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# mitsubishi

Mitsubishi AC Servo  
MDS-A-SVJ Series

## Servo Parameter Manual

BNP-B3882B-ENG

This manual pertains to the following system:

MDS-A-SVJ Series

BND-511W000-C1

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## 1. Introduction

This manual describes servo parameters and alarms pertaining to the MDS-A-SVJ Series. Any parameter not covered in this manual must be set to zero. Any parameters added, changed, or deleted due to software revisions are marked accordingly in this manual.

The following documents are also provided for reference and should be used in conjunction with this manual:

Mitsubishi Personal Machine Controller	
Servo Selection Manual	BNP-B3783
Mitsubishi Personal Machine Controller	
Servo Maintenance and Adjustment Manual	BNP-B2057

## 2. Functions and Related Parameters

By software (hereafter abbreviated to "S/W") version, functions have been added or revised as shown below.

S/W version	Date of revision	Addition/revision	Related parameter		
AO	'93-12-27	New			
BO	'94- 4-11	Absolute position control enabled	SVo17		
		Made compatible with HA93N-E30-, HA-FH**-Y-, and HA-ME-series motors	SV019	SV020	SVO25
		HA**N-E33- and HA**N-A33- series (high-speed serial detector-type) added	SV025		
		New overload detection method utilized. Servo monitor overload display now shows current actual load level.	SVo21	SVo22	
		Alarm 1F detection added			
B1	'94- 7-11	D/A output amplification rate settings changed	SV063		
		Alarm 28 (absolute position overspeed) detection deleted			
B2	'94-10-24	Regeneration resistors (MR-RB064, MR-RB34) added	SV036		
B3	'94-12-12	Made compatible with 100V units. 100V and 200V units operable using same S/W.			
		Regeneration resistors (MR-RB063, MR-RB064, two series) added	SV036		
		Alarm 10 (insufficient amp voltage) added			
B4	'95- 2-27	HA**N-E33 and HA**N-E30 parameters made common	SV025		
co	'95- 6-23	Acceleration feedforward control added	SV015		
		Induced voltage correction added (compatible with HA**N motors only)	SVo47		
		Emergency-stop ready maintenance control (thrust axis drop prevention control) added	SV048		
C1	'95- 7-26	None			

### 3, Servo Parameters

Servo parameter settings and display methods differ according to the controller used. For details, please refer to the relevant instruction manual.

Name	Abbreviation	Description	Setting screen	Type of change	Setting unit	Minimum value	Maximum value	Type		
								Machine configuration	Servo configuration	Adjustment
SV001	PC1	Motor-side gear ratio	Configuration	Initial		1	32767	○		
SV002	PC2	Machine-side gear ratio	Configuration	Initial		1	32767	○		
SV003	PGN1	Position loop gain 1	Configuration		1/Sec	1	200		○	
SV004	PGN2	Position loop gain 2	Adjustment		1/Sec	0	999			○
SV005	VGN1	Velocity loop gain 1	Adjustment			1	999			○
SV006										
SV007										
SV008	VIA	Speed loop lead compensation	Adjustment			1	9999			○
SV009	IQA	Current loop q-axis lead compensation				1	20480		○	
SV010	IDA	Current loop d-axis lead compensation				1	20480		○	
SV011	IQG	Current loop q-axis gain				1	2560		○	
SV012	IDG	Current loop d-axis gain				1	2560		○	
SV013	ILMT	Current limit			% of rated current	0	999			○
SV014	ILMTsp	Special operation current limit			% of rated current	0	999			○
SV015	FFC	Acceleration feedforward gain	Adjustment		%	0	999			○
SV016	LMC1	Lost motion correction 1	Adjustment		%, % of rated current	-1	200			○
SV017	SPEC	Servo configuration	Configuration	Initial	HEX setting	*	*	○	○	
SV018	PIT	Ball screw lead	Configuration	Initial	mm	1	32767	○		
SV019	RNG1	Position detector resolution	Configuration	Initial	kp/rev	1	9999		○	
SV020	RNG2	Speed detector resolution	Configuration	Initial	kp/rev	1	9999		○	
SV021	OLT	Overload detection time constant			sec	1	80		○	
SV022	OLL	Overload detection level			% of rated current	32	180		○	
SV023	OD1	Servo ON * excessive error detection range			mm	0	32767	○		
SV024	INP	In-position detection range			μm	0	32767	○		
SV025	MTYP	Motor/detector type	Configuration	Initial	HEX setting	*	*		○	
SV026	OD2	Servo OFF * excessive error detection range			mm	0	32767	○		
SV027	SSF1	Special servo function selection 1	Configuration		HEX setting	*	*			○

Name	Abbreviation	Description	Setting screen	Type of change	Setting unit	Minimum value	Maximum value	Type		Adjustment
								Machine configuration	Servo configuration	
SV028										
SV029										
SV030										
SV031										
SV032	TOF	Torque offset	Adjustment		% of rated current	-100	100			○
SV033	SSF2	Special servo function selection 2	Configuration		HEX setting	*	*		○	
SV034	SSF3	Special servo function selection 3		Initial	HEX setting	*	*		○	
SV035	SSF4	Special servo function selection 4			HEX setting	*	*		○	
SV036	PTYP	Regeneration resistor type	Configuration	Initial	HEX setting	*	*		○	
SV037										
SV038	FHz	Mechanical resonance suppression filter centre frequency	Adjustment		Hz	0	3000			○
SV039										
SV040	LMCT	Lost motion correction dead zone	Adjustment		μm	0	100			○
SV041	LMC2	Lost motion correction 2	Adjustment		%, % of rated current	-1	200			○
SV042										
SV043										
SV044										
SV045										
SV046										
SV047	EC	Induced voltage correction	Adjustment		%	0	200			○
SV048	EMGrT	Emergency stop ready maintenance time	Adjustment		msec	0	1000			○
SV049	PGN1sp	Special operation • position loop gain 1			1/sec	1	200			○
SV050	PGN2sp	Special operation • position loop gain 2			1/sec	0	999			○
SV051										
SV052										
SV053	OD3	Special operation • excessive error detection range			mm	0	32767			○
SV054										
SV055	EMGdt	Maximum deceleration control delay time			msec	0	5000	○		
SV056	EMGt	Deceleration control time constant			msec	0	5000	○		
SV057	SHGC	SHG control gain			1/sec	0	999			○
SV058	SHGCsp	Special operation • SHG control gain			1/sec	0	999			○
SV059										
SV060										
SV061	DA1NO	D/A output channel data				0	7			
SV062										
SV063	DA1MPY	D/A output channel amplification rate			1/256	-32768	32767			
SV064										

## 3.1 Parameter Descriptions

Name	Abbreviation	Description	Setting range	
			Minimum	Maximum
V001	PC1	Sets motor-side gear ratio	1	32767
V002	PC2	Sets machine-side gear ratio	1	32767
V003	PGN1	Sets position loop gain. Normally set to 33	1	200
V004	PGN2	Set together with SV057:SHGC when SHG control is used. Set to zero when not in use.	0	999
V005	VGN1	Sets speed loop gain. Can be increased to up to 5 times the standard value in steps of 20-30% of the standard value. Higher settings provide increased response but cause greater vibration and noise.	1	999
V006		Must be set to zero.		
V007		Must be set to zero.		
V008	VIA	Sets speed loop lead compensation. Setting is fixed according to motor type used (see Standard Parameters by Motor Type table).	1	9999
V009	IQA	Internal current loop compensation. Setting is fixed according to motor type used (see Standard Parameters by Motor Type table).	1	20480
V010	IDA	Internal current loop compensation. Setting is fixed according to motor type used (see Standard Parameters by Motor Type table).	1	20480
V011	IQG	Internal current loop compensation. Setting is fixed according to motor type used (see Standard Parameters by Motor Type table).	1	2560
V012	IDG	Internal current loop compensation. Setting is fixed according to motor type used (see Standard Parameters by Motor Type table).	1	2560
V013	ILMT	Sets current limit. Setting is a percentage of rated current. Set to standard value if motor is used to maximum torque (may be limited by amp specifications). Limit applies in + and - directions.	0	999
V014	ILMTsp	Sets special operation (e.g., absolute position initial setting or at machine end stopper method) current limit. Setting is a % of rated current. Set to standard value if motor is used to maximum torque (may be limited by amp specifications). Limit applies in + and - directions.	0	999
V015	FFC	Set when overshoot is significant under feedforward control or when relative error is significant under synchronous control. Set to zero when not in use.	0	999
V016	LMC1	Set when arc quadrant changeover projections are large (occurs when friction, torsion, or backlash causes a dead zone). Effective only when lost motion correction (SV027:lmc1, lmc2) is selected.	-1	200
		Type 1 SV027:SSF1/lmc1=1, lmc2=0 This type of correction eliminates projections with low-speed interpolation. A setting of zero gives no correction gain; a setting of 100 gives 100% correction.	0	200
		Type 2 SV027:SSF1/lmc1=0, lmc2=1 This type is standard with the MDS-A-SVJ series. Use when type-1 correction is insufficient, e.g., with high-speed, high-precision interpolation. Set as a % of rated current.	0	100
		For setting different correction gain (type-1) or correction amount (type-2) for each command direction. Set together with SV041:LMC2 when a different value setting is desired for each command direction. To change the command speed from - to + (with clockwise command direction), set value to SV016:LMC1. To change the command speed from + to - (with clockwise command direction), set value to SV041:LMC2. If -1 is set, correction is not carried out during command speed direction changes.		



Name	Breviation	Description	Setting range																																																																					
			Minimum	Maximum																																																																				
V026	DD2	sets excessive error detection range when servo is OFF. With a setting of zero, excessive error detection does not take place. Normally set to same value as SV023:OD1.	0	32767																																																																				
V027	SF1	<p>Special servo function selection 1</p> <p>15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0</p> <p>zrn2         lmc2   lmc1                    </p> <table border="1"> <thead> <tr> <th>bit</th> <th>Name</th> <th>Function when set to zero</th> <th>Function when set to 1</th> </tr> </thead> <tbody> <tr><td>0</td><td></td><td></td><td></td></tr> <tr><td>1</td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>vfct1</td><td>00: Jitter correction disabled</td><td>10: Jitter correction 2 pulse</td></tr> <tr><td>5</td><td>vfct2</td><td>01: Jitter correction 1 pulse</td><td>11: Jitter correction 3 pulse</td></tr> <tr><td>6</td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td></tr> <tr><td>8</td><td>lmc1</td><td>00: Lost motion correction disabled</td><td>10: Lost motion correction type 2</td></tr> <tr><td>9</td><td>lmc2</td><td>01: Lost motion correction type 1</td><td>11: Prohibited</td></tr> <tr><td>10</td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td></tr> <tr><td>12</td><td></td><td></td><td></td></tr> <tr><td>13</td><td></td><td></td><td></td></tr> <tr><td>14</td><td>zrn2</td><td>Reference point return type 1</td><td>Reference point return type 2</td></tr> <tr><td>15</td><td></td><td></td><td></td></tr> </tbody> </table>	bit	Name	Function when set to zero	Function when set to 1	0				1				2				3				4	vfct1	00: Jitter correction disabled	10: Jitter correction 2 pulse	5	vfct2	01: Jitter correction 1 pulse	11: Jitter correction 3 pulse	6				7				8	lmc1	00: Lost motion correction disabled	10: Lost motion correction type 2	9	lmc2	01: Lost motion correction type 1	11: Prohibited	10				11				12				13				14	zrn2	Reference point return type 1	Reference point return type 2	15					
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V030		Must be set to zero.																																																																						
V031		Must be set to zero.																																																																						
V032	TOP	sets unbalance torque for vertical axes and other axes with unbalance torque as a % of rated current. Used when SV027:SSF1/lmc1, lmc2 are set.	-100	100																																																																				
V033	SSF2	<p>Special servo function selection 2</p> <p>15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0</p> <p>                             </p> <table border="1"> <thead> <tr> <th>bit</th> <th>Name</th> <th>Function when set to zero</th> <th>Function when set to 1</th> </tr> </thead> <tbody> <tr><td>0</td><td></td><td></td><td></td></tr> <tr><td>1</td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td></tr> <tr><td>12</td><td></td><td></td><td></td></tr> <tr><td>13</td><td></td><td></td><td></td></tr> <tr><td>14</td><td></td><td></td><td></td></tr> <tr><td>15</td><td></td><td></td><td></td></tr> </tbody> </table> <p>1000h must be set.</p>	bit	Name	Function when set to zero	Function when set to 1	0				1				2				3				4				5				6				7				8				9				10				11				12				13				14				15					
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:V036	PTYP	Regeneration resistor type 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 <table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td><td style="width: 12.5%;"></td> </tr> </table> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>bit</th> <th>Name</th> <th>Function when set to zero</th> <th>Function when set to 1</th> </tr> </thead> <tbody> <tr><td>0</td><td></td><td></td><td></td></tr> <tr><td>1</td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td></tr> <tr> <td>8</td> <td>rtyp</td> <td colspan="2">Regeneration resistor type (see Regeneration Resistor Types table)</td> </tr> <tr> <td>9</td> <td></td> <td></td> <td></td> </tr> <tr> <td>10</td> <td></td> <td></td> <td></td> </tr> <tr> <td>11</td> <td></td> <td></td> <td></td> </tr> <tr> <td>12</td> <td>amp</td> <td colspan="2">Sets amp type number 1</td> </tr> <tr><td>13</td><td></td><td></td><td></td></tr> <tr><td>14</td><td></td><td></td><td></td></tr> <tr><td>15</td><td></td><td></td><td></td></tr> </tbody> </table>																	bit	Name	Function when set to zero	Function when set to 1	0				1				2				3				4				5				6				7				8	rtyp	Regeneration resistor type (see Regeneration Resistor Types table)		9				10				11				12	amp	Sets amp type number 1		13				14				15					
			bit	Name	Function when set to zero	Function when set to 1																																																																																		
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## Parameter Descriptions

Name	Abbreviation	Description	Setting range	
			Minimum	Maximum
svo37		Must be set to zero.		
SV038	FHz	Sets mechanical vibration suppression frequency if mechanical vibration suppression is required. Must be set over 100Hz. Set to zero when not in use.	0	3000
svo39		Must be set to zero.		
SV040	LMCT	Sets lost motion correction dead zone. Normally set to zero. Set only if lost motion correction timing is incorrect when feed-forward control is used.	0	100
svo41	LMC2	Normally set to zero. Set together with SV016:LMC1 only when different setting values are desired for lost motion correction gain (type 1) or correction amount (type 2) according to the command direction. To change the command speed from - to + (with clockwise command direction), set value to SV016:LMC1. To change the command speed from + to - (with clockwise command direction), set value to SV041:LMC2. If -1 is set, correction is not carried out during command speed direction changes. Only effective when lost motion correction (SV027:lmc1, lmc2) is selected.	-1	200
SV042		Must be set to zero.		
svo43		Must be set to zero.		
svo44		Must be set to zero.		
svo45		Must be set to zero.		
SV046		Must be set to zero.		
svo47	EC	Sets effective gain for induced voltage correction. Compatible only with HA**N HA053, and HA13 motors. Using this function, the feedback current's ability to follow the command current can be increased and the deceleration torque increased. The standard setting is 100, but the following adjustments must be made: Set bit 0 of SV035:SSF4 to 1 and thus display the command current peak in the MAX current 1 display on the servo monitor and the feedback current peak in the MAX current 2 display. Next, carry out acceleration/deceleration and set adjust the setting such that the feedback current peak is 5-10% smaller, than the command current peak.	0	200
SV048	EMGrT	Sets time between an emergency stop (caused by an external emergency stop input, insufficient voltage, or alarm) and ready ON. Used to prevent vertical axes from dropping after an emergency stop. Note that the time set by this parameter becomes ready-ON even if a deceleration-controllable alarm occurs. Generally, this parameter should be set to the minimum value that enables the electromagnetic brake to operate for the required time. This parameter's time setting must be smaller than that of SV055:EMGdt.	0	1000

Name	bbreviation	Description	Setting range	
			Minimum	Maximum
SV049	PGN1sp	Sets position loop gain during special operation, e.g., with synchronous tap, main axis C-axis interpolation. Normally sets main axis position loop gain.	1	200
SV050	PGN2sp	Set together with SV058:SHGCsp if SHG control is carried out during special operation, e.g., with synchronous tap, main axis C-axis interpolation. Set to zero when not in use.	0	999
SV051		Must be set to zero.		
SV052		Must be set to zero.		
SV053	OD3	Sets excessive error detection range for special operation. e.g., absolute position initial setting or at machine end stopper method. With a setting of zero, excessive error detection does not take place when the servo is ON during special operation.		32767
sv054		Must be set to zero.		
SV055	EMGdt	Sets time in ms from start of deceleration control to application of dynamic braking. Normally set to same value as SV056:EMGt. A setting of zero is taken as an input of 2,000 ms. Set to 1 if dynamic braking is selected without deceleration control. Dynamic braking selection takes precedence over position loop step stopping. For axes with brakes, select position loop step stopping or dynamic braking. This parameter's time setting must be larger than that of SV048:EMGrt.	0	5000
SV056	EMGt	Sets time taken to stop from maximum rapid traversing speed (RAPID: axis configuration parameter) following an emergency stop (caused by an external emergency stop input, insufficient voltage, or alarm). From other speeds, deceleration control takes place in direct proportion to the parameter setting. Normally set to same value as rapid traverse time constant. A setting of zero sets position loop step stopping. Reset NC power supply after changing RAPID (axis configuration parameter).	0	5000
SV057	SHGC	Set together with SV004:PGN2 when SHG control is used. Set to zero when not in use.	0	999
SV058		Set together with SV050:PGN2sp if SHG control is used during special operation, e.g., with synchronous tap, main axis C-axis interpolation.		
SV059		Must be set to zero.		
SV060		Must be set to zero.		
SV061	DA1NO	Sets output data number of D/A output channel.	0	7
SV062		Must be set to zero.		
SV063	DA1MPY	Sets output amplification rate of D/A output channel. Output amplification rate = setting value / 256. A setting of zero is taken as a setting value of 256 (output amplification rate = 1).	-32768	32767
SV064		Must be set to zero.		

## 3.2 Motor Types

Set the mtyp value for SV025:MTYP in accordance with the following tables.

Motor series	NC motor 2,000 rpm (standard)						NC motor 3,000 rpm (special)	General- purpose, low-capac- ity, low- inertia
Number	0x	1x	2x	3x	4x	5x	6x	7x
x0	HA40N							HA-FE/ FH43
x1	HA80N							HA-FE/ FH63
x2	HA100N							
x3								
x4								
x5								
x6								
x7								
x8								
x9								
xA								
xB								
xC								HA-FE/ FE053
xD								HA-FE/ FH13
xE							HA23N	HA-FE/ FH23
xF							HA33N	HA-FE/ FH33

  

Motor series	NC motor 3,000 rpm (standard)	General- purpose, low-capac- ity, extra-low- inertia						
Number	8x	9x	Ax	Bx	Cx	Dx	Ex	Fx
x0	HA43N	HA-ME43						
x1	HA83N	HA-ME73						
x2								
x3								
x4								
x5								
x6								
x7								
x8								
x9								
xA	HA93N							
xB								
xC	HA053	HA-ME053						
xD	HA13	HA-ME13						
xE		HA-ME23						
xF								

### 3.3 Detector Types

Set the etyp value for SV025:MTYP in accordance with the following table.

Number	Detector system	Motor type (detector type)	Detector resolution	RNG1/2 setting	Remarks
00	ABZ + WW (with OHM)	HA**N-E30	25000	25	
	High-speed serial	HA**N-E33	25000	25	
11	No setting				
22	High-speed serial	HA**N-E33	25000	25	
		HA**N-A33	25000	25	
		HA-FH	8000	8	
33	ABZ + ww (without OHM)	HA053/13-E30	10000	10	
		HA-FE	4000	4	
		HA-ME	4000	4	

### 3.4 Regeneration Resistors Types

Connectable regeneration resistor combinations depend on the servo amp capacity, as shown in the following table. Set SV036:PTYP to the number corresponding to the regeneration resistor combination that is connected.

Regenera- tion resistor type	Connec- tion arrange- ment	Total resis- tance	Regen- erative capac- ity	SV036	MDS- A-SVJ-01	MDS- A-SVJ-03	MDS- A-SVJ-06	MDS- A-SVJ-10	MDS- A-SVJ-20
No resis- tor				1000	⊙				
MR-RB013	1	52 Ω	18 W	1100	○	⊙	⊙		
MR-RB033	1	52 Ω	36 W	1200	○	○	○		
	2 x paral- lel	26 Ω	72 W	1200				⊙	⊙
	4 x paral- lel	13 Ω	144 W	1200					○
MR-RB064	1	26 Ω	72 W	1300				○	○
	2 x paral- lel	13 Ω	144 W	1300					○
	2 x serial	52 Ω	144 W	1F00	○	○	○		
MR-RB34	1	26 Ω	300 W	1400				○	○
	2 x paral- lel	13 Ω	600 W	1400					○
MR-RB063	1	52 Ω	72 W	1500	○	○	○		
	2 x paral- lel	26 Ω	144 W	1500				○	○
	4 x paral- lel	13 Ω	288 W	1500					○

(NOTE) ⊙ : Standard resistor selection; ○ : Possible resistor selection.

\* Resistor selection: If the servo is used on a vertical axis, select resistors of one or two grades higher than the standard selection.

### 3.5 D/A Output Channel

The servo amp has one monitor output channel for servo adjustment purposes. This output is provided via a special connector at the top of the amp's front panel.

D/A output specifications are as follows:

Number of channels : 1  
 Resolution : 7 bits (full-scale 128 resolution)  
 Output voltage range : 0 to 10 V  
 Sampling cycle : 3.55 ms

Set SV061:DA1N0 in accordance with the following table.

Number	Description	Unit	Number	Description	Unit
0	Speed feedback	rpm	4	Speed feedback	rpm
1	Current command (torque command)	% of rating	5	0 output	
2	Current command (torque command)	% of rating	6	Position droop (lower)	interpolation unit
3	Current feedback (actual torque)	% of rating	7	Position droop (upper)	

The output voltage is determined according to the formula below. To alter the output voltage, adjust the output amplification rate. Note that if SV063 is zero, the output is determined on the assumption that this parameter is set to 256.

$$\text{Data} \times \frac{\text{SV063}}{256} \times \frac{10}{256} + 5.00 = \text{output voltage [V]}$$

Example: With settings of SV061 = 0 and SV063 = 8 and a motor speed of 3,000 rpm, the output voltage is as follows:

$$3000 \times \frac{8}{256} \times \frac{10}{256} + 5.00 = 8.66 \text{ [V]}$$

### 3.6 Electronic Gearing

By correctly setting the ball screw lead, step-down ratio, step-up ratio, and detector resolution, it is possible to make amounts of machine movement consistent with those required by commands. The matching of these two amounts of movement is termed electronic gearing and determined by the following parameters:

Parameters Related to Electronic Gearing:

SV001 : PC1      SV018: PIT  
 svoo2 : PC2      SV019 : RNG1  
                   SV020 : RNG2

Set the machine constant such that the reduced numerator and denominator are less than 32767. If this condition is not satisfied, an alarm 37, abnormal parameter number 2301 (101 with M500-type NCs) will be output.

$ELG1 < 32767, ELG2 < 32767$

$\frac{ELG1}{ELG2}$  is a reduction of  $\frac{PC2 \times RANG}{PC1 \times PIT \times IUNIT}$ .

Note that  $RANG = RNG1 = RNG2$ .

IUNIT is related to the interpolation unit as follows:

0.5  $\mu\text{m}$  : IUNIT = 2,      0.05  $\mu\text{m}$ : IUNIT = 20

### 3.7 Parameter Changes

For safety, parameters must be changed with the system in an emergency stop condition. The time at which parameter changes become effective depends on the parameter. For details, refer to the Servo Parameters table. Changes to parameters marked "Initial" in the Servo Parameters table are effective the next time the controller power is switched ON. Changes to parameters with no "Initial" entry are effective immediately.

### 3.8 Command Polarity

With commands executed in the + direction, the motor direction (and thus the command direction) is termed

CW if the motor turns clockwise and

CCW if the motor turns counter-clockwise,

as seen from the load side.

The direction of rotation can be changed using the controller parameters. Note that with some parameters, the +/- motor direction relationship is reversed. Servo parameters that are affected by the CW/CCW direction are as follows:

SV016:LMC1    SV041:LMC2

(assuming different values other than zero are set for SV016 and SV041)

3.9 Standard Parameters by Motor Type

Motor Amp capacity	HA40N 06	HA80N 10	HA100N 20	HA053 01	HA13 01	HA23N 03	HA33N 03	HA43N 06	HA83N 10	HA93N 20
SV001	-	-	-	-	-	-	-	-	-	-
SV002	-	-	-	-	-	-	-	-	-	-
SV003	33	33	33	33	33	33	33	33	33	33
SV004	0	0	0	0	0	0	0	0	0	0
SV005	100	100	150	70	70	70	70	100	100	150
SV006	0	0	0	0	0	0	0	0	0	0
SV007	0	0	0	0	0	0	0	0	0	0
SV008	1364	1364	1364	1364	1364	1364	1364	1364	1364	1364
SV009	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
SV010	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
SV011	512	512	256	256	256	256	256	256	256	256
SV012	512	512	512	256	256	256	256	512	512	512
SV013	500	500	500	500	500	500	500	500	500	500
SV014	500	500	500	500	500	500	500	500	500	500
SV015	0	0	0	0	0	0	0	0	0	0
SV016	0	0	0	0	0	0	0	0	0	0
SV017	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
SV018	-	-	-	-	-	-	-	-	-	-
SV019	25	25	25	10	10	25	25	25	25	25
SV020	25	25	25	10	10	25	25	25	25	25
SV021	60	60	60	60	60	60	60	60	60	60
SV022	150	150	150	150	150	150	150	150	150	150
SV023	-	-	-	-	-	-	-	-	-	-
SV024	50	50	50	50	50	50	50	50	50	50
SV025	xx00	xx01	xx02	338C	338D	xx6E	xx6F	xx80	xx81	xx8A
SV026	-	-	-	-	-	-	-	-	-	-
SV027	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
SV028	0	0	0	0	0	0	0	0	0	0
SV029	0	0	0	0	0	0	0	0	0	0
SV030	0	0	0	0	0	0	0	0	0	0
SV031	0	0	0	0	0	0	0	0	0	0
SV032	0	0	0	0	0	0	0	0	0	0
SV033	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
SV034	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
SV035	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
SV036	1100	1200	1200	1000	1000	1100	1100	1100	1200	1200
SV037	0	0	0	0	0	0	0	0	0	0
SV038	0	0	0	0	0	0	0	0	0	0
SV039	0	0	0	0	0	0	0	0	0	0
SV040	0	0	0	0	0	0	0	0	0	0
SV041	0	0	0	0	0	0	0	0	0	0
SV042	0	0	0	0	0	0	0	0	0	0
SV043	0	0	0	0	0	0	0	0	0	0
SV044	0	0	0	0	0	0	0	0	0	0
SV045	0	0	0	0	0	0	0	0	0	0
SV046	0	0	0	0	0	0	0	0	0	0
SV047	100	100	100	100	100	100	100	100	100	100
SV048	0	0	0	0	0	0	0	0	0	0
SV049	15	15	15	15	15	15	15	15	15	15
SV050	0	0	0	0	0	0	0	0	0	0
SV051	0	0	0	0	0	0	0	0	0	0
SV052	0	0	0	0	0	0	0	0	0	0
SV053	0	0	0	0	0	0	0	0	0	0
SV054	0	0	0	0	0	0	0	0	0	0
SV055	0	0	0	0	0	0	0	0	0	0
SV056	0	0	0	0	0	0	0	0	0	0
SV057	0	0	0	0	0	0	0	0	0	0
SV058	0	0	0	0	0	0	0	0	0	0
SV059	0	0	0	0	0	0	0	0	0	0
SV060	0	0	0	0	0	0	0	0	0	0
SV061	0	0	0	0	0	0	0	0	0	0
SV062	0	0	0	0	0	0	0	0	0	0
SV063	0	0	0	0	0	0	0	0	0	0
SV064	0	0	0	0	0	0	0	0	0	0

(NOTE) Parameters marked "--" are determined according to the machine configuration.

MDS-A-SVJ
Standard Parameters

Motor	HA-FE053 (HA-FH053)	HA-FE13 (HA-FH13)	HA-FE23 (HA-FH23)	HA-FE33 (HA-FH33)	HA-FE43 (HA-FH43)	HA-FE63 (HA-FH63)				
Amp capacity	01	01	03	03	06	06				
SV001	-	-	-	-	-	-				
SV002	-	-	-	-	-	-				
SV003	33	33	33	33	33	33				
SV004	0	0	0	0	0	0				
SV005	15	15	15	15	15	15				
SV006	0	0	0	0	0	0				
SV007	0	0	0	0	0	0				
SV008	1364	1364	1364	1364	1364	1364				
SV009	2048	2048	2048	2048	2048	2048				
SV010	2048	2048	2048	2048	2048	2048				
SV011	256	256	512	512	768	768				
SV012	256	256	512	512	768	768				
SV013	500	500	500	500	500	500				
SV014	500	500	500	500	500	500				
SV015	0	0	0	0	0	0				
SV016	0	0	0	0	0	0				
SV017	0000	0000	0000	0000	0000	0000				
SV018	-	-	-	-	-	-				
SV019	4(8)	4(8)	4(8)	4(8)	4(8)	4(8)				
SV020	4(8)	4(8)	4(8)	4(8)	4(8)	4(8)				
SV021	60	60	60	60	60	60				
SV022	150	150	150	150	150	150				
SV023	-	-	-	-	-	-				
SV024	50	50	50	50	50	50				
SV025	337C (227C)	337D (227D)	337E (227E)	337F (227F)	337G (227G)	337H (227H)				
SV026	-	-	-	-	-	-				
SV027	4000	4000	4000	4000	4000	4000				
SV028	0	0	0	0	0	0				
SV029	0	0	0	0	0	0				
SV030	0	0	0	0	0	0				
SV031	0	0	0	0	0	0				
SV032	0	0	0	0	0	0				
SV033	0000	0000	0000	0000	0000	0000				
SV034	0000	0000	0000	0000	0000	0000				
SV035	0000	0000	0000	0000	0000	0000				
SV036	1000	1000	1100	1100	1100	1100				
SV037	0	0	0	0	0	0				
SV038	0	0	0	0	0	0				
SV039	0	0	0	0	0	0				
SV040	0	0	0	0	0	0				
SV041	0	0	0	0	0	0				
SV042	0	0	0	0	0	0				
SV043	0	0	0	0	0	0				
SV044	0	0	0	0	0	0				
SV045	0	0	0	0	0	0				
SV046	0	0	0	0	0	0				
SV047	0	0	0	0	0	0				
SV048	0	0	0	0	0	0				
SV049	15	15	15	15	15	15				
SV050	0	0	0	0	0	0				
SV051	0	0	0	0	0	0				
SV052	0	0	0	0	0	0				
SV053	0	0	0	0	0	0				
SV054	0	0	0	0	0	0				
SV055	0	0	0	0	0	0				
SV056	0	0	0	0	0	0				
SV057	0	0	0	0	0	0				
SV058	0	0	0	0	0	0				
SV059	0	0	0	0	0	0				
SV060	0	0	0	0	0	0				
SV061	0	0	0	0	0	0				
SV062	0	0	0	0	0	0				
SV063	0	0	0	0	0	0				
SV064	0	0	0	0	0	0				

(NOTE) Parameters marked "-" are determined according to the machine configuration.

MDS-A-SVJ
standard Parameters

Motor Amp capacity	HA-ME053 01	HA-ME13 01	HA-ME23 03	HA-ME43 03	HA-ME73 06					
SV001	-	-	-	-	-					
SV002	-	-	-	-	-					
SV003	33	33	33	33	33					
SV004	0	0	0	0	0					
SV005	8	8	8	8	8					
SV006	0	0	0	0	0					
SV007	0	0	0	0	0					
SV008	1364	1364	1364	1364	1364					
SV009	2048	2048	2048	2048	2048					
SV010	2048	2048	2048	2048	2048					
SV011	256	256	512	512	512					
SV012	256	256	512	512	512					
SV013	500	500	500	500	500					
SV014	500	500	500	500	500					
SV015	0	0	0	0	0					
SV016	0	0	0	0	0					
SV017	0000	0000	0000	0000	0000					
SV018	-	-	-	-	-					
SV019	4	4	4	4	4					
SV020	4	4	4	4	4					
SV021	60	60	60	60	60					
SV022	150	150	150	150	150					
SV023	-	-	-	-	-					
SV024	50	50	50	50	50					
SV025	339C	339D	339E	3390	3391					
SV026	-	-	-	-	-					
SV027	4000	4000	4000	4000	4000					
SV028	0	0	0	0	0					
SV029	0	0	0	0	0					
SV030	0	0	0	0	0					
SV031	0	0	0	0	0					
SV032	0	0	0	0	0					
SV033	0000	0000	0000	0000	0000					
SV034	0000	0000	0000	0000	0000					
SV035	0000	0000	0000	0000	0000					
SV036	1000	1000	1100	1100	1100					
SV037	0	0	0	0	0					
SV038	0	0	0	0	0					
SV039	0	0	0	0	0					
SV040	0	0	0	0	0					
SV041	0	0	0	0	0					
SV042	0	0	0	0	0					
SV043	0	0	0	0	0					
SV044	0	0	0	0	0					
SV045	0	0	0	0	0					
SV046	0	0	0	0	0					
SV047	0	0	0	0	0					
SV048	0	0	0	0	0					
SV049	15	15	15	15	15					
SV050	0	0	0	0	0					
SV051	0	0	0	0	0					
SV052	0	0	0	0	0					
SV053	0	0	0	0	0					
SV054	0	0	0	0	0					
SV055	0	0	0	0	0					
SV056	0	0	0	0	0					
SV057	0	0	0	0	0					
SV058	0	0	0	0	0					
SV059	0	0	0	0	0					
SV060	0	0	0	0	0					
SV061	0	0	0	0	0					
SV062	0	0	0	0	0					
SV063	0	0	0	0	0					
SV064	0	0	0	0	0					

(NOTE) Parameters marked "-" are determined according to the machine configuration.

## 4. Servo Alarms and Warnings

Number	Abbreviation	Name	Stopping method	Reset	Number	Abbreviation	Name	Stopping method	Reset
10	UV	Amp insufficient voltage	Deceleration control	PR	40				
					41				
					42	FE1	Feedback error	Deceleration control	PR
11									
12	ME	Memory error	Initial error	AR	43				
13	SWE	S/W error	Dynamic	PR	44				
14					45				
15					46	OHM	Motor overheat	Deceleration control	NR
16	RD1	Magnetic pole position detection error	Deceleration control	PR	47				
17	ADE	A/D converter error	Dynamic	PR	48				
18	RD2	Serial detector • initial communication error	Initial error	PR	49				
					4A				
					4B				
19					4C				
1A					4D				
1B					4E				
1C					4F				
1D					50	OL1	Overload detection 1	Deceleration control	NR
1E									
1F	PIDE	Power P board ID error	Initial error	AR	51	OL2	Overload detection 2	Dynamic	NR
20	NS1	No feedback signal	Dynamic	PR	52	OD1	Excessive error 1 (servo ON)	Dynamic	NR
21									
22					53	OD2	Excessive error 2 (servo OFF)	Dynamic	NR
23									
24					54				
25					55				
26	ABSE	Absolute position lost	Initial error	AR	56				
27					57				
28					58				
29					59				
2A					5A				
2B	SMEN	Serial detector • CPU error	Initial error	AR	5B				
2c	SDAT	Serial detector • data error	Dynamic	PR	5D				
					5E				
					60				
2D	SLED	Serial detector • data error	Dynamic	PR	61				
2E					62				
					63				
2F	STRE	Serial detector • communication error	Dynamic	PR	64				
					65				
30	OR	Over-regeneration	Deceleration control	PR	66				
					67				
					68				
31	OS	Overspeed	Deceleration control	PR	69				
					6A				
					6B				
32	PMOC	Power module error (excessive current)	Dynamic	PR	6C				
					6D				
33	OV	Excessive voltage	Dynamic	PR	6E				
34	DP	CRC error	Deceleration control	PR	6F				
					70				
					71				
35	DE	Data error	Deceleration control	PR	72				
					73				
					74				
36	TE	Communication error	Deceleration control	PR	75				
					76				
					77				
37	PE	Initial parameter error	Initial error	PR	78				
					79				
38	TP1	Protocol error 1	Deceleration control	PR	7A				
					7B				
					7C				
39	TP2	Protocol error 2	Deceleration control	PR	7D				
					7E				
					7F				
3A	OC	Excessive current	Dynamic	PR	80				
3B	PMOH	Power module error (overheat)	Dynamic	PR	81				
					82				
3C					83				
3D					84				
3E					85				
3F					86				

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Num-ber	Abbrevi-ation	Name	Stopping method	Reset	Num-ber	Abbrevi-ation	Name	Stopping method	Reset
87									
88	WD	Watchdog	Dynamic	AR					
89									
8A									
8B									
8C									
8D									
8E									
8F									

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Num-ber	Abbrevi-ation	Name	Reset	Num-ber	Abbrevi-ation	N a m e	Reset
90				CD		Servo OFF	
91				CE			
92				CF			
93	WAM	Initial absolute position	PR	DO		Servo ON	
94				D1			#1
95				D2			#2
96				D3			#3
97				D4			#4
98				D5			#5
99				D6			#6
9A				D7			#7
9B				D8			
9C				D9			
9D				DA			
9E	WAR	Serial detector .multi-revo- lution counter error	*	DC			
9F	WAB	Low battery voltage	*	DD			
A0				DE			
A1				DF			
A2				E0	WOR	Over-regeneration warning	*
A3				E1	WOL	Overload warning	*
A4				E2			
A5				E3	WAC	Absolute position counter warning	*
A6				E4	WPE	Parameter error warning	*
A7				E5			
A8				E6	AXE	Controlled axis removed warn- ing	*
A9				E7	NCE	External emergency stop	*
AA		Initial communication * wait- ing for phase 1 (controller OFF)		E8			
AB		Initial communication * wait- ing for phase 1		E9			
AC		Initial communication * wait- ing for phase 2		EA			
AD		Initial communication * wait- ing for phase 3		EB			
AE		Initial communication * wait- ing for phase 4		EC			
AF		Reserved		ED			
B0		Ready OFF		EE			
B1				EF			
B2				F0		Alarm * warning controlled axis display	#1
B3				F1			#2
B4				F2			#3
B5				F3			#4
B6				F4			#5
B7				F5			#6
B8				F6			#7
B9				F7			
BA				F8			
BB				F9			
BC				FA			
BD				FB			
BE				FC			
BF				FD			
C0		Servo OFF		FE			
C1				FF			
C2				00			
C3				01			
C4				02			
C5				03			
C6				#1 04			
C7				#2 05			
C8				#3 06			
C9				#4 07			
CA				#5 08			
CB				#6 09			
CC				#7 0A			
				0B			
				0C			
				0D			
				0E			
				0F			
						Flash programming error	
						Flash deletion error	
						Vpp error	
						Check sum error	
						Compare error	
						Bank designation error	
						Initial address error	
						Bank switching error	
						Address error	
						Receipt timeout	
						Command sequence error	

(NOTE) NR: Reset executed by controller reset command;  
 PR: Reset executed by turning controller power OFF;  
 AR: Reset executed by turning servo amp power OFF.

#### 4.1 Alarm Descriptions

Num-ber	Abbrevi-ation	Name	Description	stop-ping method	Reset
10	UV	Amp insufficient voltage	Servo amp's internal PN power supply voltage is too low. Servo amp waits for initial controller communication. No record is kept of this alarm.	Decel-eration control	PR
12	ME	Memory error	Error detected in memory IC/FB IC during self-diagnostic checks after servo amp power ON. No record is kept of this alarm.	Initial error	AR
13	SWE	S/W error	Software data processing not completed within designated time.	Dynamic	PR
16	RD1	Magnetic pole position detection error	Abnormality detected in UVW phase of magnetic pole position detection signal (with HA**N-E30, HA053, HA13, HA-FE, or HA-ME).	Decel-eration control	PR
17	ADE	A/D converter error	Abnormality found in current detection A/D converter during self-diagnostic checks after servo amp power ON.	Dynamic	PR
18	RD2	Serial detector . initial communication error	Initial communication with detector cannot take place (with HA**N-E33, HA**N-A33, or HA-FH).	Initial error	PR
1F	PIDE	Power P board ID error	Servo amp internal power unit is SVJ-type.	Initial error	AR
20	NS1	No feedback signal	Feedback signal lost (with HA**N-E30, HA053, HA13, HA-FE; or HA-ME).	Dynamic	PR
25	ABSE	Absolute position lost	Low voltage on absolute position detector's internal backup battery. can't guarantee accuracy of absolute position.	Initial error	AR
2B	SMEN	Serial detector . CPU error	Error detected in data in detector's internal EEPROM (with HA**N-E33, HA**N-A33).	Initial error	AR
2C	SLED	Serial detector . LED error	Deterioration sensed in detector LED (with HA**N-E33 or HA**N-A33).	Dynamic	PR
2D	SDAT	Serial detector . data error	Abnormality sensed in detector's internal position control in one revolution (with HA**N-E33 or HA**N-A33).	Dynamic	PR
2F	STRE	Serial detector . communication error	Communication with detector interrupted (with HA**N-E33, HA**N-A33, or HA-FH).	Dynamic	PR
30	OR	Over-regeneration	Overheating in regeneration resistors detected. Cannot be reset if regeneration load is over 40%. Do not force-reset by turning servo amp power OFF and ON.	Decel-eration control	PR
31	OS	Overspeed	Motor speed detected in excess of motor's permissible speed (1.2 X maximum motor speed).	Decel-eration control	PR
32	PMOC	Power module error (excessive current)	Excessive current detected by IPM used with inverter.	Dynamic	PR
33	OV	Excessive voltage	Excessive voltage detected on servo amp's internal PN power supply.	Dynamic	PR
34	DP	CRC error	Error detected in data sent from controller to servo amp.	Decel-eration control	PR

Number	Abbreviation	Name	Description	Stopping method	Reset
35	DE	Data error	Error detected in movement command data sent from controller.	Deceleration control	PR
36	TE	Communication error	Communication from controller interrupted.	Deceleration control	PR
37	PE	Initial parameter error	Illegal parameter detected in parameters sent following controller power ON.	Initial error	PR
38	TP1	Protocol error 1	Error detected in communication frame sent from controller.	Deceleration control	PR
39	TP2	Protocol error 2	Error detected in axis status data sent from controller.	Deceleration control	PR
3A	OC	Excessive current	Excessive level detected in motor drive current.	Dynamic	PR
3B	PMOH	Power module error (overheat)	Overheating detected in IPM used with inverter.	Dynamic	PR
42	FE1	Feedback error	Missing feedback pulse or abnormality in Z phase detected (with HA**N-E30, HA053, HA13, HA-FE, or HA-ME).	Deceleration control	PR
46	OHM	Motor overheat	Thermal protector operated in motor or detector.	Deceleration control	NR
50	OL1	Overload detection 1	Overload detection level current (SV022:OLL) flowed for overload time constant period (SV021:OLT), or load exceeded motor rating. Cannot be reset if load level is over 40%.	Deceleration control	NR
51	OL2	Overload detection 2	Current command of more than 95% of servo amp's maximum capacity continued for over 1 second.	Dynamic	NR
52	OD1	Excessive error 1 (servo ON)	With servo ON, discrepancy between ideal position and actual position exceeded parameter SV023:OD1 (or SV053:OD3).	Dynamic	NR
53	OD2	Excessive error 1 (servo OFF)	With servo OFF, discrepancy between ideal position and actual position exceeded parameter SV026:OD2.	Dynamic	NR
88	WD	Watchdog	Servo system not functioning normally.	Dynamic	AR

#### 4.2 Warning Descriptions

Number	Abbreviation	Name	Description	Reset
93	WAM	Initial absolute position fluctuation	Position moved by more than permissible amount from absolute position detected at controller power ON.	PR
9E	WAR	Serial detector • multi-revolution counter error	Abnormality detected in multi-revolution counter; can't guarantee accuracy of absolute position (with HA**N-A33).	.
9F	WAB	Low battery voltage	Low voltage detected on absolute position detector battery.	.
E0	WOR	Over-regeneration warning	Regeneration of 80% of over-regeneration alarm level detected.	.
E1	WOL	Overload warning	Loading of 80% of overload alarm level detected.	*
E3	WAC	Absolute position counter warning	Discrepancy detected between absolute position and relative position; can't guarantee accuracy of absolute position.	.
E4	WPE	Parameter error warning	Parameter setting detected outside permissible range.	*
E6	AXE	Controlled axis removed warning	Controlled axis removed.	*
E1	NCE	External emergency stop	External emergency stop input received.	*

## 4.3 Initial Parameter Error Numbers

Whenever an initial parameter error (alarm 37) occurs, the parameter causing the error is identified on the controller's diagnostic screen. Note that the format in which erroneous parameters are displayed differs according to the controller. For details, please refer to the relevant instruction manual. Parameter numbers are as follows:

## Parameter Numbers

M500-type CNC : 1 to 64  
 MS0-type CNC, machine controller model N : 2201 to 2264

If and when an initial parameter error occurs, first check the parameter setting range. If the setting is within the permissible range, the cause of the error is probably as shown below.

Number		Probable cause
M500	M50	
19	2219	Detector resolution setting does not match currently connected detector. (If detector is incremental type, also check SV025.)
20	2220	SV020 setting value does not match SV019.
25	2225	Motor type setting is for motor type that is not recognized. Detector type designation is incorrect. Absolute position system is set with detector type setting of 00. Motor type HA053 or HA13 is set with detector type setting of 00 (should be 33).
27	2227	Lost motion correction types 1 and 2 are enabled simultaneously.
36	2236	Regeneration resistor type setting is for regeneration resistor that is not recognized.
55	2255	SV055 setting value (input of 0 is taken as 2000) is smaller than SV048 setting value.

Parameter errors with the numbers shown below are caused by more than one parameter.

Number		Probable cause	Related parameters
M500	M50		
101	2301	Electronic gearing constant is greater than machine constant. Check that all related parameters are set correctly.	SV001:PC1, SV002:PC2, SV018:PIT SV019:RNG1, SV020:RNG2
102	2302	Absolute position detection parameter is ON with HA**N-E33 connected.  Turn absolute position detection parameter OFF. To carry out absolute position detection, replace incremental-type detector with absolute position-type.	SV017:SPEC, SV025:MTYP

#### 4.4 100V Servo Amps

A low power supply voltage can limit maximum operating capacity.

The MDS-A-SVJ-OIW (100W) and MDS-A-SVJ-03W (300W) normally have an instantaneous operating capacity of 300% of the rated motor output (excluding HA\*\*N motors). If the power supply voltage is below 90V, however, the MDS-A-SVJ-03W's maximum instantaneous operating capacity is limited to 4.75A (250% of the HA-FE33's rated output). With this limitation, excessive error 1 (OD1) alarms are liable to occur. To prevent excessive error 1 alarms, increase the excessive error detection range settings (SV023 and SV053).

Note that the MDS-A-SVJ-01W (100W) is not thus affected.

<<NOTE>> The MDS-A-SVJ-01W and MDS-A-SVJ-03W are designed for use with a single-phase, 100V power supply. Never apply a 200V power supply. Use of a 200V power supply would damage the amp.

Revision number	Date of revision (S/W)	Details of revision
	'95- 2-27 (B4)	First edition of manual released.
A	'95- 6-23 (C0)	Servo parameters added. Regeneration Resistor Types table created. D/A output specifications and output voltage calculation formula added. Causes of initial parameter errors grouped according to error parameter number.
B	'95- 1-26 (C1)	Electronic Gearing notes (section 3.6) revised. Front cover title changed from "Mitsubishi Personal Machine Controller" to Mitsubishi AC Servo.