolute value is revised when commanding manually such as with handle feed. 0: Absolute value revised 1: Absolute value not revised</p>	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	dog	int abs	0	0	0	no zp	0	0	0	0	ccw	rot	sv of	dir	0	0	0 to FFFF (Hexadecimal)	0000
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0																					
dog	int abs	0	0	0	no zp	0	0	0	0	ccw	rot	sv of	dir	0	0																					

Continued on the next page.

Note: The parameters with a * are validated by turning the power OFF - ON.

Parameter

#	Parameter	Description	Setting range (unit)	Initial value
2022	axcont*	<p>bit15 : dog (dog mode reference point return each time) Selects so that the first reference point return after the power is turned on is a dog mode reference point return, and from the second time on is the reference point return type.</p> <p>0: Rapid reference point return 1: Dog type reference point return each time</p>  <p>Note 1. When the motor with an absolute position detector is used, the dog type reference point return each time cannot be used. 2. The reference point return speed will vary with the setting of dog=0.1.</p>	0 to FFFF (Hexadecimal)	0000
2023 2024	EG1* EG2*	<p>Electronic gear Sets the electronic gear ratio. Set the ratio of EG1 and EG2 with reduced fractions.</p>  <p>EG1: Number of pulses per motor rotation (pulse) EG2: Amount of movement per motor rotation (μm)</p> <p>Note 1. Set the ratio of EG1 and EG2 with reduced fractions. 2. When the set value of the system parameter #1007 unit changes, the EG2 unit will also change. Refer to 10. "Relationship of command units and program units".</p>	1 to 32767 (Decimal) (However, $1/50 < \text{EG1}/\text{EG2} < 50$)	1

Note: The parameters with a * are validated by turning the power OFF - ON.

Parameter

【軸パラメータ】		パラメータ2. 3/3	
#		<X>	<Y>
2025	ctmax	0.000	0.000
2026	abslmt	0.000	0.000
2027	tc3	200	200
2028	tc4	200	200
2029	lmt1-	0.000	0.000
2030	lmt1+	0.000	0.000
2031	lmt2-	0.000	0.000
2032	lmt2+	0.000	0.000
2033	lmt3-	0.000	0.000
2034	lmt3+	0.000	0.000
2035	lmt4-	0.000	0.000
2036	lmt4+	0.000	0.000

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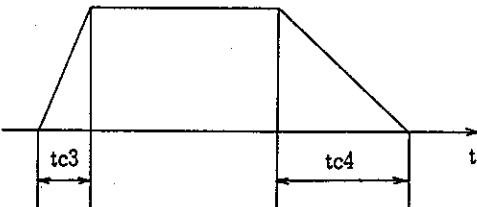
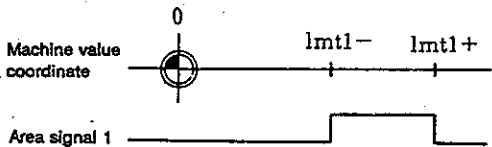
Push the **(NEXT)** key and this screen will appear.

Table 9.4 Axis Parameter Table (Screen No.3)

#	Parameter	Description	Setting range (unit)	Initial value
2025	ctmax	<p>Infinite length positioning counter maximum value</p> <p>Sets the maximum value of the coordinate values when using infinite length positioning.</p> <div style="text-align: center;"> </div> <p>Note 1. When the ctmax=0, the infinite length positioning is invalid.</p> <p>2. When the ctmax=500.000, the coordinate value is 0 to ±499.999.</p>	0 to 99999.999[mm] (When the command unit is 0.001[mm].)	0
2026	abslmt	<p>Power breakage tolerable movement amount</p> <p>Sets the tolerable movement amount during power breakage in the absolute position detection system. When the power breakage movement amount is greater than this, a "" will be displayed on the side of the axis data of the "Power breakage movement amount" in the "Coordinate value screen". The PLC interface X194 (ABS power breakage movement over) 1 (ON) will be turned on simultaneously.</p>	0 to 99999.999[mm] (When the command unit is 0.001[mm].)	0

Continued on the next page.

Parameter

#	Parameter	Description	Setting range (unit)	Initial value
2027 2028	tc3 tc4	<p>G00 Unsymmetrical acceleration/deceleration time constant (acceleration)</p> <p>G00 Unsymmetrical acceleration/deceleration time constant (deceleration)</p>  <ul style="list-style-type: none"> • Valid when parameter #2005 = 1. • Valid only when controlling one axis (#1002 = 0) • When making the acceleration/deceleration time the same, the #2005 = 0, and the acceleration/deceleration time is set with #2007. • Individual setting of the acceleration/deceleration time cannot be set other than with G00. With the G code, it will be the set value of #2006 or #2007. 	0 to 30000 [msec] 0 to 30000 [msec]	200 200
2029 2030	lmt1- lmt1+	<p>Sets the area for the signal output of area signal 1</p> <p>lmt1- : Sets the coordinate value on the (-) side of the region to output a signal.</p> <p>lmt1+ : Sets the coordinate value on the (+) side of the region to output a signal.</p>  <p>Note) When the (lmt1-) > (lmt1+), the signal will not be output.</p> <p>Please set at (lmt1-) < (lmt1+).</p>	-99999.999[mm] to 99999.999[mm] (When the command unit is 0.001[mm].)	0
2031 2032	lmt2- lmt2+	Sets the area for the signal output of area signal 2.		
2033 2034	lmt3- lmt3+	Sets the area for the signal output of area signal 3.		
2035 2036	lmt4- lmt4+	Sets the area for the signal output of area signal 4.		

Parameter

9.3 Servo Parameter

[サーボパラメータ]		パラメータ3.	
#		<X>	<Y>
3001	STY	0000	0000
3002	MSR	0	0
3003	MTY	0	0
3004	ENC	0	0
3005	INP	100	100
3006	PGN	25	25
3007	VGN	100	100
3008	VIC	20	20
3009	TLP	300	300
3010	TLN	300	300
3011		0000	0000
3012		0000	0000

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Two axes are displayed simultaneously. The left is axis No.1, the right axis No.2

Table 9.5 Servo Parameter Table

#	Parameter	Description	Setting range (unit)	Initial value										
3001	STY*	<p>Servo type</p> <p>Selects the existence of the power outage ABS and regeneration option.</p> <table border="1"> <tr> <td>0</td> <td>0</td> </tr> </table> <p> { 0: No absolute position detection 1: Absolute position detection </p> <p> { 0: No regeneration option 1: No regeneration option MR-RB30 2: No regeneration option MR-RB50, MR-RB51 3: No regeneration option MR-RB100, MR-RB101 4: No regeneration option MR-RB082 5: No regeneration option MR-RB32 </p>	0	0	0000 to FFFF	0000								
0	0													
3002	MSR*	<p>Motor series</p> <p>The following values are set according to the motor series.</p> <table border="1"> <thead> <tr> <th>Motor series</th> <th>Set value</th> </tr> </thead> <tbody> <tr> <td>HA-SA <input type="checkbox"/> (Standard)</td> <td>0</td> </tr> <tr> <td>HA-SA <input type="checkbox"/> L (Low inertia)</td> <td>1</td> </tr> <tr> <td>HA-SA <input type="checkbox"/> U (Flat)</td> <td>2</td> </tr> <tr> <td>HA-SC <input type="checkbox"/></td> <td>3</td> </tr> </tbody> </table>	Motor series	Set value	HA-SA <input type="checkbox"/> (Standard)	0	HA-SA <input type="checkbox"/> L (Low inertia)	1	HA-SA <input type="checkbox"/> U (Flat)	2	HA-SC <input type="checkbox"/>	3	0, 1, 2, 3	0
Motor series	Set value													
HA-SA <input type="checkbox"/> (Standard)	0													
HA-SA <input type="checkbox"/> L (Low inertia)	1													
HA-SA <input type="checkbox"/> U (Flat)	2													
HA-SC <input type="checkbox"/>	3													
3003	MTY*	<p>Motor rating</p> <p>The following values are set according to the rated display (rated output, rotation speed) on the model type name.</p> <p>HA-SA152LB- <input type="checkbox"/></p> <p>(Set value = 152)</p>	013 to 702	0										

Note: The parameters with a * are validated by turning the power OFF - ON.

Continued on the next page.

Parameter

#	Parameter	Description	Setting range (unit)	Initial value																	
3004	ENC*	Detector type The type of detector is selected. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Detector type</th> <th style="width: 40%;">Set value</th> </tr> </thead> <tbody> <tr> <td>Increment detector (3000 P/rev)</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Absolute positioning detector (3000 P/rev)</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Increment detector (2000 P/rev)</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Absolute position detector (4096 P/rev)</td> <td style="text-align: center;">3</td> </tr> </tbody> </table>	Detector type	Set value	Increment detector (3000 P/rev)	0	Absolute positioning detector (3000 P/rev)	1	Increment detector (2000 P/rev)	2	Absolute position detector (4096 P/rev)	3	0, 1, 2, 3	0							
Detector type	Set value																				
Increment detector (3000 P/rev)	0																				
Absolute positioning detector (3000 P/rev)	1																				
Increment detector (2000 P/rev)	2																				
Absolute position detector (4096 P/rev)	3																				
3005	INP	In position range The number of built-up pulses (droop amount) that outputs the in position signal is set. <div style="text-align: center; margin-top: 10px;"> </div>	0 to 32767 [pulse]	100																	
3006	PGN	Position loop gain Sets the gain of the position loop <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">GD_I^2/GD_M^2</th> <th style="text-align: center;">0</th> <th style="text-align: center;">1</th> <th style="text-align: center;">3</th> <th style="text-align: center;">5</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align: center;">Setting</td> <td style="text-align: center;">Standard</td> <td style="text-align: center;">25</td> <td style="text-align: center;">25</td> <td style="text-align: center;">20</td> <td style="text-align: center;">15</td> </tr> <tr> <td style="text-align: center;">Maximum</td> <td style="text-align: center;">100</td> <td style="text-align: center;">80</td> <td style="text-align: center;">40</td> <td style="text-align: center;">25</td> </tr> </tbody> </table> <p style="font-size: small; margin-top: 5px;">Note) An accurate path (straight line, circular) cannot be achieved if the same value is not set for the position gain in the interpolation axes.</p>	GD_I^2/GD_M^2		0	1	3	5	Setting	Standard	25	25	20	15	Maximum	100	80	40	25	5 to 150 [S ⁻¹]	25
GD_I^2/GD_M^2		0	1	3	5																
Setting	Standard	25	25	20	15																
	Maximum	100	80	40	25																
3007	VGN	Speed loop gain Sets the gain of the speed loop. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">GD_I^2/GD_M^2</th> <th style="text-align: center;">0</th> <th style="text-align: center;">1</th> <th style="text-align: center;">3</th> <th style="text-align: center;">5</th> </tr> </thead> <tbody> <tr> <td rowspan="2" style="text-align: center;">Setting</td> <td style="text-align: center;">Standard</td> <td style="text-align: center;">100</td> <td style="text-align: center;">100</td> <td style="text-align: center;">200</td> <td style="text-align: center;">300</td> </tr> <tr> <td style="text-align: center;">Low inertia flat</td> <td style="text-align: center;">50</td> <td style="text-align: center;">50</td> <td style="text-align: center;">100</td> <td style="text-align: center;">150</td> </tr> </tbody> </table>	GD_I^2/GD_M^2		0	1	3	5	Setting	Standard	100	100	200	300	Low inertia flat	50	50	100	150	20 to 2000	100
GD_I^2/GD_M^2		0	1	3	5																
Setting	Standard	100	100	200	300																
	Low inertia flat	50	50	100	150																

Continued on the next page.

Parameter

#	Parameter	Description	Setting range (unit)	Initial value										
3008	VIC	<p>Speed integration compensation Sets the constant during integration compensation.</p> <table border="1" style="margin-left: 40px;"> <tr> <td>GD_I^2/GD_M^2</td> <td>0</td> <td>1</td> <td>3</td> <td>5</td> </tr> <tr> <td>Setting</td> <td>20</td> <td>20</td> <td>30</td> <td>40</td> </tr> </table>	GD_I^2/GD_M^2	0	1	3	5	Setting	20	20	30	40	1 to 1000 [ms]	20
GD_I^2/GD_M^2	0	1	3	5										
Setting	20	20	30	40										
3009	TLP	<p>Torque limit value \oplus The maximum output torque during forward rotations and reverse power is set at the rated torque 100% noted in the catalog. The maximum setting value is the maximum torque in the catalog and even if any other value is set, it will be invalid.</p>	1 to 500 [%]	300										
3010	TLN	<p>Torque limit value \ominus The maximum output torque during reverse rotations and forward power is set at the rated torque 100% noted in the catalog. The maximum setting value is the maximum torque in the catalog and even if any other value is set, it will be invalid.</p>	1 to 500 [%]	300										

Parameter

9.4 Serial Connection Parameter

[SIO パラメータ]		パラメータ4.
#		
4001	station addr	0
4002	Din size	16
4003	Dout size	16
4004	baud rate	0
4005	Tout (ini)	100
4006	(run)	5
4007		
4008		
4009		
4010		

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When the **PARAM** key is pushed, and the "SIO" menu selected, the "SIO parameter screen" as shown on the left will display.

Table 9.6 Serial Connection Parameter

#	Parameter	Description	Setting range (unit)	Initial value
4001	station addr	Sets the station address number (slave terminal number). When a sequencer serial link is not being used, set at 0.	0 to 8	0
4002	Din size	Sets the data size of the input data (host terminal - MR-P20). A maximum of 16 bytes (128 points) in 1 byte (8 point) units.	0 to 16	16
4003	Dout size	Sets the data size of the output data (host terminal - MR-P20). A maximum of 16 bytes (128 points) in 1 byte (8 point) units.	0 to 16	16
4004	baud rate	Sets the transmission speed. 0: 38400 BPS 1: 19200 BPS	0 to 1	0
4005	Tout (ini)	Sets the time out time from after the connection confirmation sequence to the end of the first normal sequence (input). Will not take time out when set at "0".	0 to 999 (0.1 sec)	100
4006	(run)	Sets the time out time from after output from the MR-P20 in the normal sequence to the completion of input.	0 to 999 (0.1 sec)	5

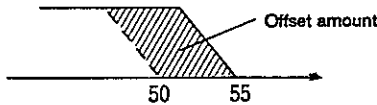
Parameter

9.5 Compensation Parameter [Special Specifications]

【補正パラメータ】			パラメータ4.		
#					
5001	D/H01	0.000	5011	D/H11	0.000
5002	D/H02	0.000	5012	D/H12	0.000
5003	D/H03	0.000	5013	D/H13	0.000
5004	D/H04	0.000	5014	D/H14	0.000
5005	D/H05	0.000	5015	D/H15	0.000
5006	D/H06	0.000	5016	D/H16	0.000
5007	D/H07	0.000	5017	D/H17	0.000
5008	D/H08	0.000	5018	D/H18	0.000
5009	D/H09	0.000	5019	D/H19	0.000
5010	D/H10	0.000	5020	D/H20	0.000

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Table 9.7 Compensation Parameter Table

#	Parameter	Description	Setting range (unit)	Initial value
5001 to 5020	D/H01 to D/H20	<p>Sets the offset amount of the tool length or tool position. Replaces the values set in the parameter screen for movement amount set in the program with the G43, G44, G45, G46, G47, G48 commands to an offset value.</p> <p>Example: Parameter #5001 = 5.000 Program G43 X50. H1 ;</p> <div style="text-align: center; margin-top: 10px;">  </div>	-999.999 to 999.999 [mm]	0

Relationship between Command Unit and Program Unit

10. Relationship between Command Unit and Program Unit

The unit of movement command (speed, movement amount etc.) will change according to the setting of the system parameter #1007 (command unit).

Standard setting is #1007 = 2.

Table 10.1 Relationship between Command Unit and Program unit

Command unit #1007		1	2	3
		0.01 mm	0.001 mm	0.0001 mm
Program movement command	Setting range with command having no decimal points	10 μm	1 μm	0.1 μm
		Setting range ± 8 digits 0 to ±99999999 (x 10 μm)	Setting range ± 8 digits 0 to ±99999999 (x 1 μm)	Setting range ± 8 digits 0 to ±99999999 (x 0.1 μm)
	Setting range with command having decimal points	mm	mm	mm
		Setting range ± 8 digits 0.00 to ±999999.99 mm	Setting range ± 8 digits 0.000 to ±99999.999 mm	Setting range ± 8 digits 0.0000 to ±9999.9999 mm
Movement amount per one manual pulse measure Step feed movement amount (Magnification x setting 1)		10 μm	1 μm	0.1 μm
Parameters related to amount of movement	Rough match output (Parameter #1013, 1014)	mm	mm	mm
		Setting range 0 to ±999999.99 mm	Setting range 0 to ±99999.999 mm	Setting range 0 to ±9999.9999 mm
	Amount of backlash compensation (Parameter #2009)	0 to 65000 pulses	0 to 65000 pulses	0 to 65000 pulses
		Soft limit (Parameter #2011, 2012)	mm	mm
	Setting range 0 to ±999999.99 mm		Setting range 0 to ±99999.999 mm	Setting range 0 to ±9999.9999 mm
	Reference point shift amount (Parameter #2015)	0 to 65000 pulses	0 to 65000 pulses	0 to 65000 pulses
	Dog extension (Parameter #2016)	0 to 65000 pulses	0 to 65000 pulses	0 to 65000 pulses
	Machine reference point position (Parameter #2019)	mm	mm	mm
Setting range 0 to ±999999.99 mm		Setting range 0 to ±99999.999 mm	Setting range 0 to ±9999.9999 mm	
No.2 reference point position (Parameter #2020)	mm	mm	mm	
	Setting range 0 to ±999999.99 mm	Setting range 0 to ±99999.999 mm	Setting range 0 to ±9999.9999 mm	
Electronic gear numerator (Parameter #2023)	1 to 32767 pulses	1 to 32767 pulses	1 to 32767 pulses	

Continued on the next page.

Relationship between Command Unit and Program Unit

Item		Command unit #1007			
		1	2	3	
		0.01 mm	0.001 mm	0.0001 mm	
Parameters related to amount of movement	Electronic gear denominator (Parameter #2024)	10 μ m	1 μ m	0.1 μ m	
		Setting range 1 to 32767 (x 10 μ m)	Setting range 1 to 32767 (x 1 μ m)	Setting range 1 to 32767 (x 0.1 μ m)	
	Maximum counter amount for infinite length positioning (Parameter #2025)	mm	mm	mm	
		Setting range 0 to 999999.99 mm	Setting range 0 to 99999.999 mm	Setting range 0 to 9999.9999 mm	
	Power breakage tolerable movement amount (Parameter #2026)	mm	mm	mm	
		Setting range 0 to 999999.99 mm	Setting range 0 to 99999.999 mm	Setting range 0 to 9999.9999 mm	
	Area signal output region (Parameter #2029 to #2036)	mm	mm	mm	
		Setting range 0 to 999999.99 mm	Setting range 0 to 99999.999 mm	Setting range 0 to 9999.9999 mm	
	Program speed command (Feed by minute G94)	Setting units with command having no decimal points	mm/min	mm/min	mm/min
			Setting range 1 to 999999 mm/min	Setting range 1 to 99999 mm/min	Setting range 1 to 9999 mm/min
Decimal point units for commands having decimal points		mm/min	mm/min	mm/min	
		Setting range 0.01 to 999999.99 mm/min	Setting range 0.001 to 99999.999 mm/min	Setting range 0.0001 to 9999.9999 mm/min	
Program speed command (Synchronous feed G95)	Setting units for commands having no decimal points	0.001 mm/rev	0.001 mm/rev	0.001 mm/rev	
		Setting range 1 to 9999999 (x 0.001 mm/rev)	Setting range 1 to 9999999 (x 0.0001 mm/rev)	Setting range 1 to 9999999 (x 0.00001 mm/rev)	
	Decimal point units for commands having decimal points	0.001 mm/rev	0.0001 mm/rev	0.00001 mm/rev	
		Setting range 0.001 to 9999.999 mm/rev	Setting range 0.0001 to 999.9999 mm/rev	Setting range 0.00001 to 99.99999 mm/rev	
JOG feed speed		mm/min	mm/min	mm/min	
		Setting range 0 to 30000 mm/min	Setting range 0 to 30000 mm/min	Setting range 0 to 30000 mm/min	
Parameters related to speed	Rapid traverse feed speed (Parameter #2003)	10 mm/min	1 mm/min	0.1 mm/min	
		Setting range 1 to 100000 (x 10 mm/min)	Setting range 1 to 100000 (x 1 mm/min)	Setting range 1 to 100000 (x 0.1 mm/min)	
	Reference point return feed speed (Parameter #2013)	10 mm/min	1 mm/min	0.1 mm/min	
		Setting range 1 to 100000 (x 10 mm/min)	Setting range 1 to 100000 (x 1 mm/min)	Setting range 1 to 100000 (x 0.1 mm/min)	

Continued on the next page.

Relationship between Command Unit and Program Unit

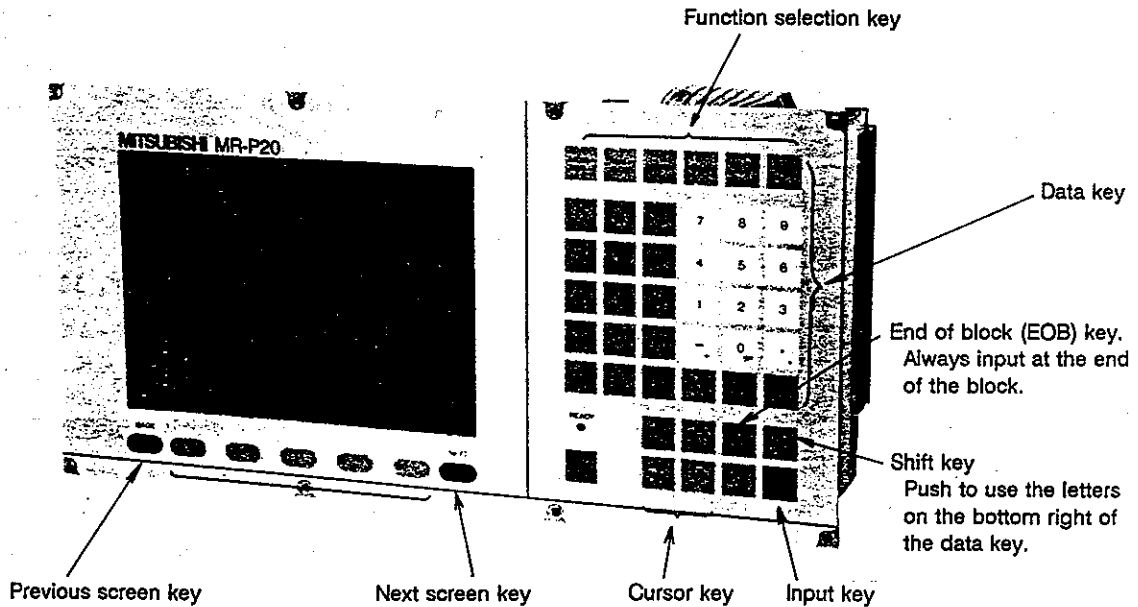
Item		Command unit #1007		
		1	2	3
		0.01 mm	0.001 mm	0.0001 mm
Parameters related to speed	Reference point return creep speed (Parameter #2014)	10 mm/min	1 mm/min	0.1 mm/min
		Setting range 1 to 60000 (x 10 mm/min)	Setting range 1 to 60000 (x 1 mm/min)	Setting range 1 to 60000 (x 0.1 mm/min)
Dwell	Setting units for commands having no decimal points	ms	ms	ms
		0 to 99999999 ms	0 to 99999999 ms	0 to 99999999 ms
	Decimal point units for commands having decimal points	s	s	s
		0 to 99999.999 s	0 to 99999.999 s	0 to 99999.999 s
Parameters related to time	Acceleration/deceleration constant 1 (Parameter #2006)	ms	ms	ms
	Acceleration/deceleration constant 2 (Parameter #2007)			

Note. Parameters with a (pulse) setting range, will not be affected by parameter #1007. The setting range will not change.

CRT Screen

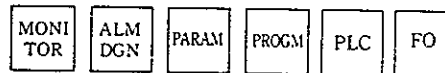
Appendix 1. CRT Screen







The creation of each monitor and program and setting of parameter data is done with the CRT operation panel. The following is the structure of the MR-P20CRT.



(1) Function selection key (selection of the screen)

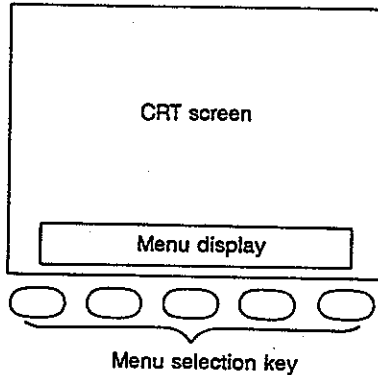
These are the keys to select the CRT screens:



- | | |
|---|--|
|  | Screen to monitor the position display of each axis and operation state of the execution program display. |
|  | Screen for alarm display, servo diagnosis and I/F diagnosis. |
|  | Screen for parameter display and setting. |
|  | Screen for creating and editing programs, and input/output operations of the I/C card. |
|  | Display and setting of the PLC parameter.
(Valid only when PLC specifications are built-in.) |
|  | The IC card (MR-P20SW02) for on board PLC, ladder creation, editing screen and PLC development is necessary. |

CRT Screen

(2) Menu key



The screen selected with the function key is divided into smaller screens (sub-screens). The menu key selects the sub-menu screen from the menus displayed on the lower part of the CRT screen.

The contents of the menu will differ according to the screen.

(3) Last screen, next screen key

When one screen is made up of several screens, the next page is selected with the next screen key, and the last screen key will be the back screen key.

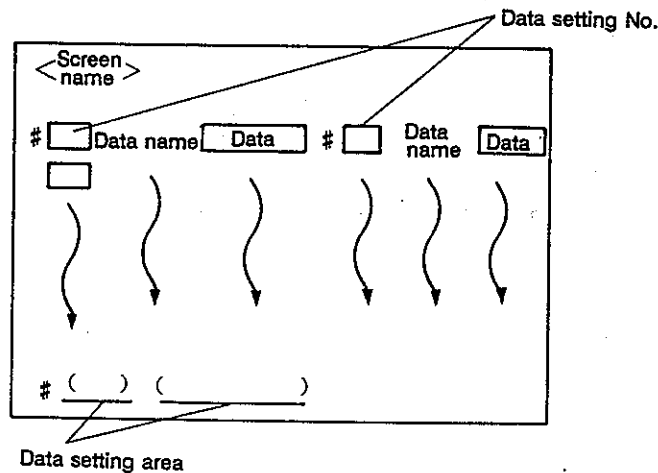
(4) Cursor key

The key moves the cursor up and down.

The key moves the cursor left and right.

The data is set in the position where the cursor is flashing.

(5) Basic operation of data setting



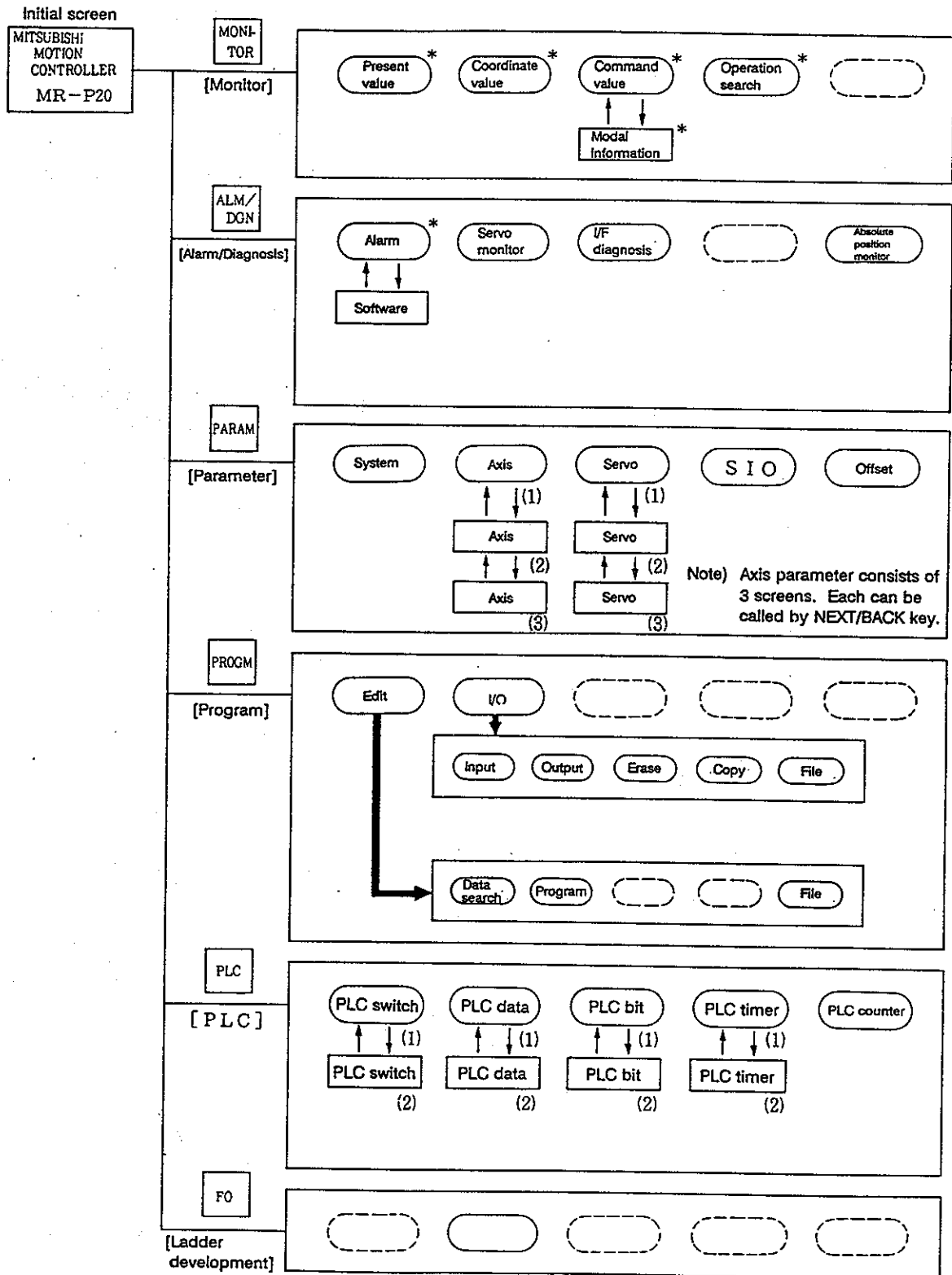
Input the setting number of the data you wish to set in # ().

Move the cursor to the right (), and input the new data.

Push , and the new data will be written into the specified setting number.

CRT Screen

(6) Screen configuration



- Note 1. For * mark, screen display differs at 2 axes independent operation.
 2. For ladder development, refer to the separate operation manual II "Built-in sequencer (PLC) programming manual".

List for Parameter Setting Values

Appendix 2. List for Parameter Setting Values

1. Parameter Systems

#	Abbreviation	Name	Initial value	Unit	Setting range	User Setting Column
1001	sysno	2 axes simultaneous control, independent control selection	0		0, 1	
1002	axnoi	Number of axis	1		0, 1	
1005	plctyp	PLC type	0		0, 1, 2, 3	
1006	inch	Unit (mm, inch)	0		0, 1	
1007	unit	Command unit	2		1, 2, 3	
1009	hand10	Handic feed acceleration/deceleration valid	0		0, 1	
1013	Rinps1	Rough match output 1	0	mm	0 to 99999.999	
1014	Rinps2	Rough match output 2	0	mm	0 to 99999.999	
1015	PLaxis	Synchronous (layered) axis designation	0		0, 1	
1016	PLsft	Synchronous operation shift amount	0	mm	0 to 99999.999	
1017	PLEG1	Synchronous encoder electronic gear 1	1		1 to 32767	
1018	PLEG2	Synchronous encoder electronic gear 2	1		1 to 32767	
1019	PLdly	Sensor signal delay time	0	ms	0 to 5000	
1020	PLdir	Synchronous encoder rotation direction	0		0, 1	
1021	R0unit	Coordinate value output unit	1		1 to 65535	

Note: The parameters in the colored part become valid when the power is turned OFF - ON.

2. Axis Parameter

#	Abbreviation	Name	Initial value	Unit	Setting range	User Setting Column
2001	axname	Axis name	X, Y		X, Y, Z, U, V, W, A, B, C	
2003	Hspeed	Rapid traverse feed speed	1000	mm/min*	1 to 100000	
2005	smgtyp	Acceleration/deceleration type	0		0, 1	
2006	tc1	Acceleration/deceleration time constant 1 (low speed feed)	100	ms	1 to 5000	
2007	tc2	Acceleration/deceleration time constant 2 (rapid traverse feed)	200	ms	1 to 30000	
2009	bklash	Amount of backlash compensation	0	pulse	0 to 65000	
2010	noimt	Soft limit invalid	1		0, 1	
2011	slmt-	Soft limit ⊖	0	mm*	-99999.999	
2012	slmt+	Soft limit ⊕	0	mm*	to +99999.999	
2013	G28rap	Reference point return feed speed	1000	mm/min*	1 to 100000	
2014	G28crp	Reference point return creep speed	100	mm/min*	1 to 60000	
2015	G28sft	Reference point shift distance	0	pulse	0 to 65000	
2016	dogext	Dog extension	0	pulse	0 to 65000	
2019	zpos1	Machine reference point position (No.1 reference point)	0	mm*	-99999.999 to 99999.999	
2020	zpos2	No.2 reference point position	0	mm*		
2022	axcont	Axis control flag	0000	HEX	0 to FFFF	

Continued on the next page.

List for Parameter Setting Values

#	Abbreviation	Name	Initial value	Unit	Setting range	User Setting Column
2023	EG1	Electronic gear (numerator)	1	pulse	1 to 32767	
2024	EG2	Electronic gear (denominator)	1	μm*	1 to 32767	
2025	ctmax	Maximum amount of infinite length positioning counter	0	mm*	0 to 99999.999	
2026	abslmt	Power breakage tolerable movement amount	0	mm*	0 to 99999.999	
2027	tc3	Unsymmetrical acceleration/deceleration time constant (acceleration)	200	ms	0 to 30000	
2028	tc4	Unsymmetrical acceleration/deceleration time constant (deceleration)	200	ms	0 to 30000	
2029	lmt1-	Limit signal output region	0	mm*	-99999.999 to 99999.999	
2030	lmt1+		0	mm*		
2031	lmt2-		0	mm*		
2032	lmt2+		0	mm*		
2033	lmt3-	0	mm*			
2034	lmt3+	0	mm*			
2035	lmt4-		0	mm*		
2036	lmt4+		0	mm*		

Note 1. The units with a * will change according to the command unit (system parameter #1007). The units in the chart are for #1007 = 2 (0.001 mm).

2. The parameters in the colored part become valid when the power is turned OFF - ON.

3. Servo Parameter

#	Abbreviation	Name	Initial value	Unit	Setting range	User Setting Column
3001	STY	Servo type	0000	HEX	0000 to FFFF	
3002	MSR	Motor series	0		0, 1, 2, 3	
3003	MTY	Motor rating	0		13 to 702	
3004	ENC	Detector type	0		0, 1, 2, 3	
3005	INP	In position range	100	pulse	0 to 32767	
3006	PGN	Position loop gain	25	S ⁻¹	5 to 150	
3007	VGN	Speed loop gain	100		20 to 2000	
3008	VIC	Speed integral compensation	20	ms	1 to 1000	
3009	TLP	Torque limit value ⊕	300	%	1 to 500	
3010	TLN	Torque limit value ⊖	300	%	1 to 500	

Note: The parameters in the colored part become valid when the power is turned OFF - ON.

4. Serial Connection Parameter

#	Abbreviation	Name	Initial value	Unit	Setting range	User Setting Column
4001	station add	Station address number	0		0 to 8	
4002	Din size	Input data size	16		0 to 16	
4003	Dout size	Output data size	16		0 to 16	
4004	baud rate	Transmission speed	0		0 to 1	
4005	Tout (ini)	Time out time (sequence finished)	100	0.1 s	0 to 999	
4006	(run)	Time out time (input finished)	5	0.1 s	0 to 999	

List for Parameter Setting Values

5. Revision Parameter

#	Abbreviation	Name	Initial value	Unit	Setting range	User Setting Column
5001	D/H01	Offset amount (the same follows)	0	mm	-999.999 to 999.999 (the same follows)	
5002	D/H02		0	mm		
5003	D/H03		0	mm		
5004	D/H04		0	mm		
5005	D/H05		0	mm		
5006	D/H06		0	mm		
5007	D/H07		0	mm		
5008	D/H08		0	mm		
5009	D/H09		0	mm		
5010	D/H10		0	mm		
5011	D/H11		0	mm		
5012	D/H12		0	mm		
5013	D/H13		0	mm		
5014	D/H14		0	mm		
5015	D/H15		0	mm		
5016	D/H16		0	mm		
5017	D/H17		0	mm		
5018	D/H18		0	mm		
5019	D/H19		0	mm		
5020	D/H20		0	mm		

Note: The parameters in the colored part are validated when the power is turned OFF - ON.

Standard Machine Interface for 2-axes Independent Operation

Appendix 3. Standard Machine Interface for 2-axes Independent Operation

With the system parameter for 2-axes independent operation #1001 sysno=1, when #1005 plctyp = 2 is selected, the standard machine interface for 2-axes independent control can be used.

When 2-axes independent control is set, the CRT screen monitor screen and alarm screen will display for each individual axis. However, the operation methods are the same as for 2-axes synchronous control.

(1) Machine input interface

	7	6	5	4	3	2	1	0	
X0	Automatic start II	Automatic start I	Operation mode II 2	Operation mode II 1	Operation mode II 0	Operation mode I 2	Operation mode I 1	Operation mode I 0	- Signal name
	6	38	23	5	37	22	4	36	- DIO module CMD12 pin No.
X8	DWS2-I 8	DWS2-I 4	DSW2-I 2	DWS2-I 1	DWS1-I 8	DWS1-I 4	DWS1-I 2	DWS1-I 1	
	21	3	35	20	2	34	19	1	
X10	FV1 II	FV0 I	FV1 II	FV0 I	Single block II	Single block I	Interlock II	Interlock I	
	44	28	11	43	27	10	42	26	
X18	*Temporary stop II	*Temporary stop I	Override II 1	Override II 0	Override I 1	Override I 0	*Near point dog II	*Near point dog I	
	9	41	8	40	25	7	39	24	
X20	*Emergency stop	Machine lock I, II	M finished II	M finished I	Manual axis start -II	Manual axis start -I	*Stroke end -II	*Stroke end -I	
	50	17	49	16	48	32	15	47	
X28	Reset II	Reset I	External search II	External search I	Manual axis start +II	Manual axis start +I	*Stroke end +II	*Stroke end +I	
	31	14	46	30	13	45	29	12	

Note 1. In the signal name's I displays axis No. 1, II axis No.2.

2. The signal for * items is the b contact point.

3. The logic of the operation mode and override signals is the same as that found on 4.5. The override is common to rapid traverse feed and low speed feed, and can be selected from 1, 25, 50 and 100%.

4. The manual feed speed is selected with FV0 and FV1 in units of 100, 1000, 5000, 10000 mm/min. The logic is the same as the override and is 100 mm/min with both ON.

5. The BCD input signal for the program number is limited to 2 digits. X08 to X0F are used for both axis No.1 and axis No.2.

Standard Machine Interface for 2-axes Independent Operation

(2) Machine output interface

	7	6	5	4	3	2	1	0	
X0	Temporary stop activated I	Automatic start activated I	Operation error I	Alarm I	Mechanical brake released I	Arrival at zero point I	Servo preparation finished I	P20 preparation finished I	- Signal name -DIO module CFD13 pin No.
	6	38	23	5	37	22	4	36	
X8	Temporary stop activated II	Automatic start activated II	Operation error II	Alarm II	Mechanical brake released II	Arrival at zero point II	Servo preparation finished II	P20 preparation finished II	
	21	3	35	20	2	34	19	1	
X10	External search error I	Movement finished I	External search finished I	M code output I	M code data I 8	M code data I 4	M code data I 2	M code data I 1	
	44	28	11	43	27	10	42	26	
X18	External search error II	Movement finished II	External search finished II	M code output II	M code data II 8	M code data II 4	M code data II 2	M code data II 1	
	9	41	8	40	25	7	39	24	

- Note 1. The signal name's I displays axis No.1, II axis No.2.
 Note 2. The M Code BCD output is limited to 1 digit per axis.