5. PARAMETERS

5. PARAMETERS

> ⚠ **CAUTION**　· Never adjust or change the parameter values extremely as it will make operation instable.

5.1 Parameter list

5.1.1 Parameter write inhibit

> **POINT**
> · After setting the parameter No. 19 value, switch power off, then on to make that setting valid.

In the MR-J2S-A servo amplifier, its parameters are classified into the basic parameters (No. 0 to 19), expansion parameters 1 (No. 20 to 49) and expansion parameters 2 (No.50 to 84) according to their safety aspects and frequencies of use. In the factory setting condition, the customer can change the basic parameter values but cannot change the expansion parameter values. When fine adjustment, e.g. gain adjustment, is required, change the parameter No. 19 setting to make the expansion parameters write-enabled.

The following table indicates the parameters which are enabled for reference and write by the setting of parameter No. 19. Operation can be performed for the parameters marked ○ .

Parameter No. 19 setting	Operation	Basic parameters No. 0 to No. 19	Expansion parameters 1 No. 20 to No. 49	Expansion parameters 2 No. 50 to No. 84
0000 (initial value)	Reference	○		
	Write	○		
000A	Reference	No. 19 only		
	Write	No. 19 only		
000B	Reference	○	○	
	Write	○		
000C	Reference	○	○	
	Write	○	○	
000E	Reference	○	○	○
	Write	○	○	○
100B	Reference	○		
	Write	No. 19 only		
100C	Reference	○	○	
	Write	No. 19 only		
100E	Reference	○	○	○
	Write	No. 19 only		

5.1.2 Lists

```
┌─────────────────────────────────────────────────────────────────┐
│  POINT                                                           │
│ ・For any parameter whose symbol is preceded by *, set the      │
│   parameter value and switch power off once, then switch it on  │
│   again to make that parameter setting valid.                   │
└─────────────────────────────────────────────────────────────────┘
```

The symbols in the control mode column of the table indicate the following modes.

P : Position control mode

S : Speed control mode

T : Torque control mode

(1) Item list

	No.	Symbol	Name	Control mode	Initial value	Unit	Customer setting
Basic parameters	0	*STY	Control mode ,regenerative option selection	P・S・T	0000		
	1	*OP1	Function selection 1	P・S・T	0002		
	2	ATU	Auto tuning	P・S	7kW or less: 0105 11kW or more:0102		
	3	CMX	Electronic gear numerator	P	1		
	4	CDV	Electronic gear denominator	P	1		
	5	INP	In-position range	P	100	pulse	
	6	PG1	Position control gain 1	P	7kW or less: 35 11kW or more:19	rad/s	
	7	PST	Position command acceleration/deceleration time constant (position smoothing)	P	3	ms	
	8	SC1	Internal speed command 1	S	100	r/min	
			Internal speed limit 1	T	100	r/min	
	9	SC2	Internal speed command 2	S	500	r/min	
			Internal speed limit 2	T	500	r/min	
	10	SC3	Internal speed command 3	S	1000	r/min	
			Internal speed limit 3	T	1000	r/min	
	11	STA	Acceleration time constant	S・T	0	ms	
	12	STB	Deceleration time constant	S・T	0	ms	
	13	STC	S-pattern acceleration/deceleration time constant	S・T	0	ms	
	14	TQC	Torque command time constant	T	0	ms	
	15	*SNO	Station number setting	P・S・T	0	station	
	16	*BPS	Serial communication function selection, alarm history clear	P・S・T	0000		
	17	MOD	Analog monitor output	P・S・T	0100		
	18	*DMD	Status display selection	P・S・T	0000		
	19	*BLK	Parameter write inhibit	P・S・T	0000		

5. PARAMETERS

	No.	Symbol	Name	Control mode	Initial value	Unit	Customer setting
Expansion parameters 1	20	*OP2	Function selection 2	P·S	0000		
	21	*OP3	Function selection 3 (Command pulse selection)	P	0000		
	22	*OP4	Function selection 4	P·S·T	0000		
	23	FFC	Feed forward gain	P	0	%	
	24	ZSP	Zero speed	P·S·T	50	r/min	
	25	VCM	Analog speed command maximum speed	S	(Note 1)0	(r/min)	
			Analog speed limit maximum speed	T	(Note 1)0	(r/min)	
	26	TLC	Analog torque command maximum output	T	100	%	
	27	*ENR	Encoder output pulses	P·S·T	4000	pulse /rev	
	28	TL1	Internal torque limit 1	P·S·T	100	%	
	29	VCO	Analog speed command offset	S	(Note 2)	mV	
			Analog speed limit offset	T	(Note 2)	mV	
	30	TLO	Analog torque command offset	T	0	mV	
			Analog torque limit offset	S	0	mV	
	31	MO1	Analog monitor 1 offset	P·S·T	0	mV	
	32	MO2	Analog monitor 2 offset	P·S·T	0	mV	
	33	MBR	Electromagnetic brake sequence output	P·S·T	100	ms	
	34	GD2	Ratio of load inertia moment to servo motor inertia moment	P·S	70	0.1 times	
	35	PG2	Position control gain 2	P	7kW or less: 35 11kW or more:19	rad/s	
	36	VG1	Speed control gain 1	P·S	7kW or less:177 11kW or more:96	rad/s	
	37	VG2	Speed control gain 2	P·S	7kW or less:817 11kW or more:45	rad/s	
	38	VIC	Speed integral compensation	P·S	7kW or less: 48 11kW or more:91	ms	
	39	VDC	Speed differential compensation	P·S	980		
	40		For manufacturer setting		0		
	41	*DIA	Input signal automatic ON selection	P·S·T	0000		
	42	*DI1	Input signal selection 1	P·S·T	0003		
	43	*DI2	Input signal selection 2 (CN1B-5)	P·S·T	0111		
	44	*DI3	Input signal selection 3 (CN1B-14)	P·S·T	0222		
	45	*DI4	Input signal selection 4 (CN1A-8)	P·S·T	0665		
	46	*DI5	Input signal selection 5 (CN1B-7)	P·S·T	0770		
	47	*DI6	Input signal selection 6 (CN1B-8)	P·S·T	0883		
	48	*DI7	Input signal selection 7 (CN1B-9)	P·S·T	0994		
	49	*DO1	Output signal selection 1	P·S·T	0000		

For notes, refer to next page.

	No.	Symbol	Name	Control mode	Initial value	Unit	Customer setting
Expansion parameters 2	50		For manufacturer setting		0000		
	51	*OP6	Function selection 6	P·S·T	0000		
	52		For manufacturer setting		0000		
	53	*OP8	Function selection 8	P·S·T	0000		
	54	*OP9	Function selection 9	P·S·T	0000		
	55	*OPA	Function selection A	P	0000		
	56	SIC	Serial communication time-out selection	P·S·T	0	s	
	57		For manufacturer setting		10		
	58	NH1	Machine resonance suppression filter 1	P·S·T	0000		
	59	NH2	Machine resonance suppression filter 2	P·S·T	0000		
	60	LPF	Low-pass filter, adaptive vibration suppression control	P·S·T	0000		
	61	GD2B	Ratio of load inertia moment to servo motor inertia moment 2	P·S	70	0.1 times	
	62	PG2B	Position control gain 2 changing ratio	P	100	%	
	63	VG2B	Speed control gain 2 changing ratio	P·S	100	%	
	64	VICB	Speed integral compensation changing ratio	P·S	100	%	
	65	*CDP	Gain changing selection	P·S	0000		
	66	CDS	Gain changing condition	P·S	10	(Note 3)	
	67	CDT	Gain changing time constant	P·S	1	ms	
	68		For manufacturer setting		0		
	69	CMX2	Command pulse multiplying factor numerator 2	P	1		
	70	CMX3	Command pulse multiplying factor numerator 3	P	1		
	71	CMX4	Command pulse multiplying factor numerator 4	P	1		
	72	SC4	Internal speed command 4	S	200	r/min	
			Internal speed limit 4	T			
	73	SC5	Internal speed command 5	S	300	r/min	
			Internal speed limit 5	T			
	74	SC6	Internal speed command 6	S	500	r/min	
			Internal speed limit 6	T			
	75	SC7	Internal speed command 7	S	800	r/min	
			Internal speed limit 7	T			
	76	TL2	Internal torque limit 2	P·S·T	100	%	
	77		For manufacturer setting		100		
	78				10000		
	79				10		
	80				10		
	81				100		
	82				100		
	83				100		
	84				0000		

Note 1. The setting of "0" provides the rated servo motor speed.

2. Depends on the servo amplifier.
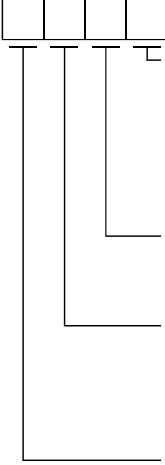
3. Depends on the parameter No. 65 setting.

5. PARAMETERS

(2) Details list

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Basic parameters	0	*STY	Control mode, regenerative option selection Used to select the control mode and regenerative option. `0   0   [ ][ ]` Select the control mode. 0:Position 1:Position and speed 2:Speed 3:Speed and torque 4:Torque 5:Torque and position Selection of regenerative option 00:·Regenerative option or regenerative option is not used with 7kW or less servo amplifier (The built-in regenerative resistor is used.) ·Supplied regenerative resistors or regenerative option is used with 11kW or more servo amplifier 01: FR-RC, FR-BU2, FR-CV 02: MR-RB032 03: MR-RB12 04: MR-RB32 05: MR-RB30 06: MR-RB50 (Cooling fan is required) 08: MR-RB31 09: MR-RB51 (Cooling fan is required) 0E: When regenerative resistors supplied to 11k to 22kW are cooled by cooling fans to increase capability The MR-RB65, 66 and 67 are regenerative options that have encased the GRZG400-2Ω, GRZG400-1Ω and GRZG400-0.8Ω, respectively. When using any of these regenerative options, make the same parameter setting as when using the GRZG400-2Ω, GRZG400-1Ω or GRZG400-0.8Ω (supplied regenerative resistors or regenerative option is used with 11kW or more servo amplifier). POINT ·Wrong setting may cause the regenerative option to burn. ·If the regenerative option selected is not for use with the servo amplifier, parameter error (AL.37) occurs.	0000		Refer to Name and function column.	P·S·T
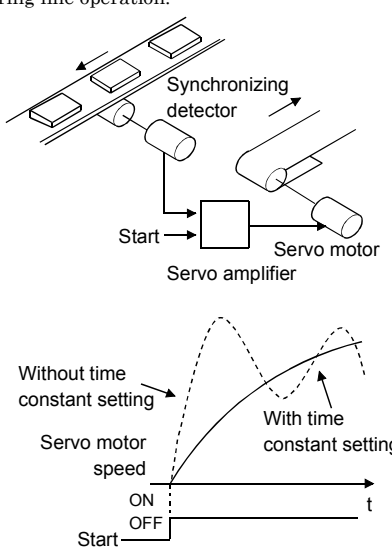
Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Basic parameters	1	*OP1	Function selection 1 Used to select the input signal filter, pin CN1B-19 function and absolute position detection system. □□□□ Input signal filter If external input signal causes chattering due to noise, etc., input filter is used to suppress it. 0: None 1: 1.777[ms] 2: 3.555[ms] 3: 5.333[ms] CN1B-pin 19's function selection 0: Zero Speed detection (ZSP) 1: Electromagnetic brake interlock (MBR) CN1B-pin 18's function selection 0: Alarm (ALM) 1: Dynamic brake interlock (DB) When using the external dynamic brake with 11kW or more, make dynamic brake interlock (DB) valid. Selection of absolute position detection system (Refer to chapter 15) 0: Used in incremental system 1: Used in absolute position detection system	0002		Refer to Name and function.	P·S·T

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Basic parameters	2	ATU	Auto tuning Used to selection the response level, etc. for execution of auto tuning. Refer to chapter 7. 0 0 ▢ └ Response level setting · If the machine hunts or generates large gear sound, decrease the set value. · To improve performance, e.g. shorten the settling time, increasethe set value. Gain adjustment mode selection (For more information, refer to section 7.1.1.)	7kW or less: 0105 11kW or more: 0102		Refer to Name and function column.	P·S
	3	CMX	Electronic gear numerator Used to set the electronic gear numerator value. For the setting, refer to section 5.2.1. Setting "0" automatically sets the resolution of the servo motor connected. For the HC-MFS series, 131072 pulses are set for example.	1		0 1 to 65535	P
	4	CDV	Electronic gear denominator Used to set the electronic gear denominator value. For the setting, refer to section 5.2.1.	1		1 to 65535	P

Response level setting:

Set value	Response level	Machine resonance frequency guideline
1	Low response	15Hz
2		20Hz
3		25Hz
4		30Hz
5		35Hz
6		45Hz
7		55Hz
8	Middle response	70Hz
9		85Hz
A		105Hz
B		130Hz
C		160Hz
D		200Hz
E	High response	240Hz
F		300Hz

Gain adjustment mode selection:

Set value	Gain adjustment mode	Description
0	Interpolation mode	Fixes position control gain 1 (parameter No. 6).
1	Auto tuning mode 1	Ordinary auto tuning.
2	Auto tuning mode 2	Fixes the load inertia moment ratio set in parameter No. 34. Response level setting can be changed.
3	Manual mode 1	Simple manual adjustment.
4	Manual mode 2	Manual adjustment of all gains.

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Basic parameters	5	INP	In-position range Used to set the in-position (INP) output range in the command pulse increments prior to electronic gear calculation. For example, when you want to set 100 μm when the ball screw is directly coupled, the lead is 10mm, the feedback pulse count is 131072 pulses/rev, and the electronic gear numerator (CMX)/electronic gear denominator (CDV) is 16384/125 (setting in units of 10 μm per pulse), set "10" as indicated by the following expression. $$\frac{100 \times 10^{-6}}{10 \times 10^{-3}} \times 131072[\text{pulse/rev}] \times \frac{125}{16384} = 10$$	100	pulse	0 to 10000	P
	6	PG1	Position control gain 1 Used to set the gain of position loop. Increase the gain to improve track ability in response to the position command. When auto turning mode 1,2 is selected, the result of auto turning is automatically used.	7kW or less: 35 11kW or more: 19	red/s	4 to 2000	P
	7	PST	Position command acceleration/deceleration time constant (position smoothing) Used to set the time constant of a low-pass filter in response to the position command. You can use parameter No. 55 to choose the primary delay or linear acceleration/deceleration control system. When you choose linear acceleration/deceleration, the setting range is 0 to 10ms. Setting of longer than 10ms is recognized as 10ms. POINT · When you have chosen linear acceleration/ deceleration, do not select control selection (parameter No. 0) and restart after instantaneous power failure (parameter No. 20). Doing so will cause the servo motor to make a sudden stop at the time of position control switching or restart. Example: When a command is given from a synchronizing detector, synchronous operation can be started smoothly if started during line operation. Synchronizing detector Start → Servo motor Servo amplifier Without time constant setting With time constant setting Servo motor speed ON OFF Start t	3	ms	0 to 20000	P
	8	SC1	Internal speed command 1 Used to set speed 1 of internal speed commands.	100	r/min	0 to instantaneous permissible speed	S
			Internal speed limit 1 Used to set speed 1 of internal speed limits.				T

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Basic parameters	9	SC2	Internal speed command 2 Used to set speed 2 of internal speed commands.	500	r/min	0 to instan-taneous permi-ssible speed	S
			Internal speed limit 2 Used to set speed 2 of internal speed limits.				T
	10	SC3	Internal speed command 3 Used to set speed 3 of internal speed commands.	1000	r/min	0 to instan-taneous permi-ssible speed	S
			Internal speed limit 3 Used to set speed 3 of internal speed limits.				T
	11	STA	Acceleration time constant Used to set the acceleration time required to reach the rated speed from 0r/min in response to the analog speed command and internal speed commands 1 to 7. For example for the servo motor of 3000r/min rated speed, set 3000 (3s) to increase speed from 0r/min to 1000r/min in 1 second.	0	ms	0 to 20000	S·T
	12	STB	Deceleration time constant Used to set the deceleration time required to reach 0r/min from the rated speed in response to the analog speed command and internal speed commands 1 to 7.	0			
	13	STC	S-pattern acceleration/deceleration time constant Used to smooth start/stop of the servo motor. Set the time of the arc part for S-pattern acceleration/deceleration. STA: Acceleration time constant (parameter No.11) STB: Deceleration time constant (parameter No.12) STC: S-pattern acceleration/deceleration time con-stant (parameter No.13) Long setting of STA (acceleration time constant) or STB (deceleration time constant) may produce an error in the time of the arc part for the setting of the S-pattern acceleration/deceleration time constant. The upper limit value of the actual arc part time is limited by $\frac{2000000}{STA}$ for acceleration or by $\frac{2000000}{STB}$ for deceleration. (Example) At the setting of STA=20000, STB=5000 and STC=200, the actual arc part times are as follows: During acceleration: 100[ms] $\left[\begin{array}{l} \text{Limited to 100[ms] since} \\ \frac{2000000}{20000} = 100[ms] < 200[ms]. \end{array}\right]$ During deceleration: 200[ms] $\left[\begin{array}{l} \text{200[ms] as set since} \\ \frac{2000000}{5000} = 400[ms] > 200[ms]. \end{array}\right]$	0	ms	0 to 1000	S·T

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Basic parameters	14	TQC	Torque command time constant Used to set the constant of a low-pass filter in response to the torque command. TQC: Torque command time constant	0	ms	0 to 20000	T
	15	*SNO	Station number setting Used to specify the station number for serial communication. Always set one station to one axis of servo amplifier. If one station number is set to two or more stations, normal communication cannot be made.	0	sta-tion	0 to 31	P·S·T
	16	*BPS	Serial communication function selection, alarm history clear Used to select the serial communication baud rate, select various communication conditions, and clear the alarm history. Serial baud rate selection 0: 9600 [bps] 1: 19200[bps] 2: 38400[bps] 3: 57600[bps] Alarm history clear 0: Invalid 1: Valid When alarm history clear is made valid, the alarm history is cleared at next power-on. After the alarm history is cleared, the setting is automatically made invalid (reset to 0). Serial communication standard selection 0: RS-232C used 1: RS-422 used Serial communication response delay time 0: Invalid 1: Valid, reply sent after delay time of 800 μs or more	0000		Refer to Name and function column.	P·S·T

5. PARAMETERS

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Basic parameters	17	MOD	Analog monitor output Used to selection the signal provided to the analog monitor (MO1)・analog monitor (MO2) output. (Refer to section 5.2.2) ┌─┐ ┌─┐ ┌─┐ │0│ │0│ │ │ └─┘ └─┘ └─┘ 	Setting	Analog monitor (MO2) / Analog monitor (MO1)
0	Servo motor speed (±8V/max. speed)
1	Torque (±8V/max. torque) (Note)
2	Motor speed (+8V/max. speed)
3	Torque (+8V/max. torque) (Note)
4	Current command (±8V/max. current command)
5	Command pulse frequency (±10V/500kpulse/s)
6	Droop pulses (±10V/128 pulses)
7	Droop pulses (±10V/2048 pulses)
8	Droop pulses (±10V/8192 pulses)
9	Droop pulses (±10V/32768 pulses)
A	Droop pulses (±10V/131072 pulses)
B	Bus voltage (+8V/400V)	 Note. 8V is outputted at the maximum torque. However, when parameter No.28・76 are set to limit torque, 8V is outputted at the torque highly limited.	0100		Refer to Name and function column.	P・S・T

The settings table within the parameter description:

Setting	Analog monitor (MO2)	Analog monitor (MO1)
0	Servo motor speed (±8V/max. speed)	
1	Torque (±8V/max. torque) (Note)	
2	Motor speed (+8V/max. speed)	
3	Torque (+8V/max. torque) (Note)	
4	Current command (±8V/max. current command)	
5	Command pulse frequency (±10V/500kpulse/s)	
6	Droop pulses (±10V/128 pulses)	
7	Droop pulses (±10V/2048 pulses)	
8	Droop pulses (±10V/8192 pulses)	
9	Droop pulses (±10V/32768 pulses)	
A	Droop pulses (±10V/131072 pulses)	
B	Bus voltage (+8V/400V)	

Note. 8V is outputted at the maximum torque.
However, when parameter No.28・76 are
set to limit torque, 8V is outputted at the torque highly limited.

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Basic parameters	18	*DMD	Status display selection Used to select the status display shown at power-on. ⬛ 0 ⬛ 0 ⬛ ⬛ ⬛ Selection of status display at power-on 0: Cumulative feedback pulses 1: Servo motor speed 2: Droop pulses 3: Cumulative command pulses 4: Command pulse frequency 5: Analog speed command voltage (Note 1) 6: Analog torque command voltage (Note 2) 7: Regenerative load ratio 8: Effective load ratio 9: Peak load ratio A: Instantaneous torque B: Within one-revolution position low C: Within one-revolution position high D: ABS counter E: Load inertia moment ratio F: Bus voltage Note 1. In speed control mode. Analog speed limit voltage in torque control mode. 2. In torque control mode. Analog torque limit voltage in speed or position control mode. Status display at power-on in corresponding control mode 0: Depends on the control mode.	0000		Refer to Name and function column.	P·S·T

Control Mode	Status display at power-on
Position	Cumulative feedback pulses
Position/speed	Cumulative feedback pulses/servo motor speed
Speed	Servo motor speed
Speed/torque	Servo motor speed/analog torque command voltage
Torque	Analog torque command voltage
Torque/position	Analog torque command voltage/cumulative feedback pulses

1: Depends on the first digit setting of this parameter.

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Basic parameters	19	*BLK	Parameter write inhibit Used to select the reference and write ranges of the parameters. Operation can be performed for the parameters marked ○.	0000		Refer to Name and function column.	P·S·T
Expansion parameters 1	20	*OP2	Function selection 2 Used to select restart after instantaneous power failure, servo lock at a stop in speed control mode, and slight vibration suppression control.	0000		Refer to Name and function column.	S P·S

Parameter No. 19 (*BLK) table:

Set value	Operation	Basic parameters No. 0 to No. 19	Expansion parameters 1 No. 20 to No. 49	Expansion parameters 2 No. 50 to No. 84
0000 (Initial value)	Reference	○		
	Write	○		
000A	Reference	No. 19 only		
	Write	No. 19 only		
000B	Reference	○	○	
	Write	○		
000C	Reference	○	○	
	Write	○	○	
000E	Reference	○	○	○
	Write	○	○	○
100B	Reference	○		
	Write	No. 19 only		
100C	Reference	○	○	
	Write	No. 19 only		
100E	Reference	○	○	○
	Write	No. 19 only		

Parameter No. 20 (*OP2) function selection 2:

```
0 □ □ □
      └ Restart after instantaneous power failure
```

Restart after instantaneous power failure
If the power supply voltage has returned to normal after an undervoltage status caused by the reduction of the input power supply voltage in the speed control mode, the servo motor can be restarted by merely turning on the start signal without resetting the alarm.
0: Invalid (Undervoltage alarm (AL.10) occurs.)
1: Valid

Selection of servo lock at stop
In the speed control mode, the servo motor shaft can be locked to prevent the shaft from being moved by the external force.
0: Valid (Servo-locked)
  The operation to maintain the stop position is performed.
1: Invalid (Not servo-locked)
  The stop position is not maintained.
  The control to make the speed 0r/min is performed.

Slight vibration suppression control
Made valid when auto tuning selection is set to "0400" in parameter No. 2.
Used to suppress vibration at a stop.
0: Invalid
1: Valid

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Expansion parameters 1	21	*OP3	Function selection 3 (Command pulse selection) Used to select the input form of the pulse train input signal. (Refer to section 3.4.1) `0  0  □  □` └ Command pulse train input form 0: Forward/reverse rotation pulse train 1: Signed pulse train 2: A・B-phase pulse train Pulse train logic selection 0: Positive logic 1: Negative logic	0000		Refer to Name and function column.	P
	22	*OP4	Function selection 4 Used to select stop processing at forward rotation stroke end (LSP)・reverse rotation stroke end (LSN) off and choose VC/VLA voltage averaging. `0  □  0  □` └ How to make a stop when forward rotation stroke end (LSP)・reverse rotation stroke end (LSN) is valid. (Refer to section 5.2.3) 0: Sudden stop 1: Slow stop VC/VLA voltage averaging Used to set the filtering time when the analog speed command (VC) voltage or analog speed limit (VLA) is imported. Set 0 to vary the speed to voltage fluctuation in real time. Increase the set value to vary the speed slower to voltage fluctuation. 	Set value	Filtering time [ms]
---	---
0	0
1	0.444
2	0.888
3	1.777
4	3.555		0000		Refer to Name and function column.	P・S P・S・T
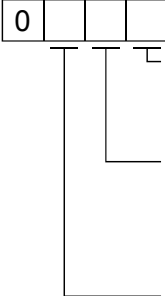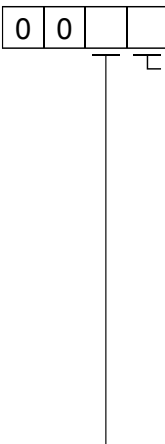
Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Expansion parameters 1	23	FFC	Feed forward gain Set the feed forward gain. When the setting is 100%, the droop pulses during operation at constant speed are nearly zero. However, sudden acceleration/deceleration will increase the overshoot. As a guideline, when the feed forward gain setting is 100%, set 1s or more as the acceleration/deceleration time constant up to the rated speed.	0	%	0 to 100	P
	24	ZSP	Zero speed Used to set the output range of the zero speed (ZSP).	50	r/min	0 to 10000	P·S·T
	25	VCM	Analog speed command maximum speed Used to set the speed at the maximum input voltage (10V) of the analog speed command (VC). Set "0" to select the rated speed of the servo motor connected.	0	/ r/min	0 / 1 to 50000	S
			Analog speed limit maximum speed Used to set the speed at the maximum input voltage (10V) of the analog speed limit (VLA). Set "0" to select the rated speed of the servo motor connected.	0	/ r/min	0 / 1 to 50000	T
	26	TLC	Analog torque command maximum output Used to set the output torque at the analog torque command voltage (TC = ±8V) of +8V on the assumption that the maximum torque is 100[%]. For example, set 50 to output (maximum torque × 50/100) at the TC of +8V.	100	%	0 to 1000	T
	27	*ENR	Encoder output pulses Used to set the encoder pulses (A-phase, B-phase) output by the servo amplifier. Set the value 4 times greater than the A-phase or B-phase pulses. You can use parameter No. 54 to choose the output pulse setting or output division ratio setting. The number of A・B-phase pulses actually output is 1/4 times greater than the preset number of pulses. The maximum output frequency is 1.3Mpps (after multiplication by 4). Use this parameter within this range. ・For output pulse designation Set "0□□□" (initial value) in parameter No. 54. Set the number of pulses per servo motor revolution. Output pulse = set value [pulses/rev] At the setting of 5600, for example, the actually output A・B-phase pulses are as indicated below. $A \cdot B\text{-phase output pulses} = \dfrac{5600}{4} = 1400[\text{pulse}]$ ・For output division ratio setting Set "1□□□" in parameter No. 54. The number of pulses per servo motor revolution is divided by the set value. $\text{Output pulse} = \dfrac{\text{Resolution per servo motor revolution}}{\text{Set value}} [\text{pulses/rev}]$ At the setting of 8, for example, the actually output A・B-phase pulses are as indicated below. $A \cdot B\text{-phase output pulses} = \dfrac{131072}{8} \cdot \dfrac{1}{4} = 4096[\text{pulse}]$	4000	pulse/rev	1 to 65535	P·S·T
	28	TL1	Internal torque limit 1 Set this parameter to limit servo motor torque on the assumption that the maximum torque is 100[%]. When 0 is set, torque is not produced.	100	%	0 to 100	P·S·T

(Note) TL	Torque limit
0	Internal torque limit 1 (Parameter No. 28)
1	Analog torque limit < internal torque limit 1 : Analog torque limit Analog torque limit > internal torque limit 1 : Internal torque limit 1
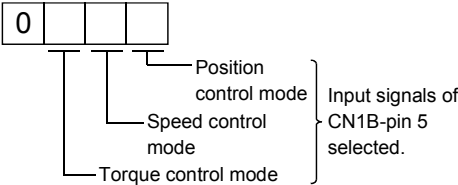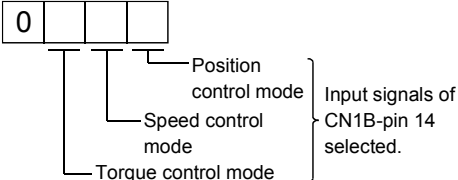
Note. 0: off
     1: on

When torque is output in analog monitor output, this set value is the maximum output voltage (+8V). (Refer to section 3.4.1 (5))

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Expansion parameters 1	29	VCO	Analog speed command offset Used to set the offset voltage of the analog speed command (VC). For example, if CCW rotation is provided by switching on forward rotation start (ST1) with 0V applied to VC, set a negative value. When automatic VC offset is used, the automatically offset value is set to this parameter. (Refer to section 6.3) The initial value is the value provided by the automatic VC offset function before shipment at the VC-LG voltage of 0V.	Depends on servo amplifier	mV	−999 to 999	S
			Analog speed limit offset Used to set the offset voltage of the analog speed limit (VLA). For example, if CCW rotation is provided by switching on forward rotation selection (RS1) with 0V applied to VLA, set a negative value. When automatic VC offset is used, the automatically offset value is set to this parameter. (Refer to section 6.3) The initial value is the value provided by the automatic VC offset function before shipment at the VLA-LG voltage of 0V.				T
	30	TLO	Analog torque command offset Used to set the offset voltage of the analog torque command (TC).	0	mV	−999 to 999	T
			Analog torque limit offset Used to set the offset voltage of the analog torque limit (TLA).				S
	31	MO1	Analog monitor 1 offset Used to set the offset voltage of the analog monitor (MO1).	0	mV	−999 to 999	P·S·T
	32	MO2	Analog monitor 2 offset Used to set the offset voltage of the analog monitor (MO2).	0	mV	−999 to 999	P·S·T
	33	MBR	Electromagnetic brake sequence output Used to set the delay time (Tb) between electronic brake interlock (MBR) and the base drive circuit is shut-off.	100	ms	0 to 1000	P·S·T
	34	GD2	Ratio of load inertia moment to servo motor inertia moment Used to set the ratio of the load inertia moment to the servo motor shaft inertia moment. When auto tuning mode 1 and interpolation mode is selected, the result of auto tuning is automatically used. (Refer to section 7.1.1) In this case, it varies between 0 and 1000.	70	0.1 times	0 to 3000	P·S
	35	PG2	Position control gain 2 Used to set the gain of the position loop. Set this parameter to increase the position response to level load disturbance. Higher setting increases the response level but is liable to generate vibration and/or noise. When auto tuning mode 1,2 and interpolation mode is selected, the result of auto tuning is automatically used.	7kW or less: 35 11kW or more: 19	rad/s	1 to 1000	P
	36	VG1	Speed control gain 1 Normally this parameter setting need not be changed. Higher setting increases the response level but is liable to generate vibration and/or noise. When auto tuning mode 1·2, manual mode and interpolation mode is selected, the result of auto tuning is automatically used.	7kW or less: 177 11kW or more: 96	rad/s	20 to 8000	P·S
	37	VG2	Speed control gain 2 Set this parameter when vibration occurs on machines of low rigidity or large backlash. Higher setting increases the response level but is liable to generate vibration and/or noise. When auto tuning mode 1·2 and interpolation mode is selected, the result of auto tuning is automatically used.	7kW or less: 817 11kW or more: 45	rad/s	20 to 20000	P·S
	38	VIC	Speed integral compensation Used to set the integral time constant of the speed loop. Lower setting increases the response level but is liable to generate vibration and/or noise. When auto tuning mode 1·2 and interpolation mode is selected, the result of auto tuning is automatically used.	7kW or less: 48 11kW or more: 91	ms	1 to 1000	P·S
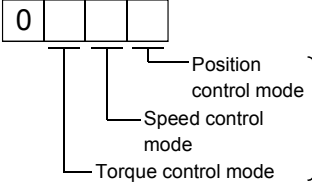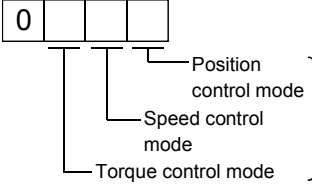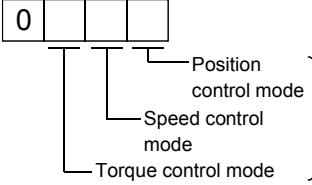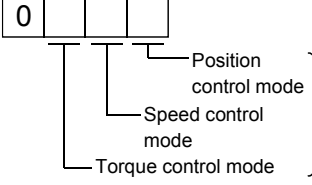
Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Expansion parameters 1	39	VDC	Speed differential compensation Used to set the differential compensation. Made valid when the proportion control (PC) is switched on.	980		0 to 1000	P·S
	40		For manufacturer setting Do not change this value by any means.	0			
	41	*DIA	Input signal automatic ON selection Used to set automatic Servo-on (SON) · forward rotation stroke end (LSP) · reveres rotation stroke end (LSN). 0 [ ][ ][ ] Servo-on (SON) input selection 0: Switched on/off by external input. 1: Switched on automatically in servo amplifier. (No need of external wiring) Forward rotation stroke end (LSP) input selection 0: Switched on/off by external input. 1: Switched on automatically in servo amplifier. (No need of external wiring) Reverse rotation stroke end (LSN) input selection 0: Switched on/off by external input. 1: Switched on automatically in servo amplifier. (No need of external wiring)	0000		Refer to Name and function column.	P·S·T P·S
	42	*DI1	Input signal selection 1 Used to assign the control mode changing signal input pins and to set the clear (CR). 0 0 [ ][ ] Control change (LOP) input pin assignment Used to set the control mode change signal input connector pins. Note that this parameter is made valid when parameter No. 0 is set to select the position/speed, speed/torque or torque/position change mode. 	Set value	Connector pin No.
---	---
0	CN1B-5
1	CN1B-14
2	CN1A-8
3	CN1A-7
4	CN1B-8
5	CN1B-9	 Clear (CR) selection 0: Droop pulses are cleared on the leading edge. 1: While on, droop pulses are always cleared.	0003		Refer to Name and function column.	P/S S/T T/P P

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode

Expansion parameters 1	43	*DI2	Input signal selection 2 (CN1B-5)
			This parameter is unavailable when parameter No.42 is set to assign the control change (LOP) to CN1B-pin 5.
			Allows any input signal to be assigned to CN1B-pin 5.
			Note that the setting digit and assigned signal differ according to the control mode.
			
			Signals that may be assigned in each control mode are indicated below by their symbols.
			Setting of any other signal will be invalid.
			
			<table><tr><td rowspan="2">Set value</td><td colspan="3">(Note) Control mode</td></tr><tr><td>P</td><td>S</td><td>T</td></tr><tr><td>0</td><td></td><td></td><td></td></tr><tr><td>1</td><td>SON</td><td>SON</td><td>SON</td></tr><tr><td>2</td><td>RES</td><td>RES</td><td>RES</td></tr><tr><td>3</td><td>PC</td><td>PC</td><td></td></tr><tr><td>4</td><td>TL</td><td>TL</td><td></td></tr><tr><td>5</td><td>CR</td><td>CR</td><td>CR</td></tr><tr><td>6</td><td></td><td>SP1</td><td>SP1</td></tr><tr><td>7</td><td></td><td>SP2</td><td>SP2</td></tr><tr><td>8</td><td></td><td>ST1</td><td>RS2</td></tr><tr><td>9</td><td></td><td>ST2</td><td>RS1</td></tr><tr><td>A</td><td></td><td>SP3</td><td>SP3</td></tr><tr><td>B</td><td>CM1</td><td></td><td></td></tr><tr><td>C</td><td>CM2</td><td></td><td></td></tr><tr><td>D</td><td>TL1</td><td>TL1</td><td>TL1</td></tr><tr><td>E</td><td>CDP</td><td>CDP</td><td>CDP</td></tr></table>
			Note. P: Position control mode
			     S: Speed control mode
			     T: Torque control mode
				0111		Refer to Name and function column.	P·S·T

	44	*DI3	Input signal selection 3 (CN1B-14) Allows any input signal to be assigned to CN1B-pin 14. The assignable signals and setting method are the same as in input signal selection 2 (parameter No. 43). This parameter is unavailable when parameter No. 42 is set to assign the control change (LOP) to CN1B-pin 14.	0222		Refer to Name and function column.	P·S·T

Input signals of CN1B-pin 5 selected. — Position control mode / Speed control mode / Torque control mode

Input signals of CN1B-pin 14 selected. — Position control mode / Speed control mode / Torque control mode

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Expansion parameters 1	45	*DI4	Input signal selection 4 (CN1A-8) Allows any input signal to be assigned to CN1A-pin 8. The assignable signals and setting method are the same as in input signal selection 2 (parameter No. 43). 0 □ □ □ — Position control mode — Speed control mode — Torque control mode Input signals of CN1A-pin 8 selected. This parameter is unavailable when parameter No. 42 is set to assign the control change (LOP) to CN1 A-pin 8.	0665		Refer to Name and function column.	P·S·T
	46	*DI5	Input signal selection 5 (CN1B-7) Allows any input signal to be assigned to CN1B-pin 7. The assignable signals and setting method are the same as in input signal selection 2 (parameter No. 43). 0 □ □ □ — Position control mode — Speed control mode — Torque control mode Input signals of CN1B-pin 7 selected. This parameter is unavailable when parameter No. 42 is set to assign the control change (LOP) to CN1 B-pin 7.	0770		Refer to Name and function column.	P·S·T
	47	*DI6	Input signal selection 6 (CN1B-8) Allows any input signal to be assigned to CN1B-pin 8. The assignable signals and setting method are the same as in input signal selection 2 (parameter No. 43). 0 □ □ □ — Position control mode — Speed control mode — Torque control mode Input signals of CN1B-pin 8 selected. This parameter is unavailable when parameter No. 42 is set to assign the control change (LOP) to CN1B-pin 8. When "Used in absolute position detection system" is selected in parameter No. 1, CN1B-pin 8 is in the ABS transfer mode (ABSM). (Refer to section 15.5)	0883		Refer to Name and function column.	P·S·T
	48	*DI7	Input signal selection 7 (CN1B-9) Allows any input signal to be assigned to CN1B-pin 9. The assignable signals and setting method are the same as in input signal selection 2 (parameter No. 43). 0 □ □ □ — Position control mode — Speed control mode — Torque control mode Input signals of CN1B-pin 9 selected. This parameter is unavailable when parameter No. 42 is set to assign the control change (LOP) to CN1B-pin 9. When "Used in absolute position detection system" is selected in parameter No. 1, CN1B-pin 9 is in the ABS request mode (ABSR). (Refer to section 15.5)	0994		Refer to Name and function column.	P·S·T

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Expansion parameters 1	49	*DO1	Output signal selection 1 Used to select the connector pins to output the alarm code, warning (WNG) and battery warning (BWNG).	0000		Refer to Name and function column.	P·S·T

(see diagram below for detailed settings)

0 [ ][ ][ ]

Setting of alarm code output
The alarm code output and the following functions are exclusive, so the simultaneous use is not possible. If set, the parameter error alarm (AL.37) occurs.
· Absolute position detection system
· Signal assignment function of the electromagnetic interlock (MBR) to pin CN1B-19

Set value	Connector pins		
	CN1B-19	CN1A-18	CN1A-19
0	ZSP	INP or SA	RD
1	Alarm code is output at alarm occurrence.		

(Note) Alarm code			Alarm display	Name
CN1B pin 19	CN1A pin 18	CN1A pin 19		
0	0	0	88888	Watchdog
			AL.12	Memory error 1
			AL.13	Clock error
			AL.15	Memory error 2
			AL.17	Board error 2
			AL.19	Memory error 3
			AL.37	Parameter error
			AL.8A	Serial communication time-out error
			AL.8E	Serial communication error
0	0	1	AL.30	Regenerative error
			AL.33	Overvoltage
0	1	0	AL.10	Undervoltage
0	1	1	AL.45	Main circuit device overheat
			AL.46	Servo motor overheat
			AL.50	Overload 1
			AL.51	Overload 2
1	0	0	AL.24	Main circuit
			AL.32	Overcurrent
1	0	1	AL.31	Overspeed
			AL.35	Command pulse frequency error
			AL.52	Error excessive
1	1	0	AL.16	Encoder error 1
			AL.1A	Motor combination error
			AL.20	Encoder error 2
			AL.25	Absolute position erase

Note. 0: off
1: on

Setting of warning (WNG) output
Select the connector pin to output warning. The old signal before selection will be unavailable.
A parameter error (AL. 27) will occur if the connector pin setting is the same as that in the third digit.

Set value	Connector pin No.
0	Not output
1	CN1A-19
2	CN1B-18
3	CN1A-18
4	CN1B-19
5	CN1B-6

Setting of battery warning (BWNG) output
Select the connector pin to output battery warning. The old signal before selection will be unavailable. Set this function as in the second digit of this parameter. Parameter No. 1 setting has priority. A parameter error (AL. 37) will occur if the connector pin setting is the same as that in the second digit.

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Expansion parameters 2	50		For manufacturer setting Do not change this value by any means.	0000			
	51	*OP6	Function selection 6 Used to select the operation to be performed when the reset (RES) switches on. This parameter is invalid (base circuit is shut off) in the absolute position detection system. `0 _ 0 0` Operation to be performed when the reset (RES) switches on 0: Base circuit shut off 1: Base circuit not shut off	0000		Refer to Name and function column.	P・S・T
	52		For manufacturer setting Do not change this value by any means.	0000			
	53	*OP8	Function selection 8 Used to select the protocol of serial communication. `0 _ _ 0` Protocol checksum selection 0: Yes (checksum added) 1: No (checksum not added) Protocol checksum selection 0: With station numbers 1: No station numbers	0000		Refer to Name and function column.	P・S・T
	54	*OP9	Function selection 9 Use to select the command pulse rotation direction, encoder output pulse direction and encoder pulse output setting. `_ _ 0 _` Servo motor rotation direction changing Changes the servo motor rotation direction for the input pulse train. Encoder pulse output phase changing Changes the phases of A, B-phase encoder pulses output. Encoder output pulse setting selection (refer to parameter No. 27) 0: Output pulse designation 1: Division ratio setting	0000		Refer to Name and function column.	P・S・T

Servo motor rotation direction changing table:

Set value	Servo motor rotation direction	
	At forward rotation pulse input (Note)	At reverse rotation pulse input (Note)
0	CCW	CW
1	CW	CCW

Note. Refer to section 3.4.1 (1) (a).

Encoder pulse output phase changing table:

Set value	Servo motor rotation direction	
	CCW	CW
0	A-phase / B-phase	A-phase / B-phase
1	A-phase / B-phase	A-phase / B-phase

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Expansion parameters 2	55	*OPA	Function selection A Used to select the position command acceleration/deceleration time constant (parameter No. 7) control system. `0 0 □ 0` Position command acceleration/deceleration time constant control 0: Primary delay 1: Linear acceleration/deceleration	0000		Refer to Name and function column.	P
	56	SIC	Serial communication time-out selection Used to set the communication protocol time-out period in [s]. When you set "0", time-out check is not made.	0	s	0 1 to 60	P·S·T
	57		For manufacturer setting Do not change this value by any means.	10			
	58	NH1	Machine resonance suppression filter 1 Used to selection the machine resonance suppression filter. (Refer to section 8.1) `0 □ □ □` Notch frequency selection Set "00" when you have set adaptive vibration suppression control to be "valid" or "held" (parameter No. 60: □1□□ or □2□□). Notch frequency table: 00 Invalid, 08 562.5, 10 281.3, 18 187.5 01 4500, 09 500, 11 264.7, 19 180 02 2250, 0A 450, 12 250, 1A 173.1 03 1500, 0B 409.1, 13 236.8, 1B 166.7 04 1125, 0C 375, 14 225, 1C 160.1 05 900, 0D 346.2, 15 214.3, 1D 155.2 06 750, 0E 321.4, 16 204.5, 1E 150 07 642.9, 0F 300, 17 195.7, 1F 145.2 Notch depth selection 0 Deep −40dB 1 −14dB 2 −8dB 3 Shallow −4dB	0000		Refer to Name and function column.	P·S·T
	59	NH2	Machine resonance suppression filter 2 Used to set the machine resonance suppression filter. `0 □ □ □` Notch frequency Same setting as in parameter No. 58 However, you need not set "00" if you have set adaptive vibration suppression control to be "valid" or "held". Notch depth Same setting as in parameter No. 58	0000		Refer to Name and function column.	P·S·T

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Expansion parameters 2	60	LPF	Low-pass filter · adaptive vibration suppression control Used to selection the low-pass filter · adaptive vibration suppression control. (Refer to chapter 8) □□□ 0 Low-pass filter selection 0: Valid (Automatic adjustment) 1: Invalid When you choose "valid", the filter of the handwidth represented by the following expression is set automatically For 1kW or less $$\frac{VG2 \text{ setting} \times 10}{2\pi \times (1 + GD2 \text{ setting} \times 0.1)} [Hz]$$ For 2kW or more $$\frac{VG2 \text{ setting} \times 5}{2\pi \times (1 + GD2 \text{ setting} \times 0.1)} [Hz]$$ Adaptive vibration suppression control selection Choosing "valid" or "held" in adaptive vibration suppression control selection makes the machine resonance control filter 1 (parameter No. 58) invalid. 0: Invalid 1: Valid Machine resonance frequency is always detected and the filter is generated in response to resonance to suppress machine vibration. 2: Held The characteristics of the filter generated so far are held, and detection of machine resonance is stopped. Adaptive vibration suppression control sensitivity selection Used to set the sensitivity of machine resonance detection. 0: Normal 1: Large sensitivity	0000		Refer to Name and function column.	P·S·T
	61	GD2B	Ratio of load inertia moment to servo motor inertia moment 2 Used to set the ratio of load inertia moment to servo motor inertia moment when gain changing is valid.	70	0.1 times	0 to 3000	P·S
	62	PG2B	Position control gain 2 changing ratio Used to set the ratio of changing the position control gain 2 when gain changing is valid. Made valid when auto tuning is invalid.	100	%	10 to 200	P
	63	VG2B	Speed control gain 2 changing ratio Used to set the ratio of changing the speed control gain 2 when gain changing is valid. Made valid when auto tuning is invalid.	100	%	10 to 200	P·S
	64	VICB	Speed integral compensation changing ratio Used to set the ratio of changing the speed integral compensation when gain changing is valid. Made valid when auto tuning is invalid.	100	%	50 to 1000	P·S

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Expansion parameters 2	65	*CDP	Gain changing selection Used to select the gain changing condition. (Refer to section 8.3) 0　0　0　☐ └ Gain changing selection Gains are changed in accordance with the settings of parameters No. 61 to 64 under any of the following conditions: 0: Invalid 1: Gain changing (CDP) signal is ON 2: Command frequency is equal to higher than parameter No. 66 setting or more 3: Droop pulse value is equal to higher than parameter No. 66 setting or more 4: Servo motor speed is equal to higher than parameter No. 66 setting or more	0000		Refer to Name and function column.	P・S
	66	CDS	Gain changing condition Used to set the value of gain changing condition (command frequency, droop pulses, servo motor speed) selected in parameter No. 65.The set value unit changes with the changing condition item. (Refer to section 8.5)	10	kpps pulse r/min	10 to 9999	P・S
	67	CDT	Gain changing time constant Used to set the time constant at which the gains will change in response to the conditions set in parameters No. 65 and 66. (Refer to section 8.5)	1	ms	0 to 100	P・S
	68		For manufacturer setting Do not change this value by any means.	0			
	69	CMX2	Command pulse multiplying factor numerator 2 Used to set the multiplier for the command pulse. Setting "0" automatically sets the connected motor resolution.	1		0・1 to 65535	P
	70	CMX3	Command pulse multiplying factor numerator 3 Used to set the multiplier for the command pulse. Setting "0" automatically sets the connected motor resolution.	1		0・1 to 65535	P
	71	CMX4	Command pulse multiplying factor numerator 4 Used to set the multiplier for the command pulse. Setting "0" automatically sets the connected motor resolution.	1		0・1 to 65535	P
	72	SC4	Internal speed command 4 Used to set speed 4 of internal speed commands.	200	r/min	0 to instantaneous permissible speed	S
			Internal speed limit 4 Used to set speed 4 of internal speed limits.				T

Class	No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode
Expansion parameters 2	73	SC5	Internal speed command 5 Used to set speed 5 of internal speed commands.	300	r/min	0 to instantaneous permissible speed	S
			Internal speed limit 5 Used to set speed 5 of internal speed limits.				T
	74	SC6	Internal speed command 6 Used to set speed 6 of internal speed commands.	500	r/min	0 to instantaneous permissible speed	S
			Internal speed limit 6 Used to set speed 6 of internal speed limits.				T
	75	SC7	Internal speed command 7 Used to set speed 7 of internal speed commands.	800	r/min	0 to instantaneous permissible speed	S
			Internal speed limit 7 Used to set speed 7 of internal speed limits.				T
	76	TL2	Internal torque limit 2 Set this parameter to limit servo motor torque on the assumption that the maximum torque is 100[%]. When 0 is set, torque is not produced. (Refer to section 3.4.1 (5))	100	%	0 to 100	P·S·T
	77		For manufacturer setting Do not change this value by any means.	00			
	78			10000			
	79			10			
	80			10			
	81			100			
	82			100			
	83			100			
	84			0000			