SH2882D073

Sanmei Invention Servo

Si servo 3

Instruction Manual

Serial communication part

202011

sanmei

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1. Before use

- "Si servo3 Instruction Manual (Serial communication part) SH2882D073" describes the serial communication functions of Si servo3. In addition to this manual, carefully read the related editions "Si servo3 Instruction Manual (Main part) SH2882D071", "Si servo3 Instruction Manual (Point-Table part) SH2882D072" and the booklet attached to the motor to understand the correct usage.
- In particular, be sure to understand and remember the contents of "Safety Precautions" described in "Si servo3 Instruction Manual (Main part) SH2882D071". Be careful not to mishandle the equipment in any case. Improper use may lead to serious accidents including death.
- After reading this instruction manual, the related editions, and the booklet attached to the motor, keep them in a place where you can access and read them whenever needed.

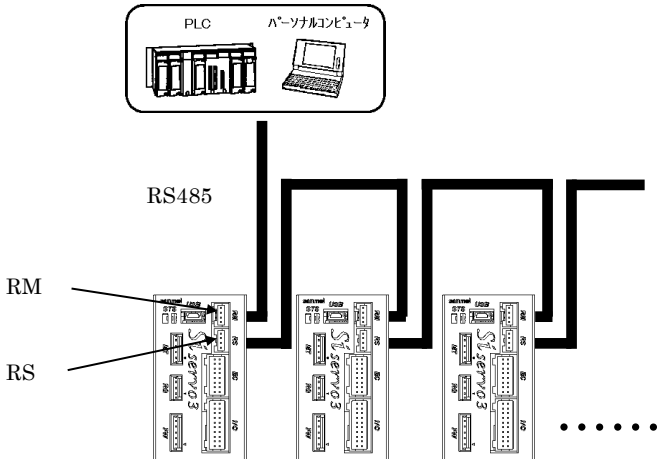
Servo driver models to which the contents of this manual apply

Si servo3	Si-02DT Si-05DT

２． Communication specifications

Si servo3 uses RS485 (2-wire type) with multidrop link to control multiple axes.

２－１． Communication specifications



Compliant standard	RS485
Communication method	asynchronous
	characters
	half-duplex
Baud rate (*1)	9600, 19200, 38400 57600, 115200bps
Start bit	1bit
Data format	8bit ASCII code HEX
Parity	1 bit (even)
Stop bit	1bit
Checksum	none
Maximum cable length	20m
Configurable axis number	15 selections (00~0E)

*1) Baud rate is switched with the parameter of Si servo driver.

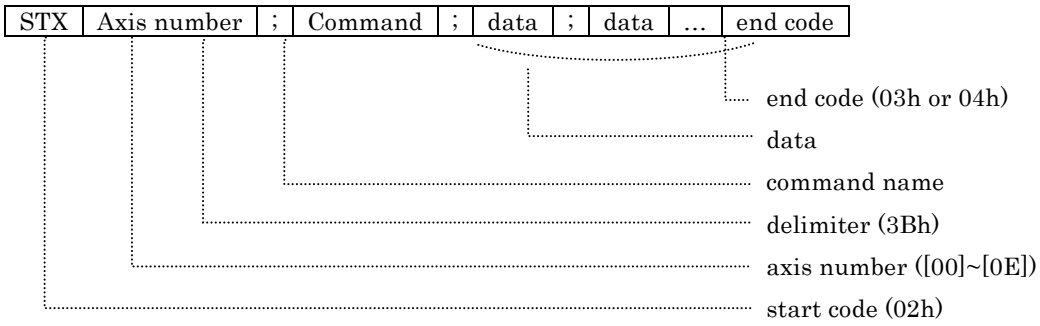
3． Communication protocol

3－1． Communication frame structure

A single communication frame is the transmission from the start code STX (02h) to the end code ETX (03h) or EOT (04h).

For the end code, both ETX and EOT can be used for communication with the servo driver.

The end code for a servo driver reply to the host controller can be selected with the parameter N0419 "Communication format select". The axis number of the servo driver is set by the parameter N0020 "Axis number".



Communication method is half-duplex. After receiving all the replies from the servo driver, send the next command.

The following examples show communication frames with EOT as the end code.

3－2． Data string format

The communication method uses ASCII codes to send and receive character strings between the host controller and servo driver.

- The numerical information is transmitted as a numeric string in hexadecimal notation with a maximum of 8 characters.
- The axis number should be a 2-digit hexadecimal number.
- For hexadecimal numbers other than axis numbers, the number of characters required to represent the number can be used. There is no need to add leading 0s to align it to a certain length.
  However, if the value is negative, be sure to send 8 characters.
  Example: Both [00000100] and [100] represent the number "256".
  The number "-1" should be represented as [FFFFFFFF]. [FFFF] is interpreted as the number "65535".

- Numerical value in the reply character string from the servo driver to the host controller is sent with a fixed number of characters according to each command.
- When sending strings from the host to the servo driver, either uppercase or lowercase characters can be used for hexadecimal values.

With the parameter N0419 "Communication format select", the uppercase or lowercase hexadecimal alphabetic characters when sending from the servo driver to the host controller can be selected.

3－3. Single axis command communication

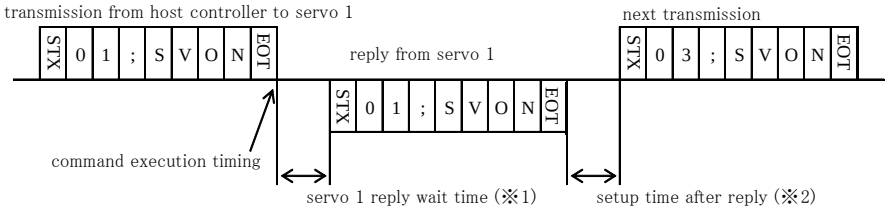
To send a command from the host controller to one of the multiple connected servo drivers, specify the axis number of the target servo driver.

Only the servo driver with the specified axis number will reply to the host controller.

Example of use: 2 axes multidrop communication

① servo driver 1 (axis number 01) turn servo ON

② servo driver 2 (axis number 03) turn servo ON



※1) Set the time from command reception completion in the servo driver to the start of reply by the servo driver parameter N0420 "Reply wait time" in [ms].

※2) After reply from the servo driver is completed, wait for at least 2ms before sending the next command.

3－4. All axes command communication

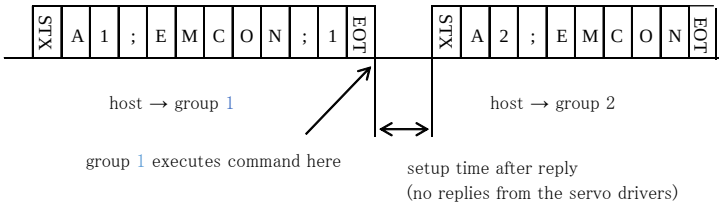
If a command with the axis number "7F" is sent, all servo drivers connected by multidrop will execute the command simultaneously. In this case, no replies from the servo drivers to the host controller are sent, including communication errors.

3－5. Group command communication

To send a command from the host controller to the group of multiple connected servo drivers, specify the group number ([00]~[0F]) of the target servo drivers.

When specifying a group, the first character of the axis number is "A" and the second character is the group number (0h~Fh).

The group number of the servo driver is set by the parameter N0424 "Serial communication axis group number". For details, refer to the "Parameters" section in the Instruction manual (Main part).



In the group command communication, no replies from the servo drivers to the host controller are sent, including communication errors.

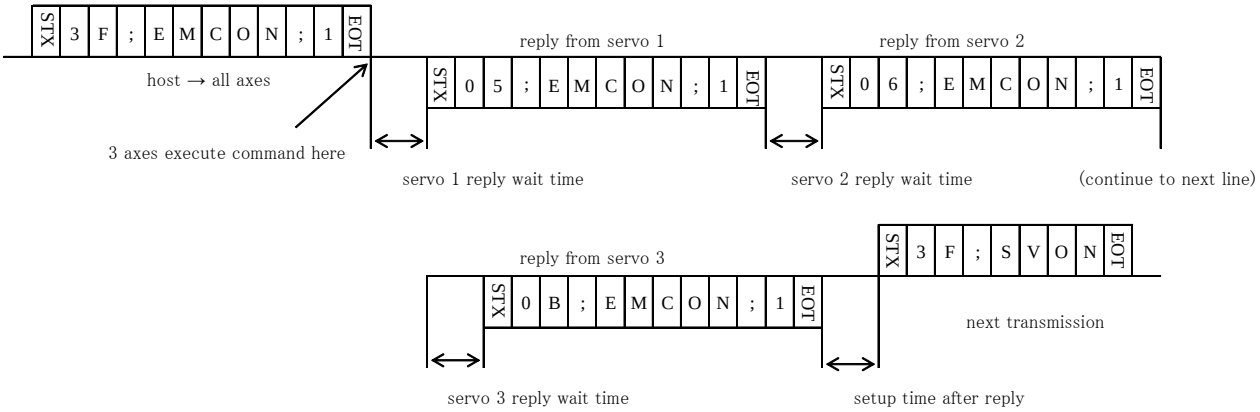
3－6． Overall command communication

If a command with the axis number [3F] is sent, all servo drivers connected by multidrop will execute the command. Replies to this command are sent in order according to the setting of the parameter "All axis command reply order" of each servo driver.

The replies are sent in order from the servo driver with the lowest number in the parameter N0423 "Serial communication reply order". The servo driver with the parameter value 0 replies first, then the servo driver with 1, next the servo driver with 2, and so on. Assign the numbers 0~(number of multidrop connections - 1) to the parameter N0423 " Serial communication reply order " for each multidrop servo driver without any shortage or duplication. If there are any deficiencies or duplications, the servo driver replies will collide.

Example of use: 3 axes multidrop communication, 3 axes simultaneously EMC turn ON

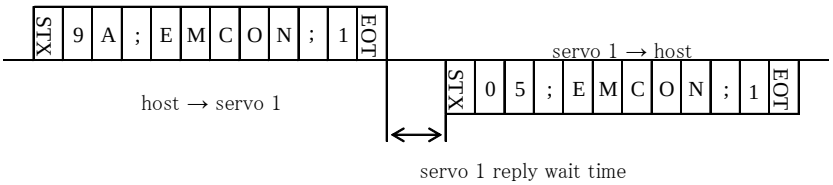
	Axis number	All axis command response order
servo driver 1	5 (05h)	00h
servo driver 2	6 (06h)	01h
servo driver 3	11 (0Bh)	02h



3－7． Wildcard command communication

If a command with the axis number [9A] is sent, the received servo driver will execute the command regardless of its own axis number. In this case, the returned axis number is the axis number of the servo driver.

Do not use this command for multidrop connections. Multiple servo drivers will reply at the same time, causing collision.



３－８． Command input method select

By setting the parameter N0006 "Command input method select", the serial communication commands for various operation methods can be enabled / disabled. If a serial communication command for an operation set as invalid for communication command is received, a communication error [ERR;04] (Input method not selected) is returned and the command is not executed.

The setting is made by parameter N0006 "Command input method select" with 2 bits per operation command:

01: Serial communication command

00: Control input

to select from.

Serial communication command setting (set value: 01):

The serial communication command is valid regardless of the control input terminal function setting. (Control input signal is invalid)

Control input setting (set value: 00):

The operation command is given by the control input, and the communication command is invalid. However, if the control input signal corresponding to each operation command is not assigned to any of the control input terminals IN0~IN4, the serial communication command is valid.

※Only for the servo ON command, if the control input SVON is not assigned, the servo ON state is fixed and the communication command is invalid.

※For the control input signals corresponding to each operation command, refer to the table below.

Table of parameter N0006 "Command input method select" bits sequence

Bit position	Bit name	Function
31~14	-	reserved (write 0)
13~12	TSEL	Torque limit value select
11~10	RSEL	Reference pulse multiply select
9~8	PNT	Point number specify
7~6	ZSTR	Homing operation start/stop
5~4	STR	Point-Table operation start/stop
3~2	JOG	Jog operation start/stop
1~0	SVON	Servo ON/OFF

Correspondence between serial communication command and control input for each operation command

Bit name	Function	Serial communication command (set value: 01)	Control input signal (set value: 00)
TSEL	Torque limit value select	[TSELON] [TSELOFF] [TSEL1ON]~[TSEL4ON]	TSEL0~TSEL4 TSEL0P~TSEL4P TSEL0N~TSEL4N
RSEL	Pulse command multiply	[RSELON] [RSELOFF]	RSEL
PNT	Point number specify	[PNT]	P0_IN~P7_IN
ZSTR	Homing operation	[ZSTRON] [ZSTROFF] [ZSTRP]	ZSTR, ZSTRP
STR	Point-Table operation	[STRON] [STROFF] [STRP] [STROND] [STRPD]	STR, STRP
JOG	Jog operation	[PJOG] [NJOG] [JOGOFF] [PJOGD] [NJOGD]	PJOG, NJOG
SVON	Servo ON	[SVON] [SVOFF]	SVON

3－9. Communication error reply

If the command received by the servo driver is not executed correctly, an error message will be returned to the host controller.

communication error No.

STX	axis No.	;	E	R	R	;	0	1	EOT

No.	Content
01	Command error The received command could not be recognized.
02	Machine home overwrite failure An attempt was made to execute the machine home overwrite command [ZSET] when the position error exceeded the range of the servo driver parameter N0000 "In-position range", or, an attempt was made to overwrite the machine home [ZSET] to a position above the forward rotation software OT or below the reverse rotation software OT.
03	Outside the range of input value An attempt was made to enter data that is out of the specified range.
04	Input method not selected The received communication command is invalidated by the servo driver according to the parameter N0006 "Command input method select" and control input terminal function setting.
06	RESET failure An attempt was made to execute [RESET] command (CPU reset) while the servo was ON.
07	Servo ON failure ① An attempt was made to execute [SVON] command while an alarm occurred.
08	Servo ON failure ② An attempt was made to execute [SVON] command during emergency stop.
0B	Data count mismatch The number of data after the command name in the character string received by the servo driver (separated by the delimiter) does not match the specifications of the command.

4. Communication commands list

Function		Command	Content
Parameters・Point-Table	Parameter read	PR	Read the contents of Si3 servo driver parameter specified by the number.
	Parameter write	PW	Write the Si3 servo driver parameter specified by the number.
	Point-Table read	PTR	・ Point table number (0~255) ・ Move amount (pulses) ・ Moving velocity (min^{-1}) ・ Acceleration/deceleration time constant (ms) ・ Wait time (ms) ・ Branch destination point number (0~255, 256 for end, +1000 for SBK) ・ Bit command BIT0: absolute/relative value (0: absolute, 1: relative) BIT1: continuous operation (0: NO, 1: YES) BIT2: S-curve acceleration/deceleration BIT3: sensor positioning BIT4: sensor positioning BIT6: — BIT7: — BIT8: M code BIT9: M code BITA: M code BITB: M output select ・ Input branch destination point number (0~255, 256 for end, +1000 for SBK) ・ Input branch destination point number 2 (0~255, 256 for end, +1000 for SBK) ・ Input branch destination point number 3 (0~255, 256 for end, +1000 for SBK) ・ Number of loops ・ Branch destination point number after loop (0~255, 256 for end, +1000 for SBK) ・ Torque set (0: none, 1~2000 limit by 0.1% increment) ・ Loop counter clear (-1: none, 0~255 clear the loop counter of that point number) ・ Deceleration time constant (ms) ※When input branch destinations 1, 2, 3 are not used, set to "-1".
	Point-Table write	PTW	
	Point-Table item read	PTRS	Specify point number and item selection (position, velocity, etc.) in the data.
	Point-Table item write	PTWS	Specify point number, item selection and write value in the data.
	Parameter read (compatible with old models)	PRMR	Read the servo driver parameter contents specified by the number. Specify the Si2 parameter number (refer to ６－１. Old model (Si servo2) parameters correspondence table).
	Parameter write (compatible with old models)	PRMW	Overwrite the servo driver parameter specified by the number. Specify the Si2 parameter number (refer to ６－１. Old model (Si servo2) parameters correspondence table).
	Point-Table read (compatible with old models)	TR	The same items are read as with PTR command, except the deceleration time constant.
	Point-Table write (compatible with old models)	TW	The same items are written as with PTW command, except the deceleration time constant.
	Data store	FLASH	Store the parameters and Point-Table data to the non-volatile memory in the driver.

	Function	Command	Content
Basic operation	Servo ON	SVON	The same functionality as the control input signal SVON.
	Servo OFF	SVOFF	
	Emergency stop	EMCON	The same functionality as the control input signals EMCF, EMCE. In the data specify 0,1: servo free, 2: control braking.
	Emergency stop release	EMCOFF	The same functionality as the control input signals EMCF, EMCE. There is no argument specified for emergency stop release.
	Start Point-Table	STRON	The same functionality as the control input signal STR.
	Stop Point-Table	STROFF	
	Point-Table start edge	STRP	The same functionality as the control input signal STRP.
	Point-Table specified start	STROND	Starts with the specified point table number. Specify the point table number in the data. The same functionality as the control input signal STR.
	Point-Table specified start edge	STRPD	Starts with the specified point table number. Specify the point table number in the data. The same functionality as the control input signal STRP.
	Homing start	ZSTRON	The same functionality as the control input signal ZSTR.
	Homing stop	ZSTROFF	
	Homing start edge	ZSTRP	The same functionality as the control input signal ZSTRP.
	Operation stop	STOP	The same functionality as the control input signal STP.
	Home deceleration ON	DECON	The same functionality as the control input signal DEC.
	Home deceleration OFF	DECOFF	
	Pause	HOLDON	The same functionality as the control input signal HOLD.
	Pause release	HOLDOFF	
	Single block ON	SBKON	The same functionality as the control input signal SBK.
	Single block OFF	SBKOFF	
	Input branch ON	EXINON	Select 1~3 in the data. The same functionality as the communication commands [EXIN1ON]~[3ON], [EXIN1OFF]~[3OFF]. If no data, [EXINON][EXINOFF] is executed.
	Input branch OFF	EXINOFF	
	Input branch 1 ON	EXIN1ON	The same functionality as the control input signal EXIN.
	Input branch 1 OFF	EXIN1OFF	
	Input branch 2 ON	EXIN2ON	The same functionality as the control input signal EXIN2.
	Input branch 2 OFF	EXIN2OFF	
	Input branch 3 ON	EXIN3ON	The same functionality as the control input signal EXIN3.
	Input branch 3 OFF	EXIN3OFF	
	Forward jog start	PJOG	JOG operation is performed in forward direction.
	Reverse jog start	NJOG	JOG operation is performed in reverse direction.
	Stop jog operation	JOGOFF	Stop JOG operation.
	Teaching	TDIN	Current position is stored in "Move amount" of the point number specified by PNT command.
	Alarm reset	ARST	The same functionality as the control input signal ARST.
	Torque peak reset	TRST	Reset the torque peak.
	Point number specify	PNT	The same functionality as the control input signals P0_IN~P7_IN.
	Alarm history clear	HCL	Clear alarm histories.
	CPU reset	RESET	Turn the power OFF-ON (power cycle).
	Current position set	ZSET	Specify the coordinate value of current position. (overwrite the mechanical home).
	Position error set	ESET	Set or clear the position error counter.

Function		Command	Content
Basic operation	Resolution select ON	RSELON	The same functionality as the control input signal RSEL.
	Resolution select OFF	RSELOFF	
	Torque select	TSELON	Select 0~4 in the data. The same functionality as the communication commands [TSEL0ON]~[4ON]. If no data, [TSEL0ON] is executed.
	Torque deselect	TSELOFF	Cancels the torque selection.
	Torque select 0 ON	TSEL0ON	The same functionality as the control input signal TSEL0.
	Torque select 1 ON	TSEL1ON	The same functionality as the control input signal TSEL1.
	Torque select 2 ON	TSEL2ON	The same functionality as the control input signal TSEL2.
	Torque select 3 ON	TSEL3ON	The same functionality as the control input signal TSEL3.
	Torque select 4 ON	TSEL4ON	The same functionality as the control input signal TSEL4.
	M complete ON	MFINON	The same functionality as the control input signal MFIN.
	M complete OFF	MFINOFF	
	Step operation start	STEPON	Select 0~3 in the data.The same functionality as the communication commands [STEP0ON]~[3ON]. If no data, the same operation as [STEP0ON] is executed.
	Step operation stop	STEPOFF	Stop the step operation.
	Step operation 0 start	STEP0ON	Move for the set value (pulses) of "Step operation pulses 0". Maximum velocity and acc/dec are the same as for JOG operation.
	Step 0 forward start	STEP0P	Move in forward direction for the set value of "Step operation pulses 0".
	Step 0 reverse start	STEP0N	Move in reverse direction for the set value of "Step operation pulses 0".
	Step 1 start	STEP1ON	Move for the set value (pulses) of "Step operation pulses 1". Maximum speed and acceleration/deceleration are the same as for JOG operation.
	Step 1 forward start	STEP1P	Move in forward direction for the set value of "Step operation pulses 1".
	Step 1 reverse start	STEP1N	Move in reverse direction for the set value of "Step operation pulses 1".
	Step operation 2 start	STEP2ON	Move for the set value (pulses) of "Step operation pulses 2". Maximum speed and acceleration/deceleration are the same as for JOG operation.
	Step 2 forward start	STEP2P	Move in forward direction for the set value of "Step operation pulses 2".
	Step 2 reverse start	STEP2N	Move in reverse direction for the set value of "Step operation pulses 2".
	Step operation 3 start	STEP3ON	Move for the set value (pulses) of "Step operation pulses 3". Maximum velocity and acceleration/deceleration are the same as for JOG operation.
	Step 3 forward start	STEP3P	Move in forward direction for the set value of "Step operation pulses 3".
	Step 3 reverse start	STEP3N	Move in reverse direction for the set value of "Step operation pulses 3".
	Transition to sensor input standby state	SLREQON	Transition to the sensor input standby state.
	Cancel sensor input standby state	SLREQOFF	Cancels the sensor input standby state.
	Direct positioning start	DPS	Starts profile positioning. Specify the target position, velocity, and acceleration/deceleration in the data.
Monitor	Numerical value monitor	MON	Specify the monitor item as data.
	Read alarm information (compatible with old models)	ALM	Current alarm and history of the past 8 alarms is returned. Read the bit status corresponding to the generated alarm number.
	I/O monitor	IO2	Monitors the status of control input/output terminals.
	Alarm read	ALMP	Read the list of currently occurring alarms.
	Alarm history read	ALHP	Read the alarms list that have occurred in the past.
	Monitor ・ diagnostic information read	DIAG	Specify the diagnostic information number (0~31) and monitor number (0~255) in the data. diagnostic information number 0: current, 1~31: diagnostic information when an alarm occurred

5. Communication commands details

5－1. Parameters/Point-Table setting commands

Note) Numeric hexadecimal values other than the axis number can be represented by the number of characters required to represent the value (it is not necessary to add zeros to the beginning to align them to a certain length). However, if the value is negative, be sure to send 8 characters.

Example: Both [00000100] and [100] represent the number "256".
The number "-1" should be represented as [FFFFFFFF]. [FFFF] is interpreted as the number "65535".

Numerical value in the reply character string from the servo driver to the host controller is sent with a fixed number of characters according to each command.

5－1－1. [PR] [PRMR] Parameter read

[PR] command reads the values of parameters N0000~N0435.

Example) Read the parameter N0100 from Si3 servo driver with axis number 3.

host controller ⇒Si3 servo driver

axis number　　command parameter number [N0100 (64h)]

	STX	0	3	;	P	R	;	6	4	EOT
(ASCII code)	02	30	33	3B	50	52	3B	36	34	04

Si3 servo driver ⇒ host controller

parameter value [hexadecimal 8 characters]

STX	0	3	;	P	R	;	0	0	0	0	0	0	0	1	EOT

(read result 1)

(Commands for compatibility with old models)

[PRMR] is a command for compatibility with old models. With this command, the parameter numbers 0~79 of Si servo2 are specified, and the values of corresponding function parameters (N0000~N0435) of Si servo3 are read. If Si servo2 driver is replaced with Si servo3, the system can continue to use [PRMR] command issued by the host controller.

※For details on [PRMR] command sending and receiving data, refer to the Si servo2 Instruction manual (Communication part).

※For details on the parameters correspondence between Si servo2 and Si servo3, refer to 6－1. Old model (Si servo2) parameters correspondence table.

５－１－２．[PW] [PRMW] Parameter write

[PW] command overwrites the values of servo driver parameters N0000~N0435.

The parameter value set by this command will not be retained after the power is turned off. Execute [FLASH] command to store the set value.

Example) Write 1 (01h) to the parameter No.0100 of Si3 servo driver with axis number 3.

host controller ⇒Si3 servo driver

axis number　　command parameter number [N0100 (64h)]

	STX	0	3	;	P	W	;	6	4
(ASCII code)	02	30	33	3B	50	57	3B	36	34

parameter value [hexadecimal 8 characters]

;	0	0	0	0	0	0	0	1	EOT
3B	30	30	30	30	30	30	30	31	04

Si3 servo driver ⇒host controller

STX	0	3	;	P	W	EOT

(Commands for compatibility with old models)

[PRMW] is a command for compatibility with old models. With this command, the parameter numbers 0~79 of Si servo2 are specified, and the values of corresponding function parameters (N0000~N0435) of Si servo3 are written. If Si servo2 driver is replaced with Si servo3, the system can continue to use [PRMW] command issued by the host controller.

※For details on [PRMW] command sending and receiving data, refer to the Si servo2 Instruction manual (Communication part).

※For details on the parameters correspondence between Si servo2 and Si servo3, refer to ６－１. Old model (Si servo2) parameters correspondence table.

５－１－３．[PTR] [TR] Point-Table read

Read the contents of Point-Table No.0~255 from the servo driver.

With [TR] command for compatibility with old models, items other than the deceleration time constant are read. When replacing Si servo2 with Si servo3, [TR] command issued by the host controller can be used as previously.

Note 1) Some data such as absolute position, relative value are handled collectively as a bit command. For details, refer to the table below [Bit command details].

Bit command details

Bit position	Item	Content	
		0	1
BIT0	Absolute value/Relative value	Absolute value	Relative value
BIT1	Continuous operation	none	YES
BIT2	S-curve acceleration/deceleration	none	YES
BIT3 BIT4	Sensor positioning	BIT4,3 00: none 01: sensor positioning 1 10: sensor positioning 2	
BIT5	- Branch signal level input (※)	edge	level
BIT6	—	—	—
BIT7	—	—	—
BIT8 BIT9 BITA	M code	BIT8,9,A 000: none 001: M code 1 010: M code 2 011: M code 3 100: M code 4 101: M code 5 110: M code 6 111: M code 7	
BITB	M output selection	before points start	after points end
BITC	—	—	—
BITD	—	—	—
BITE	—	—	—
BITF	—	—	—

(※) This data is valid only for Si servo3.

Example) Read the contents of point number 154 from a servo driver with axis number 3

host controller ⇒Si3 servo driver

axis number point number

	STX	0	3	;	P	T	R	;	9	A	EOT
(ASCII code)	02	30	33	3B	50	55	52	3B	39	41	04

Si3 servo driver ⇒host controller

axis number move amount moving velocity

STX	0	3	;	P	T	R	;	0	0	0	2	E	3	1	1	;	0	1	F	4	;

acc/dec time constant wait time normal branch bit command[Note 1)]

0	0	6	4	;	0	3	E	8	;	0	0	0	C	;	0	0	0	7	;

input branch 1 (※2) input branch 2 (※2) input branch 3 (※2) number of loops

F	F	F	F	;	F	F	F	F	;	F	F	F	F	;	0	0	0	A	;

branch after loop torque loop counter clear (※2) dec time constant (※1)

0	0	9	0	;	0	0	0	0	;	F	F	F	F	;	0	0	3	2	EOT

(※1) Deceleration time constant is the data of [PTR] command only.
(※2) [FFFF](h) is returned when the input branch destinations 1~3 and the loop counter clear values are "-1" (not used).

5－1－4. [PTW] [TW] Point-Table write

Overwrite the contents of servo driver Point-Table No.0~255.

The [TW] command for compatibility with old models writes the data other than the deceleration time constant (the value set for acceleration/deceleration time constant is applied as the deceleration time constant).

When replacing Si servo2 with Si servo3, [TW] command issued by the host controller can be used as previously.

The position data set by this command will not be retained after the power is turned off. Execute [FLASH] command to store the set value.

Note 1) Some data such as absolute position, relative value are handled collectively as a bit command.
For details, refer to "[PTR] [TR] Point-Table read" table [Bit command details].

Example) Write to point number 2 of Si3 servo with axis number 3

host controller ⇒Si3 servo driver

					command				point number					move amount						
	STX	0	3	;	P	T	W	;	0	2	;	0	0	0	2	E	3	1	1	;
(ASCII code)	02	30	33	3B	50	54	57	3B	30	32	3B	30	30	30	32	45	33	31	31	3B

moving velocity					acc/dec time constant					wait time					normal branch			
0	7	D	0	;	0	1	F	4	;	0	3	E	8	;	0	0	1	4	;
30	37	44	30	3B	30	31	46	34	3B	30	33	45	38	3B	30	33	31	38	3B

bit command[Note 1]					input branch 1 (※2)									input branch 2 (※2)							
0	0	0	3	;	0	0	0	0	0	0	0	B	;	F	F	F	F	F	F	F	F	;
30	30	30	33	3B	30	30	30	30	30	30	30	42	3B	46	46	46	46	46	46	46	46	3B

input branch 3 (※2)									number of loops			branch after loop				
F	F	F	F	F	F	F	F	;	0	5	;	0	1	0	0	;
46	46	46	46	46	46	46	46	3B	30	35	3B	30	31	30	30	3B

torque					loop counter clear (※2)								deceleration time constant (※1)				
0	0	0	0	;	F	F	F	F	F	F	F	F	;	0	1	F	4	EOT
30	30	30	30	3B	46	46	46	46	46	46	46	46	3B	30	31	46	34	04

Si3 servo driver ⇒host controller

STX	0	3	;	P	T	W	EOT

(※1) Deceleration time constant is the data of [PTR] command only.

(※2) When not using the input branch destination (1~3) and loop counter clear, set the corresponding items to "-1", that is, to [FFFFFFFF](h).

５－１－５．[PTRS] Point-Table item read

Read the contents corresponding to the specified item from the specified point in Point-Table.

Item codes list

Code	Item
00	Move amount
01	Velocity
02	Acceleration/deceleration time constant
03	Wait time
04	Normal branch destination
05	Bit command (※)
06	Input branch destination 1
07	Input branch destination 2
08	Input branch destination 3
09	Number of loops
0A	Branch destination point
0B	Torque set
0C	Loop counter clear
0D	Deceleration time constant

(※) For bit command details refer to "Bit command details" in PTR, TR commands description.

Example) Read the content "Move amount" of point number 154 from a servo driver with axis number 3

host controller ⇒Si3 servo driver

		axis number								point number			read code		
	STX	0	3	;	P	T	R	S	;	9	A	;	0	0	EOT
(ASCII code)	02	30	33	3B	50	52	52	53	39	41	39		39	41	04

Si3 servo driver ⇒host controller

	axis number										move amount					
STX	0	3	;	P	T	R	S	;	0	0	0	2	E	3	1	1	EOT

５－１－６．[PTWS] Point-Table item write

Write data to the specified item of the specified point in Point-Table.

The position data set by this command will not be retained after the power is turned off. Execute [FLASH] command to store the set value.

Note 1) For item code details refer to "[PTR] [TR] Point-Table read" table [Bit command details].

Example) Write moving velocity to point number 2 of Si3 servo with axis number 3

host controller ⇒Si3 servo driver

						command				point number			code			moving velocity				
	STX	0	3	;	P	T	W	S	;	0	2	;	0	1	;	0	7	D	0	EOT
(ASCII code)	02	30	33	3B	50	54	57	53	3B	30	32	3B	30	31	3B	30	37	44	30	04

Si3 servo driver ⇒host controller

STX	0	3	;	P	T	W	S	EOT

※When not using the input branch (1~3) and loop counter clear, set the corresponding items to "-1", that is to [FFFFFFFF](h).

５－１－７．[FLASH] EEPROM write

Store the data set by [PW], [PRMW], [PTW], [TW], and [TDIN] commands in the servo driver nonvolatile memory. The stored values are retained after the power is turned off.

Nonvolatile memory can nominally be rewritten 100,000 times.

Example) Store the data (parameters, point table data) of a servo driver with axis number 3

host controller ⇒servo driver

	STX	0	3	;	F	L	A	S	H	EOT
(ASCII code)	02	30	33	3B	46	4C	41	53	48	04

servo driver ⇒host controller

STX	0	3	;	F	L	A	S	H	EOT

５－２． Basic operation commands

５－２－１． [SVON] [SVOFF] Servo ON/OFF

The same functionality as turning ON/OFF the control input signal SVON.

※When using this command, enable the communication command for SVON (servo ON/OFF) function by selecting the command input method.
If not enabled, a communication error [ERR;04] (Input method not selected) will be returned.
For details on command input method selection, refer to "３－８． Command input method select".

Parameter N0006 "Command input method select": Serial communication command enable

Function	BIT	Set value	Select device
SVON	BIT1	0	communication command [SVON] [SVOFF]
	BIT0	1	

Example) Turn servo ON, servo OFF of a servo driver with axis number 3

[SVON] command

host controller ⇒servo driver

	STX	0	3	;	S	V	O	N	EOT
(ASCII code)	02	30	33	3B	53	56	4F	4E	04

servo driver ⇒host controller

	STX	0	3	;	S	V	O	N	EOT

[SVOFF] command

host controller ⇒servo driver

	STX	0	3	;	S	V	O	F	F	EOT
(ASCII code)	02	30	33	3B	53	56	4F	46	46	04

servo driver ⇒host controller

	STX	0	3	;	S	V	O	F	F	EOT

☆[SVON] and [SVOFF] commands usage precautions

The servo ON command by the communication command [SVON] is held in the driver. When the servo is turned ON by [SVON] and the servo is forcibly turned OFF by alarm or emergency stop, and then the alarm/emergency stop is released, the servo ON command is retained internally and the servo is turned ON again.
If the communication command [SVOFF] is executed while the servo is OFF due to alarm or emergency stop, the internally held servo ON command will be released and the servo OFF state will be kept even after the alarm/emergency stop is released.

５－２－２．[EMCON] [EMCOFF] Emergency stop ON/OFF

When a servo driver receives [EMCON] command, the motor will perform emergency stop operation.

The emergency stop operation changes depending on the data added to the command.

Send string	Emergency stop operation
EMCON	servo free
EMCON;0	
EMCON;1	
EMCON;2	control braking

Example) Emergency stop (control braking) and release in a servo driver with axis number 3

If this is omitted, [EMCON;0] is executed.

[EMCON] command

host controller ⇒servo driver

	STX	0	3	;	E	M	C	O	N	;	2	EOT
(ASCII code)	02	30	33	3B	45	4D	43	4F	4E	3B	32	04

servo driver ⇒host controller

STX	0	3	;	E	M	C	O	N	EOT

[EMCOFF] command

host controller ⇒servo driver

	STX	0	3	;	E	M	C	O	F	F	EOT
(ASCII code)	02	30	33	3B	45	4D	43	4F	46	46	04

servo driver ⇒host controller

STX	0	3	;	E	M	C	O	F	F	EOT

５－２－３．[STRON] [STROFF] [STRP] Point-Table start ON/OFF

[STRON] and [STRP] commands activate Point-Table operation.
Specify in advance the Point-Table number to be activated using the control inputs P0_IN ~P7_IN or [PNT] command.
[STROFF] command stops the point table operation started by [STRON] or [STROND] commands.
※When using this command, enable the communication command for STR (Point-Table operation start/stop) function by selecting the command input method.
If not enabled, a communication error [ERR;04] (Input method not selected) will be returned.
For details on command input method selection, refer to "３－８．Command input method select".

Parameter N0006 "Command input method select": Serial communication command enable

Function	BIT	Set value	Select device
STR	BIT5	0	communication command [STRON] [STROFF] [STRP]
	BIT4	1	

Example) Start and stop Point-Table No.5 of a servo driver with axis number 3
[PNT] command
host controller ⇒servo driver

	STX	0	3	;	P	N	T	;	0	5	EOT
(ASCII code)	02	30	33	3B	50	4E	54	3B	30	35	04

servo driver ⇒host controller

STX	0	3	;	P	N	T	EOT

[STRON] command
host controller ⇒servo driver

	STX	0	3	;	S	T	R	O	N	EOT
(ASCII code)	02	30	33	3B	53	54	52	4F	4E	04

servo driver ⇒host controller

STX	0	3	;	S	T	R	O	N	EOT

[STROFF] command
host controller ⇒servo driver

	STX	0	3	;	S	T	R	O	F	F	EOT
(ASCII code)	02	30	33	3B	53	54	52	4F	46	46	04

servo driver ⇒host controller

STX	0	3	;	S	T	R	O	F	F	EOT

[STRP] command
host controller ⇒servo driver

	STX	0	3	;	S	T	R	P	EOT
(ASCII code)	02	30	33	3B	53	54	52	50	04

servo driver ⇒host controller

STX	0	3	;	S	T	R	P	EOT

☆Differences between [STRON] and [STRP] commands and usage precautions

- The Point-Table operation start command [STRON] is held in the servo driver as a level signal. By canceling this signal with [STROFF] command, the running Point-Table operation is stopped.
- The Point-Table operation start command [STRP] is a one-shot signal and is not held in the servo driver. Use [STOP] command to stop the Point-Table operation started by [STRP] command.
- The Point-Table operation start command [STRON] is held in the servo driver as a level signal. Therefore, after the Point-Table operation started by [STRON] command ends (normal end or forced stop due to alarm or emergency stop) it is necessary to send [STROFF] command before sending next [STRON]. [STROFF] is not required when operation is started with [STRP].

５－２－４．[STROND] [STRPD] Point-Table specified start

[STROND] and [STRPD] commands specify the Point-Table number and start the operation.

Use [STROFF] command to stop the Point-Table operation started by [STROND] command.

※When using this command, enable the communication command for STR (Point-Table operation start/stop) and PNT (Point number specify) functions by selecting the command input method. If not enabled, a communication error [ERR;04] (Input method not selected) will be returned. For details on command input method selection, refer to "３－８．Command input method select".

Parameter N0006 "Command input method select": Serial communication command enable

Function	BIT	Set value	Select device
PNT	BIT9	0	communication command
	BIT8	1	
STR	BIT5	0	communication command
	BIT4	1	

Example) Start and stop Point-Table No.5 of a servo driver with axis number 3

[STROND] command

host controller ⇒servo driver

	STX	0	3	;	S	T	R	O	N	D	;	0	5	EOT
(ASCII code)	02	30	33	3B	53	54	52	4F	4E	44	3B	30	35	04

servo driver ⇒host controller

STX	0	3	;	S	T	R	O	N	D	EOT

[STRPD] command

host controller ⇒servo driver

	STX	0	3	;	S	T	R	P	D	;	0	5	EOT
(ASCII code)	02	30	33	3B	53	54	52	50	44	3B	30	35	04

servo driver ⇒host controller

STX	0	3	;	S	T	R	P	EOT

☆Differences between [STROND] and [STRPD] commands and usage precautions

- The Point-Table operation start command [STROND] is held in the servo driver as a level signal. By canceling this signal with [STROFF] command, the running Point-Table operation is stopped.
- The Point-Table operation start command [STRPD] is a one-shot signal and is not held in the servo driver. Use [STOP] command to stop the Point-Table operation started by [STRPD] command.
- The Point-Table operation start command [STROND] is held in the servo driver as a level signal. Therefore, after the Point-Table operation started by [STROND] command ends (normal end or forced stop due to alarm or emergency stop) it is necessary to send [STROFF] command before sending next [STROND]. [STROFF] is not required when operation is started with [STRPD].

５－２－５．[ZSTRON] [ZSTROFF] [ZSTRP] Homing start ON/OFF

The same functionality as turning ON or OFF the control input signal ZSTR (ZSTRP). If the servo driver receives [ZSTRON] command while the servo is ON, the homing operation will start according to the selected method in the servo driver parameter "Homing method".
If a servo driver receives [ZSTROFF] command during the homing operation started by [ZSTRON], the motor will decelerate and stop. In this case, the homing is not completed yet, thus perform a homing again before starting operation.
Use [STOP] command to interrupt the homing operation started by [ZSTRP].
After the homing operation started by [ZSTRON] is normally completed or after the homing operation is forcibly stopped by an alarm or emergency stop, [ZSTROFF] must be executed before next [ZSTRON] command. [ZSTROFF] is not required when operation is started with [ZSTRP].

※When using this command, enable the communication command for ZSTR (Homing operation start/stop) function by selecting the command input method.
If not enabled, a communication error [ERR;04] (Input method not selected) will be returned.
For details on command input method selection, refer to "３－８．Command input method select".

Parameter N0006 "Command input method select": Serial communication command enable

Function	BIT	Set value	Select device
ZSTR	BIT7	0	communication command [ZSTRON][ZSTROFF][ZSTRP]
	BIT6	1	

Example) Homing start and stop of a servo driver with axis number 3

[ZSTRON] command

host controller ⇒servo driver

	STX	0	3	;	Z	S	T	R	O	N	EOT
(ASCII code)	02	30	33	3B	5A	53	54	52	4F	4E	04

servo driver ⇒host controller

	STX	0	3	;	Z	S	T	R	O	N	EOT

[ZSTROFF] command

host controller ⇒servo driver

	STX	0	3	;	Z	S	T	R	O	F	F	EOT
(ASCII code)	02	30	33	3B	5A	53	54	52	4F	46	46	04

servo driver ⇒host controller

	STX	0	3	;	Z	S	T	R	O	F	F	EOT

[ZSTP] command

host controller ⇒servo driver

	STX	0	3	;	Z	S	T	R	P	EOT
(ASCII code)	02	30	33	3B	5A	53	54	52	50	04

servo driver ⇒host controller

	STX	0	3	;	Z	S	T	R	P	EOT

５－２－６．[STOP] Stop operation

The same functionality as the control input signal STP.

If the servo driver receives [STOP] command during point operation, homing, or JOG operation, the operation will be interrupted and the motor will decelerate and stop.

If point operation is in progress, the remaining move amount will be cleared after stopping.

If the homing is in progress, the homing will remain incomplete.

Example) Stop operation of a servo driver with axis number 3

host controller ⇒servo driver

	STX	0	3	;	S	T	O	P	EOT
(ASCII code)	02	30	33	3B	53	54	4F	50	04

servo driver ⇒host controller

	STX	0	3	;	S	T	O	P	EOT

５－２－７．[DECON] [DECOFF] Home deceleration LS ON/OFF

The same functionality as turning ON/OFF the control input signal DECON.

Example) Activate and deactivate home deceleration of a servo driver with axis number 3

[DECON] command

host controller ⇒servo driver

	STX	0	3	;	D	E	C	O	N	EOT
(ASCII code)	02	30	33	3B	44	45	43	4F	4E	04

servo driver ⇒host controller

	STX	0	3	;	D	E	C	O	N	EOT

[DECOFF] command

host controller ⇒servo driver

	STX	0	3	;	D	E	C	O	F	F	EOT
(ASCII code)	02	30	33	3B	44	45	43	4F	46	46	04

servo driver ⇒host controller

	STX	0	3	;	D	E	C	O	F	F	EOT

５－２－８．[HOLDON] [HOLDOFF] Pause (HOLD) ON/OFF

The same functionality as turning ON or OFF the control input signal HOLD. If the servo driver receives [HOLDON] command during the point positioning operation, it will decelerate and stop while holding the remaining move amount. When [HOLDOFF] is received, the point positioning operation that was being executed before the pause is continued.

Example) Pause and continue point positioning operation of a servo driver with axis number 3

[HOLDON] command

host controller ⇒servo driver

	STX	0	3	;	H	O	L	D	O	N	EOT
(ASCII code)	02	30	33	3B	48	4F	4C	44	4F	4E	04

servo driver ⇒host controller

	STX	0	3	;	H	O	L	D	O	N	EOT

[HOLDOFF] command

host controller ⇒servo driver

	STX	0	3	;	H	O	L	D	O	F	F	EOT
(ASCII code)	02	30	33	3B	48	4F	4C	44	4F	46	46	04

servo driver ⇒host controller

	STX	0	3	;	H	O	L	D	O	F	F	EOT

５－２－９．[SBKON] [SBKOFF] Single block ON/OFF

The same functionality as turning ON or OFF the control input signal SBK. When the "Normal/Input branch destination" item in the Point-Table is set to a value in 1000~1255, a single block operation is performed with this command.

Example) Turn ON and OFF the single block signal input of a servo driver with axis number 3

[SBKON] command

host controller ⇒servo driver

	STX	0	3	;	S	B	K	O	N	EOT
(ASCII code)	02	30	33	3B	53	42	4B	4F	4E	04

servo driver ⇒host controller

	STX	0	3	;	S	B	K	O	N	EOT

[SBKOFF] command

host controller ⇒servo driver

	STX	0	3	;	S	B	K	O	F	F	EOT
(ASCII code)	02	30	33	3B	53	42	4B	4F	46	46	04

servo driver ⇒host controller

	STX	0	3	;	S	B	K	O	F	F	EOT

５－２－１０．[EXINON] [EXINOFF] [EXIN1ON] [EXIN1OFF] [EXIN2ON] [EXIN2OFF] [EXIN3ON] [EXIN3OFF] Input branch ON/OFF

The same functionality as turning ON or OFF the control input signals EXIN, EXIN2, EXIN3. This command is valid when the input condition jump is set in Point-Table.

[EXINON] and [EXINOFF] commands with arguments 1~3 turn ON and OFF the control input signals EXIN, EXIN2, and EXIN3.

Example) Turn input branch 2 ON and OFF in a servo driver with axis number 3

<Example 1> Turn EXIN2 ON and OFF with [EXINON] [EXINOFF] commands

[EXINON] command

host controller ⇒ servo driver

	STX	0	3	;	E	X	I	N	O	N	;	2	EOT
(ASCII code)	02	30	33	3B	45	58	49	4E	4F	4E	3B	32	04

servo driver ⇒host controller

STX	0	3	;	E	X	I	N	O	N	EOT

[EXINOFF] command

host controller ⇒servo driver

	STX	0	3	;	E	X	I	N	O	F	F	;	2	EOT
(ASCII code)	02	30	33	3B	45	58	49	4E	4F	46	46	3B	32	04

servo driver ⇒host controller

STX	0	3	;	E	X	I	N	O	F	F	EOT

<Example 2> Turn EXIN2 ON and OFF with [EXIN2ON] [EXIN2OFF] command

[EXIN2ON] command

host controller ⇒servo driver

	STX	0	3	;	E	X	I	N	2	O	N	EOT
(ASCII code)	02	30	33	3B	45	58	49	4E	32	4F	4E	04

servo driver ⇒host controller

STX	0	3	;	E	X	I	N	2	O	N	EOT

[EXIN2OFF] command

host controller ⇒servo driver

	STX	0	3	;	E	X	I	N	2	O	F	F	EOT
(ASCII code)	02	30	33	3B	45	58	49	4E	32	4F	46	46	04

servo driver ⇒host controller

STX	0	3	;	E	X	I	N	2	O	F	F	EOT

５－２－１１．[PJOG] [NJOG] [JOGOFF] JOG operation

[PJOG] command starts jog operation in forward direction, and [NJOG] command starts jog operation in reverse direction.

[JOGOFF] command stops the jog operation started by [PJOG], [NJOG], [PJOGD] or [NJOGD] commands.

※When using this command, enable the communication command for JOG (Jog operation start/stop) function by selecting the command input method.
If not enabled, a communication error [ERR;04] (Input method not selected) will be returned.
For details on command input method selection, refer to "３－８．Command input method select".

Parameter N0006 "Command input method select": Serial communication command enable

Function	BIT	Set value	Select device
JOG	BIT3	0	communication command [PJOG] [NJOG] [JOGOFF]
	BIT2	1	

Example) Jog operation of a servo driver with axis number 3

[PJOG] command

host controller ⇒servo driver

	STX	0	3	;	P	J	O	G	EOT
(ASCII code)	02	30	33	3B	50	4A	4F	47	04

servo driver ⇒host controller

	STX	0	3	;	P	J	O	G	EOT

[NJOG] command

host controller ⇒servo driver

	STX	0	3	;	N	J	O	G	EOT
(ASCII code)	02	30	33	3B	4E	4A	4F	47	04

servo driver ⇒host controller

	STX	0	3	;	N	J	O	G	EOT

[JOGOFF] command

host controller ⇒servo driver

	STX	0	3	;	J	O	G	O	F	F	EOT
(ASCII code)	02	30	33	3B	4A	4F	47	4F	46	46	04

servo driver ⇒host controller

	STX	0	3	;	J	O	G	O	F	F	EOT

☆[PJOG] and [NJOG] commands usage precautions

・ The jog operation start [PJOG] and [NJOG] commands are held in the servo driver as level signals. Therefore, after the jog operation started by [PJOG] or [NJOG] command ends due to alarm or emergency stop it is necessary to send [JOGOFF] command before sending next [PJOG] or [NJOG].

５－２－１２．[TDIN] Teaching

The same functionality as the control input signal TDIN. Used in combination with [PNT] command. When the servo driver receives [TDIN] command, it sets (teaching) the current position to the "Move amount" of the point number specified by the [PNT] command. In addition, the "Absolute/relative value" of the point number where the teaching was performed is automatically set to 0 (absolute value). The position data set by this command will not be retained after the power is turned off, similar to [PRMW] [TBLW] [TW] commands. Execute [FLASH] command to store the set value.

Example) Set the current position at 123456 pulses to point No.5 of a servo driver with axis number 3 (123456 (1E240h) [pulses] is set)

[PNT] command

host controller ⇒servo driver

	STX	0	3	;	P	N	T	;	0	5	EOT
(ASCII code)	02	30	33	3B	50	4E	54	3B	30	35	04

servo driver ⇒host controller

STX	0	3	;	P	N	T	EOT

[TDIN] command

host controller ⇒servo driver

	STX	0	3	;	T	D	I	N	EOT
(ASCII code)	02	30	33	3B	54	44	49	4E	04

servo driver ⇒host controller

STX	0	3	;	T	D	I	N

;	0	5	;	0	0	0	1	E	2	4	0	EOT

５－２－１３．[ARST] Alarm reset

Currently occurring alarms that can be released will be released.

[ARST] command

host controller ⇒servo driver

	STX	0	3	;	A	R	S	T	EOT
(ASCII code)	02	30	33	3B	41	52	53	54	04

servo driver ⇒host controller

STX	0	3	;	A	R	S	T	EOT

５－２－１４．[TRST] Torque peak reset

Clears the torque peak value (read by the numerical monitor command [MON;09]) stored in the servo driver.

[TRST] command

host controller ⇒servo driver

	STX	0	3	;	T	R	S	T	EOT
(ACSII code)	02	30	33	3B	54	52	53	54	04

servo driver ⇒host controller

STX	0	3	;	T	R	S	T	EOT

５－２－１５．[PNT] Point specify

The same functionality as the control inputs P0_IN~P7_IN. The point number specified by this command is used in [STRON] and [TDIN] commands.

※When using this command, enable the communication command for PNT (Point number specify) function by selecting the command input method.
If not enabled, a communication error [ERR;04] (Input method not selected) will be returned.
For details on command input method selection, refer to "３－８．Command input method select".

Parameter N0006 "Command input method select": Serial communication command enable

Function	BIT	Set value	Select device
PNT	BIT9	0	communication command [PNT]
	BIT8	1	

Example) Specify Point-Table 5 of a servo driver with axis number 3

[PNT] command

host controller ⇒servo driver

	STX	0	3	;	P	N	T	;	0	5	EOT
(ASCII code)	02	30	33	3B	50	4E	54	3B	30	35	04

servo driver ⇒host controller

STX	0	3	;	P	N	T	EOT

５－２－１６．[HCL] Alarm history clear

History of the past 8 alarms stored in the servo driver is cleared.

Example) Clear the alarm history of a servo driver with axis number 3

host controller ⇒servo driver

	STX	0	3	;	H	C	L	EOT
(ASCII code)	02	30	33	3B	48	43	4C	04

servo driver ⇒host controller

STX	0	3	;	H	C	L	EOT

５－２－１７．[RESET] CPU reset

If the servo driver receives this command when servo is OFF, the same operation as with turning the power OFF and ON (power cycle) will be executed. (If the command is received during servo ON, [ERR;06] is returned.) To store the rewritten point data and parameters, execute [FLASH] command before [RESET] command. In addition, the machine home will be cleared, so after [RESET], perform the homing operation before use.

As the servo driver receives this command, it immediately※ resets the CPU, thus the servo driver does not reply to the controller.

※If EEPROM writing operation is in progress when [RESET] command is received, the servo driver waits until the EEPROM writing operation is completed, and RESET operation is performed after the writing operation is completed.

Example) CPU reset of a servo driver with axis number 3

host controller ⇒servo driver

	STX	0	3	;	R	E	S	E	T	EOT
(ASCII code)	02	30	33	3B	52	45	53	45	54	04

５－２－１８．[ZSET] Machine home rewrite

When this command is received, the machine origin is rewritten so that the specified value is the current position. (If this command is received when the position error is larger than the set value in the servo driver parameter "In-position range", [ERR;02] is returned.)

Example) Rewrite the current position to 300000 (493E0h) [pulses] in a servo driver with axis number 3

host controller ⇒servo driver

					command					new value								
	STX	0	3	;	Z	S	E	T	;	0	0	0	4	9	3	E	0	EOT
(ASCII code)	02	30	33	3B	5A	53	45	54	3B	30	30	30	34	39	33	45	30	04

servo driver ⇒host controller

STX	0	3	;	Z	S	E	T	EOT

５－２－１９．[ESET] Error counter set

When this command is received, the error counter is set to the specified value (when "0" is specified, the error counter is cleared).

Example) Set the error counter to 4000 (FA0h) [pulses] in a servo driver with axis number 3

host controller ⇒servo driver

					command					error pulses								
	STX	0	3	;	E	S	E	T	;	0	0	0	0	0	F	A	0	EOT
(ASCII code)	02	30	33	3B	45	53	45	54	3B	30	30	30	30	30	46	41	30	04

servo driver ⇒host controller

STX	0	3	;	E	S	E	T	EOT

５－２－２０．[RSELON] [RSELOFF] Resolution selection

The same functionality as turning ON or OFF the control input signal RSEL. The command switches the resolution of reference pulse.

※When using this command, enable the communication command for RSEL (Reference pulse multiply select) function by selecting the command input method.
If not enabled, a communication error [ERR;04] (Input method not selected) will be returned.
For details on command input method selection, refer to "３－８．Command input method select".

Parameter N0006 "Command input method select": Serial communication command enable setting

Function	BIT	Set value	Select device
RSEL	BIT11	0	communication command [RSELON] [RSELOFF]
	BIT10	1	

Example) Select resolution of a servo driver with axis number 3

[RSELON] command

host controller ⇒servo driver

	STX	0	3	;	R	S	E	L	O	N	EOT
(ASCII code)	02	30	33	3B	52	53	45	4C	4F	4E	04

servo driver ⇒host controller

	STX	0	3	;	R	S	E	L	O	N	EOT

[RSELOFF] command

host controller ⇒servo driver

	STX	0	3	;	R	S	E	L	O	F	F	EOT
(ASCII code)	02	30	33	3B	52	53	45	4C	4F	46	46	04

servo driver ⇒host controller

	STX	0	3	;	R	S	E	L	O	F	F	EOT

５－２－２１．[TSELON] [TSELOFF] [TSEL0ON] [TSEL1ON] [TSEL2ON] [TSEL3ON] [TSEL4ON] Torque select

The same functionality as the control inputs TSEL0~TSEL4. With this command, the torque limit value is switched to the value set in the parameters "Torque limit value select 0"~"Torque limit value select 4" of the servo driver.

With [TSELON] arguments 0~4 the torque 0~4 is selected.

[TSELOFF] command turns OFF all control input signals TSEL0~TSEL4 (torque limit is deselected).

※When using this command, enable the communication command for TSEL (Torque limit value) function by selecting the command input method.
If not enabled, a communication error [ERR;04] (Input method not selected) will be returned.
For details on command input method selection, refer to "３－８．Command input method select".

Parameter N0006 "Command input method select": Serial communication command enable

Function	BIT	Set value	Select device
TSEL	BIT13	0	communication command [TSELON] [TSELOFF] etc.
	BIT12	1	

Example) Select torque limit value of a servo driver with axis number 3

<Example 1> Select TSEL2 with the [TSELON] command

host controller ⇒servo driver

	STX	0	3	;	T	S	E	L	O	N	;	2	EOT
(ASCII code)	02	30	33	3B	54	53	45	4C	4F	4E	3B	32	04

servo driver ⇒host controller

STX	0	3	;	T	S	E	L	O	N	EOT

<Example 2> Select TSEL2 with the [TSEL2ON] command

host controller ⇒servo driver

	STX	0	3	;	T	S	E	L	2	O	N	EOT
(ASCII code)	02	30	33	3B	54	53	45	4C	32	4F	4E	04

servo driver ⇒host controller

STX	0	3	;	T	S	E	L	2	O	N	EOT

[TSELOFF] command

host controller ⇒servo driver

	STX	0	3	;	T	S	E	L	O	F	F	EOT
(ASCII code)	02	30	33	3B	54	53	45	4C	4F	45	45	04

servo driver ⇒host controller

STX	0	3	;	T	S	E	L	O	F	F	EOT

５－２－２２．[MFINON] [MFINOFF] M complete input ON/OFF

The same functionality as turning ON/OFF the control input signal MFIN.

Example) Turn M complete ON and OFF in a servo driver with axis number 3

[MFINON] command

host controller ⇒servo driver

	STX	0	3	;	M	F	I	N	O	N	EOT
(ASCII code)	02	30	33	3B	4D	46	49	4E	4F	4E	04

servo driver ⇒host controller

	STX	0	3	;	M	F	I	N	O	N	EOT

[MFINOFF] command

host controller ⇒servo driver

	STX	0	3	;	M	F	I	N	O	F	F	EOT
(ASCII code)	02	30	33	3B	4D	46	49	4E	4F	46	46	04

servo driver ⇒host controller

	STX	0	3	;	M	F	I	N	O	F	F	EOT

５－２－２３．[STEPON] [STEPOFF] [STEP0ON] [STEP1ON] [STEP2ON] [STEP3ON] Step operation

Starts and stops the step operation.

With [STEPON] arguments 0~3 the step operation 0~3 is selected.

If [STEPOFF] command is received during step operation, the motor will decelerate and stop.

Example) Start and stop the step operation of a servo driver with axis number 3

<Example 1> Start step 2 operation with [STEPON] command

[STEPON] command

host controller ⇒servo driver

	STX	0	3	;	S	T	E	P	O	N	;	2	EOT
(ASCII code)	02	30	33	3B	53	54	45	50	4F	4E	3B	32	04

servo driver ⇒host controller

	STX	0	3	;	S	T	E	P	O	N	EOT

<Example 2> Start step operation 2 with the [STEP2ON] command

[STEP2ON] command

host controller ⇒servo driver

	STX	0	3	;	S	T	E	P	2	O	N	EOT
(ASCII code)	02	30	33	3B	53	54	45	50	32	4F	4E	04

servo driver ⇒host controller

	STX	0	3	;	S	T	E	P	2	O	N	EOT

[STEPOFF] command

host controller ⇒servo driver

	STX	0	3	;	S	T	E	P	O	F	F	EOT
(ASCII code)	02	30	33	3B	54	53	45	4C	4F	45	45	04

servo driver ⇒host controller

	STX	0	3	;	S	T	E	P	O	F	F	EOT

５－２－２４．[STEP0P] [STEP0N] [STEP1P] [STEP1N] [STEP2P] [STEP2N] [STEP3P] [STEP3N] Step operation (direction specified)

Starts the step operation.

With [STEP0P] [STEP1P] [STEP2P] [STEP3P] the step operation is performed in forward direction for the absolute pulse number distance set in the parameters "Step operation pulses 0~3".

With [STEP0N] [STEP1N] [STEP2N] [STEP3N] the step operation is performed in reverse direction for the absolute pulse number distance set in the parameters "Step operation pulses 0~3".

Example) Start the step operation forward 2 of a servo driver with axis number 3

host controller ⇒servo driver

	STX	0	3	;	S	T	E	P	2	P	EOT
(ASCII code)	02	30	33	3B	53	54	45	50	32	50	04

servo driver ⇒host controller

	STX	0	3	;	S	T	E	P	2	P	EOT

５－２－２５．[SLREQON] [SLREQOFF] Transition to / Cancel sensor input standby state

The current position latch function controls transition and cancellation of the sensor input standby state.

For details on current position latch function, refer to Instruction Manual: Main part "14-3-2. Current position latch function".

Example) Transition / cancellation of sensor input standby state of a servo driver with axis number 3

[SLREQON] command

host controller ⇒servo driver

	STX	0	3	;	S	L	R	E	Q	O	N	EOT
(ASCII code)	02	30	33	3B	53	4C	52	45	51	4F	4E	04

servo driver ⇒host controller

	STX	0	3	;	S	L	R	E	Q	O	N	EOT

[SLREQOFF] command

host controller ⇒servo driver

	STX	0	3	;	S	L	R	E	Q	O	F	F	EOT
(ASCII code)	02	30	33	3B	53	4C	52	45	51	4F	46	46	04

servo driver ⇒host controller

	STX	0	3	;	S	L	R	E	Q	O	F	F	EOT

５－２－２６．[DPS] Direct positioning start

Specify the positioning profile data and start operation.

For details on positioning operation, refer to Instruction Manual: Main part "14-3-1. Profile operation command" .

The content of the positioning profile data id as follows.

Item	Explanation	Unit
Absolute value target position	Specify the final target position (absolute value) for positioning.	Reference unit
Target velocity	Specify the target velocity for positioning operation in [min^{-1}].	min^{-1}
Acceleration time constant	Set the acceleration time from velocity 0 to 3000min^{-1} in [ms]. ※If deceleration time constant is omitted, this data will be applied to both acceleration and deceleration.	ms/ 3000min^{-1}
Deceleration time constant	Set the acceleration time from velocity 3000 to min^{-1} in [ms]. ※This data can be omitted. If omitted, deceleration operates at the same slope as acceleration.	ms/ 3000min^{-1}

Example) Start positioning of a Si3 servo with axis number 3

host controller ⇒Si3 servo driver

					Command				Absolute value target position								
	STX	0	3	;	D	P	S	;	0	0	0	3	0	D	4	0	;
(ASCII code)	02	30	33	3B	44	50	53	3B	30	30	30	33	30	44	34	30	3B

Target velocity					Acc time constant					Dec time constant				
0	7	D	0	;	0	1	F	4	;	0	3	E	8	EOT
30	37	44	30	3B	30	31	46	34	3B	30	33	45	38	04

servo driver ⇒host controller

STX	0	3	;	D	P	S	EOT

5－3. Monitor commands

5－3－1. [MON] Value monitor

Reads various numerical values.

Example) Read the command remain distance of a servo driver with axis number 3
(the read value is 16550 (40A6h) pulses)

host controller ⇒servo driver monitor number [hexadecimal 2 characters]

	STX	0	3	;	M	O	N	;	0	3	EOT
(ASCII code)	02	30	33	3B	4D	4F	4E	3B	30	33	04

servo driver ⇒host controller monitor number [hexadecimal 2 characters]

STX	0	3	;	M	O	N	;	0	3

;	0	0	0	0	4	0	A	6	EOT

The values read for each monitor number are shown in the table below

Number	Name	Content
00	Actual position	Returns the current motor position (feedback pulses) in reference units.
01	Reference position	Returns the current reference position in reference units.
02	Position error	Returns the current position error in motor encoder pulse units.
03	Command remain distance	Returns the remaining move amount for Point-Table positioning in reference units. Returns 0 except during the point positioning.
04	Actual velocity	The current velocity (calculated from feedback pulses) is returned in [min-1] units.
05	Velocity of reference positoin	Returns the current velocity of reference position in [min^{-1}].
06	Actual Torque	Returns current torque as a percentage of rated torque (ratio of detected current to rated current). (with sign)
07	Relative command value	Returns the command amount calculated from the start of point positioning.
08	Sensor position (for compatibility with old models)	The distance from the sensor startup to the current position is returned in the case of sensor positioning.
09	Torque peak	Returns the peak torque as a percentage of the rated torque (absolute value). Returns the maximum value of "Actual Torque " item.
0A	Executing point table No.	Returns the currently executed point table number.
0C	DEC-Z distance	Returns the distance between home deceleration LS and Z pulse in motor encoder pulse units. This value is updated when Z pulse is detected in returning to home.
0E	Communication command status	Returns the status of soft switches set by the communication command. Each bit's value 1 indicates the ON state. See the table below for correspondence of each bit.
10	Servo status	Returns the servo status as bits. See the table below for correspondence of each bit.
13	Completed point number	Returns the execution completed point number.
14	Z pulse latch position	Returns the position when the Z pulse signal rises.
15	Sensor latch position	Returns the position when the SENS signal rises.
16	Torque output effective value	Returns the torque output effective value(root mean square). Indicates the degree of variation in load torque.
17	Velocity error effective value	Retuens the velocity error effective value(root mean square). Indicates the degree of variation in motor rotation speed.

MON;0E [Communication command status] BIT correspondence table

BIT	Communication command status	BIT	Communication command status
31	—	15	TSEL3
30	—	14	TSEL2
29	—	13	TSEL1
28	—	12	TSEL0
27	—	11	EXIN3
26	—	10	EXIN2
25	—	09	EXIN
24	—	08	SBK
23	—	07	HOLD
22	—	06	DEC
21	TSTR	05	ZSTR
20	SLREQ	04	STR
19	MFIN	03	EMC (servo free)
18	RSEL	02	NJOG
17	EMCE (control braking)	01	PJOG
16	TSEL4	00	SVON

MON;10 [Servo status] BIT correspondence table

BIT	Servo status	BIT	Servo status
31	Servo ON	15	RUN
30	-OT	14	—
29	—	13	—
28	—	12	Sensor detection completed (SFIN)
27	EMC	11	Homing completed (ZFIN)
26	—	10	—
25	—	09	—
24	+OT	08	COIN (FIN)
23	Alarm	07	—
22	Velocity limiter	06	BB (base block)
21	—	05	—
20	—	04	—
19	Torque limiter	03	In point operation
18	—	02	—
17	—	01	—
16	Excessive error	00	—

５－３－２．[ALM] Alarm information

The current alarm status and the history of past 8 alarms are returned as "Alarm category numbers". BITs corresponding to the occurred alarm category are set in the reply data. For details about the alarm category codes refer to Si servo3 Instruction manual (Main part).

Use [ALMP] and [ALMHP] to read the detailed alarm code in the alarm category.

Correspondence between alarm numbers, alarm category numbers, and BITs is shown in the table below.

BIT	Number (※)	BIT	Number (※)
BIT0	01	BIT8	09
BIT1	02	BIT9	10
BIT2	03	BIT10	11
BIT3	04	BIT11	12
BIT4	05	BIT12	13
BIT5	06	BIT13	14
BIT6	07	BIT14	15
BIT7	08	BIT15	-

※Si servo2: Alarm number

Si servo3: Alarm category number

Example) Read the alarm information of a servo driver with axis number 3 (detect BIT5 and BIT6)

host controller ⇒servo driver

Command

	STX	0	3	;	A	L	M	EOT
(ASCII code)	02	30	33	3B	41	4C	4D	04

servo driver ⇒host controller

alarm occurrence status [hexadecimal 4 characters]

STX	0	3	;	A	L	M	;	0	0	6	0

Alarm history 1

;	0	0	4	0

Alarm history 2

;	0	0	2	0

:

Alarm history 8

;	0	0	0	1	EOT

５－３－３．[IO2] I/O monitor 2

Monitors the status of control input/output terminals. In the reply data, the upper 16 BITs represent the status of input terminals, and the lower 16 BITs represent the status of output terminals, where BIT value 1 corresponds to a closed state of the terminal.

Input		Output	
BIT	Device	BIT	Device
31	—	15	—
30	—	14	—
29	—	13	—
28	—	12	—
27	—	11	—
26	—	10	—
25	—	09	—
24	—	08	—
23	—	07	—
22	—	06	—
21	—	05	LED (red)
20	IN4	04	LED (green)
19	IN3	03	BK
18	IN2	02	OUT2
17	IN1	01	OUT1
16	IN0	00	OUT0

Example) Read I/O status of a servo driver with axis number 3

host controller ⇒servo driver

	STX	0	3	;	I	O	2	EOT
(ASCII code)	02	30	33	3B	49	4F	32	04

servo driver ⇒host controller

STX	0	3	;	I	O	2	;	0	5	9	1	0	0	3	9	EOT
									input terminals				output terminals			

5－3－4．[ALMP] Alarm read

Read the currently occurring alarm list (16) in batch.

host controller ⇒servo driver

Axis number

STX	0	3	;	A	L	M	P	EOT

servo driver ⇒host controller

axis number　occurring alarm 1　occurring alarm 2

STX	0	3	;	A	L	M	P	;	0	0	0	0	;	0	0	0	0	;

occurring alarm 3　(omitted: 4~14)　occurring alarm 15　occurring alarm 16

0	0	0	0	;		;	0	0	0	0	;	0	0	0	0	EOT

5－3－5．[ALHP] Alarm history read

Read the alarm history (31) in batch.

host controller ⇒servo driver

Axis number

STX	0	3	;	A	L	H	P	EOT

servo driver ⇒host controller

axis number　alarm history 1　alarm history 2

STX	0	3	;	A	L	H	P	;	0	0	0	0	;	0	0	0	0	;

alarm history 3　(omitted: 4~29)　alarm history 30　alarm history 31

0	0	0	0	;		;	0	0	0	0	;	0	0	0	0	EOT

The alarm history 1 is the latest (last generated).

５－３－６．[DIAG] Monitor･Read diagnostic information

Reads various numerical values and bit data indicating the operating status of Si servo3 driver.
Specify the diagnostic information number (0~31) and the monitor number (0~255) in the data.
Specify 0 as the diagnostic information number to read the current diagnostic information, and 1~31 to read the diagnostic information when a past alarm occurred. The latest diagnostic information (when the last alarm occurred) is information No.1.
For details on the monitor number, refer to the Monitor data and diagnostic information in the Si servo3 Instruction manual (Main part).

Example) Read the command remain distance (monitor number 100) at the time of the last alarm in a servo driver with axis number 3

host controller ⇒servo driver

	axis number								diagnostic number			monitor number			
STX	0	3	;	D	I	A	G	;	0	1	;	0	6	4	EOT

servo driver ⇒host controller

	axis number								monitor data								
STX	0	3	;	D	I	A	G	;	0	0	0	0	4	0	A	6	EOT

6. Appendix

6－1. Old model (Si servo2) parameters correspondence table

Si2 No.	Si2 parameter name	Si3 No.	Si3 parameter name	Remarks
0	Axis number	N0020	Axis number	
1	Control input function preset setting	-	-	
2	Resolution numerator	N0003	Electronic gear denominator	Resolution numerator = Electronic gear denominator
3	Resolution denominator	N0002	Electronic gear numerator	Resolution denominator x 10000 = Electronic gear numerator
4	Pulse command multiply	N0401	Reference pulse multiply 2	N0400: Reference pulse multiply 1 is "1"
5	-	-	-	
6	Forward software OT	N0004	Forward direction software OT	
7	Reverse software OT	N0005	Reverse direction software OT	
8	Current down current	N0125	Current down current	
9	Current down time limit	N0126	Current down time limit	
10	Preset servo gain select	-	-	
11	Position proportional gain	N0101	Position proportional gain	
12	Position feedforward coefficient	N0105	Velocity feedforward coefficient	
13	Velocity proportional gain	N0104	Load moment of inertia	
14	Velocity derivative gain	-	-	
15	Velocity integral gain	-	-	
16	Integral operation in holding state	-	-	
17	Maximum position error	N0412	Maximum position error	
18	In-position range	N0000	In-position range	
19	Torque completed/ VZR output range	N0207	Torque completed/ VZR output range	
20	Input pulse type	N0007	Reference pulse type select	
21	Jog velocity	N0310	Jog velocity	
22	Jog acc/dec time constant	N0311	Jog acc/dec time constant	
23	Step operation pulses 0	N0312	Step operation pulses 0	
24	Step operation pulses 1	N0313	Step operation pulses 1	
25	Step operation pulses 2	N0314	Step operation pulses 2	
26	Step operation pulses 3	N0315	Step operation pulses 3	
27	Homing method	N0300	Homing method select	
28	Homing direction	N0301	Homing direction select	
29	Homing fast velocity	N0302	Homing approach velocity	
30	Homing slow velocity	N0303	Homing creep velocity	
31	Homing acc/dec time constant	N0304	Homing acc/dec time constant	
32	Homing final travel distance	N0305	Homing final travel distance	
33	Homing push torque	N0306	Homing push torque	Si2:[%]units⇔Si3:[0.1%]units conversion
34	Velocity limit during torque limit	N0210	Velocity limit during torque limit	
35	Velocity limit when torque limit is released	N0211	Velocity limit when torque limit is released	
36	Velocity limit acc/dec time constant	N0212	Velocity limit acc/dec time constant	
37	Torque limit inc/dec time constant	N0208	Torque limit inc/dec time constant	
38	Operation mode switch	N0019	Velocity control operation mode select	
39	Alarm output time constant	N0406	Alarm signal output time constant	
40	Z phase output time	N0407	ZPLS output minimum time/ Stop time agter PTFIN	
41	Control input filter time constant	N0408	Control input filter time constant	
42	Reference pulse smoothing filter time constant	N0402	Reference pulse smoothing filter time constant	
43	Communication format select	N0419	Communication format select	
44	Reply wait time	N0420	Reply wait time	
45	Input method select	N0006	Command input method select	
46	-	-	-	

Si2 No.	Si2 parameter name	Si3 No.	Si3 parameter name	Remarks
47	Servo free delay time	N0411	Servo free delay time	
48	Rotation direction select	N0001	Motor rotation direction select	
49	Motor power voltage	-	-	
50	Open loop maximum velocity	-	-	
51	Open loop maximum position error	-	-	
52	In-position output permission sampling time	N0405	In-position output permission time	
53	Startup excitation hold time	N0421	Startup excitation hold time	
54	Point selection multiply	N0416	Point selection multiply	
55	VCMP output range	N0414	VCMP output range	
56	Auto tuning	-	-	
57	Number of pulses in rotating coordinate system	N0418	Rotating coordinate system upper limit	N0417: Rotating coordinate system lower limit is "0"
58	Machine edge detect sequence	N0422	Initial coordinate detection operation select	
59	Number of grid mask pulses	N0307	Homing grid mask pulses	
60	Extended input set 1	N0008	Control input function select: IN0	parameter 60 BIT0~BIT7 ⇔N0008
		N0009	Control input function select: IN1	parameter 60 BIT8~BIT15 ⇔N0009
		N0010	Control input function select: IN2	parameter 60 BIT16~BIT23 ⇔N0010
		N0011	Control input function select: IN3	parameter 60 BIT24~BIT31 ⇔N0011
61	Extended input set 2	N0012	Control input function select: IN4	
62	-	-	-	
63	Extended output set	N0013	Control output function select: OUT0	parameter 63 BIT0~BIT7 ⇔N0013
		N0014	Control output function select: OUT1	parameter 63 BIT8~BIT15 ⇔N0014
		N0015	Control output function select: OUT2	parameter 63 BIT16~BIT23 ⇔N0015
64	-	-	-	
65	Control input logic set	N0017	Control input logic selection	
66	Control output logic set	N0018	Control output logic selection	
67	-	-	-	
68	Alarm output protection set	N0413	Alarm output protection set	
69	-	-	-	
70	Torque select 0	N0202	Torque limit value select 0	Si2:[%]units⇔Si3:[0.1%]units conversion
71	Torque select 1	N0203	Torque limit value select 1	Si2:[%]units⇔Si3:[0.1%]units conversion
72	Torque select 2	N0204	Torque limit value select 2	Si2:[%]units⇔Si3:[0.1%]units conversion
73	Torque select 3	N0205	Torque limit value select 3	Si2:[%]units⇔Si3:[0.1%]units conversion
74	Torque select 4	N0206	Torque limit value select 4	Si2:[%]units⇔Si3:[0.1%]units conversion
75	Forward torque limiter	N0200	Forward direction basic torque limit	Si2:[%]units⇔Si3:[0.1%]units conversion
76	Reverse torque limiter	N0201	Reverse direction basic torque limit	Si2:[%]units⇔Si3:[0.1%]units conversion

■Contact information■■■

(Sales inquiry)

Sanmei Co., Ltd.

E-mail : service@sanmei.co.jp

Head office	〒424-0825	6-16 Matsubara-cho, Shimizu-ku, Shizuoka-shi, Shizuoka TEL (054)353-3271	FAX (054)352-1648
Tokyo branch	〒113-0033	Hongo Core Building 3F 3-43-16 Hongo, Bunkyo-ku, Tokyo TEL (03)5803-1621	FAX (03)3813-3431
North Kanto sales office	〒360-0041	Miyamachi City Hall Building 3F 2-138 Miyamachi, Kumagaya-shi, Saitama TEL (048)527-0780	FAX (048)527-1340
Yamagata sales office	〒990-0023	Habitation II 102 1-15-31 Matsunami, Yamagata-shi, Yamagata TEL (023)629-6455	FAX (023)629-6456
West Tokyo branch Kanagawa sales office	〒243-0035	Yasudaya Building 3F 1-4-3 Aiko, Atsugi-shi, Kanagawa TEL (046)280-6230	FAX (046)280-6237
Numazu sales office	〒410-0062	14-4 Miyamaemachi, Numazu-shi, Shizuoka TEL (055)922-5333	FAX (055)922-3609
Chubu branch Hamamatsu sales office	〒430-0911	658-1, Niitsu-cho, Naka-ku, Hamamatsu-shi, Shizuoka TEL (053)461-1094	FAX (053)461-3879
Nagoya sales office	〒464-0075	Imaike Central Building 6F B-2 3-10-17 Uchiyama, Chikusa-ku, Nagoya-shi, Aichi TEL (052)753-5605	FAX (052)753-5603
Osaka branch	〒532-0011	Third Nakajima Building 10F 5-11-10 Nishinakajima, Yodogawa-ku, Osaka-shi, Osaka TEL (06)6309-5123	FAX (06)6305-0326
Hokuriku sales office	〒930-0966	Hirota Building 1F 2-4-2 Ishigane, Toyama-shi, Toyama TEL (076)420-6573	FAX (076)420-6574
Nagano sales office	〒399-8204	2287-28 Takaya, Toyoshina, Azumino-shi, Nagano TEL (0263)71-4560	FAX (0263)71-4522
Hachinohe sales office	〒031-0822	Hachinohe Marine Hall 3F 95 Mishimashita, Shirogane-machi, Hachinohe-shi, Aomori TEL (0178)31-4170	FAX (0178)31-4180

(Technical inquiry)

Sanmei Electronics Co., Ltd.

Address: 2-2-1 Seikai, Shimizu-ku, Shizuoka-shi, Shizuoka 424-0924

TEL: (054)335-5588 FAX: (054)335-7363

E-Mail: si-cuty@sanmei-ele.co.jp

URL: http://www.sanmei-ele.co.jp

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