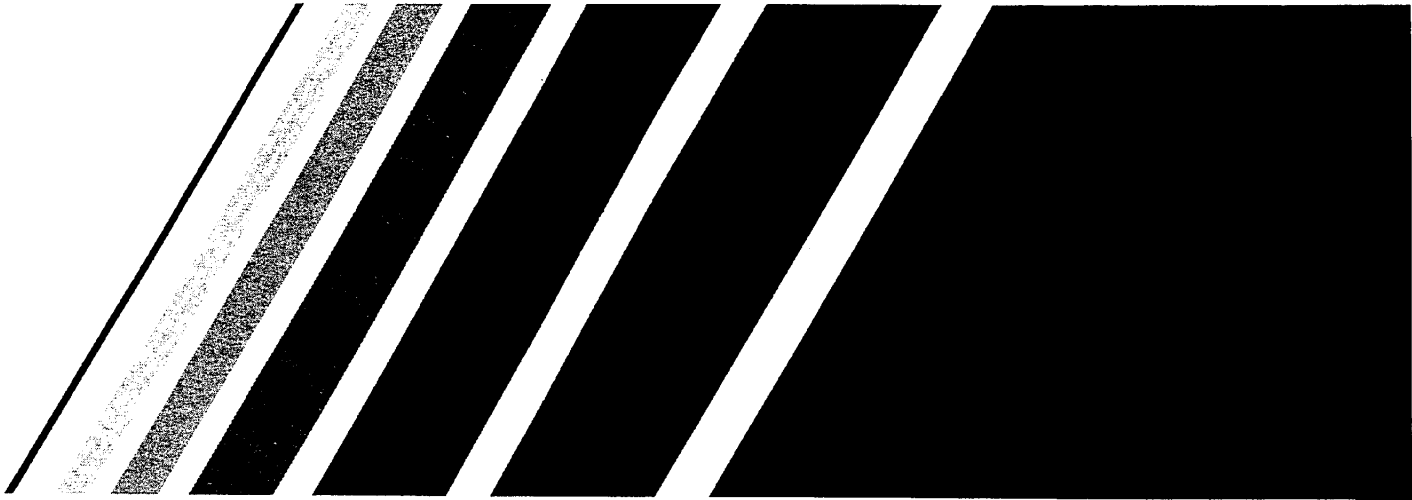
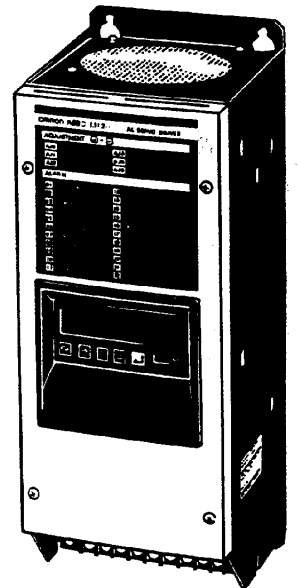


Cat. No. I511-E1-2

OMRON



USER'S MANUAL

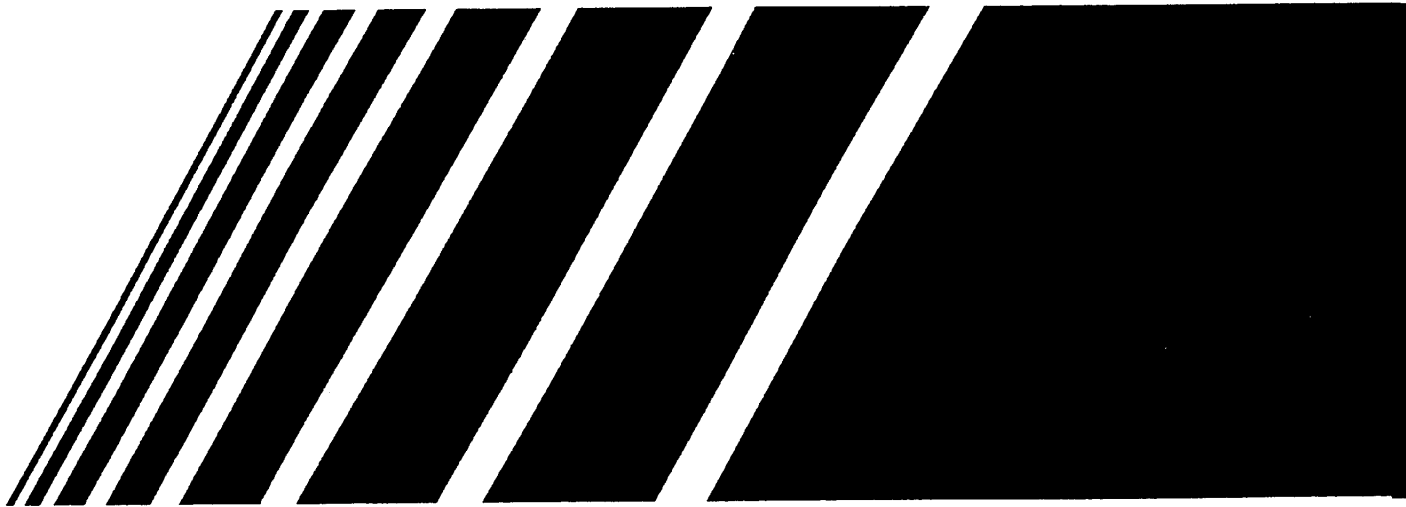


OMNUC M SERIES

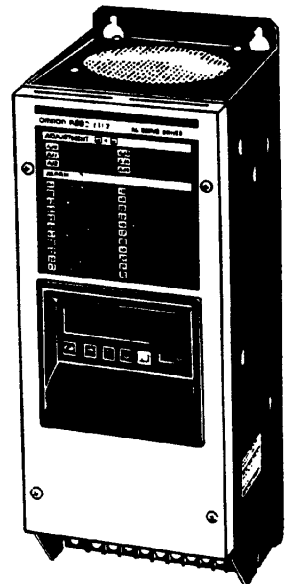
MODEL :R88D-MT10/-MT20/-MT50/-MT80/-MT150

AC SERVO DRIVER

OMRON



USER'S MANUAL



OMNUC M SERIES

MODEL :R88D-MT10/-MT20/-MT50/-MT80/-MT150

AC SERVO DRIVER

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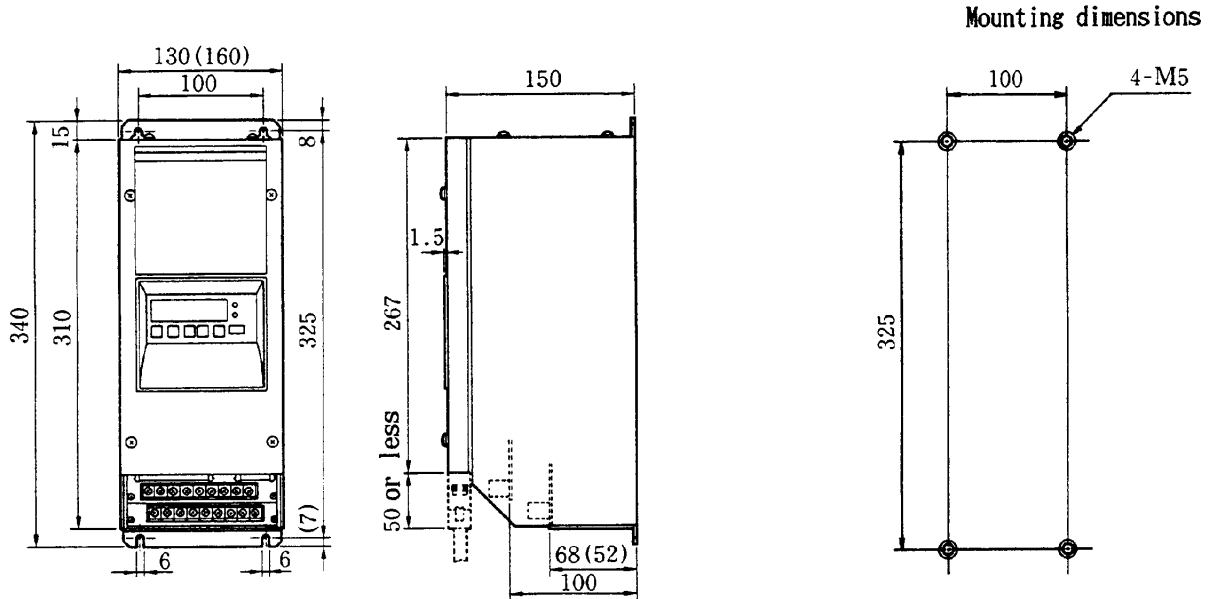
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CHAPTER1 DESIGN INFORMATION

1.1 External dimensions

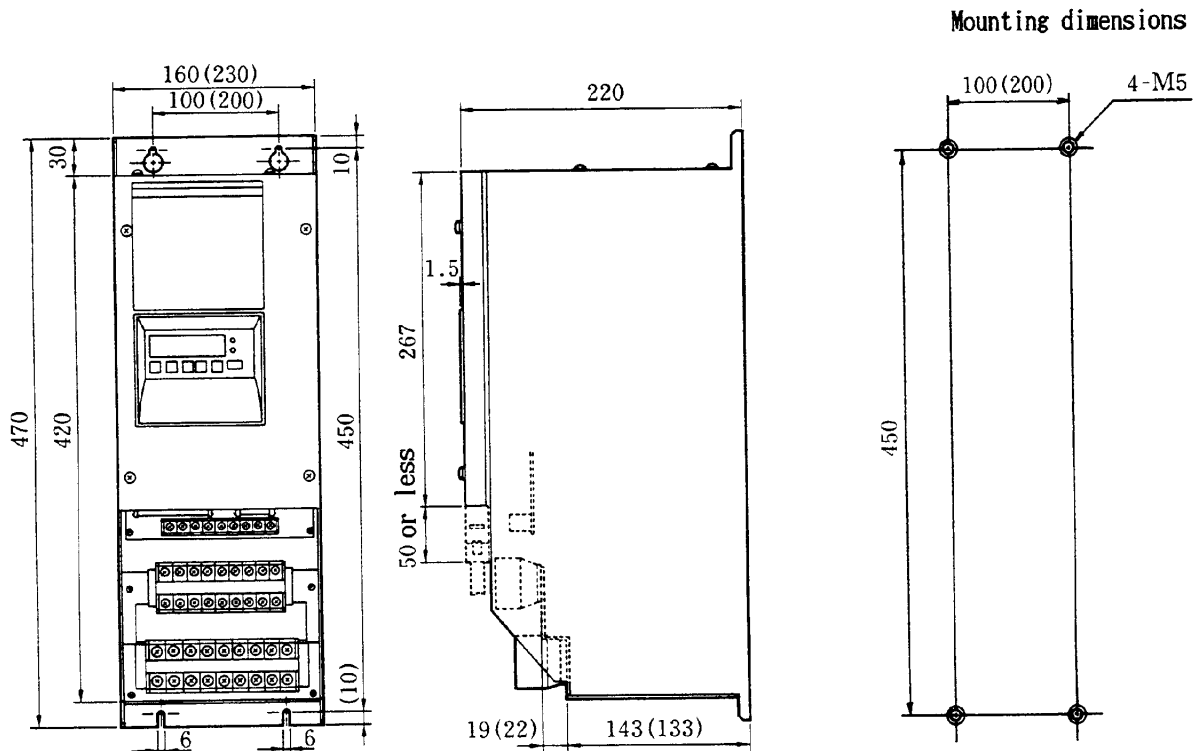
■ AC servo drivers

• Model R88D-MT10/MT20/MT50



Note: The dimensions in parentheses () are for the R88D-MT50.

• Model R88D-MT80/MT150

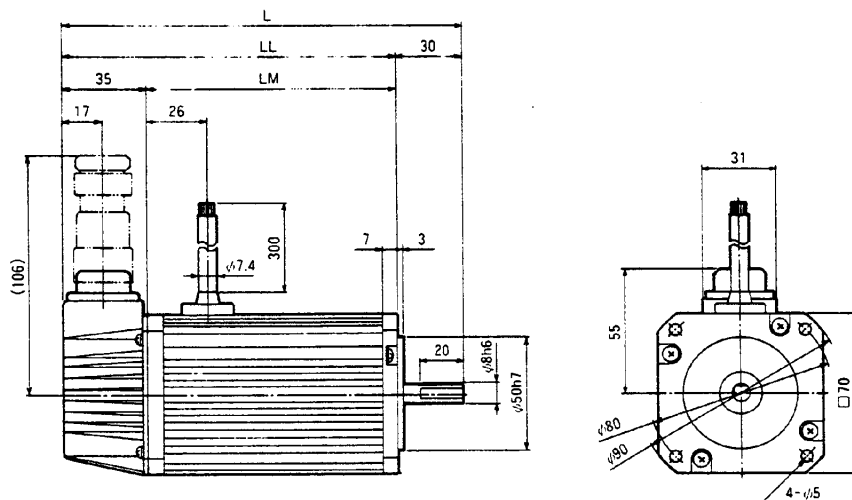


Note: The dimensions in parentheses () are for the R88D-MT150.

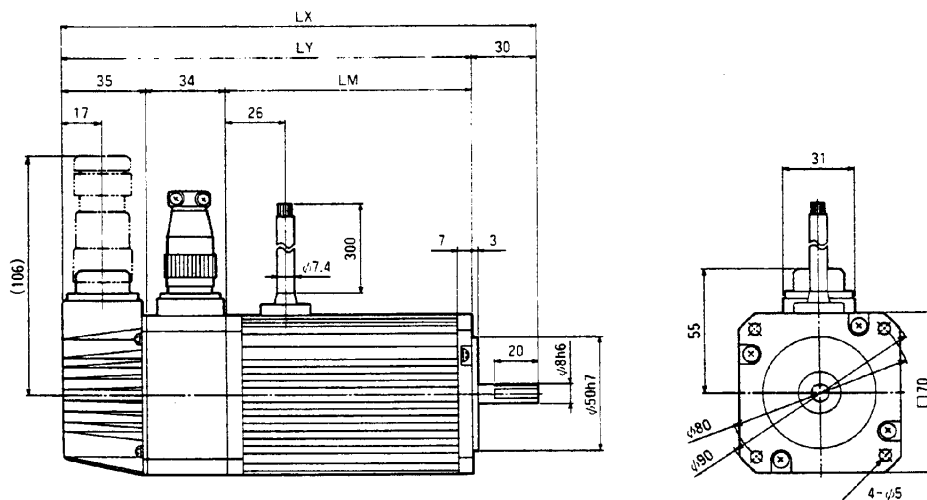
CHAPTER1 DESIGN INFORMATION

■ AC servo motors

- 60/120 W (4000 r/min) Standard Model R88M-M06040/M12040

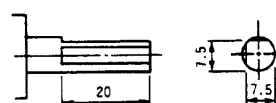


- 60/120 W (4000 r/min) With brake Model R88M-M06040-B/M12040-B



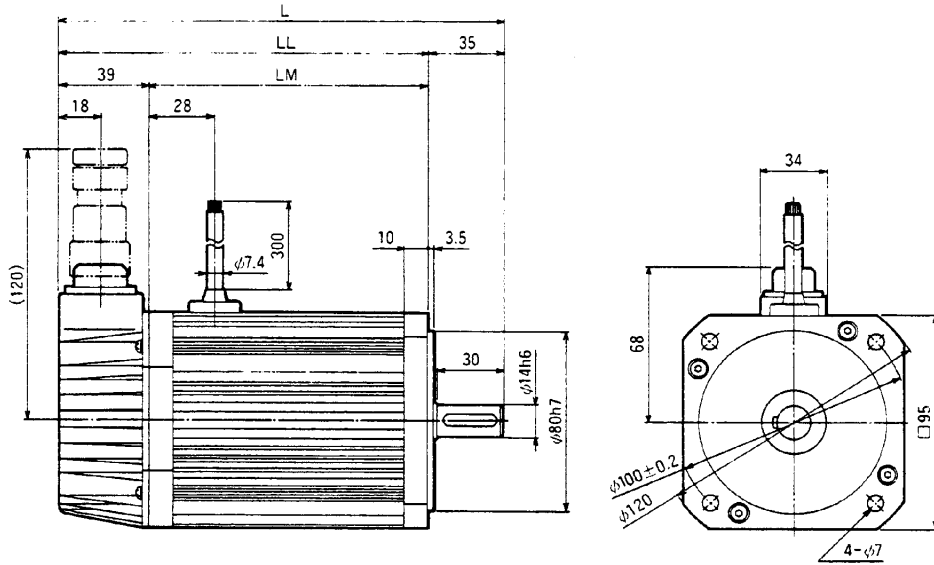
Model	L	LL	LM	LX	LY
R88M-M06040(-B)	150	120	85	184	154
R88M-M12040(-B)	175	145	110	209	179

Shaft end dimensions

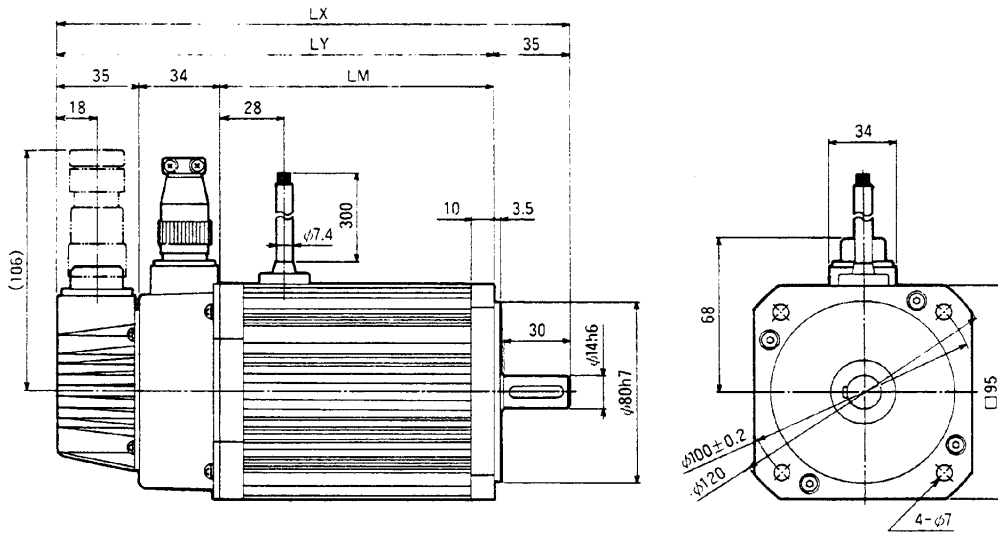


CHAPTER 1 DESIGN INFORMATION

• 200 W (2000 r/min), 200/400 W (4000 r/min) Standard Model R88M-M20020/M20040/M40040

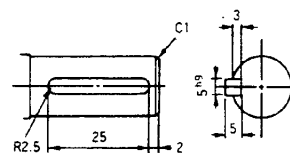


• 200 W (2000 r/min), 200/400 W (4000 r/min) With brake Model R88M-M20020-B/M20040-B/M40040-B



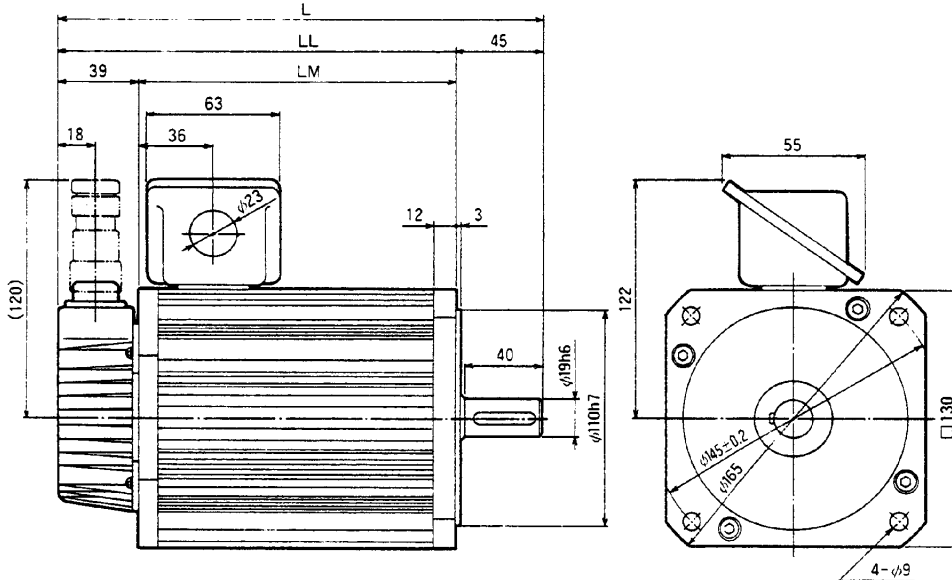
Model	L	LL	LM	LX	LY
R88M-M20020(-B)	166	131	92	196	161
R88M-M20040(-B)	196	161	122	226	191
R88M-M40040(-B)					

Shaft end dimensions

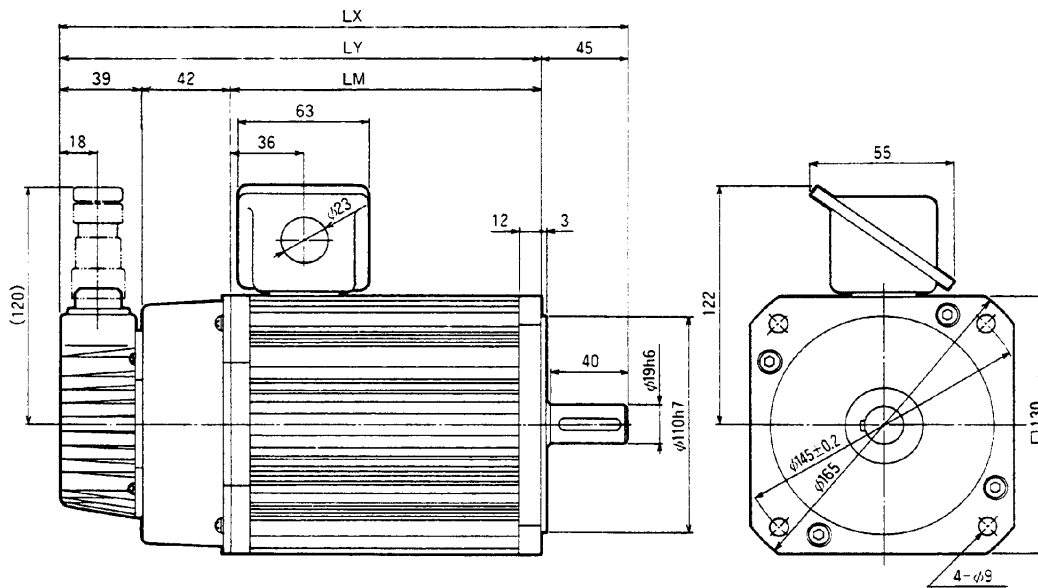


CHAPTER1 DESIGN INFORMATION

- 200/400/700 W (1200 r/min) Standard Model R88M-M20012/M40012/M70012
- 400/700/1100 W (2000 r/min) Standard Model R88M-M40020/M70020/M1K120
- 700/1100/2000 W (4000 r/min) Standard Model R88M-M70040/M1K140/M2K040

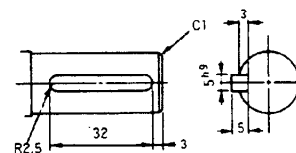


- 200/400/700 W (1200 r/min) With brake Model R88M-M20012-B/M40012-B/M70012-B
- 400/700/1100 W (2000 r/min) With brake Model R88M-M40020-B/M70020-B/M1K120-B
- 700/1100/2000 W (4000 r/min) With brake Model R88M-M70040-B/M1K140-B/M2K040-B



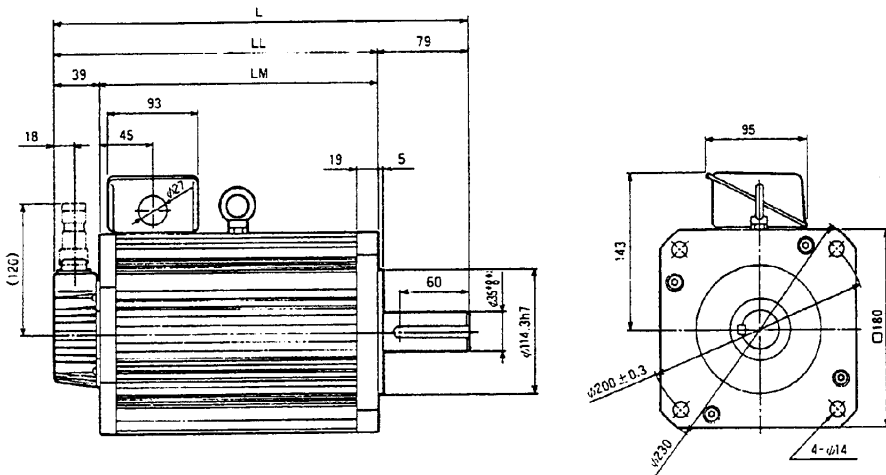
Model	L	LL	LM	LX	LY
R88M-M20012(-B)	240	195	156	282	237
R88M-M40020(-B)					
R88M-M70040(-B)					
R88M-M40012(-B)	275	230	191	317	272
R88M-M70020(-B)					
R88M-M1K140(-B)	345	300	261	387	342
R88M-M70012(-B)					
R88M-M1K120(-B)					
R88M-M2K040(-B)					

Shaft end dimensions

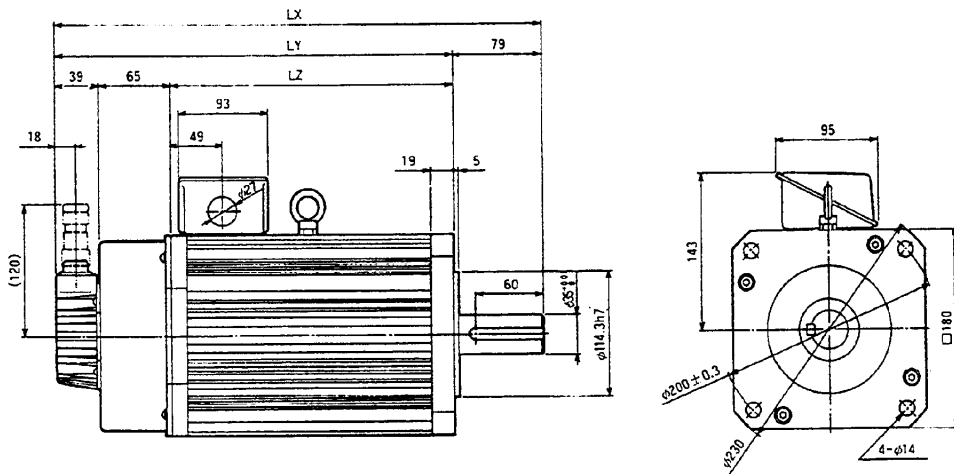


CHAPTER 1 DESIGN INFORMATION

- 1100/1400/1800/2600 W (1200 r/min) Standard Model R88M-M1K112/M1K412/M1K812/M2K612
- 1800/2200/3000/4200 W (2000 r/min) Standard Model R88M-M1K820/M2K220/M3K020/M4K220
- 3000/3800/5000/6400 W (4000 r/min) Standard Model R88M-M3K040/M3K840/M5K040/M6K440

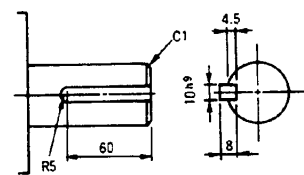


- 1100/1400/1800/2600 W (1200 r/min) With brake Model R88M-M1K112-B/M1K412-B/M1K812-B/M2K612-B
- 1800/2200/3000/4200 W (2000 r/min) With brake Model R88M-M1K820-B/M2K220-B/M3K020-B/M4K220-B
- 3000/3800/5000/6400 W (4000 r/min) With brake Model R88M-M3K040-B/M3K840-B/M5K040-B/M6K440-B



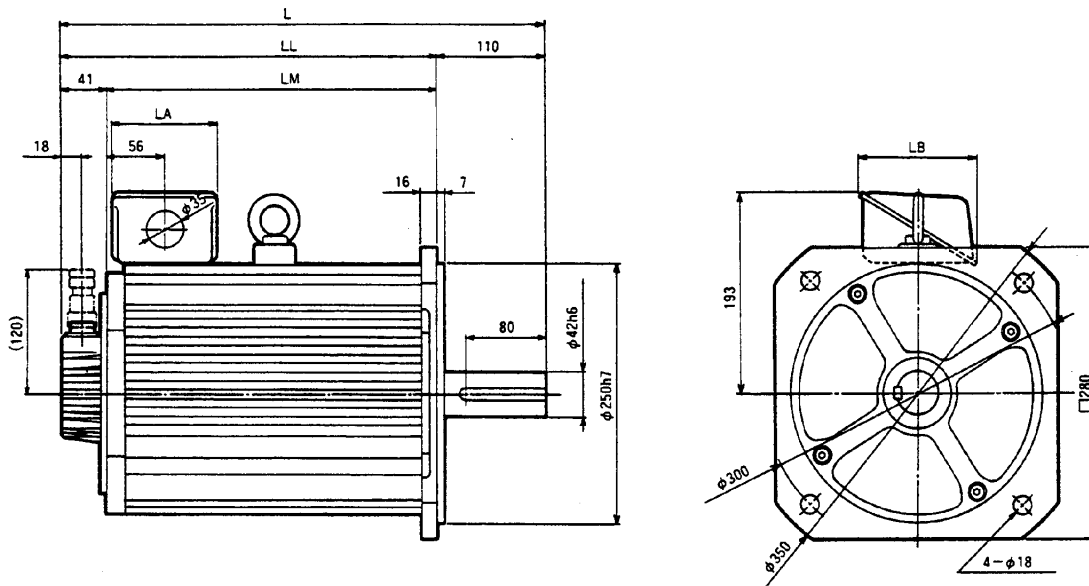
Model	L	LL	LM	LX	LY	LZ
R88M-M1K112(-B)	370	291	252	439	360	256
R88M-M1K820(-B)						
R88M-M3K040(-B)						
R88M-M1K412(-B)	400	321	282	469	390	286
R88M-M2K220(-B)						
R88M-M3K840(-B)						
R88M-M1K812(-B)	460	381	342	529	450	346
R88M-M3K020(-B)						
R88M-M5K040(-B)						
R88M-M2K612(-B)	560	481	442	629	550	446
R88M-M4K220(-B)						
R88M-M6K440(-B)						

Shaft end dimensions

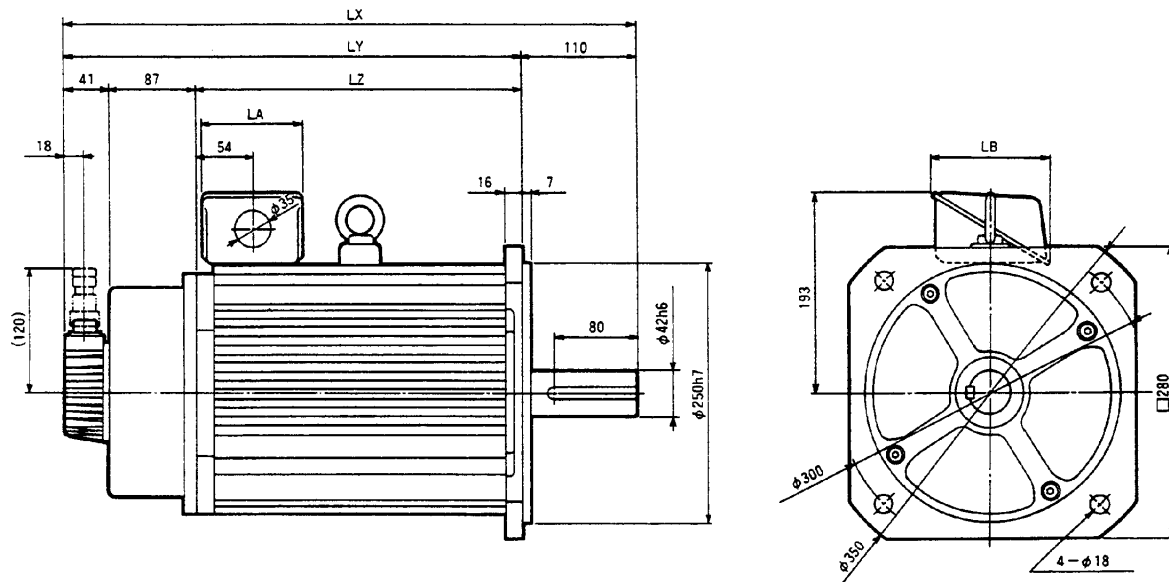


CHAPTER1 DESIGN INFORMATION

- 4000/4800/6200 W (1200 r/min) Standard Model R88M-M4K012/M4K812/M6K212
- 7200 W (2000 r/min) Standard Model R88M-M7K220

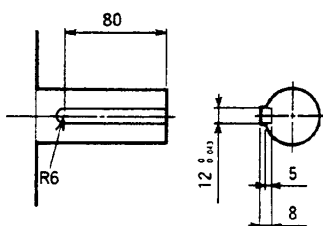


- 4000/4800/6200 W (1200 r/min) With brake Model R88M-M4K012-B/M4K812-B/M6K212-B
- 7200 W (2000 r/min) With brake Model R88M-M7K220-B



Model	L	LL	LM	LX	LY	LZ	LA	LB
R88M-M4K012(-B)	480	370	329	565	455	327	103	120
R88M-M4K812(-B)	530	420	379	615	505	377		
R88M-M7K220(-B)	598	488	447	683	573	445	123	145
R88M-M6K212(-B)								

Shaft end dimensions



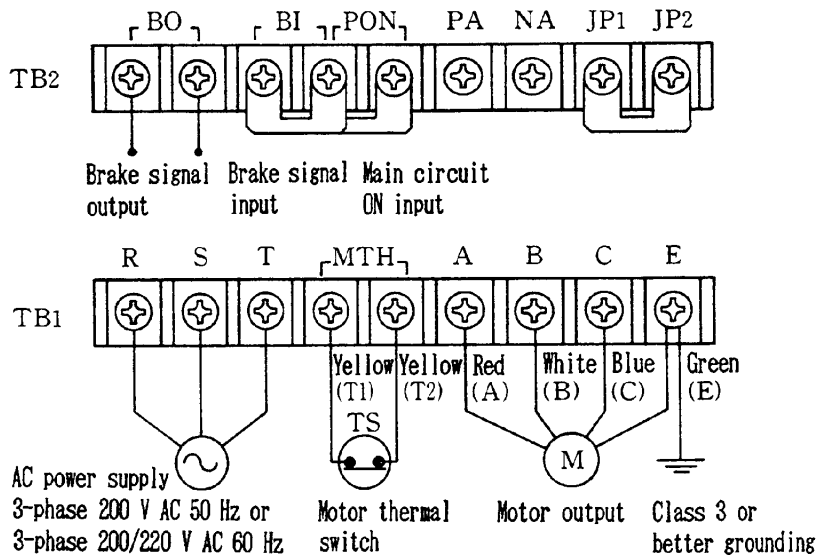
CHAPTER 1 DESIGN INFORMATION

1.2 Terminal connections

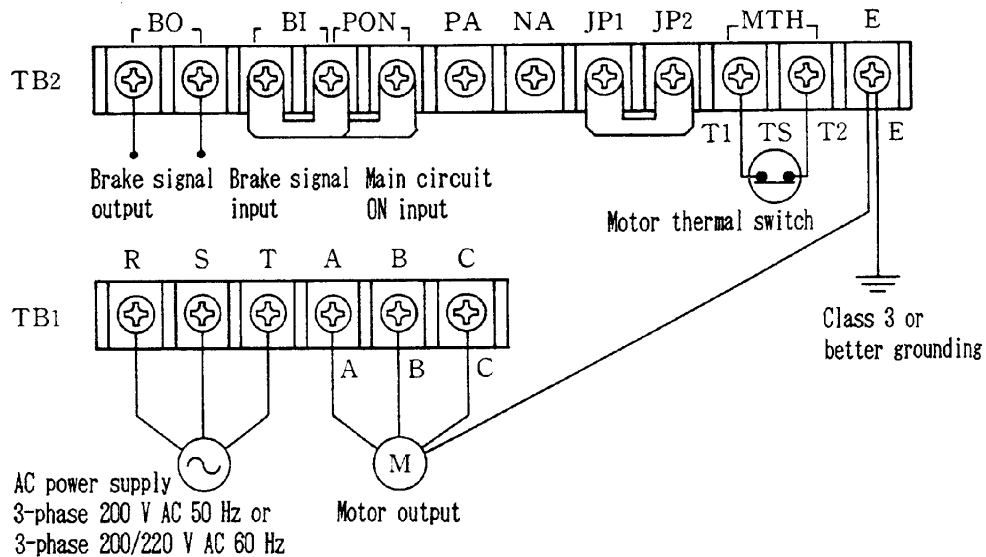
When connecting the terminals, use the specified wire diameter, grounding method, and noise prevention measures.

Terminal wiring method

• Model R88D-MT10/MT20/MT50/MT80



• Model R88D-MT150



Note: The unit is shipped from the factory with the connections shown in the figure.
(Shorting bars are connected between BI and PON and between JP1 and JP2.)

CHAPTER 1 DESIGN INFORMATION

Terminal specifications

Terminal symbol	Name	Function
BO	Brake signal output	This output operates the contactor used with a dynamic brake or a solenoid brake. One phase of the input AC power supply is output.
BI	Brake signal input	This input is for confirming the operation of the contactor used with a dynamic brake or solenoid brake. Make sure the shorting bar is installed when this input is not in use. See Note 1 below.
PON	Main circuit ON input	This input operates the main circuit contactor (*) from an external circuit. Make sure the shorting bar is installed when this input is not in use. See Note 1 below.
PA NA	Main circuit power supply	These are the check terminals for the main circuit DC power supply output. The voltage should be in the range from 250 to 340 V DC.
JP1 JP2	Regeneration resistance selection terminals	An external resistor should be connected between PA and JP1 when the regeneration energy is large. Remove the shorting bar if you connect the external resistor.
R S T	AC power input	Commercial 3-phase 220 V AC, 50 Hz or 3-phase 200/220 V AC, 60 Hz power supply input. When there is a ground phase in the power supply, connect the S terminal to the ground phase.
MTH	Motor thermal switch	Connect the contacts of the motor thermal switch (wire color: yellow or symbols T1 and T2) to these terminals.
A B C	Motor power lines	Connect the motor drive wires to these terminals. Make sure the connections to these terminals are correctly made. A: Motor drive wire color - Red B: Motor drive wire color - White C: Motor drive wire color - Blue (When the core diameter of the motor drive wires is more than 3.2 mm ² , the wire colors are all black. Make the connections according to the symbols marked on the wire sheaths.)
E	Ground	This is the chassis ground of the servo driver. Connect this terminal to the ground terminal of the motor (the green colored wire or the ground screw in the terminal box). For noise prevention and safety, make sure to connect to a Class 3 ground or better. See Note 2 below.

* The main circuit contactor is the contactor built into the driver.

Note 1: 24 V DC is output at the center terminal between BI and PON. The unit will be damaged if this terminal is connected to other power supplies or to the frame ground FG.

Note 2: Connect the motor ground directly to the driver ground. If these terminals are not connected, the motor shaft will vibrate.

CHAPTER 1 DESIGN INFORMATION

■ Wire diameters for terminal connections

The nominal diameters of the terminal screws and the recommended wire diameters are given in the following table.

Terminal symbol	Name	Item	Model R88D- servo driver				
			MT10	MT20	MT50	MT80	MT150
BO	Brake signal output	Wire diameter	1.25				
		Nominal screw diameter	M4			M5	
BI	Brake signal input	Wire diameter	1.25				
		Nominal screw diameter	M4			M5	
PON	Main circuit ON input	Wire diameter	1.25				
		Nominal screw diameter	M4			M5	
JP1, PA	External regeneration resistance connection	Wire diameter	2				
		Nominal screw diameter	M4			M5	
R, S, T	AC power supply input	Wire diameter	2	3.5	8	14	
		Nominal screw diameter	M4			M5	M6
MTH	Motor thermal switch	Wire diameter	1.25				
		Nominal screw diameter	M4			M5	
A, B, C	Motor drive terminals	Wire diameter	See Table 1 for the wire diameters of the drive lines for different motor types.				
		Nominal screw diameter	M4			M5	M6
E	Ground	Wire diameter	See Table 1 for the wire diameters of the drive lines for different motor types.				
		Nominal screw diameter	M4			M5	

Note 1: The wire diameter units are mm^2 .

Note 2: The wire diameters given above are values for heat-resistant PVC wire (HIV, 105°C) used at an ambient temperature of 55°C.

Table 1. Wire diameters of the drive lines

1200 r/min series

2000 r/min series

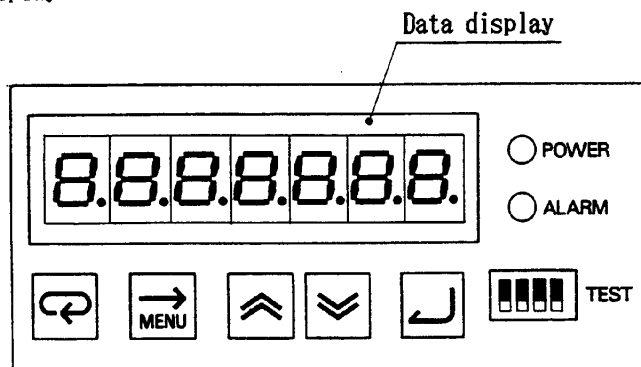
4000 r/min series

Model R88M- servo motor	Wire diameter		Model R88M- servo motor	Wire diameter		Model R88M- servo motor	Wire diameter	
	mm^2	AWG		mm^2	AWG		mm^2	AWG
M20012(-B)	1.25	AWG16	M20020(-B)	0.75	AWG18	M06040(-B)	0.75	AWG18
M40012(-B)	1.25	AWG16	M40020(-B)	1.25	AWG16	M12040(-B)	0.75	AWG18
M70012(-B)	1.25	AWG16	M70020(-B)	1.25	AWG16	M20040(-B)	0.75	AWG18
M1K112(-B)	2	AWG14	M1K120(-B)	1.25	AWG16	M40040(-B)	0.75	AWG18
M1K412(-B)	2	AWG14	M1K820(-B)	3.5	AWG12	M70040(-B)	1.25	AWG16
M1K812(-B)	2	AWG14	M2K220(-B)	3.5	AWG12	M1K140(-B)	1.25	AWG16
M2K612(-B)	3.5	AWG12	M3K020(-B)	3.5	AWG10	M2K040(-B)	3.5	AWG12
M4K012(-B)	5.5	AWG10	M4K220(-B)	5.5	AWG10	M3K040(-B)	3.5	AWG10
M4K812(-B)	5.5	AWG10	M7K220(-B)	8	AWG 8	M3K840(-B)	5.5	AWG10
M6K212(-B)	8	AWG 8				M5K040(-B)	5.5	AWG10
						M6K440(-B)	8	AWG 8

CHAPTER2 OPERATION

2.1 Operating console display and display contents

Operating console display



Symbol	Name	Function
(Numeric display)	Data display	Displays parameters or operating status.
POWER (Green)	Power supply lamp	Lights when the control power supply is normal.
ALARM (Red)	Alarm lamp	Lights when CPU operation is abnormal.
	Mode key	Changes the mode.
	Menu key	Changes the data display within the same mode.
	Increment key	Increments the value when inputting data.
	Decrement key	Decrements the value when inputting data.
	Enter key	Confirms the entered value when inputting data. Also functions as the Reset key (see Note 1).
TEST	Test key	Used for checking the operation of the motor and the driver.

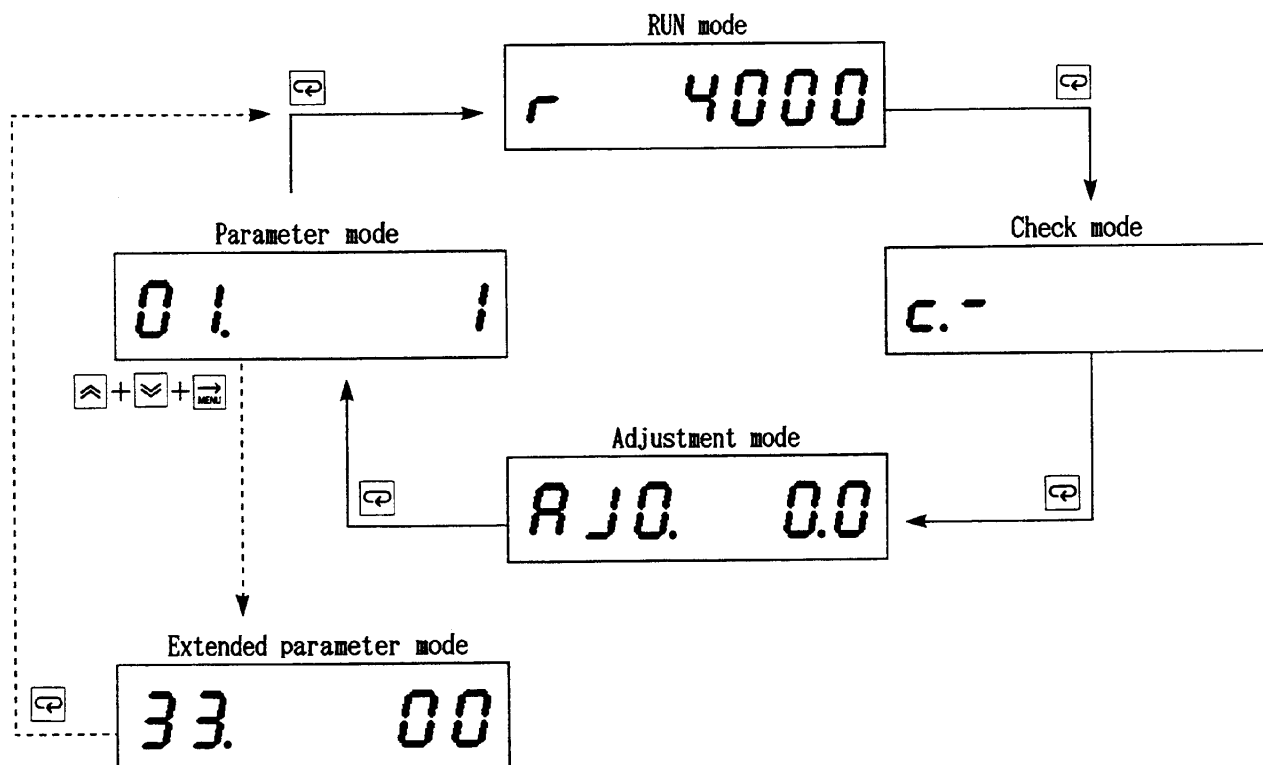
Note 1: The Enter key functions as the Reset key only when an alarm condition is indicated on the data display.

Types of modes

Mode	Function
RUN mode	Displays the operating status, such as the speed, the current value, and the accumulated number of pulses.
Check mode	Displays the status of the input and output signals and alarm information.
Adjustment mode	Used for making gain and zero adjustments.
Parameter mode	Used to set parameters during normal operation.
Extended parameter mode	Used to set the input and output functions and signal levels.

CHAPTER 2 OPERATION

Mode selection method

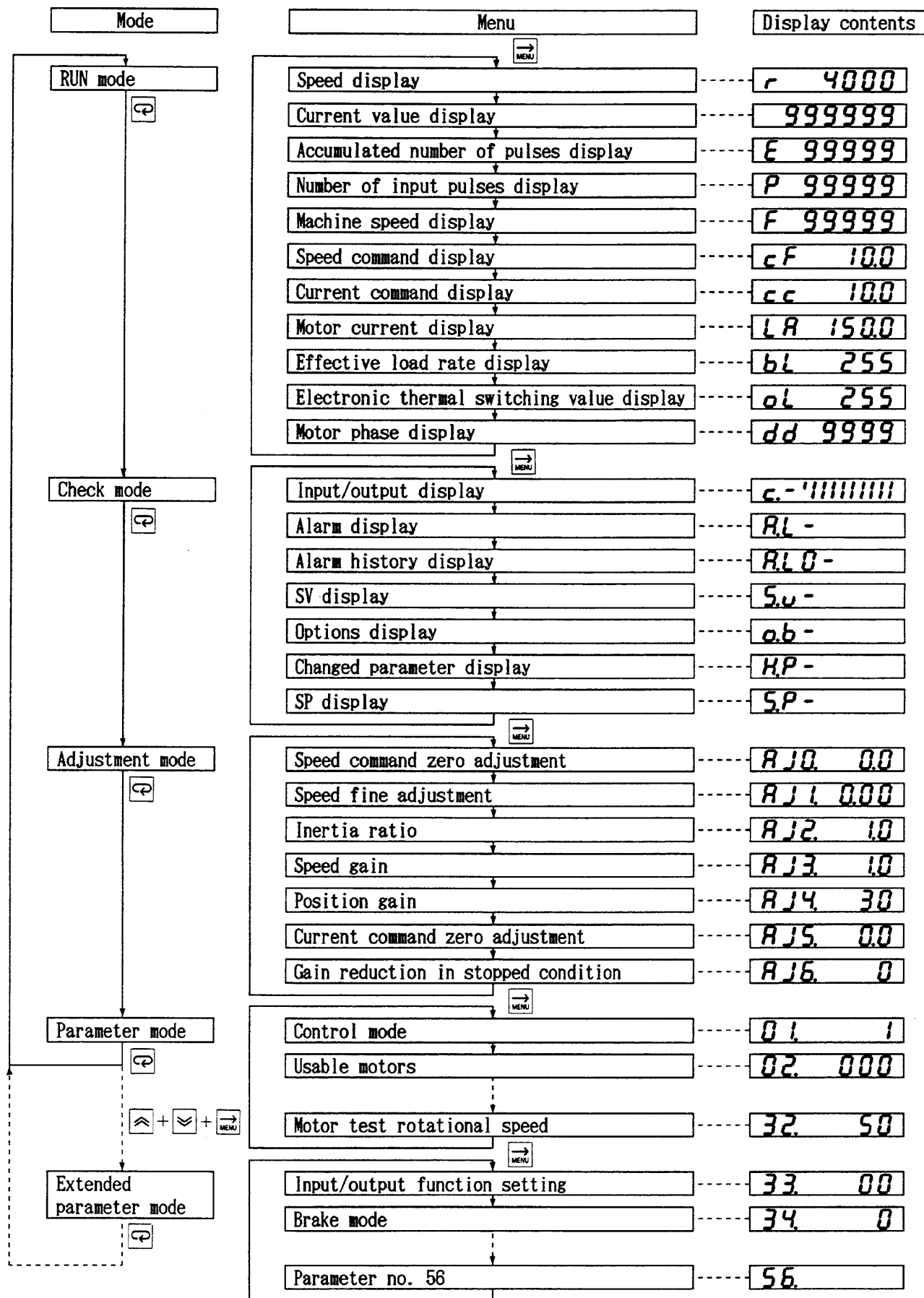


Note 1: The mode entered on power up can be set using parameter no. 25

Note 2: To enter the extended parameter mode, from the parameter mode press and hold the Increment(`↑`) and Decrement(`↓`) keys and press the Menu(`MENU`) key.

CHAPTER 2 OPERATION

■ Display transitions and contents



CHAPTER 2 OPERATION

2.2 Initial setting

2.2.1 Parameter updating operations

Parameters are set to suit the individual system.

The parameter settings can be changed easily via the operating console while observing the display.

■ Procedure for parameter updating

Item	Key operation	Description of operation	Display
(RUN Mode)			
① Change to parameter mode (display state)		Press the key until the first two digits of the display become 01.	
② Change to updatable mode	+	Press and hold the key and press the key. (The updatable mode is indicated by a blinking decimal point on the display)	
③ Parameter selection		Press the key several times to select the number of the parameter to be changed.	
④ Changing a parameter setting	or	Increase the parameter value by pressing the key or decrease the value by pressing the key.	
⑤ Storing the parameter		The changed parameter value is stored into memory by pressing the key.	
⑥ Selection of other parameters		Set other parameters by pressing the key and repeating steps ③ to ⑤.	
⑦ Changing to other display modes		To return to RUN mode, press the key.	

Note 1: The value of the parameter increases/decreases automatically as long as the key/ key is held down.

Note 2: The mark indicates that the decimal point is blinking. The parameter value can only be set when the decimal point is blinking.

Note 3: Parameter setting and operations with other displays can be performed even when an alarm has been generated. In this case, the decimal point of the last digit of the display will blink, as shown below.

CHAPTER2 OPERATION

2.2.2 Initial settings

The initial settings are the parameters that must be set at power up to customize the operation for user requirements.

The parameters are used in functions that rarely need to be changed after being set up once.

■List of initial settings

No.	Parameter name	Factory setting	Unit	Description
01	Control mode	1		The settable control modes of the driver are as follows: 1: Analog speed control 2: Analog current control 3: Analog speed or current control 4: Pulse train position control 5: Pulse train position control with FF
02	Usable motors	000		The settable servo motor types are as follows: 101-1FF: 1200 r/min series 201-2FF: 2000 r/min series 401-4FF: 4000 r/min series
03	Resolver cable length	5	■	Set the resolver cable length in the range from 1 to 60 ■ (in increments of 1 ■).

Note 1: After they are set, the initial settings take effect the next time the power is switched on.

•Control mode (parameter no.01)

The servo driver is controlled from the control mode by applying command inputs.

- | |
|--|
| <p>1: Analog speed control
Used when connecting the driver to a controller that outputs an analog speed signal. The motor speed is proportional to the voltage of the analog speed command signal (REF).</p> <p>2: Analog current control
Used to control the motor current in proportion to the voltage of the current command signal (CREF).</p> <p>3: Analog speed or current control
Allows analog speed control or analog current control to be selected via an external signal input (control mode selection: ECRST).</p> <p>4: Pulse train position control
Used when connecting the driver to a controller that outputs a pulse train. The motor speed is proportional to the pulse frequency and the amount of motor rotation is controlled by the number of pulses.</p> <p>5: Pulse train position control with FF
The same as pulse train position control, but with a feed forward function added. Used to make the tracking error small, such as during synchronous operation using an external encoder. This control may become unstable for load variations or when acceleration and deceleration are frequent, and may result in an alarm being generated.</p> |
|--|

CHAPTER 2 OPERATION

- Usable motors (parameter no. 02)

Set the motor code carefully according to the following table.

Setting the wrong code can cause abnormal motor operation.

- 1200 r/min series

Servo motor model	Motor code
R88M-M20012(-B)	105
R88M-M40012(-B)	106
R88M-M70012(-B)	107
R88M-M1K112(-B)	108
R88M-M1K412(-B)	109
R88M-M1K812(-B)	10A
R88M-M2K612(-B)	116
R88M-M4K012(-B)	117
R88M-M4K812(-B)	10c
R88M-M6K212(-B)	10d

- 2000 r/min series

Servo motor model	Motor code
R88M-M20020(-B)	205
R88M-M40020(-B)	206
R88M-M70020(-B)	207
R88M-M1K120(-B)	208
R88M-M1K820(-B)	217
R88M-M2K220(-B)	218
R88M-M3K020(-B)	219
R88M-M4K220(-B)	21A
R88M-M7K220(-B)	20d

- 4000 r/min series

Servo motor model	Motor code
R88M-M06040(-B)	405
R88M-M12040(-B)	406
R88M-M20040(-B)	407
R88M-M40040(-B)	408
R88M-M70040(-B)	409
R88M-M1K140(-B)	40A
R88M-M2K040(-B)	40b
R88M-M3K040(-B)	40c
R88M-M3K840(-B)	40d
R88M-M5K040(-B)	40E
R88M-M6K440(-B)	40F

Note: Take special care in differentiating between 6 and b on the display, as they have a similar appearance.

6 → “6” b → “b”

CHAPTER2 OPERATION

2.3 Function Settings

The M series servo driver can be used in a variety of ways, such as for soft starts or electronic gearing.

The procedure for setting these functions is described below.

■List of parameters

(See Section 4.4 "Parameter specifications" for details.)

No.	Name	Factory setting	Unit	Description	Control mode
01	Control mode (See Note 2 below.)	1		1: Analog speed control 2: Analog current control 3: Analog speed or current control 4: Pulse train position control 5: Pulse train position control with Feed-forward	—
02	Usable motors (See Note 2 below.)	000		101-1FF: 1200 r/min series 201-2FF: 2000 r/min series 401-4FF: 4000 r/min series	○
03	Resolver cable length (See Note 2 below.)	5	m	Resolver cable length setting between 1 to 60 m	○
05		0		(Do not change the setting.)	—
06	Number of resolutions (G1)	4000	Pulse	G1 and G2 = 1-32767 Number of resolutions = (G1/G2)	○
07	Number of resolutions (G2)	1	Revolution	Setting range: $1 \leq (G1/G2) \leq 20000$	
09	Width after positioning is completed	20	Pulse	Sets the width in number of pulses, where one revolution of the motor is equivalent to 20000 pulses. Range: 1 to 20000 pulses	4,5
10	Origin shift	0	Pulse	Sets the position of the origin pulse output. Range: 0 to 9999 pulses	○
11	Input pulse type	0		0: Forward rotation pulse/reverse rotation pulse 1: 90 degree phase difference signal (phase A/phase B pulses)	○
12	Output pulse type	1		0: Forward rotation pulse/reverse rotation pulse 1: 90 degree phase difference signal (phase A/phase B pulses)	○
13		0		(Do not change the setting.)	—
14		0		(Do not change the setting.)	—
15		0		(Do not change the setting.)	—

CHAPTER2 OPERATION

No.	Name	Factory setting	Unit	Description	Control mode
20	Acceleration/ deceleration selection	0		0: Rectangular curve 1: S-shaped curve	1,3
21	Soft start acceleration time	0	ms	Sets the duration of acceleration from the stopped condition to the rated speed in the range from 1 to 10000 ms.	1,3
22	Soft start deceleration time	0	ms	Sets the duration of deceleration from the rated speed to the stopped condition in the range from 1 to 10000 ms.	1,3
23	S-shaped curve time constant	0	ms	Sets the time taken to reach 90% of the desired rotational speed in the range from 1 to 10000 ms.	1,3
24	Current command filter time constant	1	ms	Sets the filter time constant of the current command input section in the range from 0 to 40 ms.	2,3
25	Initial display setting (See Note 2 below.)	00		Selects the mode and the display contents at power up.	○
26	Display multiplication factor	1	Times	Sets the display multiplication factor used for displaying the mechanical speed in the range from 1 to 500.	○
29		05		(Do not change the setting.)	—
30	Monitor output selection	01		Selects the output of the analog monitor.	○
31	Effective load rate calculation time	30	s	Sets the time constant for calculating the effective load rate as an integral multiple of the cycle time of the machine in the range from 1 to 120 seconds.	○
32	Motor test rotational speed (See Note 2 below.)	50	r/min	Sets the motor test rotational speed in the range from 1 to 4000 r/min.	○




Note 1: The number in the control mode column corresponds to the number of the control mode of parameter no.1.

The circle mark denotes that the setting is effective in all control modes.

Note 2: These parameter settings become effective the next time the power is switched on.

CHAPTER2 OPERATION

List of extended parameters

To enter the extended parameter mode, press and hold the  and  keys and press the  key from the parameter mode.

No.	Name	Factory setting	Unit	Description	Control mode																																																									
33	Setting input/output signal functions (See Note 2 below.)	00		Input/output signal functions are set as follows: <table border="1" style="margin: 10px auto;"> <tr> <td style="width: 30px; text-align: center;">3</td> <td style="width: 30px; text-align: center;">3</td> <td style="width: 30px;"></td> <td style="width: 30px;"></td> <td style="width: 30px;"></td> <td style="width: 30px; text-align: center;">*1</td> <td style="width: 30px; text-align: center;">*2</td> </tr> </table> *1: Output signal function setting <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Output</th> <th>0</th> <th>1</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>STOP</td> <td>Stopped state detected</td> <td>Stopped state detected</td> <td>Reverse rotation inhibited</td> </tr> <tr> <td>LACT</td> <td>Torque limited</td> <td>Torque limited</td> <td>Forward rotation inhibited</td> </tr> <tr> <td>ALM</td> <td>Alarm</td> <td>Alarm code 3</td> <td>Alarm code 3</td> </tr> <tr> <td>SUB</td> <td>-</td> <td>Alarm code 2</td> <td>Alarm code 2</td> </tr> <tr> <td>ICW</td> <td>Reverse rotation inhibited</td> <td>Alarm code 1</td> <td>Alarm code 1</td> </tr> <tr> <td>ICCW</td> <td>Forward rotation inhibited</td> <td>Alarm code 0</td> <td>Alarm code 0</td> </tr> </tbody> </table> *2: Input signal function setting <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Input</th> <th>0</th> <th>1</th> <th>2</th> </tr> </thead> <tbody> <tr> <td>PLCK</td> <td>Position lock</td> <td>Position lock</td> <td>Reverse rotation enabled</td> </tr> <tr> <td>CLIM</td> <td>Torque limited</td> <td>Torque limited</td> <td>Forward rotation enabled</td> </tr> <tr> <td>HRET</td> <td>Origin adjustment</td> <td>Reverse rotation enabled</td> <td>Origin adjustment</td> </tr> <tr> <td rowspan="2">ECSRST</td> <td>Deviation counter reset (control modes 4 and 5)</td> <td rowspan="2">Forward rotation enabled</td> <td>Deviation counter reset (control modes 4 and 5)</td> </tr> <tr> <td>Control mode selection (control mode 3)</td> <td>Control mode selection (control mode 3)</td> </tr> </tbody> </table>	3	3				*1	*2	Output	0	1	2	STOP	Stopped state detected	Stopped state detected	Reverse rotation inhibited	LACT	Torque limited	Torque limited	Forward rotation inhibited	ALM	Alarm	Alarm code 3	Alarm code 3	SUB	-	Alarm code 2	Alarm code 2	ICW	Reverse rotation inhibited	Alarm code 1	Alarm code 1	ICCW	Forward rotation inhibited	Alarm code 0	Alarm code 0	Input	0	1	2	PLCK	Position lock	Position lock	Reverse rotation enabled	CLIM	Torque limited	Torque limited	Forward rotation enabled	HRET	Origin adjustment	Reverse rotation enabled	Origin adjustment	ECSRST	Deviation counter reset (control modes 4 and 5)	Forward rotation enabled	Deviation counter reset (control modes 4 and 5)	Control mode selection (control mode 3)	Control mode selection (control mode 3)	○
3	3				*1	*2																																																								
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	Control mode selection (control mode 3)		Control mode selection (control mode 3)																																																											
34	Brake mode (See Note 2 below.)	0		0: Dynamic brake 1: Solenoid brake (retaining brake)	○																																																									
35	Speed FB differentiation time constant	32	ms	Adjustment of the speed amplifier differentiation time constant	○																																																									
42	Speed or current limiting method	00		<table border="1" style="margin: 10px auto;"> <tr> <td style="width: 30px; text-align: center;">4</td> <td style="width: 30px; text-align: center;">2</td> <td style="width: 30px;"></td> <td style="width: 30px;"></td> <td style="width: 30px;"></td> <td style="width: 30px; text-align: center;">*1</td> <td style="width: 30px; text-align: center;">*2</td> </tr> </table> *1: Current limiting method 0: Limited by the analog input (CREF). Limits when the torque limiting input (CLIM) is ON. 1: Limited by the value of extended parameter no. 43. Limits when the torque limiting input (CLIM) is ON. 2: Limited by the value of extended parameter no. 43. Limits irrespective of the torque limiting input state (CLIM). *2: Speed limiting method 0: Limited by the analog input (REF). 1: Limited by the value of extended parameter no. 44.	4	2				*1	*2	○																																																		
4	2				*1	*2																																																								

CHAPTER 2 OPERATION

No.	Name	Factory setting	Unit	Description	Control mode
43	Current limit value	0.0	A	Sets the current limit value in the range from 0.0 to 150.0 (A). Valid when the setting of extended parameter no. 43 is either 1 or 2.	○
44	Speed limiting value	0	r/min	Sets the speed limit in the range from 0 to the maximum rotational speed. Valid when the setting of the speed limiting method in extended parameter no. 42 is 1.	2,3
45	Speed command scale	100	%	Sets the ratio of the speed command input (REF) to the motor rotational speed in the range from 10% to 200% as follows: □% = (10 (V) / The command voltage (V) for the rated rotational speed) × 100	1,2,3
46	Current command scale	100	%	Sets the ratio of the current command input (CREF) to the servo driver maximum current in the range from 10% to 200% as follows: □% = (10 (V) / The command voltage (V) for the maximum current) × 100	○
47	Direction of rotation	0		0: Forward rotation for positive voltages 1: Forward rotation for negative voltages	1,3
48	Display sign reversal	0		0: The sign is not reversed. 1: The sign is reversed. (Affects the signs of the current values, the accumulated number of pulses, and the machine speed.)	

Note 1: The number in the control mode column corresponds to the number of the control mode of parameter no. 1.

The circle mark denotes that the setting is effective in all the control modes.

Note 2: These parameter settings become effective the next time the power is switched on.

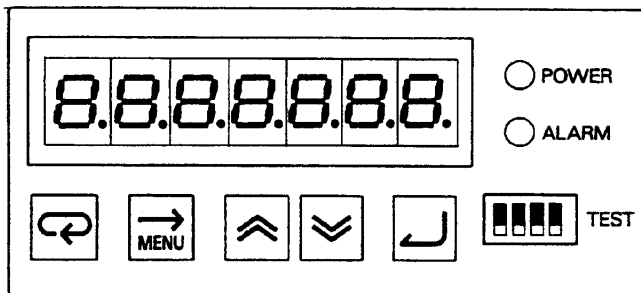
CHAPTER 3 MAINTENANCE

3.1 Using the Display

3.1.1 Display functions

The OMNUC M series AC servo drivers have many features unique to software servos, such as allowing the quantitative observation of different characteristics in real-time on a digital display. Use these displayed characteristics, for example, for making checks during operation.

■ Display section layout



Symbol	Name	Function
(Numeric display)	Data display	Displays parameters or operating status.
POWER	POWER lamp	Lights when the control power supply is normal.
ALARM	ALARM lamp	Lights when CPU operation is abnormal.
	Mode key	Changes the mode.
	Menu key	Changes the data display within the same mode.
	Increment key	Increments the value when inputting data.
	Decrement key	Decrements the value when inputting data.
	Enter key	Confirms the entered value when inputting data. Also functions as the Reset key (see Note).
TEST	Test key	Used for checking the operation of the motor and the driver.

Note : The Enter key functions as the Reset key only when an alarm condition is indicated on the data display.

■ Types of modes



Mode	Function
RUN mode	Displays the operating status, such as the speed, the current value, and the accumulated number of pulses.
Check mode	Displays the status of the input and output signals and alarm information.
Adjustment mode	Used for making gain and zero adjustments.
Parameter mode	Used to set parameters during normal operation.
Extended parameter mode	Used to set the input and output functions and signal levels.

Note : The mode is changed by pressing the Mode () key .


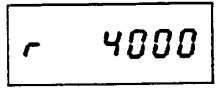
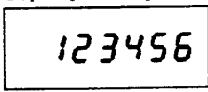

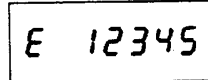
CHAPTER 3 MAINTENANCE

3.1.2 RUN mode display

Numerical display of the operating status, such as the speed, the current value, and the accumulated number of pulses.

Set the mode to RUN using the Mode () key and select the display contents using the Menu () key.

■ Contents of the status display in the RUN mode

Display item	Display	Display range and units	Function
Speed		-4400~+4400 (r/min) (within the maximum speed of rotation)	Displays the rotational speed of the motor. A minus sign "-" indicates the rotation is in the reverse direction. Display example:  (Forward rotation)
Current value		-99999~+99999 (pulses)	Displays the cumulative value of the position output pulses. When the value to be displayed exceeds the display range, the value "99999" is displayed. A minus sign "-" indicates the pulses are for rotation in the reverse direction. The display value corresponds to the setting of the number of resolution. The display resets to "0" when the current value is cleared (CLR is set to ON). Display example: 
Number of accumulated pulses		-99999~+99999 (pulses)	Displays the number of accumulated pulses in the deviation counter, with one revolution taken to be 20000 pulses. A minus sign "-" indicates the pulses are for rotation in the reverse direction. The display resets to "0" when the deviation counter is reset (ECRST is set to ON). The display is "0" in the analog speed control and analog current control modes. Display example: 

CHAPTER 3 MAINTENANCE

Display item	Display	Display range and units	Function
Number of input pulses	P	-99999 ~ +99999 (pulses)	<p>Displays the cumulative number of pulses of the pulse command input.</p> <p>For phase A or phase B pulse inputs, the display shows the number of pulses multiplied by 4. The angle of rotation corresponding to one pulse is determined by the setting of the number of resolution parameter.</p> <p>"99999" is displayed when the number of input pulses exceeds the display range.</p> <p>Display example:</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> P 12345 </div>
Machine speed	F	-99999 ~ +99999 (mm/min)	<p>Displays the machine speed.</p> <p>Machine speed = Rotational speed (r/min) × Display multiplication factor (parameter no. 26)</p> <p>Display example:</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> F 12345 </div>
Speed command	cF	-12.5 ~ +12.5 (V)	<p>Displays the voltage of the speed command input (REF).</p> <p>Display example:</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> cF 10.0 </div>
Current command	cc	-12.5 ~ +12.5 (V)	<p>Displays the voltage of the current command input (CREF).</p> <p>Display example:</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> cc 10.0 </div>
Motor current	LA	-150.0 ~ +150.0 (Ap)	<p>Displays the value of the motor current.</p> <p>Since the peak value of the sine wave is displayed, multiply by $1/\sqrt{2}$ to get the RMS value.</p> <p>Display example:</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> LA 10.0 </div> <p>(Care should be taken when using this value. All motor specifications are given in terms of RMS values.)</p>

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Display item	Display	Display range and units	Function
Effective load rate	bl	0 ~ 255 (%)	Displays the effective load rate of the motor. The displayed effective value is calculated at time intervals set in the effective load rate calculation time parameter (parameter no. 31). Display example: <div style="border: 1px solid black; padding: 2px; display: inline-block;">bl 255</div>
Electronic thermal switching value	ol	0 ~ 255 (%)	Displays the amount of heat generated in the motor (the average over the motor thermal time constant). This also serves as the overload detection value; alarm AL-17 is issued when this value exceeds 110%. Display example: <div style="border: 1px solid black; padding: 2px; display: inline-block;">ol 23</div>
Motor phase	dd	0 ~ 9999 (pulses)	Displays the angle of rotation from the origin. The display is based on the number of pulses, taking one revolution to be 20000 pulses. Display example: <div style="border: 1px solid black; padding: 2px; display: inline-block;">dd 1234</div>

CHAPTER 3 MAINTENANCE

3.1.3 Check mode display

Displays the ON or OFF state of the input and output signals and displays alarms.

■ Contents of the check mode display

Item	Display	Description
Input/output display	<i>C.-</i>	<p>The ON or OFF state of the input/output signals is displayed as follows. (The segment lights when the signal is ON.)</p> <ul style="list-style-type: none"> PON: Main circuit ON input BI: Brake signal input ECRST: Deviation counter reset HRET: Origin adjustment CLIM: Torque limiting PLOCK: Position lock signal EXM: Monitor selection CLR: Clear current value RESET: Alarm reset RUN: Operation command input READY: Servo ready signal INP: Desired value reached signal STOP: Stopped state detected LACT: Torque limited output ALM: Alarm output SUB: Auxiliary output ICW: Reverse rotation inhibited ICCW: Forward rotation inhibited BO: Brake signal output
Alarm display	<i>RL-</i>	Alarm display. The display changes unconditionally to the alarm display when an alarm is generated.
Alarm history display	<i>RL0-</i>	Information for up to eight previous alarms can be displayed by pressing the or key (0-7).
SV display	<i>S.V-</i>	(For factory use only)
Option display	<i>o.b-</i>	Displays the option type in the form of a code.
Changed parameter display	<i>H.P-</i>	Displays the number of the extended parameter that was changed. The changed parameters can be displayed successively by pressing the or key.
SP display	<i>S.P-</i>	(For factory use only)

CHAPTER 3 MAINTENANCE

3.2 Protection and Diagnostic Functions

3.2.1 Alarm display

When an abnormality occurs in the unit, the details of the abnormality are displayed by the LEDs or the numeric display.

LED Display

Symbol	Name	Color	Function
POWER	Power supply lamp	Green	Lights when the control power supply is normal.
ALARM	Alarm lamp	Red	Lights when CPU operation is abnormal.
CHARGE	Charging lamp	Red	Lights when the main circuit DC power supply is charging.

PRECAUTIONS AGAINST ELECTRICAL SHOCK



The CHARGE lamp remains ON even after the AC power supply has been removed as long as some voltage is present at the power supply terminals. Before touching the terminal board, etc., make sure that this lamp is off.

There is a danger of electrical shock if the terminal board is touched while the CHARGE lamp is on.

* The CHARGE lamp is located on the terminal board.

Code display and alarm output

Display number	Name	Alarm code			
		3	2	1	0
No display	Normal	on	on	on	on
1	Main circuit overcurrent (hardware)	on	on	on	off
2	Main circuit overvoltage	on	on	off	on
3	Main circuit voltage less than rated value	off	on	off	on
4	Control circuit voltage less than rated value	on	off	off	off
5	Built-in power supply voltage less than rated value	on	off	off	off
6	Resolver open circuit	on	on	off	off
7	Power section abnormality	on	off	off	off
8	Driver overheating	on	off	on	off
9	Regeneration resistor overheating	on	off	off	on
10	Regeneration abnormality	on	off	off	on
11	Motor overheating	off	on	on	off
12	Clock stopped state detection	on	off	off	off
13	PON not yet input	off	off	off	on
14	Brake operating	off	off	off	on
15	Overcurrent (software)	on	on	on	off
16	Speed amplifier saturated	on	off	on	off
17	Motor overload	off	on	on	off
18	Short time overload	off	on	on	off
19	Resolver abnormality	on	on	off	off
20	Speed overshoot	off	off	on	on
21	Deviation counter overflow	off	off	on	on
22	Error in setting the usable motor	off	on	on	on

Note 1: An alarm code is displayed on the alarm display in the check mode. It is also possible to output an alarm signal, depending on the setting of the input/output function (extended parameter no. 33).

Note 2: When an alarm is generated, the display changes to the alarm display irrespective of current display setting.

CHAPTER 3 MAINTENANCE

3.2.2 Troubleshooting

When an abnormality occurs in the unit, determine the nature of the abnormality from the display, etc., investigate the cause, and take the appropriate countermeasures as described below.

■ Confirming the motor code

When an abnormality or an alarm occurs, first check if the motor code has been set correctly (parameter no. 2).

If this setting is not correct, the overload alarm (alarm no. 17 and 18) or the overspeed alarm (alarm no. 20) may be generated.

■ Motor vibrations

When the motor starts vibrating and the vibrations do not stop, check the following:

Cause	Items to be checked	Countermeasures
The motor code is not correct.	Check the motor code setting.	Set the correct code.
The frame ground (FG) line between the motor and the driver is not connected (or is open circuited).	Check for a connection between these two points using a multimeter. The connection is satisfactory if the resistance is 2Ω or less	Connect correctly
The gain adjustment is not correct.	Check if the vibrations persist after reducing the gain.	Adjust the gain.

■ Diagnosis based on the LED display

LED indication	Alarm status	Name	Cause	Items to be checked	Countermeasures
POWER	Off	Abnormality in the 5V control power supply	Reduction in the input power supply voltage (phases R, S, T)	Measure the input voltage using a voltmeter. Normal voltage range: 180 to 220 V AC, 50 Hz 180 to 242 V AC, 60 Hz	Correct the power supply wiring and capacity.
			The control power supply has been short-circuited externally.	Check the external wiring.	
			The control power supply is defective.		Replace the unit
ALARM	On	CPU operation abnormality	There is an abnormality in the operation of the servo driver CPU.	Switch the power supply off and then on. Try replacing the servo driver.	Replace the unit
CHARGE	Off	The main circuit DC power supply is not being charged.	Reduction in the input power supply voltage (phases R, S, T)	Measure the input voltage using a voltmeter. Normal voltage range: 180 to 220 V AC, 50 Hz 180 to 242 V AC, 60 Hz	Correct the power supply wiring and capacity.
			The main circuit DC power supply is defective.	Measure the voltage between terminals PA (+) and NA (-) of terminal board no. 2 (TB2). Normal voltage range: 250 to 340 V DC	Replace the unit

CHAPTER 3 MAINTENANCE

■ Diagnosis based on the alarm code

Carefully investigate alarms, because malfunctions can cause damage to or destruction of the driver and the motor.

Display number	Name and its description	Cause	Items to be checked	Countermeasures
1	Main circuit overcurrent A current exceeding the current limit value setting flowed in motor output phases A, B, and C.	Motor output phases A, B, and C are either short-circuited or connected to ground.	Check for continuity between phases A, B, and C of terminal board 1 (TB1) and the ground line E using a multimeter.	Correct any short circuits. Connect correctly.
			Check the resistance between phases A, B, and C of the motor and the ground line E using a multimeter and a insulation resistance meter. If the resistance is 1 MΩ or more, the connections are normal.	Replace the motor.
2	Main circuit overvoltage The main circuit DC voltage exceeded 400 V.	The voltage on R, S, or T is too high.	Using a multimeter, make sure that the power supply voltage is 242 V or less for a 60 Hz line frequency, or 220 V or less for 50 Hz.	Install a transformer.
		Terminal board 2 (TB2) connections are incorrect.	Check if terminals JP1 and JP2 of terminal board 2 (TB2) have been shorted (internal regeneration resistor) or if an external regeneration resistor has been connected between terminals PA and JP1.	Connect correctly.
		The acceleration/deceleration time constant is small.	Try increasing the setting of the acceleration and deceleration time duration settings in parameter Nos. 21 and 22. Try decreasing the speed.	Revise the acceleration and deceleration time durations. Revise the feeding speed.
		The regeneration resistor on the servo board is open circuited.	Remove the shorting bar between terminals JP1 and JP2 of terminal board 2(TB2) and measure the resistance using a multimeter. (Make this measurement about five minutes after the charge lamp goes off.)	Replace the unit.

CHAPTER 3 MAINTENANCE

Display number	Name and its description	Cause	Items to be checked	Countermeasures
3	<p>The main circuit voltage is lower than the rated value.</p> <p>The main circuit DC voltage is less than 200 V.</p>	The input voltage (R, S, T) is too low.	Measure the input voltage using a voltmeter.	Correct the power supply wiring and capacity.
		One of the phases of the input power supply has failed (resulting in a single-phase input).	Check the connections.	Connect correctly.
		PON and BI are incorrectly connected. An external voltage was applied to PON or BI (on TB2).		Connect correctly or replace the unit.
4	<p>The control circuit voltage is below the rated value.</p> <p>The power supply voltage for driving the power devices is too low.</p>	The power supply for driving the power devices is defective.		Replace the unit.
5	<p>The built-in power supply voltage is too low.</p> <p>The voltage of the +/-15 V power supply has dropped.</p>	The +/-15 V power supply has failed.		Replace the unit.
6	Resolver open circuit.	The resolver connector is disconnected.	Check if the connector is loose or detached.	Connect correctly.
	The resolver feedback signal is not present.	The resolver cable is defective (open or short circuit).	Check the cable and try replacing it.	Repair or replace the cable.
7	Power section abnormality.	There is a defect in the power section.		Replace the unit.

CHAPTER 3 MAINTENANCE

Display number	Name and its description	Cause	Items to be checked	Countermeasures
8	Driver overheating. The thermal switch for a power transistor in the servo driver was actuated.	The permissible continuous power output is being exceeded during servo driver operation.	Try reducing the load.	Reduce the load. Increase the acceleration and deceleration time durations. Increase the capacity.
		The ambient temperature has increased.	Measure the ambient temperature. Check if the ventilation is obstructed.	Improve the cooling.
		The servo driver cooling fan has stopped.	Check if the cooling fan is rotating.	Replace the unit.
		There is a defect in the thermal switch.	Check if the unit fails to operate in the no load condition.	
9	The regeneration resistor is overheating. The regeneration resistor thermal switch was actuated.	The regeneration energy from the motor is too large.	Reduce the frequency of acceleration and deceleration. Reduce the speed. Reduce the load.	Change the frequency of acceleration and deceleration. Change the regeneration energy absorption capacity. Reduce the load.
		The ambient temperature has increased.	Measure the ambient temperature. Check if the ventilation is obstructed. Check if there is anything blocking the fan guard.	Cool the driver using a fan, a cooler, etc. Remove any dirt using a vacuum cleaner, etc.
		The servo driver cooling fan has stopped.	Check if the cooling fan is rotating.	Replace the unit.
		There is a defect in the thermal switch.	Check if the unit fails to operate in the no load condition.	Replace the unit.

CHAPTER 3 MAINTENANCE

Display number	Name and its description	Cause	Items to be checked	Countermeasures
10	Regeneration error. The transistor for absorbing the regeneration energy was ON for more than 50 ms.	The regeneration energy from the motor is too large.	Reduce the frequency of acceleration and deceleration. Reduce the speed. Reduce the load.	Change the frequency of acceleration and deceleration. Change the regeneration energy absorption capacity. Reduce the load.
		The shorting bar between terminals JP1 and JP2 of terminal board 2 (TB2) is disconnected (when the internal resistor is used to absorb the regeneration energy).	Check if the shorting bar has been disconnected.	Connect correctly.
		There is an open circuit in the cable for the external regeneration resistor (when an external resistor is used to absorb the regeneration energy).	Check the cable for the external resistor.	Repair the cable.
		The transistor used for switching the regeneration energy has been damaged.		Replace the unit.
11	Motor overheating. The thermal switch for the motor was actuated.	The motor is overloaded.	Check the electronic thermal relay value (OL in the RUN mode display). Try reducing the load.	Reduce the load. Increase the acceleration and deceleration time durations.
		Bad connections on terminal board 1 (TB1).	Check if the motor thermal switch terminal (MTH) of the terminal board and the thermal switch contact output (yellow) are connected and not open-circuited.	Connect correctly.
		Poor motor cooling.	Check the ambient temperature of the motor (operating range: 0 to +40°C).	Make sure that the ambient temperature is in the range from 0 to +40°C.
		The thermal switch in the motor is defective.	Check the motor thermal switch terminals (yellow) using a multimeter. The thermal switch is normal if there is continuity between these terminals.	Replace the motor.

CHAPTER 3 MAINTENANCE

Display number	Name and its description	Cause	Items to be checked	Countermeasures
12	The clock output has stopped. The clock signal inside the driver has stopped.	The clock signal is not being output from the servo driver.		Replace the unit.
13	PON has not yet been input. There has been no ON signal at the built-in main circuit contact.	When the RUN command is input, the main circuit ON signal (PON) is not being input.	Check if the PON terminal of terminal board 2 (TB2) has been shorted.	Connect correctly. Change the external sequence.
14	The brake is operating. The dynamic brake is active. The solenoid brake is operating.	The brake was not released when the RUN signal was input.	Check if the signal from the auxiliary contact of the brake connector has been input to the brake signal input (B1) of terminal board 2 (TB2).	Connect correctly. Change the external sequence.
15	Overcurrent (software). A current exceeding the limit value flowed in phases A, B, and C of the motor output.	The motor is mechanically locked.	Check if the motor is mechanically locked. Check if the solenoid brake has detached.	Mechanically unlock the motor. Change the solenoid brake sequence. Check the connections.
		Motor output phases A, B, and C are shorted.	Check if there are any short circuits in the connections of phases A, B, and C.	Correct the connections.
		There is an error in the usable motor setting in parameter no. 02.	Check if the usable motor in parameter no. 02 has been set correctly.	Set correctly.
16	The speed amplifier saturated. The speed amplifier in the servo driver saturated.	The cable for motor output phases A, B, and C is open circuited.	Check the cable for motor output phases A, B, and C.	Correct the connections.

CHAPTER 3 MAINTENANCE

Display number	Name and its description	Cause	Items to be checked	Countermeasures
17	Motor overloading.	The motor is overloaded.	Reduce the load.	Reduce the load. Increase the acceleration and deceleration time durations.
	The electronic thermal relay value has exceeded 110%.	There is an error in the usable motor setting in parameter no. 02.	Check if the usable motor in parameter no. 02 has been set correctly.	Set correctly.
18	Short time duration overload.	The motor is overloaded.	Reduce the load.	Reduce the load. Increase the acceleration and deceleration time durations.
	A current exceeding the rated current flowed continuously in motor output phases A, B, and C.	The motor is mechanically locked.	Check if the motor is locked mechanically.	Mechanically unlock the motor.
19	Resolver error.	The resolver connector has become detached.	Check if the connector is loose or detached.	Connect correctly.
	There is some abnormality in the resolver feedback.	The resolver cable is defective (open or short circuit).	Check the cable and try replacing it.	Connect correctly.
20	Excessive speed.	The rated speed has been exceeded.	Check the inertia ratio (adjustment parameter AJ2).	Adjust correctly.
	The rotational speed of the motor has become too large.	The control input is exceeding the maximum rotational speed value.	Check the input.	

CHAPTER 3 MAINTENANCE

Display number	Name and its description	Cause	Items to be checked	Countermeasures
21	Deviation counter overflow.	The machine has collided.	Check if the machine has collided.	Change the operating pattern.
	The accumulated number of pulses in the deviation counter exceeded the permissible value.	The control input is exceeding the maximum rotational speed value (when a pulse train is being input).	Check the input.	Change the electronic gear.
		The gain is not appropriate.	Try increasing the gain.	Adjust the gain.
		Acceleration or deceleration is too rapid.	Make the acceleration and deceleration slower.	Adjust the acceleration and deceleration time durations.
26	Usable motor setting error. There is an abnormality in the usable motor setting.	There is an error in the usable motor setting in parameter no. 02.	Check if the usable motor in parameter no. 02 is set correctly.	Set correctly. (After entering the motor code, switch OFF the power supply and switch it ON again.)

CHAPTER 3 MAINTENANCE

3. 2. 3 Overload Detection Characteristics

The servo driver contains electronic thermal overload protection to protect the servo motor and driver from overload.

If motor overload (AL-17) or short-time overload (AL-18) occurs, remove the cause of overload and wait at least 1 minute for the motor to cool before restarting the motor.

If the motor is restarted without a cool-off interval, it may be damaged.

■ Detecting Motor Overload (AL-17)

● Detection method

Motor overload is detected by calculating the motor's heat dissipation (electronic thermal value) from the motor current.

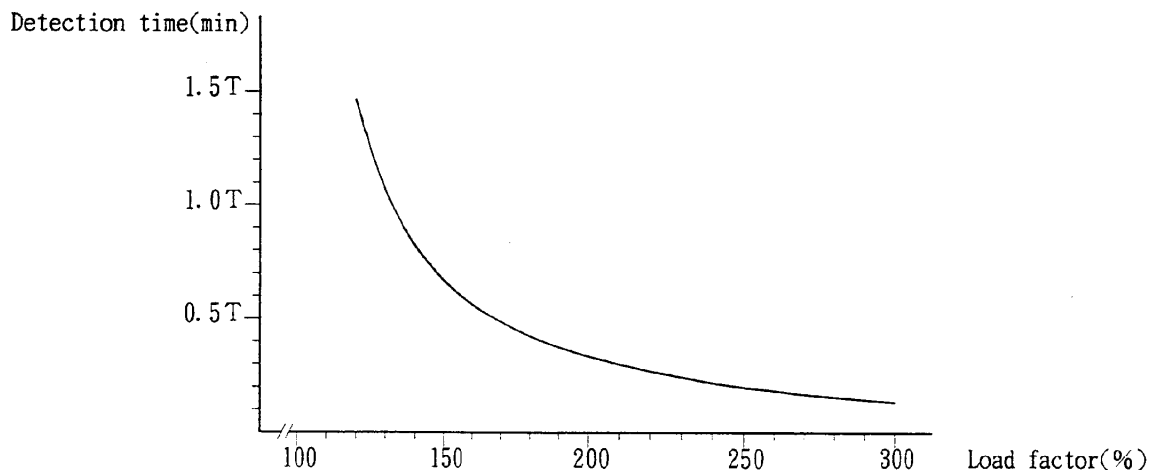
Detection threshold is an electronic thermal value of 110%.

The electronic thermal value is displayed on the electronic thermal switching value display (oL) in RUN mode.

● Detection time

The following figure shows the time until the driver detects motor overload after a set load is applied to the motor with the electronic thermal value set at zero (reference value).

Note: Whenever the motor driver is turned on, the electronic thermal value is set to 90% (because overload must be detected as early as possible to protect the motor from damage). Therefore, the electronic thermal value will be nearly 90% even when the driver is turned on with no load applied to the motor. This value will be gradually reduced unless an overload condition exists.



Note 1: Load factor is given by the following formula:

$$\text{Load factor (\%)} = \frac{\text{motor current}}{\text{rated motor current}} \times 100$$

Note 2: T is a constant unique to each motor model.

•1200 r/min Series

Model	T(min)
R88M-M20012	16
R88M-M40012	30
R88M-M70012	30
R88M-M1K112	30
R88M-M1K412	50
R88M-M1K812	60
R88M-M2K612	80
R88M-M4K012	80
R88M-M4K812	100
R88M-M6K212	120

•2000 r/min Series

Model	T(min)
R88M-M20020	16
R88M-M40020	16
R88M-M70020	30
R88M-M1K120	30
R88M-M1K820	50
R88M-M2K220	50
R88M-M3K020	60
R88M-M4K220	60
R88M-M7K220	80

•4000 r/min Series

Model	T(min)
R88M-M06040	7
R88M-M12040	7
R88M-M20040	7
R88M-M40040	16
R88M-M70040	16
R88M-M1K140	16
R88M-M2K040	30
R88M-M3K040	30
R88M-M3K840	30
R88M-M5K040	30
R88M-M6K440	50

CHAPTER 3 MAINTENANCE

■ Detection of Short Time Duration Overload (AL-18)

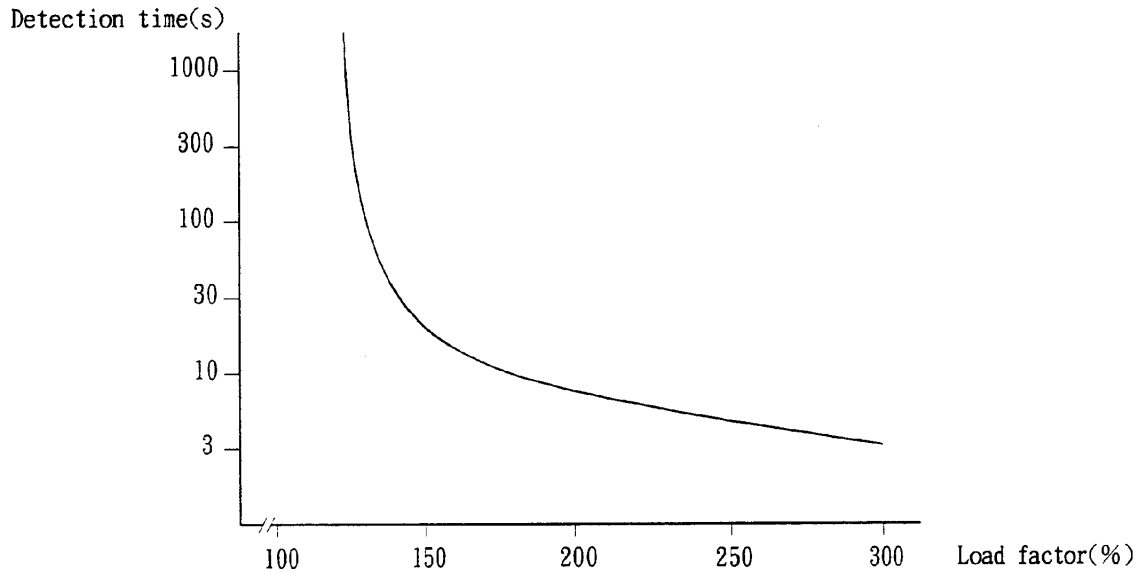
● Detection method

Short time duration overload is detected when the motor current exceeds 120% of rated motor current continuously for a specified time period.

● Detection time

Detection time is not dependent on motor model.

The figure shows detection time versus load factor (reference data):



CHAPTER 3 MAINTENANCE

3. 3 P e r i o d i c C h e c k s

■ Daily Checks

Check the following items while the system is operating:

- Motor generates no unusual noises.
- Mounting bolts and screws are all securely tightened.
- No overheating.
- Ambient temperature is within the specified range.
- Motor current (IA), effective load rate (bL), and electronic thermal switching value (oL) displayed are all at normal levels.

■ Periodic Checks

Verify the following items during periodic maintenance:

• Servo motor

- Motor generates no unusual noises.
- Motor mounting bolts are securely tightened.
- Appearance is normal.
- Resolver cable is free from sharp bends or crushing.

• Servo driver

- Terminal block and connector screws are all securely tightened.
- Ventilation holes are not clogged with dust.
- Motor current (IA), effective load rate (bL), and electronic thermal switching value (oL) displayed are all at normal levels.
- Fan operates normally.
- Signal cables are free from sharp bends or crushing.

CHAPTER 3 MAINTENANCE

■ Periodic Maintenance for Parts

The servo motor and its driver consist of many parts.

Some mechanical and electronic parts require periodic maintenance or replacement depending on operating conditions (from "Recommendation for periodic maintenance of general-purpose inverters" by JEMA).

The periodic maintenance interval depends on the operating environment and conditions in which the servo motor and driver are used. The maintenance intervals for the servo motor and driver are shown below. Use them as a guideline for periodic maintenance.

• Servo motor

Periodic maintenance intervals are as follows:

Oil seals : 2000 hours

Bearings : 30000 hours

Operating conditions should not exceed ambient temperature range, permissible shaft load, rated rotation rate, torque, and mounting conditions specified in the Instruction Manual. In general, the radial load to the timing pulley or other pulleys (driven by belts) is doubled during operation as compared to that in the stationary state.

The belt and pulley should be designed not to exceed the motor's permissible shaft load during operation.

Consult the manufacturers of the belt and pulley as required.

If permissible motor shaft load is exceeded, the shaft may be damaged or the bearing may seize.

• Servo driver

Periodic maintenance intervals are as follows:

Electrolytic capacitors: 50000 hours

Axial fan: 35000 hours

Operating conditions should not exceed an ambient temperature of 35°C, or the rated torque and mounting conditions specified in the Instruction Manual.

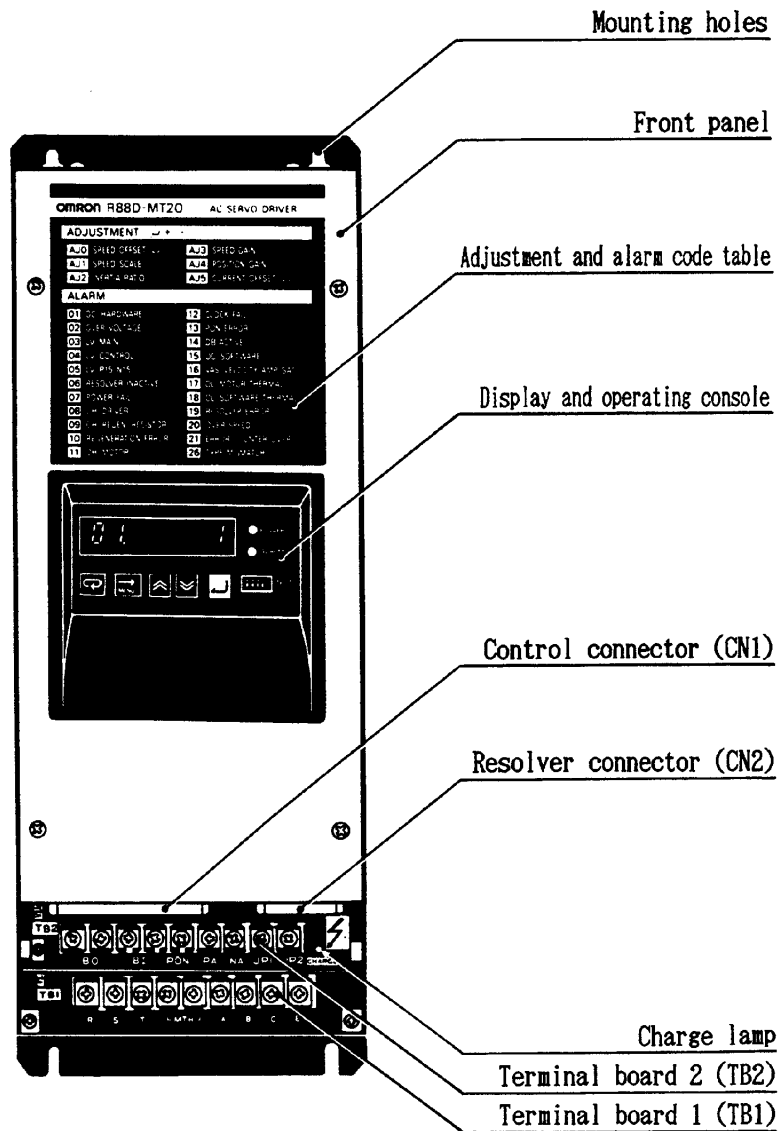
To extend the periodic maintenance interval, it is recommended that ambient temperature and operating duration be reduced as much as possible.

- The life of aluminum electrolytic capacitors is greatly affected by the ambient operating temperature. Generally speaking, an increase of 10°C in the ambient operating temperature will reduce capacitor life by 50%. We recommend that ambient operating temperature be lowered and the power supply time be reduced as much as possible to lengthen the maintenance times for Servo Drivers.
- If the Servomotor or Servo Driver is not be used for a long time, or if they are to be used under conditions worse than those described above, a periodic inspection schedule of five years is recommended. Please consult with OMRON to determine whether or not components need to be replaced.

For detailed maintenance methods, consult our sales engineer.

CHAPTER4 SPECIFICATIONS

4.1 General and performance specifications



■ General specifications

Ambient operating temperature range	0 to +55°C (non-freezing)
Ambient operating humidity range	35 to 85% RH (noncondensing)
Storage temperature range	-10 to +75°C
Storage humidity range	35 to 85% RH (noncondensing)
Ambient operating environment	There should be no corrosive gases, etc., in the operating environment.
Vibration resistance	1 G {9.8m/s ² } or less (Type JIS-C0911-IIIC2)
Shock resistance	Peak acceleration of 10 G {98m/s ² } or less . (in three directions: X, Y, and Z)
Insulation resistance	5 MΩ or more (using a 1000 V DC insulation resistance meter) between the AC input terminals and the external case (heat sink plate).
Breakdown voltage	1500 V AC 50/60 Hz for 1 minute between the AC input terminals and the external case (the heat sink plate).
Construction	Panel installation type.

CHAPTER 4 SPECIFICATIONS

■ Performance specifications

Model		R88D-MT10	R88D-MT20	R88D-MT50	R88D-MT80	R88D-MT150
Continuous output current		5 A	12 A	23 A	36 A	74 A
Instantaneous maximum output current		10 A	20 A	50 A	80 A	150 A
Mass		4.6 kg	4.9 kg	6.5 kg	11 kg	18 kg
Power supply voltage		3-phase 200 V AC 50 Hz or 3-phase 200/220 V AC 60 Hz				
Permissible power supply voltage range		3-phase 180 V AC to 220 V AC 50 Hz or 3-phase 180 V AC to 242 V AC 60 Hz				
Heat loss	Main circuit	40 W	80 W	160 W	230 W	460 W
	Control circuit	35 W		50 W	60 W	80 W
Regeneration energy absorption capacity		40 W	70 W	100 W	150 W	250 W
Speed and position detectors		Resolver (Absolute accuracy: 0.18° max. at 25°C ambient temperature)				
Protection functions		Protection against overcurrent, overvoltage, main circuit voltage drop below rated value, resolver open circuit, driver overheating, regeneration resistor overheating, regeneration abnormality, motor overheating, motor overload, short time duration overload, resolver error, excess speed, and deviation counter overflow.				
Usable load inertia		10 times the inertia of the rotor.				
Control inputs		24 V DC 8 mA optically isolated inputs: RUN command, alarm reset, current value clear, monitor selection, position lock, torque limit, origin adjustment, deviation counter reset inputs.				
Control outputs		Open collector outputs: 30 V DC max., 30 mA, saturation voltage - 1.2 V: Servo ready, target value match, stop detection, torque limited, alarm, reverse rotation inhibited, forward rotation inhibited, alarm code (4 bits).				
Speed control range		1 : 5000				
Speed variation rate		Load characteristics: $\pm 0.1\%$ or less (motor load 0 ~ 100%) Voltage characteristics: $\pm 0.1\%$ or less (200 V AC $\pm 10\%$) Temperature characteristics: $\pm 0.3\%$ or less (0 ~ 50°C)				
Speed (limiting) command input		\pm Rated rotational speed at ± 10 V DC, 15 k Ω input impedance.				
Current (limiting) command input		\pm Maximum current at ± 10 V DC, 15 k input impedance, temperature characteristics $\pm 5\%$ (25 \pm 25°C)				
Soft start (Rectangular curve)		Individually settable acceleration and deceleration times from 0 to 10 seconds in steps of 10 ms.				
Soft start (S curve)		The time taken to reach 90% of the target rotational speed can be set from 0 to 10 seconds in steps of 10 ms.				
Built-in command power supply		± 15 V DC $\pm 5\%$ Output resistance 680 Ω				

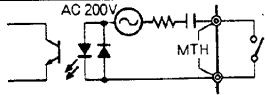
CHAPTER 4 SPECIFICATIONS

Model		R88D-MT10	R88D-MT20	R88D-MT50	R88D-MT80	R88D-MT150
Pulse input	Number of divisions	1 to 20000 divisions (settable parameters and fractional settings)				
	Format	Forward rotation pulse/reverse rotation pulse or phase A/phase B inputs. Maximum pulse frequency response: 400 kpps 5 V DC, 15 mA, optically coupled, ON voltage 3.5 V or more, OFF voltage 1.5 V or less.				
Pulse output	Number of divisions	1 to 20000 divisions (settable parameters and fractional settings)				
	Format	Open collector outputs: Forward rotation pulse/reverse rotation pulse (or phase A/phase B) inputs, origin pulse equivalent to 74LS06, 30 V DC max., 30 mA, saturation voltage 0.7 V. Line driver outputs: Forward rotation pulse/reverse rotation pulse (or phase A/phase B) inputs, origin pulse equivalent to 26LS31, H level 2.5 V min., L level 0.5 V max., maximum output current 20 mA. * Z phase is 2 (pulse/rev.).				
Deviation counter		21 bits				
In position width		1 to 20000 pulses (set relative to 20000 pulses per rotation)				
Electronic gear function		Settable number of pulses G1 per number of rotations G2. $1 \leq G1/G2 \leq 20000$				
Analog outputs		Number of rotations or current monitor: Rated number of rotations or maximum driver current at ± 8 V DC; 8-bit A/D conversion output, 680 Ω impedance.				
Built-in display device		7-digit 7-segment LED display: Speed, current value, number of accumulated pulses, number of input pulses, machine speed, speed command, current command, motor current, effective load rate, electronic thermal relay value, motor phase, input and output statuses.				

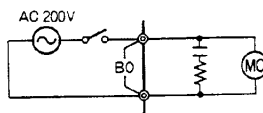
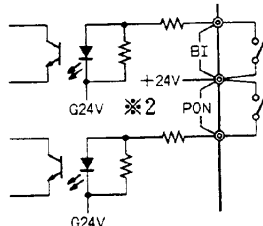
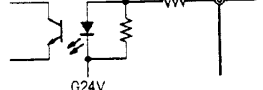
CHAPTER 4 SPECIFICATIONS

4.2 Terminal board specifications

Terminal board 1 (TB1)

Symbol	Name	Function	(for reference)	
			Driver side	External side
R S T	Power supply input	Input: 3-phase 200 V AC $\pm 10\%$ 50 Hz or 3-phase 200/220 V AC $\pm 10\%$ 60 Hz.		
MTH	Motor thermal switch (See Note 1.)	These are the motor thermal switch contact input terminals. Connect these to the motor output wires (yellow).		
A B C	Motor connection terminals	Connect these terminals to the motor. Make sure the connections are correct.	A Red B White C Blue	
E	Ground	Always connect the ground wire to this terminal and connect the other end of the wire to Class 3 or better grounding.	E Green	

Terminal board 2 (TB2)

Symbol	Name	Function	(for reference)	
			Driver side	External side
BO	Brake signal output	Output terminal for controlling a dynamic brake or a solenoid brake. Connect the coil of the contactor to this terminal.		
BI	Brake signal input	Input terminal for confirming the operation of the dynamic brake or the solenoid brake. Remove the shorting bar when using this terminal.		
PON	Main circuit ON input	Input terminal for operating the main circuit contactor (built-in). Remove the shorting bar when using this terminal.		
PA NA	Main circuit power supply + Main circuit power supply -	Terminals for checking the main circuit DC power supply. The power supply is normal if the voltage across these terminals is in the range from 250 to 340 V DC.		
JP1 JP2	Regeneration resistor selection terminals	Terminals for selecting and connecting the resistor for absorbing regeneration energy. When connecting an external regeneration resistor, remove the shorting bar between JP1 and JP2 and connect the external regeneration resistor between terminals PA and JP1.		

Note 1: In the model R88D-MT150, the motor thermal relay terminal (MTH) is located on terminal board 2 (TB2).

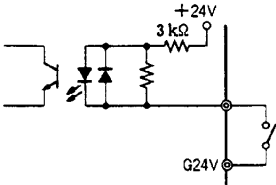
Note 2: The +24 V terminal (between BI and PON) outputs +24 V.
Do not apply an external voltage to this terminal.
The driver will be damaged if an external voltage is applied to this terminal.

CHAPTER 4 SPECIFICATIONS

4.3 Control I/O specifications

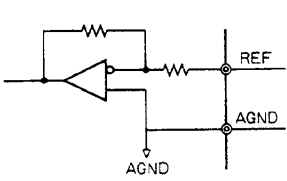
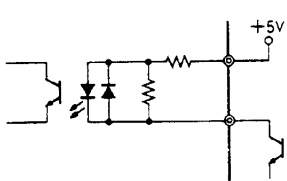
■ Control input signals (CN1)

• External input signals

Signal name	Pin number	Function	(for reference)												
			Driver side	External side											
Operation command input RUN	50	ON: Servo ON command	 <p style="text-align: center;">24 V DC 8 mA (internal power supply)</p> <p>The functions of these input signals can be changed using the extended parameter settings.</p>												
Alarm reset RESET	49	ON: The alarm state is reset. The pulse width must be 30 ms or greater.													
Current value clear CLR	48	ON: The current value and the number of input pulses are cleared. The pulse width must be 30 ms or greater.													
Monitor selection EXM	47	ON: The analog monitor contents are selected.													
Position lock signal PLOCK	30	ON: In the speed control mode, the servo locks in the current position. In this state, apply command pulses to control the position. In the position control mode, the pulse inputs are inhibited.													
Torque limiting CLIM	29	ON: Limits the current according to the level of the analog current command input (CREF) or the setting of parameter no. 43.													
Origin adjustment command HRET	14	ON: In the position control mode, if this signal goes ON in the command pulse input state, the motor stops at the position of the origin pulse. The command pulse frequency must be less than or equal to a value corresponding to a rotational speed of 500 r/min.													
Deviation counter reset ECRST	13	The function differs depending on the control mode as follows: <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Control mode</th> <th>ECRST</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>Position control</td> <td>ON</td> <td>Deviation counter reset</td> </tr> <tr> <td rowspan="2">Speed or current control</td> <td>ON</td> <td>Current control</td> </tr> <tr> <td>OFF</td> <td>Speed control</td> </tr> </tbody> </table>			Control mode	ECRST	Function	Position control	ON	Deviation counter reset	Speed or current control	ON	Current control	OFF	Speed control
Control mode	ECRST	Function													
Position control	ON	Deviation counter reset													
Speed or current control	ON	Current control													
	OFF	Speed control													
24 V DC power supply ground G24V	12 41	The common ground terminal for the external input signals.													

CHAPTER 4 SPECIFICATIONS

• Command inputs

Signal name	Pin number	Function	(for reference) Driver side External side
Speed command input REF (analog input)	18	In the speed control mode: The motor speed is proportional to the input voltage. The motor rotates forward for positive input voltages and in reverse for negative input voltages. The rotational speed is \pm the rated rotational speed for inputs of ± 10 V. In the current control mode: This input becomes the speed limiting input.	 Input impedance: 15 k Ω
Current command input CREF (analog input)	17	In the current control mode: Controls the motor current in proportion to the input voltage. Input voltages of ± 10 V correspond to \pm maximum torque limit values. In the speed control mode: This input becomes the current limiting input.	
Analog ground AGND	32 31	This is the ground terminal for REF and CREF.	
Forward rotation command pulse CCW -CCW	11 10	The forward rotation pulse input (CCW). Becomes a 90° phase difference signal (phase A) depending on the setting of parameter no. 11.	5 V DC 15 mA 
Reverse rotation command pulse CW -CW	9 8	The reverse rotation pulse input (CW). Becomes a 90° phase difference signal (phase B) depending on the setting of parameter no. 11.	ON: 3.5 V or more OFF: 1.5 V or less

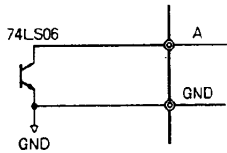
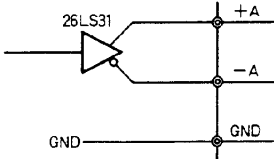
CHAPTER4 SPECIFICATIONS

- Control output signals (CN1)
- External output signals

Signal name	Pin number	Function	(for reference)	
			Driver side	External side
Servo ready READY	46	ON: Indicates operation command inputs (RUN) can be accepted. Remains OFF until all power supply voltages stabilize.	<p>(Common)</p> <p>30 V max., 30 mA max., saturation voltage 1.2 V</p> <p>The function of these output signals can be changed depending on the setting of the extended parameters.</p>	
Target value match INP	45	In the position control mode: ON: Position control completed. The width of position control completion is set by a parameter. In the speed control mode: ON: The target speed has been reached. Goes ON when the speed is the target speed ± 50 r/min.		
Stop detection STOP	44	ON: The motor rotational speed is 50 r/min or less.		
Torque being limited LACT	43	In the position control and speed control modes: ON: The current is controlled. In the current control mode: ON: The speed is controlled.		
Alarm output ALM	42	OFF: When an abnormality occurs or immediately after power up. ON: During normal operation.		
Auxiliary output SUB	28	Outputs an alarm code depending on the setting of extended parameter no. 33.		
Reverse rotation inhibited ICW	27	ON: The reverse rotation enable signal has not been input. (See extended parameter no. 33)		
Forward rotation inhibited ICCW	25	ON: The forward rotation enable signal has not been input. (See extended parameter no. 33)		
24 V DC Power supply +24VOUT	26	Power supply for the external output signals 24 V DC is output (120 mA max.)		

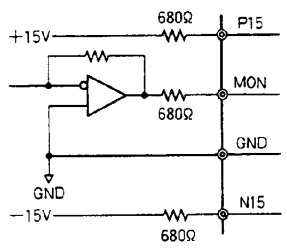
CHAPTER 4 SPECIFICATIONS

• Pulse outputs

Signal name		Pin number	Function	(for reference) Driver side External side
Position pulse output	A	7	A: Forward rotation pulse output / Phase A output. B: Reverse rotation pulse output / Phase B output.	30 V max., 30 mA max., saturation voltage 0.7 V
	B	6		
Open collector outputs	Z	5	Z: Origin pulse output. (The output mode is selected using parameter no. 12.)	
	GND	4		
Position pulse output Line driver outputs	+A	24	A: Forward rotation pulse output / Phase A output. B: Reverse rotation pulse output / Phase B output. Z: Origin pulse output. H level 2.5 V min. L level 0.5 V max. (maximum output current 20 mA) (The output mode is selected using parameter no. 12.)	
	-A	40		
	+B	23		
	-B	39		
	+Z	22		
	-Z	38		

■ Monitor output signals (CN1)

• Analog outputs

Signal name		Pin number	Function	(for reference) Driver side External side
Analog monitor	MON	3	The motor rotational speed or the motor current is output as an analog voltage. Set in parameter no. 30. Speed monitor: ± 8 V corresponds to \pm the rated rotational speed. Current monitor: ± 8 V corresponds to \pm the maximum torque limit value.	
	GND	2		
Built-in command power supply	P15	16	P15: +15 V DC output	
	N15	15	N15: -15 V DC output Can be used as the power supply for setting the speed or the current.	

CHAPTER 4 SPECIFICATIONS

■ Control connector pin arrangement (CN1)

50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
RUN	RESET	CLR	EXM	READY	INP	STOP	LACT	ALM	G24V	-A	-B	-Z	NC	NC	NC	NC	NC
			32	31	30	29	28	27	26	25	24	23	22	21	20	19	
			AGND	AGND	PLOCK	CLIM	SUB	ICW	24VOUT	ICW	+A	+B	+Z	NC	NC	NC	
18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
REF	CREF	P15	N15	HRET	ECRST	G24V	CCW	-CCW	CW	-CW	A	B	Z	GND	MON	GND	FG

Connector plug: MR-50F (made by Honda Tsushin)

Connector case: MR-50L (made by Honda Tsushin)

■ Resolver connector pin arrangement (CN2)

20	19	18	17	16	15	14
SG 3	SG 2	SG 1	NC	NC	NC	NC
	13	12	11	10	9	8
	S 4	S 3	R 2	NC	NC	NC
7	6	5	4	3	2	1
S 2	S 1	R 1	NC	NC	NC	NC

Connector plug: MR-20F (made by Honda Tsushin)

Connector case: MR-20L (made by Honda Tsushin)

No.	Symbol	Function
1	NC	
2	NC	
3	NC	
4	NC	
5	R 1	Resolver output signal
6	S 1	SIN Winding excitation
7	S 2	COS Winding excitation
8	NC	
9	NC	
10	NC	

No.	Symbol	Function
11	R 2	Resolver output signal
12	S 3	SIN Winding excitation
13	S 4	COS Winding excitation
14	NC	
15	NC	
16	NC	
17	NC	
18	SG 1	Shield ground
19	SG 2	Shield ground
20	SG 3	Shield ground

CHAPTER 4 SPECIFICATIONS

4.4 Parameter specifications

Parameters

Parameter no. 01 Control mode

0	1				*
---	---	--	--	--	---

Set the control mode of the servo driver as follows:

- 1: Analog speed control
- 2: Analog current control
- 3: Analog speed and current control
- 4: Pulse train position control
- 5: Pulse train position control (with FF)

Factory setting : 1

Note : This parameter setting becomes effective the next time the power is switched on.

Parameter no. 02 Usable motor

0	2		*	*	*
---	---	--	---	---	---

Sets the code of the servo motor to be connected.

The correspondence between the motor model numbers and the motor codes are as follows:

• 1200 r/min series

Servo motor model	Motor code
R88M-M20012(-B)	105
R88M-M40012(-B)	106
R88M-M70012(-B)	107
R88M-M1K112(-B)	108
R88M-M1K412(-B)	109

Servo motor model	Motor code
R88M-M1K812(-B)	10A
R88M-M2K612(-B)	116
R88M-M4K012(-B)	117
R88M-M4K812(-B)	10c
R88M-M6K212(-B)	10d

• 2000 r/min series

Servo motor model	Motor code
R88M-M20020(-B)	205
R88M-M40020(-B)	206
R88M-M70020(-B)	207
R88M-M1K120(-B)	208
R88M-M1K820(-B)	217

Servo motor model	Motor code
R88M-M2K220(-B)	218
R88M-M3K020(-B)	219
R88M-M4K220(-B)	21A
R88M-M7K220(-B)	20d

• 4000 r/min series

Servo motor model	Motor code
R88M-M06040(-B)	405
R88M-M12040(-B)	406
R88M-M20040(-B)	407
R88M-M40040(-B)	408
R88M-M70040(-B)	409
R88M-M1K140(-B)	40A

Servo motor model	Motor code
R88M-M2K040(-B)	40b
R88M-M3K040(-B)	40c
R88M-M3K840(-B)	40d
R88M-M5K040(-B)	40E
R88M-M6K440(-B)	40F

Factory setting : 000

Usable control mode no. : 1, 2, 3, 4, 5

Note : This parameter setting becomes effective the next time the power is switched on.

CHAPTER 4 SPECIFICATIONS

Parameter no. 03 Cable length

0	3				*	*
---	---	--	--	--	---	---

Sets the length of the resolver cable.

Set in the range from 1 to 60 in units of 1.

Factory setting : 5

Unit : mm

Usable control mode no. : 1, 2, 3, 4, 5

Note : This parameter setting becomes effective the next time the power is switched on.

Parameter no. 06 Number of resolver divisions (G1)

Parameter no. 07 Number of resolver divisions (G2)

0	5	*	*	*	*	*
---	---	---	---	---	---	---

0	7	*	*	*	*	*
---	---	---	---	---	---	---

Sets the number of divisions per revolution of the motor in the form of a fraction.

• Number of divisions : (G1/G2) (pulses/revolutions)

• Setting range: G1, G2: 1 to 32767
 $1 \leq (G1/G2) \leq 20000$

Factory setting : G1 = 4000, G2=1

Unit : G1 : Pulses

G2 : Number of revolutions

Usable control mode no. : 1, 2, 3, 4, 5

Parameter no. 09 Positioning completion width

0	9	*	*	*	*	*
---	---	---	---	---	---	---

Sets the positioning completion width (width when correctly positioned) in terms of the number of pulses, with one revolution of the motor equivalent to 20000 pulses.

• Setting range: 1 to 20000 pulses

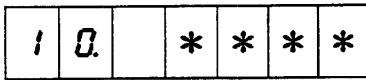
Factory setting : 20

Unit : Pulses

Usable control mode no. : 4, 5

CHAPTER 4 SPECIFICATIONS

Parameter no. 10 Origin shift

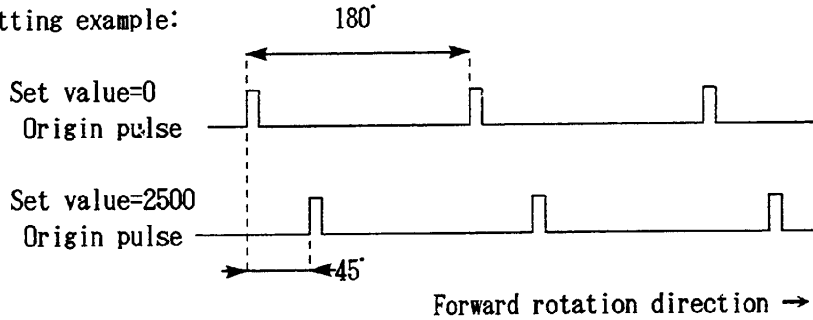


Sets the position at which the origin pulse is output.

Set the amount of shift in terms of the number of pulses, taking one revolution of the motor to be 20000 pulses (the amount of shift is set in the forward direction).

• Range of setting: 0 to 9999

Setting example:

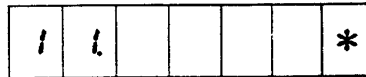


Factory setting : 0

Unit : Pulses

Usable control mode no. : 1, 2, 3, 4, 5

Parameter no. 11 Input pulse type



Sets the type of pulse command input.

0: Forward rotation pulse/reverse rotation pulse

1: 90 Degree phase shift signal (phase A/phase B)

Factory setting : 0

Usable control mode no. : 1, 2, 3, 4, 5

Parameter no. 12 Output pulse type

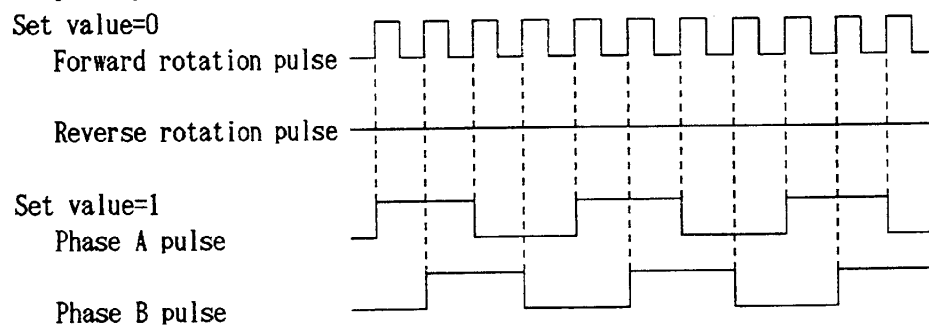


Sets the type of position output pulse.

0: Forward rotation pulse/reverse rotation pulse

1: 90 Degree phase shift signal (phase A/phase B)

Setting example:



Factory setting : 1

Usable control mode no. : 1, 2, 3, 4, 5

CHAPTER 4 SPECIFICATIONS

Parameter no. 20 Acceleration/deceleration selection

2	0					*
---	---	--	--	--	--	---

Sets the method of acceleration or deceleration.

- 0: Rectangular shaped curve (parameter nos. 21 and 22 become effective)
- 1: S-shaped curve (parameter no. 23 becomes effective)

Factory setting : 0

Usable control mode no. : 1, 3

Parameter no. 21 Soft start acceleration time duration

2	1	*	*	*	*	*
---	---	---	---	---	---	---

Sets the acceleration time duration from the stopped condition to reaching rated speed.

- Set within the range from 0 to 10000 ms in units of 10 ms.
- Set to 0 when the soft start function is not used.

Factory setting : 0

Unit : ms

Usable control mode no. : 1, 3

Parameter no. 22 Soft start deceleration time duration

2	2	*	*	*	*	*
---	---	---	---	---	---	---

Sets the deceleration time duration from rated speed rotation to reaching the stopped condition.

- Set within the range from 0 to 10000 ms in units of 10 ms.
- Set to 0 when the soft start function is not used.

Factory setting : 0

Unit : ms

Usable control mode no. : 1, 3

Parameter no. 23 S-shaped curve time constant

2	3	*	*	*	*	*
---	---	---	---	---	---	---

Sets the time taken to reach 90% of the target rotational speed.

- Set within the range from 0 to 10000 ms in units of 10 ms.

Factory setting : 0

Unit : ms

Usable control mode no. : 1, 3

CHAPTER 4 SPECIFICATIONS

Parameter no. 24 Current command filter time constant

2	4				*	*
---	---	--	--	--	---	---

Sets the filter time constant of the current command input section.

- Set within the range from 0 to 40 ms in units of 1 ms.

Factory setting : 1

Unit : ms

Usable control mode no. : 2 , 3

Parameter no. 25 Initial display setting

2	5				*1	*2
---	---	--	--	--	----	----

Sets the power-up mode and display contents.

*1: Mode selection

- 0: RUN Mode
- 1: Check mode
- 2: Adjustment mode

*2: Selection of display contents

RUN Mode	Check mode	Adjustment mode
0 Speed	0 Input/output	0 Speed command zero adjustment
1 Current value	1 Alarm	1 Speed fine adjustment
2 Number of accumulated pulses	2 Alarm history	2 Inertia ratio
3 Number of input pulses	3 SV	3 Speed gain
4 Machine speed	4 Option	4 Position gain
5 Speed command		5 Current command zero adjustment
6 Current command		6 Gain reduction amount in the stopped condition
7 Motor current		
8 Effective load rate		
9 Electronic thermal relay		
A Motor phase shift		

Factory setting : 00

Usable control mode no. : 1 , 2 , 3 , 4 , 5

Note : This parameter setting becomes effective the next time the power is switched on.

CHAPTER 4 SPECIFICATIONS

Parameter no. 26 Display multiplication factor

2	6.			*	*	*
---	----	--	--	---	---	---

Sets the multiplication factor for displaying the machine speed.

- Setting range: 1 to 500
- When the amount of machine movement for one revolution of the motor (in mm/rev) has been set, the unit of machine speed becomes mm/min.
- Machine speed = rotational speed (r/min) × display multiplication factor

Factory setting : 1

Unit : Times

Usable control mode no. : 1 , 2 , 3 , 4 , 5

Parameter no. 30 Monitor output selection

3	0.				*1	*2
---	----	--	--	--	----	----

Sets the output of the analog monitor.

- *1: Contents of the output when the monitor selection signal (EXM) is OFF.
- *2: Contents of the output when the monitor selection signal (EXM) is ON.

• Output contents:

- 0: Motor rotational speed
- 1: Motor current

Factory setting : 01

Usable control mode no. : 1 , 2 , 3 , 4 , 5

Parameter no. 31 Effective load rate calculation time duration

3	1.			*	*	*
---	----	--	--	---	---	---

Sets the time interval for calculating the effective load rate.

- Set within the range from 1 to 120 s.
- Set integral times for machine cycle time.

Factory setting : 30

Unit : s

Usable control mode no. : 1 , 2 , 3 , 4 , 5

CHAPTER4 SPECIFICATIONS

Parameter no. 32 Motor rotational speed

3	2		*	*	*	*
---	---	--	---	---	---	---

Sets the motor rotational speed during the motor test.

- Set within the range from 1 to 4000 r/min in units of 1 r/min.
- The actual motor rotational speed is obtained from the following equation:

$$\text{Motor rotational speed} = P32 \times \frac{P45 + AJ1}{100}$$

Where,

P32: The set value in parameter no. 32;

P45: The set value in extended parameter no. 45 (%);

AJ1: Speed fine adjustment value (%)

- Set this parameter within the range of the rated speed of rotation of the motor.

Factory setting : 50

Unit : r/min

Usable control mode no. : 1 , 2 , 3 , 4 , 5

CHAPTER 4 SPECIFICATIONS

Extended parameter

Parameter no. 33 I/O Function settings

3	3				*1	*2
---	---	--	--	--	----	----

Assigns the input and output signal functions.

*1: Output function setting

Output	0	1	2
STOP	Stop detection	Stop detection	Reverse rotation inhibited
LACT	Torque is limite	Torque is limited	Forward rotation inhibited
ALM	Alarm	Alarm code 3	Alarm code 3
SUB	—	Alarm code 2	Alarm code 2
ICW	Reverse rotation inhibited	Alarm code 1	Alarm code 1
ICCW	Forward rotation inhibited	Alarm code 0	Alarm code 0

*2: Input function setting

Input	0	1	2
PLOCK	Position lock	Position lock	Reverse rotation enable
CLIM	Torque limiting	Torque limiting	Forward rotation enable
HRET	Origin adjustment	Reverse rotation enable	Origin adjustment
ECSRST	Deviation counter reset (control modes 4 and 5)	Forward rotation enable	Deviation counter reset (control modes 4 and 5)
	Control mode selection (control mode 3)		Control mode selection (control mode 3)

Factory setting : 00

Usable control mode no. : 1 , 2 , 3 , 4 , 5

Note : This parameter setting becomes effective the next time the power is switched on.

Parameter no. 34 Brake mode

3	4				*
---	---	--	--	--	---

Sets the type of brake to be used.

0: Dynamic brake

1: Solenoid brake (holding brake)

Factory setting : 0

Usable control mode no. : 1 , 2 , 3 , 4 , 5

Note : This parameter setting becomes effective the next time the power is switched on.

CHAPTER4 SPECIFICATIONS

Parameter no. 35 Speed FB differentiation time constant

3	5			*	*	*
---	---	--	--	---	---	---

Sets the differentiation time constant of the speed amplifier.

- Set in the range from 1 to 255 ms in units of 1 ms.

Factory setting : 32

Unit : ms

Usable control mode no. : 1 , 2 , 3 , 4 , 5

Parameter no. 42 Speed and current limiting methods

4	2				*1	*2
---	---	--	--	--	----	----

Sets the method for speed limiting and for current limiting.

*1: Current limiting method

0: Limited by the analog input (CREF).

Limits when the torque limiting input (CLIM) is ON.

1: Limits based on the value of extended parameter no. 43.

Limits when the torque limiting input (CLIM) is ON.

2: Limits based on the value of extended parameter no. 43.

Limits irrespective of the torque limiting input (CLIM).

*2: Speed control method

0: Limits according to the analog input (REF).

1: Limits based on the value of extended parameter no. 44.

Factory setting : 00

Usable control mode no. : 1 , 2 , 3 , 4 , 5

Parameter no. 43 Current limit value

4	3		*	*	*	*
---	---	--	---	---	---	---

Sets the current limit value.

- This value is effective when the current limiting method setting is "1" or "2" in extended parameter no. 42.

- Set within the range from 0.0 to 150.0 A in units of 0.1 A.

Factory setting : 0.0

Unit : A

Usable control mode no. : 1 , 2 , 3 , 4 , 5

CHAPTER 4 SPECIFICATIONS

Parameter no. 44 Speed limit value

4	4		*	*	*	*
---	---	--	---	---	---	---

Sets the speed limit value.

- This value is effective when the speed limiting method setting is "1" in extended parameter no. 42.
- Set in the range from 0 to the maximum speed of rotation in units of 1 r/min.

Factory setting : 0

Unit : r/min

Usable control mode no. : 2 , 3

Parameter no. 45 Speed command scale

4	5		*	*	*
---	---	--	---	---	---

Sets the ratio of the motor speed to the speed command input (REF).

- $\square \% = \frac{10 (V)}{\text{Command voltage during the rated speed (V)}} \times 100$
- Set in the range from 10 to 200% in units of 1%.

Factory setting : 100

Unit : %

Usable control mode no. : 1 , 2 , 3

Parameter no. 46 Current command scale

4	5		*	*	*
---	---	--	---	---	---

Sets the ratio of the servo driver maximum current to the current command input (CREF).

- $\square \% = \frac{10 (V)}{\text{Command voltage during maximum current (V)}} \times 100$
- Set in the range from 10 to 200% in units of 1%.

Factory setting : 100

Unit : %

Usable control mode no. : 1 , 2 , 3 , 4 , 5

CHAPTER4 SPECIFICATIONS

Parameter no. 47 Rotation direction specification



4	7					*
---	---	--	--	--	--	---

Specifies the direction of motor rotation corresponding to the polarity of the speed command input (REF).

0: Forward rotation for positive input voltages.

1: Forward rotation for negative input voltages.

- When "1" is set in this parameter, even the direction of rotation during a motor test will be opposite to that of the factory setting.

Set value		
0	Motor forward rotation	Motor reverse rotation
1	Motor reverse rotation	Motor forward rotation

Factory setting : 0

Usable control mode no. : 1 , 3

Parameter no. 48 Display sign reversal

4	8					*
---	---	--	--	--	--	---

Specifies whether or not the signs of the following three data items displayed in the RUN mode are to be reversed:

- Current value display
- Display of the number of accumulated pulses
- Machine speed display

0: The sign is not reversed.

1: The sign is reversed

Factory setting : 0

Usable control mode no. : 1 , 2 , 3 , 4 , 5

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