VC Series

<Volume : Commands>

Instructions Manual

Ver. 1.1

Nikki Denso Co., Ltd

Manual No. TIE-12950A

Preface

Thank you for buying Nikki AC servo controller.

[About this Instructions manual]

This Instruction manual contains the explanation of commands for AC servo controller <VC series>.

Refer to “Volume: Dedicated Functions” of the VC series for the installation of this controller, wiring, operations, maintenance, fault diagnosis and counter measures as well as setup & display. Further, if the contents are repeated, then “Volume: Dedicated Functions” should be referred and it supersedes the Instruction manual.

Please understand the contents of this manual thoroughly to perform the Automatic operations in an appropriate way.

This Instructions manual corresponds to machines displaying the following in the LCD diagnosis display mode.

SOFT display: “1.30” onwards

Safety precautions

Before installation, running, maintenance and inspection, please read the instruction manual and all associated manuals comprehensively and then use this unit properly.
It is advisable to have knowledge and information of this controller for the safety purpose, before using it. In this Instruction manual, the safety precautions are ranked as [Danger] and [Caution]. The precautions for handling are divided into [Prohibition] and [Compulsion], which are defined respectively as, (Actions not to be performed) and (Action to be performed).

Danger : In case of improper handling, dangerous situations such as, death or serious injury that may lead to death could occur.

Caution : In case of improper handling, dangerous situations such as, medium or light injury or mechanical damage could occur.

Further, •Caution items described under this if not followed may result in serious consequences depending on the situation.
Please strictly follow all of them.

Prohibition : **Prohibited action.**
If this precaution is ignored, the unit will not work properly.

Mandatory : **Compulsory action.**
If this precaution is ignored, the unit will not work properly.

[Precautions when using unit]

•Precaution

If command and parameter data settings are not performed properly, normal operations may not be possible and it may cause device running out of control, damage and injury etc. Please perform the settings with utmost care.

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Chapter 1 Outline

1-1 Command Outline

VC series is equipped with various types of commands for implementing automatic operation, and various applications can be performed by using these commands.

Commands are grouped as follows, depending on their functions.

Group	Name	Functional outline
0	Motion command group	This command is for execution of single operation. Program ends, after executing this command.
1	No motion command group	This command is not applicable for motor movements like timer, M output.
2	Operation command group	This command is for operation.
3	Jump command group	This jump command is for program control.
4	Dedicated command group	**Dedicated command for VC-C1.** This command is for driver control movement of speed / torque.
5	Continuous command group	This command is for movement execution. However, after this command is executed, process will continue for the next address.
6	Dedicated command group	**This command is only for the following models. VC-C1：Continuous control command Dedicated command for continuous motion. VC-C6：Free curve motion command Dedicated command for free curve control motion.**
7~9	Special specifications command group	**This command is assigned for special specifications.**

[Table1-1] Command group list

Chapter No.2 Command List

2-1 Command List

GP	BS	Title	Command Name	Functional outline	Input data
O Motion command group	No (1)	NOP	No function [No Operation]	・No motion	None
	No (2)	POS	Positioning [POSitioning]	・Executes positioning ・External trigger positioning is possible. ・General output can be sent when motion starts. ・Program ends after motion is completed	POS [Positioning location / direction] A/I [Absolute location／relative position] F [Positioning speed] UPDN [Accel. / Decel. time] TRG [External trigger position] OUT [General output]
	No (2)	HOME	Zero Return [HOME Positioning]	・Executes Zero return ・Setting Zero return method and direction is possible. ・General output is possible when motion starts. ・Finishes the program after motion is completed.	TYPE[Return method] DIR [Motion direction] OUT [General output]
	No (2)	INDX	Index positioning [INDEX Positioning]	・ Executes positioning of the rotating work to a shorter rotating direction. ・ General output is possible when motion starts. ・ Finishes the program after motion is completed.	POS [Positioning location / direction]F [Positioning speed] UPDN [Accel. / Decel. time] OUT [General output]
1 No motion command group	Ys (1)	M	M Output [M out]	・Waits for M complete signal, after sending M output	M [M output]
	No (1)	TIME	Timer [TIMEr]	・Waits for the specified time. ・General output is possible when motion starts.	TIME[Timer time] OUT [General output]
	No (2)	PEND	Program end [Program END]	・Finishes executing the program.	None
	Ys (4)	CALL	Sub-routine call [sub-routine CALL]	・Repeats subroutine in specified frequency	CADR [Call to address] REPT [Repetition]
	Ys (1)	RET	Subroutine return [sub-routine RETurn]	・Finishes called Subroutine and returns to the caller address	None
	No (1)	GSEL	Gain select [Gain SELect]	・Changes to selected motion gain (excluding the position loop gain) after the set time has elapsed.	SEL [Gain select] TIME [Gain switch over time]

[Table2-1 (a)] Command list 1/6

GP	BS	Title	Command Name	Functional outline	Input data
2 Operation command group	No (1)	I MOV	Transfer [Indirect MOVe]	・Transfers specified data to the Index data..	DST [Transfer destination] SOC [Transfer Source data]
	No (1)	ADD	Addition [ADDition]	・Executes Addition and transfers the results to the Index data.	DST [Transfer destination] SOC1 [Additional factor1] SOC2 [Additional factor 2]
	No (1)	SUB	Subtraction [SUBtraction]	・Executes Subtraction and transfers the results to Index data.	DST [Transfer destination] SOC1 [Subtraction factor1] SOC2 [Subtraction factor 2]
	No(1)	MUL	Multiplication [MULtiplcation]	・Executes Multiplication and transfers the results to Index data.	DST [Transfer destination] SOC1 [Multiplication factor 1] SOC2 [Multiplication factor 2]
	No (1)	DIV	Division [DIVision]	・Executes Division and transfers the results to Index data.	DST1 [Division remainder transfer destination] DST2 [Division quotient transfer destination] SOC1 [Dividend] SOC2 [Divisor]
	No (1)	AND	Logical AND [AND]	・Executes 'AND' and transfers the results to Index data.	DST [Transfer destination] SOC1 [Logical AND factor 1] SOC2 [Logical AND factor 2]
	No (1)	OR	Logical OR [OR]	・Executes OR and transfers the results to Index data.	DST [Transfer destination] SOC1 [Logical OR factor1] SOC2 [Logical OR factor 2]
	No (1)	XOR	Exclusive logical OR [eXclusive OR]	・Executes Exclusive OR and transfers the results to Index data.	DST [Transfer destination] SOC1[Exclusive logical OR factor 1] SOC2[Exclusive logical OR factor 2]
3 Jump command group	Ys (1)	JMP	Un-conditional jump [JuMP]	・Jumps to specified address without any condition.	JADR [Jump destination address]
	Ys (1)	JZ	0 Jump [Jump if Zero]	・If jump judgment is 0, Jump to specified address.	JADR [Jump destination address] SOC [Jumps to specified address when Branch decision is 0]
	Ys (1)	JNZ	Not 0 jump [Jump if Not Zero]	・Jumps to specified address when Branch decision is not 0.	JADR [Jump destination address] SOC [Branch condition decision data]
	Ys (1)	JG	Greater than 1 jump [Jump if Greater than zero]	・Jumps to specified address when Branch decision is 1 or more.	JADR[Jump destination address] SOC [Branch condition decision data]
	Ys (1)	JL	Less than -1 jump [Jump if Less than zero]	・Jumps to specified address when Branch decision is -1 or less.	JADR [Jump destination address] SOC [Branch condition decision data]

[Table2-1(b)] Command list 2/6

GP	BS	Title	Command Name	Functional outline	Input data
4 Driver command group	Y(1)	TRQ	Torque control [ToRQu]	・This command is dedicated command of VC-C1 ・Executes torque control in accordance with torque command selection. ・If “SEL0”is selected by torque command, motion is performed with external torque command. ・If “SEL1~3” is selected by torque command selection, motion is performed by parameters [P137~P139：torque command 1~3] ・Sends M output at motion start and completes the motion by input of M completion (MFIN). ・Complete motion performs servo lock after Decel. stop and executes next command. ・When Hold (HLD) is given as an input when executing this command, a motor decelerates and stops. ・Decel. stop at complete motion and Hold (HOLD) is performed by [P126: Decel. time 3]	TRQ [Torque command selection] M [M output]

	Ys (1)	SPD	Speed control [SPeeD]	・This command is dedicated command of VC-C1. ・Executes torque control in accordance with torque command selection. ・If “SEL0”is selected by speed command, motion is performed with external speed command. ・If “SEL1~3” is selected by speed command selection, motion is performed by parameters [P134~P136：Speed command 1~3] ・Sends M output at motion start and completes the motion by input of M completion (MFIN). ・Complete motion performs servo lock after Decel. stop and executes next command. ・When Hold (HLD) is given as an input when executing this command, a motor decelerates and stops. ・Decel. stop at complete motion and Hold (HOLD) is performed by [P126: Decel. time 3]	SPD [Speed command selection] M [M output]

[Table2-1(c)] Command list 3/6

G P	B S	Title	Command Name	Functional outline	Input data
5 Continuity command group	No (1)	SPNS	Spin speed [SPiN Speed]	・Achieves specified speed (rpm) for the set Accel. /Decel.time. ・Can send M output at Motion start and wait for M completion.	RPM [Rotational speed] TIME[Accel./ Decel.time] M [M output]
	No (1)	SPNT	Spin Timer [SPiN Timer]	・Retains speed status at Spin speed for specified time. ・Can send M output at Motion start and wait for M completion.	TIME[Retaining time] M [M output]
	Ys (1)	SPNP	Spin Positioning [SPiN Positioning]	・Executes Positioning from the state of rotations at Spin speed to a specified position for the set time. ・Can send M output at Motion start and wait for M completion.	POS [Positioning position] DOWN[Decel. time] M [M output]
	Ys (1)	SPOS	Positioning [Sequential POSitioning]	・Motion is identical to POS (Positioning) command. However the difference is that the program is continued even if the operation is completed.	POS [Positioning position/ direction] A/I [Absolute position /Relative position] F [Positioning speed] UPDN[Accel./ Decel.time] TRG [External trigger position] OUT [General output]
	Ys (2)	CONT	Simple continuous positioning [CONTinue positioning]	・When this command continues and the motion direction is unchanged, Positioning is continued without stopping. ・When this command is independent, the function is same as SPOS. ・External trigger positioning is possible. ・General output can be sent when motion starts.	POS [Positioning position ・direction] A/I [Absolute position /Relative position] F [Positioning speed] UPDN[Accel./ Decel.time] TRG [External trigger position] OUT [General output]
	Ys (3)	REPT	Repeat Positioning [REPeaT positioning]	・Repeats the specified Positioning for the set number of times. ・ External trigger positioning is possible. ・Can send M output at Motion start and wait for M completion.	POS [Positioning position /direction] A/I [Absolute position /Relative position] F [Positioning speed] UPDN[Accel./ Decel.time] TRG [External trigger position] M [M output] REPT[Looping frequency]

	Ys (1)	SHOM	Zero return [Sequential Zero positioning]	・Motion is identical to “0 HOME” (Zero return) command. However the difference is that the program is continued even if the operation is completed.	TYPE[Zero return method] DIR [Motion direction] OUT [General output]
	Ys (1)	SIND	Index positioning [Sequential IND-ex positioning]	・Motion is identical to INDX (Index Positioning) command. However the difference is that the program is continued even if the operation is completed.	POS [Positioning position/ direction] F [Positioning speed] UPDN[Accel./ Decel.time] OUT [General output]

[Table2-1(d)] Command List4/6

GP	BS	Title	Command Name	Functional outline	Input data
6 Continual control command group	No (1)	CPOS	Continual position control [Continual POSitioning]	・This command is dedicated command of VC-C1.. ・Performs Positioning. ・External trigger delayed operation is possible. ・When end condition matches during the motion, other continual control commands can be executed. ・General output can be sent when motion starts.	POS [Positioning position/ direction] A/I [Absolute position /Relative position] F [Speed] UPDN [Accel./ Decel.time] TRG [External trigger delayed distance] OUT [General output] COND[Internal end condition]
	No (1)	CTRQ	Continual torque control [Continual ToRQue]	・This command is dedicated command of VC-C1. ・Performs torque control operation is performed. ・External trigger delayed operation is possible. ・When end condition matches during the motion, other continual control commands can be executed. ・General output can be sent when motion starts.	TRQ [Torque command] F [Speed control] TRG [External trigger delayed distance] OUT [General output] COND[Internal end condition]
	No (1)	CSPD	Continual speed control [Continual SPeeD]	・This command is dedicated command of VC-C1. ・Speed control operation is performed. ・External trigger delayed operation is possible. ・When end condition matches during the motion, other continual control commands can be executed. ・General output can be sent when motion starts.	F+ - [Speed command] LIM%[Torque control] TRG [External trigger delayed distance] OUT [General output] COND[Internal end condition]
	No (1)	CEND	Continual control end [Continual END]	・This command is an exclusive command of VC-C1type. ・Ends continual control operation and performs servo lock after Decel.stop. ・General output is possible.	OUT [General output]

[Table 2-1(e)] Command List 5/6

GP	BS	Title	Command Name	Functional outline	Input data
6 Free curvilinear motion Continual Command group	Ys (1)	FCM	Free curve motion [Free Curve Motion]	・This command is an exclusive command of VC-C6 type. ・Executes a selected free curve pattern motion by synchronizing the slave axis to the master axis.	TRG [Adjustment function selection for synchronous starting position] PSEL[Motion parameter selection]
	Ys (1)	FRR	Free curve Return to standard position [Free curve Reference Return]	・This command is an exclusive command ofVC-C6 type. ・Positions the slave axis in position corresponding to the specified master axis position on a selected free curve pattern.	F [Positioning speed] PSEL[Motion parameter selection]
	Ys (1)	FMR	Free curve Return to master position [Free curve Master Return]	・This command is an exclusive command ofVC-C6 type. ・Positions the slave axis in position corresponding to the specified master axis position on a selected free curve pattern.	MPOS [Master axis position] F [Positioning speed] PSEL[Motion parameter selection]
	Ys (1)	PCLR	Free curve Pattern clear [Free curve pattern CLeaR]	・This command is an exclusive command ofVC-C6 type. ・Clears the selected free curve pattern data.	PATN [Pattern selection]
	Ys (1)	PSET	Free curve Point set [Free curve Point SET]	・This command is an exclusive command of VC-C6 type. ・Registers the slave axis position and general output at a suitable point on the specified master axis position of the selected free curve pattern.	MPOS [Master axis position] POS [Slave axis position] OUT [General output] PATN[Pattern selection]
	Ys (1)	POUT	Free curve Output set [Free curve OUT set]	・This command is an exclusive command of VC-C6 type. ・Registers the general output at a suitable point on the specified master axis position of the selected free curve pattern.	MPOS [Master axis position] OUT [General output] PATN[Pattern selection]
	Ys (1)	PCNV	Free curve Pattern convert [Free curve pattern CoNVert]	・This command is an exclusive command of VC-C6 type. ・Converts the selected free curve pattern into executable data.	PATN [Pattern selection]

[Table2-1(f)] Command List6/6

Supplement for the Command specification description

1) GP column indicates the group to which each command is affiliated at the time of editing.

2) All commands are listed under the title column.

3) The BS column indicates a block stop function at each command end.
A Block stop function executes stop motion at end of the command with a Block Stop Signal (BTSP) during Auto run.

"No (1)" neglects the Block stop signal and executes the next address command.

"No (2)" neglects the Block stop signal and executes commands till the Program end.

"Ys (1)" creates a wait condition for restarting when a command is completed.
The next address command is executed on restart.

"Ys (2)" creates a wait condition for restarting when a Continuous motion is completed and the motor stops.
The next address command for Block stop completion is executed on restart.

"Ys (3)" creates a wait condition for restarting when all Repeat positioning is completed.
The next address command is executed on restart.

"Ys (4)" creates a wait condition for restarting after calling a specified address.
The specified address command is executed on restarting and this command is continued or restarted.

Notes for common Command

Note1) Program operation is finished by any of the following command
"POS"/"ZERO"/"INDX"/"PEND"

Chapter 3 Setup

3-1 Common settings

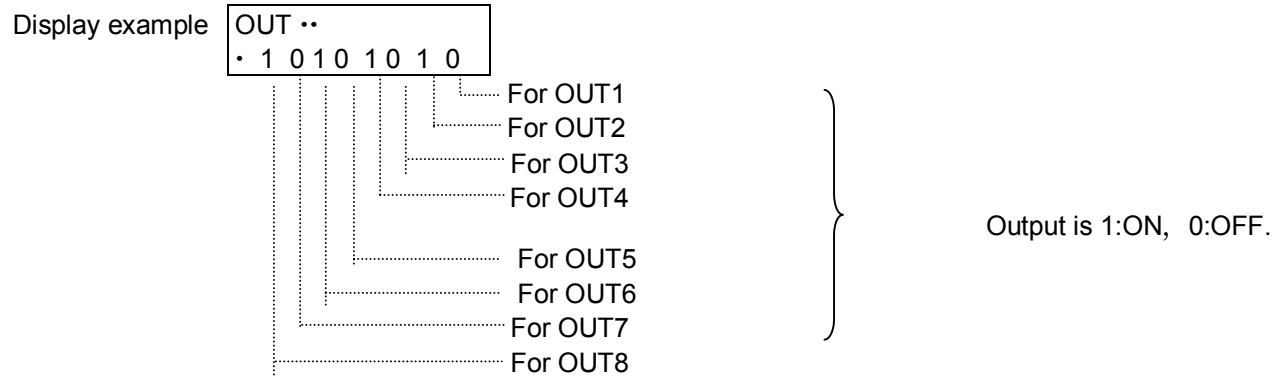
(1) Selection of Acceleration deceleration time.

Acceleration time and deceleration time is set by parameter and it is set from combinations mentioned below.

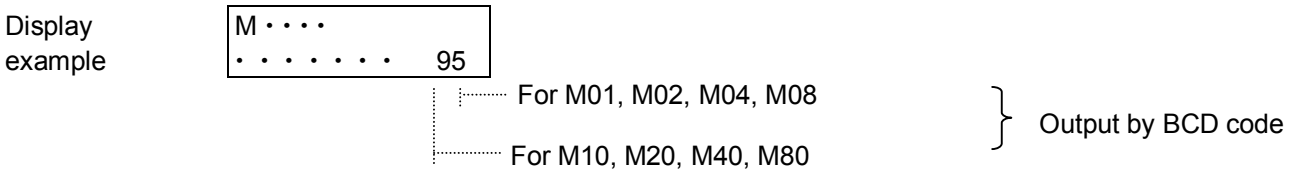
Accel./ decal. time selection	Accel./ decal. time setting（Parameter）
SEL.1	Acceleration time is set to [P211: Acceleration time 1]. Deceleration time is set to [P214:Deceleration time 1]
SEL. 2	Acceleration time is set to [P212:Acceleration time 2] Deceleration time is set to [P215:Deceleration time 2]
SEL. 3	Acceleration time is set to [P213:Acceleration time３] Deceleration time is set to [P216:Deceleration time３]

[Table3-1] Combination of acceleration/ deceleration time.

(2) General output



(3) M output



(4) Movement parameter selection

Motion parameter selection at the time of execution of free curve command group is as follows.

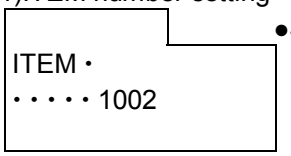
Motion parameter selection	Motion parameter setting（Parameter）
SEL. 1	Master standard position is according to [P830: Master standard position 1]. Master axis delay length at the time of startup is set to [P831: Master axis length 1 at the time of startup]. Pattern magnification denominator is set to [P832:Pattern diameter denominator1] Pattern magnification numerator number is set to [P833:Pattern diameter numerator number1] Acceleration time is set to [P211:Acceleration speed 1] Deceleration time is set to [P214:Deceleration speed1]
SEL. 2	Master standard position is set to [P835:Master standard position2] Master axis delay length at the time of startup is set to [P836:Master axis delay length 2 at the time of startup] Pattern magnification denominator is set to [P837:Pattern magnification denominator 2] Pattern magnification numerator number is set to [P838:Pattern magnification numerator 2] Acceleration time is set to [P212:Acceleration time2] Deceleration time is set to [P215:Deceleration time 2]
SEL. 3	Master standard position is set to [P840:Master standard position３] Master axis delay length at the time of startup is set to [P841:Master axis delay length３ at the time of startup] Pattern magnification denominator is set to [P842:Pattern magnification denominator３] Pattern magnification numerator number is set to [P843:Pattern magnification numerator number３] Acceleration time is set to [P213:Acceleration time ３] Deceleration time is set to [P216:Deceleration time ３]

[Table3-2] Combination of motion parameter selection (free curve motion operation)

3-2 Setting method

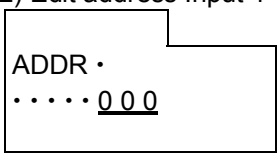
Command edit process is as follows.

(1)ITEM number setting



●Set [1002] ITEM number.
●When・key is pressed after setting, it switch over to ②

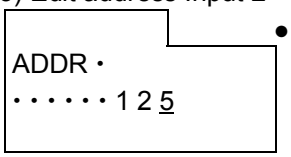
(2) Edit address Input 1



Cursor

● When・key is pressed, cursor displays and input is possible.
●When・or・key is pressed numerical value of cursor column changes.
●When・key is pressed, cursor moves.
●For canceling entered data, press・・key simultaneously.

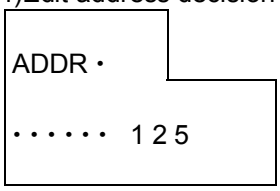
(3) Edit address Input 2



Cursor

● Enter Edit address by above mentioned operation.

(4)Edit address decision



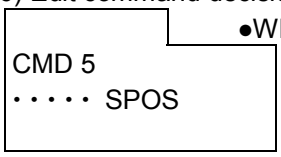
●When・key is pressed cursor disappears, and edit address can be decided.
●After the address is decided if・key is pressed it moves to⑤.

(5)Edit command selection

Cursor

● When・key is pressed, cursor displays and edit command can be selected.
● By pressing・key command group is selected.
● By pressing・or・key edit command is selected.

(6) Edit command decision



●When・key is pressed, cursor disappears and editing command is decided.
●After the command is decided, if・or・key is pressed it moves to⑦.

(7) Editing each setting of the selected command.
→ Refer to the command specifications on the following pages.
Editing (numerical input or menu selection) procedure of every setting is same as that of parameter editing.

4-1 Group 0 Command specifications

4-1-1 [NOP] No function

[Function]

- This command does not execute anything.
  (After completion of this command next step command is executed.)
- This command does not execute stop by block hold signal.
- When there is serial execution of NOP command and operation command, control of controller, control of input signal/ response of communication/ display updating get delayed.
  (Maximum 1 m sec delayed for each command)

[Setting]

- There are no settings for this command.

4-1-2 [POS] Positioning

[Function]

- This command executes positioning which includes the following functions.
  (After completion of this command, the status changes to 'Waiting to start' as per address specifications.)

  (1) Position is decided by speed F in 'POS' position according to absolute position or relative position specifications 'A / I'

  (2) Accel. / decel. time is controlled as per 'UPDN' Accel. / decel. time selection.

  (3) External trigger positioning operation is carried out in 'TRG position by inputting external trigger signal (TRG).
  - [TRG.EDGE] is selected in [P411:external trigger level selection] and when signal is input after starting execution of this command, external trigger positioning is performed from the position where input signal is received.
  - [TRG.LEVEL] is selected in [P411: external trigger level selection] and when this command is executed in 'Signal-input' status, external trigger positioning is performed from the motion start position.

  (4) When set value of 'TRG' is small and when specified Decel. is not possible as per the speed while inputting the external trigger signal, positioning is performed by sudden Decel.
  Therefore, motor movement may not be due to force of inertia and [Deviation overflow] or [Deviation error] may occur.

  (5) When hold signal (HLD) is input during movement, deceleration is stopped by 'UPDN', the status changes to 'Waiting to restart' status and Auto run ready signal (PRDY) is output.

  Positioning is started again from stop position due to restart.

  (6) When [P703: rough matching range] is attained for positioning position, rough matching signal (PRF) is output.

  (7) After positioning command completion, when position deviation pulse is reached to [P202: Completion range], positioning completion signal is output and this command ends.

  (8) Along with completion of this command, program end signal (PEND) and auto run ready signal (PRDY) is output.

  (9) Numerical value input (direct data specifications) or index data specifications are possible for each data of positioning position, speed, external trigger location and general output.

  (10) General output is output while starting the command.

  (11) This command does not execute stop by block hold signal.

(1) Title display	Setting contents		
↑ Display sequence	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details and supplement related to setting)		

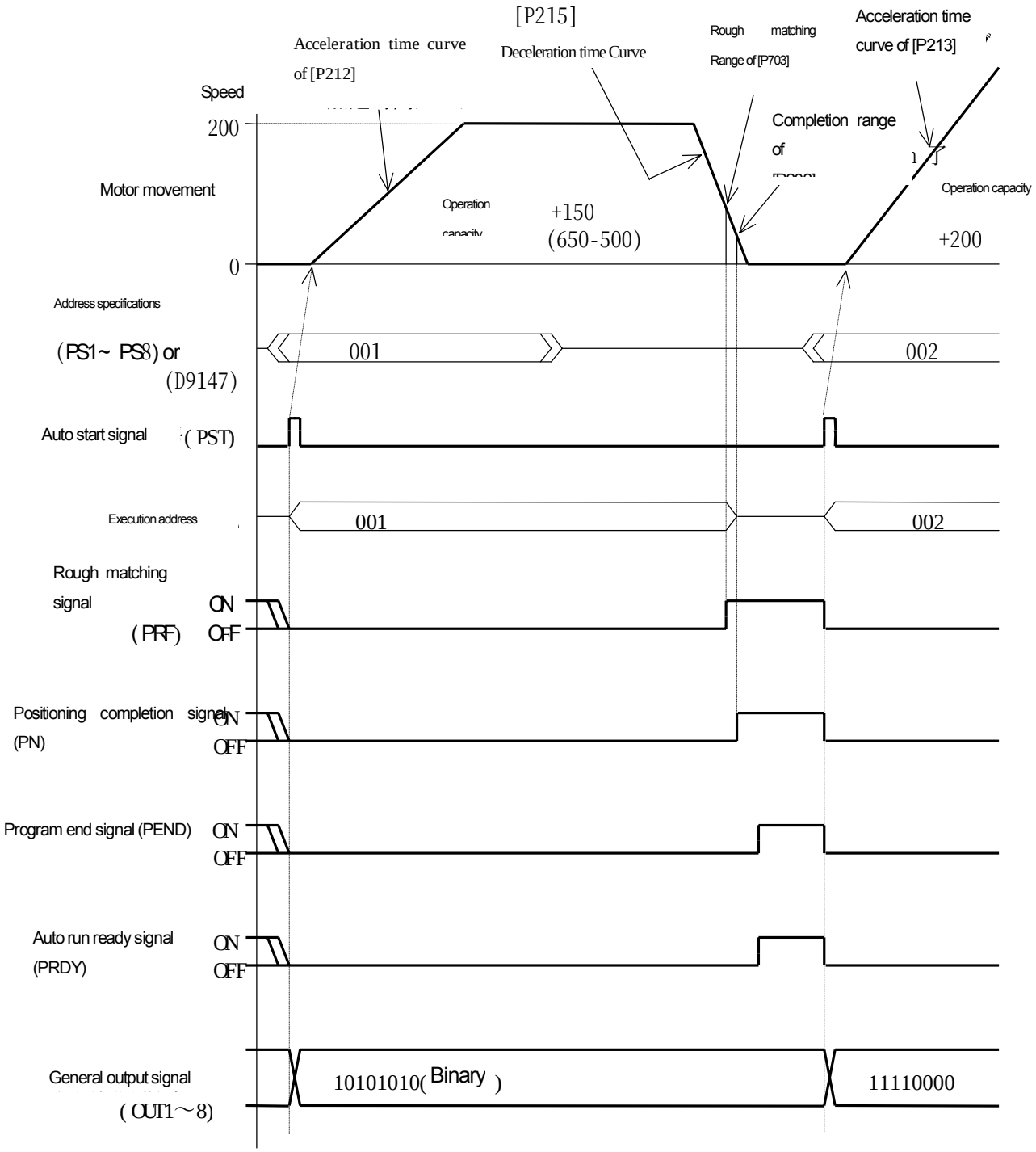
[Setting] ((Group 0: POS))

(1) POS・・	Position data and positioning direction		
	mm, °,inch	-99999999~99999999 IX00~IX99	00000000
	●Increment data: Sets positioning direction and positioning quantity of current position. (Relative position) ●Absolute data: Sets standard position and direction of position data standard. (Absolute position) ●Decimal point position of set value is as per [P302:Command unit]		
(2) A/I・・	Type of position data (Absolute position/Relative position)		
	None	ABSOLUTE/INCREMENT	INCREMENT
(3) F・・・・	Positioning speed		
	mm/s,°/s,inch/s	0000000~9999999 IX00~IX99	000000
	● Decimal point position of set value is as per [P302: Command unit] ● When set value is [0], the motor is moved at minimum set speed.		
(4) UPDN・	Accel. / decel. time selection		
	None	SEL.1/SEL.2/SEL.3	SEL.1
	Refer to [Chapter 3 Setting] for selection/setting method of Accel./ decel. time		
(5) TRG・・	External trigger position data		
	mm, °,inch	00000000~99999999 IX00~IX99	00000000
	● Decimal point position of set value is as per [P302: Command unit]. ● Positioning direction is as per [POS]. ● When set value is [0], external trigger positioning is not performed.		
(6) OUT・・	General output data		
	Binary	00000000~11111111 IX00~IX99	/00000000
	● Refer to [Chapter 3 Setting],for setting method.		

[Operation example]

((Positioning operation example_1))

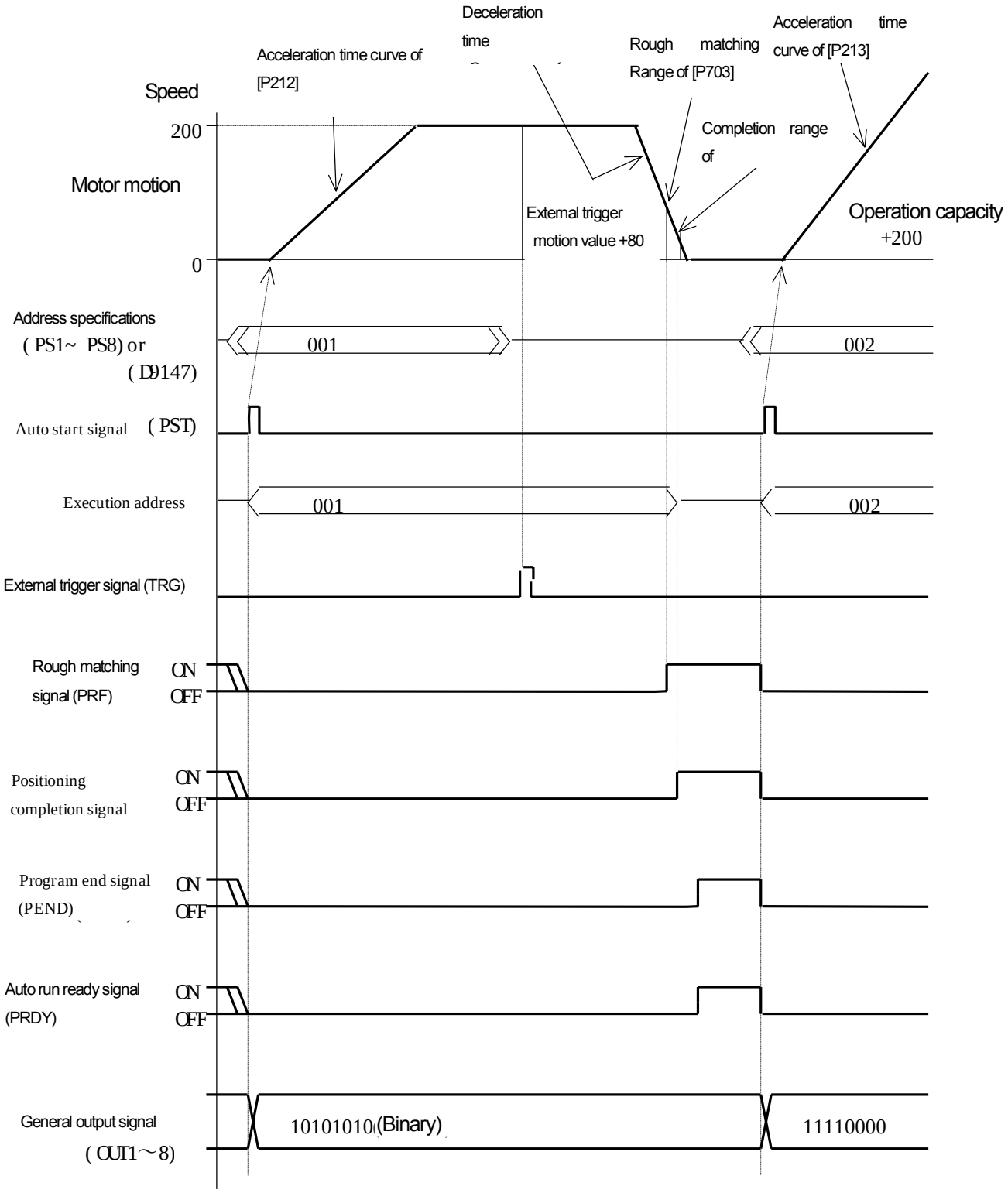
ADDR	CMD	POS	A/I	F	UPDN	TRG	OUT	Remarks
001	POS	650	ABS	200	SEL.2	0	10101010	Start position: 500
002	POS	200	INC	900	SEL.3	0	11110000	



[Operation example]

((Positioning operation example_2)) (At the time of external trigger positioning)

ADDR	CMD	POS	A/I	F	UPDN	TRG	OUT	Remarks
001	POS	650	ABS	200	SEL.2	80	10101010	Start position:500
002	POS	200	INC	900	SEL.3	0	11110000	



4-1-3 [HOME] Zero return

[Function]

- This command executes 'Zero return' operation which includes the following functions.
  (After completion of this command, the status changes to 'Waiting to start' according to the address specifications.)

(1) Excluding following points, the operations are same as in 'Zero return' mode.

(2) 'Zero return method is followed by 'TYPE' setting.

(3) Zero return method is followed by 'ＤＩＲ'Setting.

(4) When Hold signal (HLD) is input during movement, Decel. is stopped as per [P214: Decel. time 1], the status changes to 'Waiting to restart' and Auto run ready signal (PRDY) is output.
This command is executed from the beginning due to restart.

(5) When returned to starting point, rough matching signal (PRF) and positioning completion signal (PN) is output and this command is completed.

(6) Program end signal (PEND) is output along with completion of this command.

(7) Numerical value input (direct data specifications) or index data specifications are possible for general output data.

(8) General output is output When the command is started.

(9)This command does not execute stop by block hold signal.

(1) Title display	Setting contents		
↑ Display sequence	Setting unit	Setting range (Direct Data) (Index data)	Initial value
	Remarks (Details and supplement related to setting)		

[Setting] ((Group 0: HOME))

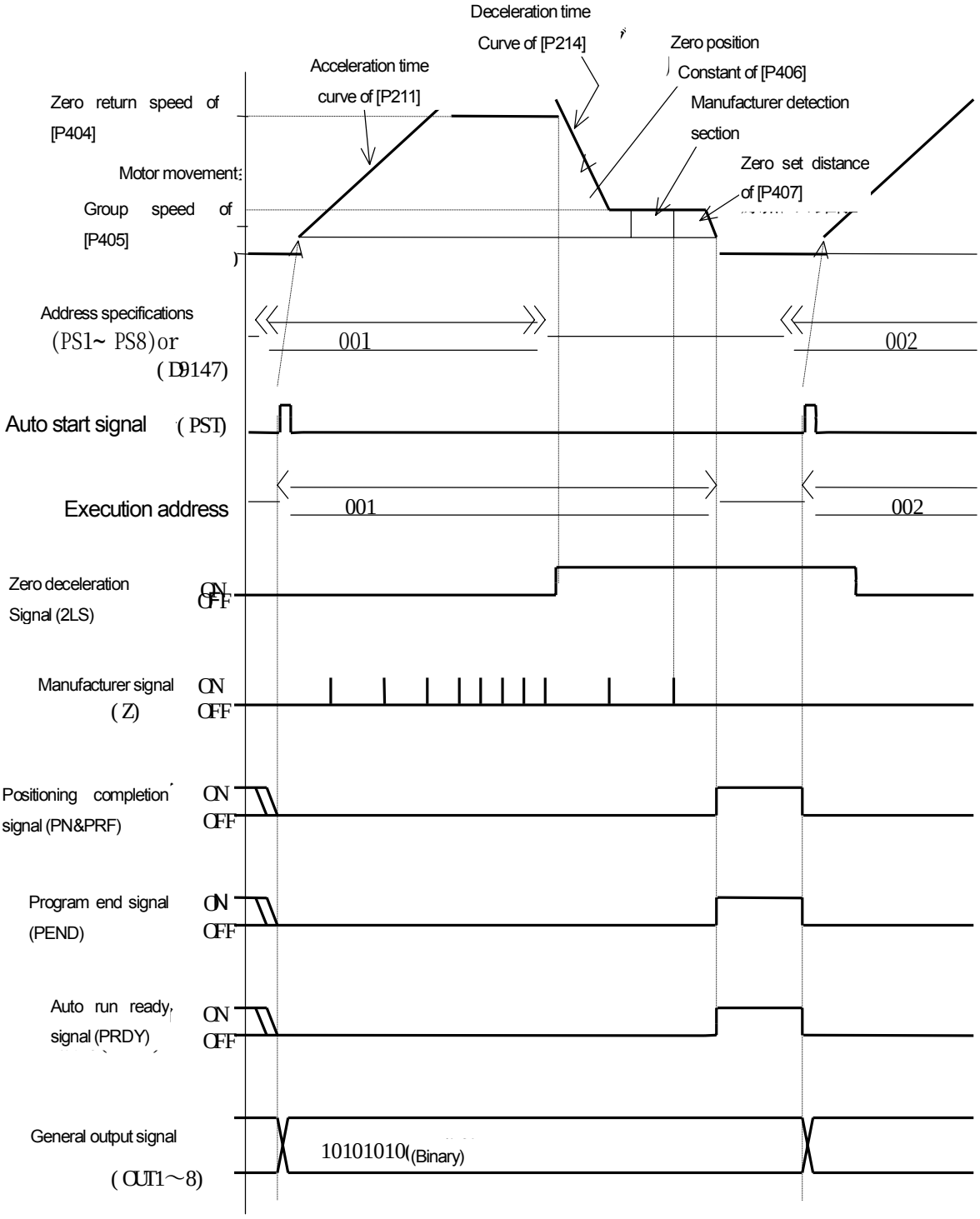
(1) TYPE	Zero return method		
	None	STD.HOME/LS LESS /STOP HOME /OT HOME	STD.HOME
	● Specifications of each method are same as [P402:Zero return method selection]		
(2) DIR・・	Zero return direction		
	None	FORWARD/REVERSE	FORWARD
	● Definition of rotation direction is same as [P300: Rotation direction selection]		
(3) OUT・・	General output data		
	Binary	00000000~11111111 IX00~IX99	/00000000
	● Refer to [Chapter 3 Setting] for setting method.		

[Operation example]

※ Refer to "Volume: dedicated model" the supplement of instruction manual for the operation example other than standard Zero return method.

((Zero return Operation example))(STD.HOME: At the time of standard Zero return)

ADDR	CMD	TYPE	DIR	OUT	Remarks
001	HOME	STD.HOME	FORWARD	10101010	
002	POS				POS command data is omitted.

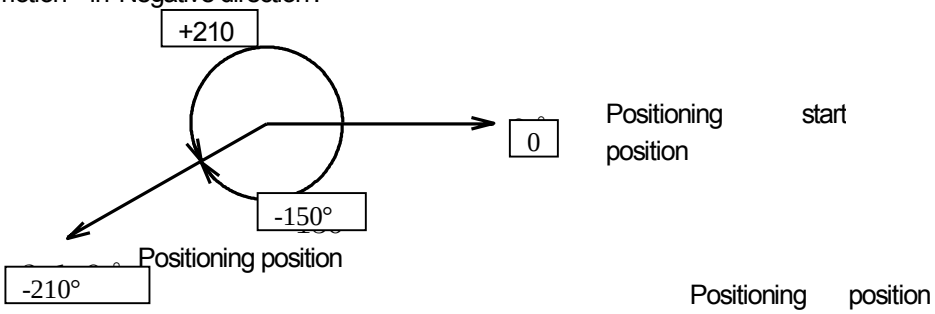


4-1-4 [INDX] Index positioning

[Function]

- This command executes index positioning for rotating machine including the following functions.
  (After completion of this command, the status changes to 'Waiting to start' as per address specifications.)

  (1) Positioning is performed by speed 'F' in absolute position 'POS', in rotating machine.
  For example, if a rotating machine rotates once in 360°, to position from 0° to 210°, it will rotate in 210° in positive direction and 150° in negative direction and exact position is obtained by small rotational motion in 'Negative direction'.



[Diagram4-1] Concept of motion index

(2) 1rotation data is set by [P305: rotation body position range].
However, setting of 1rotation data is [0] and Alarm stops when this command is executed.

(3) When the value more than [1rotation data] is set for 'POS' set value stop is performed by rotating fixed value.

(4) Accel./ decel. time is controlled along with 'UPDN' Accel./ decel. time selection.

(5) When Hold signal (HLD) is input during movement, Decel. is stopped as per 'UPDN','the status changes to 'Waiting to restart" and Auto run ready signal (PRDY) is output.
Index positioning of stop position is started again due to restart.

(6) When [P703: rough matching range] is attained for positioning position, rough matching signal (PRF) is output.

(7) After completion of positioning command, when position deviation pulse is reached to [P202: Completion range], positioning completion signal (PN) is output and this command ends.

(8) Along with completion of this command, program end signal (PEND) is output.

(9) Numerical value input (direct data specifications) or index data specifications are possible for each data of positioning position, speed and general output.

(10) General output is output when the command is started.

(11) This command does not execute stop by block hold signal.

(1) Title display	Setting contents		
↑ Display sequence	Setting unit	Setting range (Direct Data) (Index data)	Initial value
	Remarks (Details and supplement related to setting)		

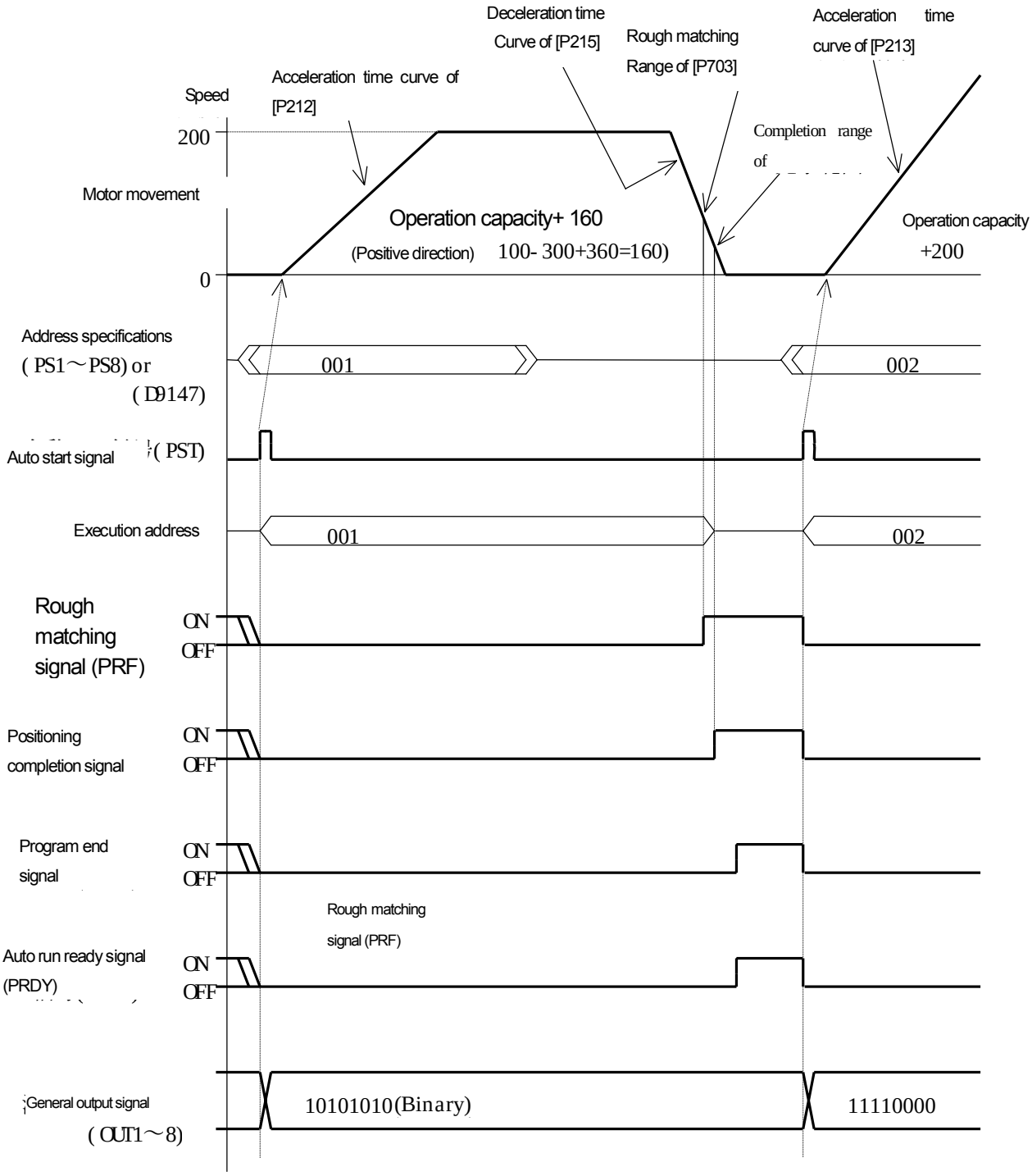
[Setting] ((Group 0: INDX))

(1) POS・・	Position data		
	mm, °,inch	00000000~99999999 IX00~IX99	00000000
	● Position data sets positioning position of rotating part form standard position data. ● Decimal point position of set value is as per [P302: Command unit].		
(2) F・・・・	Positioning speed		
	mm/s,°/s,inch/s	0000000~9999999 IX00~IX99	000000
	● Decimal point position of set value is as per [P302: Command unit]. ● When set value is [0] operation is performed at minimum set speed.		
(3) UPDN・	Accel. / decel. time selection		
	None	SEL.1/SEL.2/SEL.3	SEL.1
	● Refer to [Chapter 3 Setting], for selection/setting method of Accel. / decel. time		
(4) OUT・・	General output data		
	Binary	00000000~11111111 IX00~IX99	/00000000
	● Refer to [Chapter 3 Setting], for setting method.		

[Operation example]

((Index positioning example))

	CMD	POS	A/I	F	UPDN	TRG	OUT	Remarks
001	INDX	100	---	200	SEL.2	--------	10101010	Start position: 300
002	POS	200	INC	900	SEL.3	0	11110000	1 rotationData: 360



4-2 Group 1 Command Specifications

4-2-1 [M] M output

"Function"

● This command performs M output which includes the following function.
(After completion of this command, execute the command of next address.)

1) It controls 'data output' and 'waiting for answer input' related to external control equipments.

2) Operation of this command is shown below which is according to the output setting status of M (output / do not output).

▪ Output is of M output signal (M00~M99) & M strobe signal (MSTB) and M completion signal is awaited (MFIN).
With the input of M completion signal output of M strobe signal is set to OFF and this command is completed.
▪This command is completed.

3) M output signal is output with 2 digit BCD code (00~99).

4) Once there is output of M output signal then the M output signal maintains data till the next M output executes the command for valid setting condition.

5) On input of hold signal (HLD), when M completion signal (MFIN) is awaiting, restart awaiting condition occurs with maintenance of M output signal data and there is output of auto run ready signal (PRDY).
At restart, input awaiting resumes for M finish signal (MFIN).

6) On input of M completion signal (MFIN) when restart is temporarily is on hold, output of M strobe signal is set to OFF.
Restart ends this command.

7) With input M completion signal, if this command is executed, then there is no output M strobe signal till the input of M completion signal is set to OFF.

8) For M output data, numerical input (direct data specification) or index data specification is possible.

9) By executing this command, if block stop signal (BSTP) is turned ON, it moves to 'waiting for restart' status and auto operation ready signal is output (PRDY).
Next address command is executed by restart.

1) Title display	Setting contents		
↑ Display order	Setting unit	Setting range(Direct data) (Index data)	Initial value
	Note (Detailed/ supplementary explanation related to settings)		

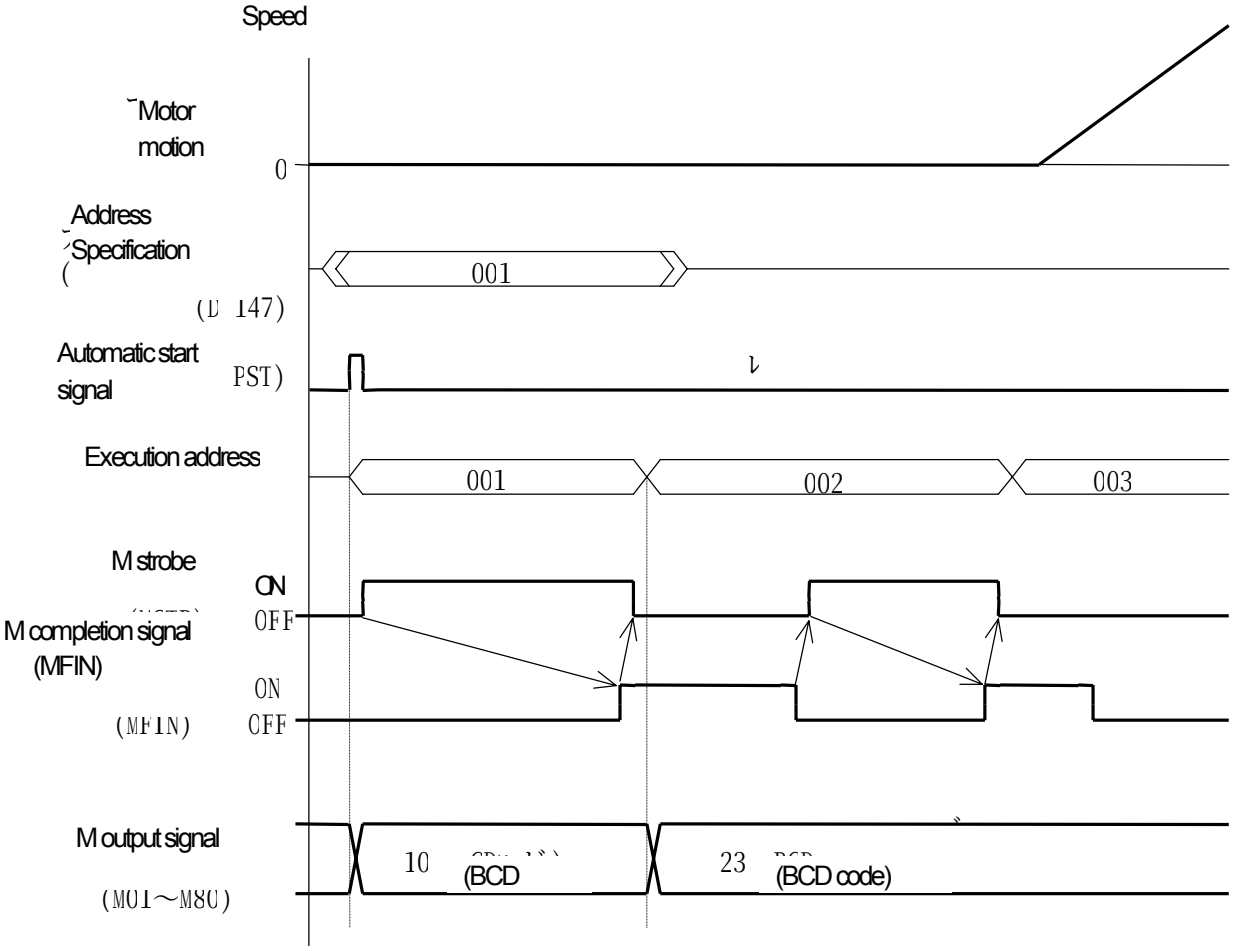
[Index Settings] (Group1: M)

1) M…	M output data		
	BCD 2 digits	00~99 IX00~IX99	/00
	●For setting methods, refer to “Chapter No.3 Settings”		

“Operation Example”

{{M output operation example}}

ADDR	CMD	M				Note
001	M	10				
002	M	23				
003	POS					Data of POS command is omitted.



4-2-2 [TIME] Timer

"Function"

●This command performs the timer control which includes the following function.
(After completion of this command, execute the command of next address.)

1) This command ends, after the time set 'TIME' has elapsed from start.

2) By executing this command, when hold signal (HLD) is input it moves to waiting for restart status. However, even in this status as elapsed time is counted, while restarting if there is timeout this command ends immediately.

3) All the data of time and general output, numeric input (Direct data specification) or index data specification is possible.

4) General output is output while starting the execution of command.

5) While executing this command if the block stop signal (BSTP) is turned ON, program operations are stopped when this command is completed. Further, it moves to 'waiting for restart' status and auto run ready signal (PRDY) is output.
Next address command is executed by restart.

1)Title display	Setting contents		
↑ Display order	Setting unit	Setting range(Direct data) (Index data)	Initial value
	Note (Detailed / supplementary explanation related to settings)		

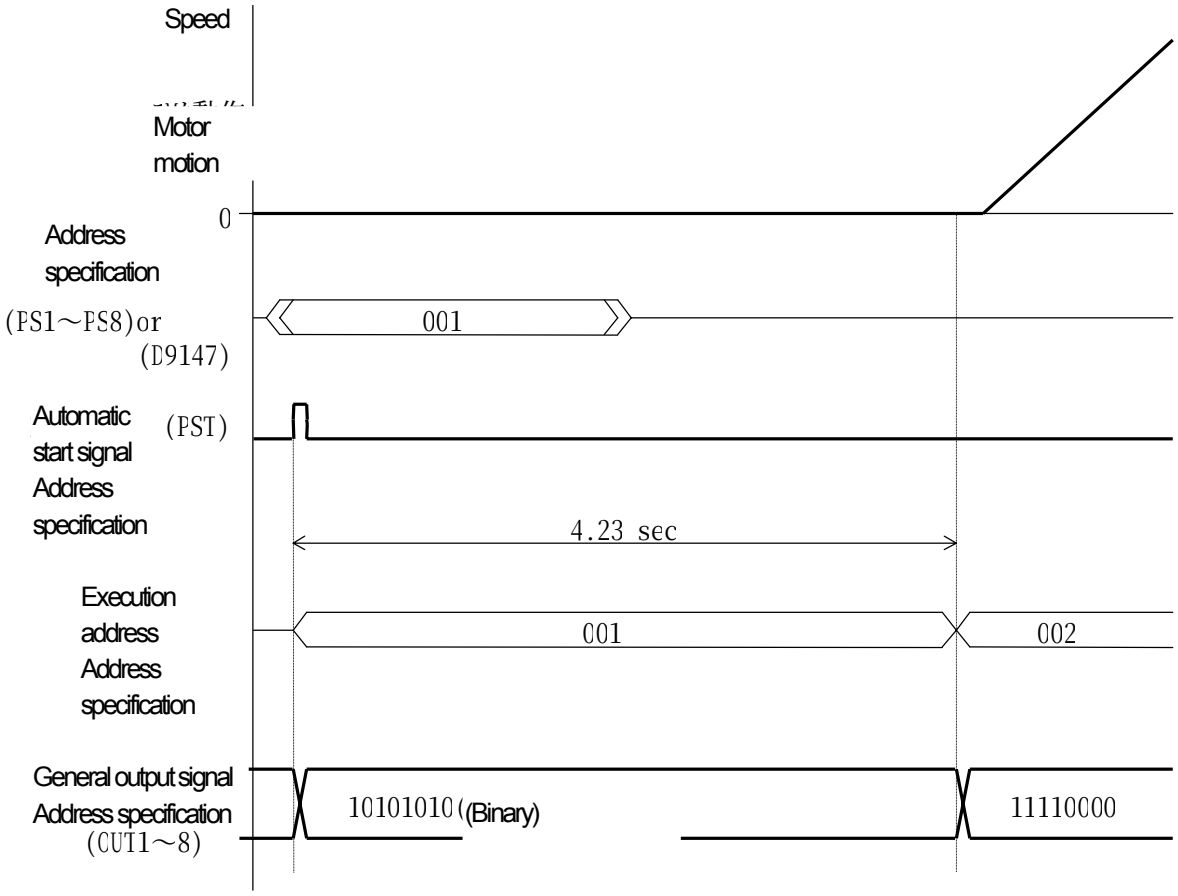
[Settings] [Group 1: TIME]

1) TIME	Timer time		
	0.01 sec	000000.00~999999.99 IX00~IX99	00000000
	●Timer time sets the time from starting of this command till the starting of next command.		
2) OUT	General output data		
	Binary	00000000~11111111 IX00~IX99	/00000000
	●For setting method , refer to "Chapter No.3 settings"		

“Operation Example”

{{Timer operation example}}

ADDR	CMD	TIME	OUT		Remarks
001	TIME	4.23	10101010		
002	POS	----	11110000		Data except OUT is omitted



4-2-3 [PEND] Program End

"Function"

●This command controls the end of program operations, which includes following function.
(After completion of this command it moves to 'waiting for restart' status as per address specifications.)

1) By executing this command the program operations end and this command is completed.

2) With the end of this command program end signal (PEND) auto run ready signal (PRDY) are output.

3) Output status of general output signal (OUT1~8) & M output signal (M01~80) is maintained.

4) Motor is in servo lock status.

5) This command is not stopped by block stop signal.

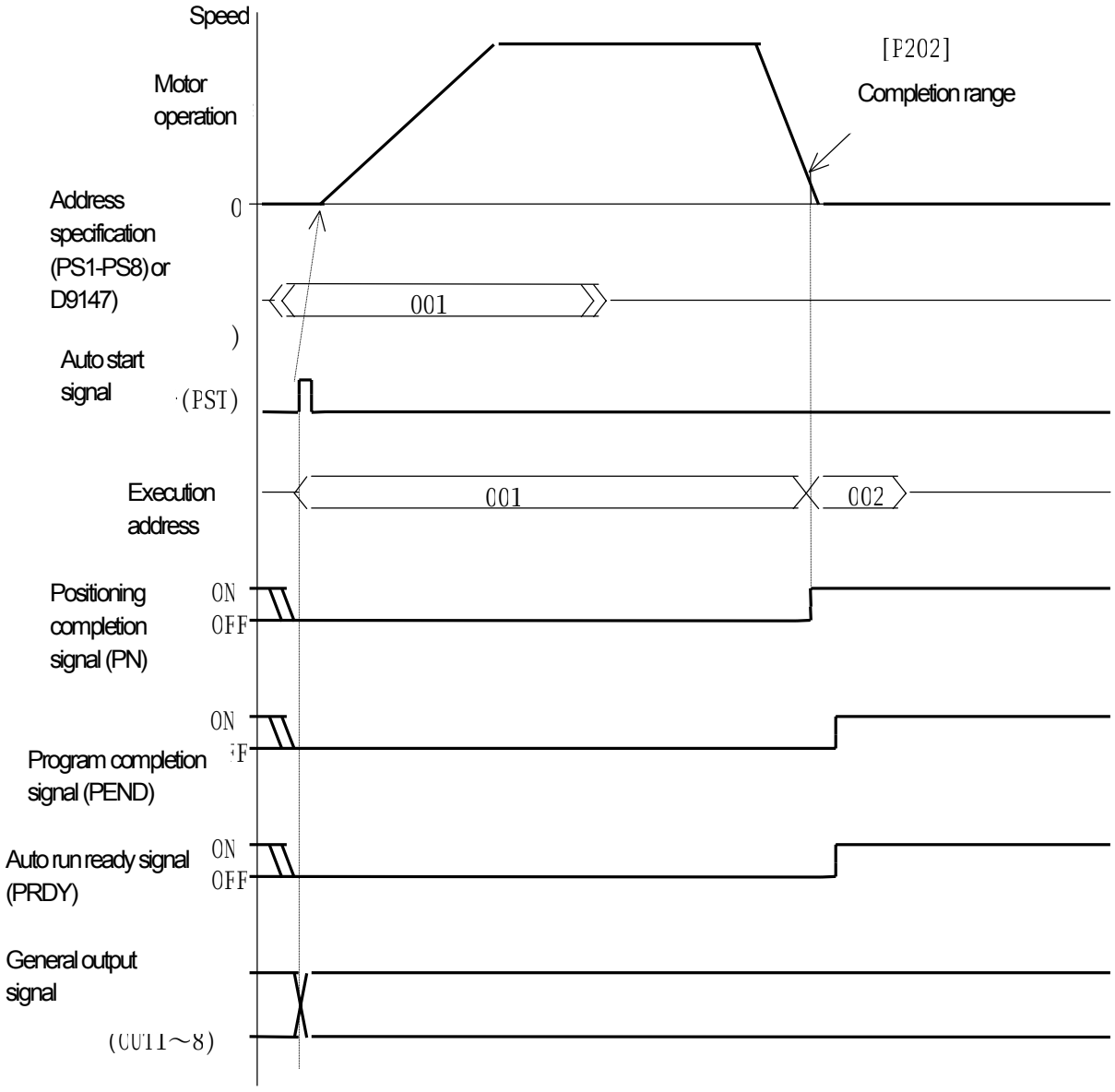
"Settings"

● This command does not include setting items.

“Operation Example”

“Program end operation example”

ADDR	CMD					Note
001	SPOS					Data of SPOS command is omitted.
002	PEND					



4-2-4 [CALL] Subroutine call

"Function"

●This command controls subroutine / call, which includes the following functions.
(After completion of this command, execute the command of next address.)

1) By executing this command, the looping time is executed as set in 'REPT' from the command set in 'call to' address 'CADR' till subroutine return command [RET].

2) Nesting (Looping time of executing this command without return) is possible for maximum 8 times.

3) When this command is executed with more than 280 'call to' addresses, auto run is stopped by giving alarm.

4) For all the data of 'call to' address and looping time, numerical input (Direct data specification) or index data specifications are possible.

5) While executing this command, if the block stop signal (BSTP) is turned ON, the program operations stops after the specified address is called. Further, it moves to 'waiting for restart' status and auto run ready signal (PRDY) is output.
Command of specified address is executed by restart and continued and restarted.

1) Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Note (Detailed/ supplementary explanation related to settings)		

[Setting] [Group 1: CALL]

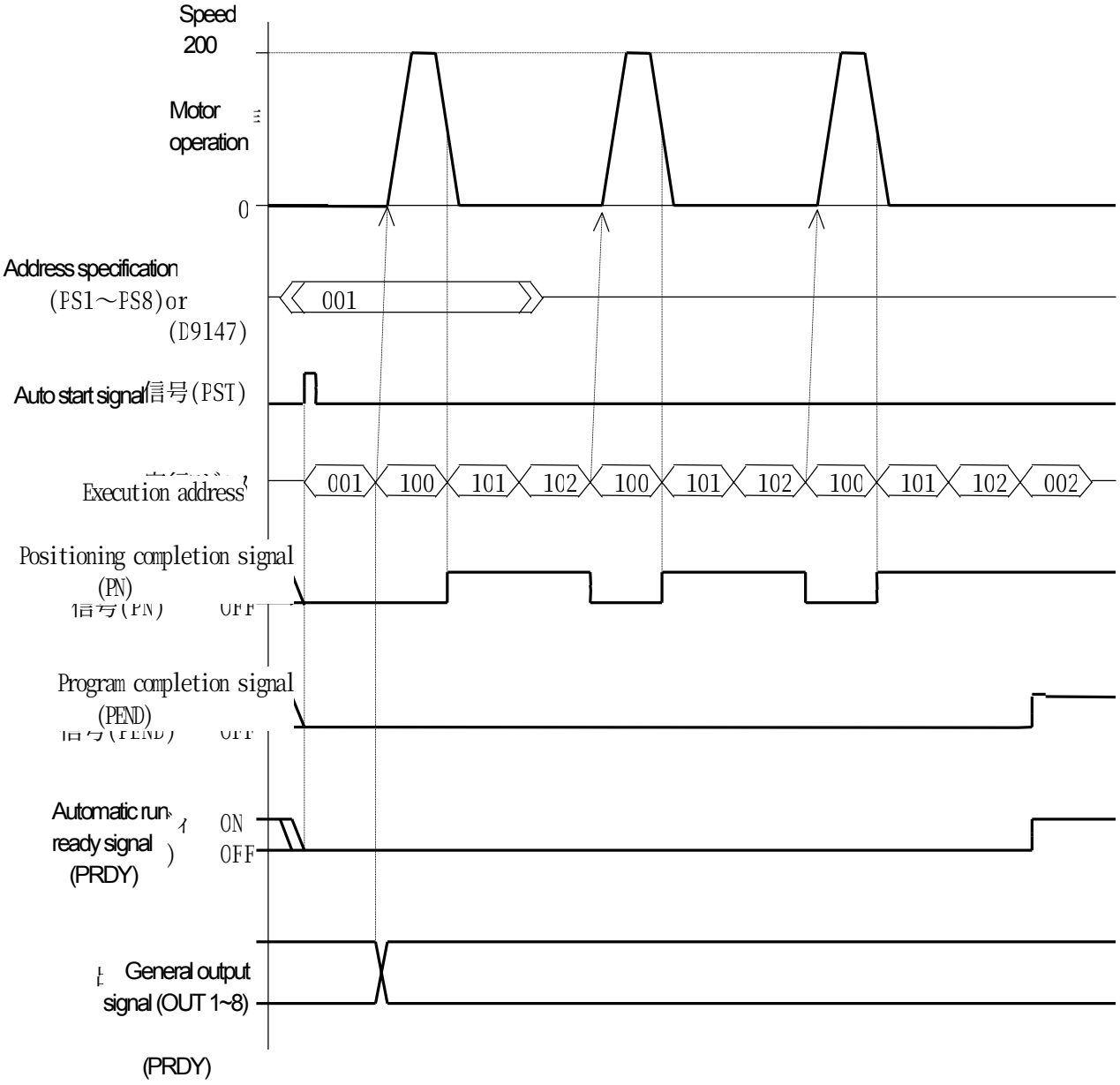
1) CADR	Call to address		
	None	000~279 IX00~IX99	000
2) REPT	Looping time		
	None	00000~65535 IX00~IX99	00000
	●It the setting value is [0], this command is ignored and command of next address is executed.		

"Operation Example"

"Subroutine call operation example"

ADDR	CMD	CADR	REPT		Remarks
001	CALL	100	3		
002	PEND	----	----		
100	SPOS				The data of SPOS command is omitted.
101	ADD				The data of ADD command is omitted.
102	RET	----	----		

※ Example of repeating address "100~102" for 3 times.



4-2-5 [RET] Subroutine return

"Function"

●This command includes the following functions.

1) By executing this command, after the end of called subroutine, the execution address is jumped to 'call to' address.
When subroutine is executed for specified number of times, execution address is jumped to the next address of CALL command.

2) While executing this command, if block stop signal (BSTP) is turned ON. Further, it moves to 'waiting for restart' status and auto run ready signal (PRDY) is output.
'Call to' address "or "Next address of CALL command' is executed by restart.

3) When this command is executed for other than subroutine, it stops by giving alarm.

- Refer to [CALL] for related command.

"Settings"

- This command does not include setting items.

4-2-6 [GSEL] Gain Selection

"Function"

●This command selects the operation gain.
(After completion this command, execute the command of next address.)

1) By execution of this command, after the set time is elapsed, it changes to selected operation gain (Excluding location loop gain).

2) This command is not stopped by block stop signal.

3) Operation gain specified by this command is invalid in "When program ends (PEND)", "In case of RST/PCAN", "When alarm rings", "Other than auto run mode" and it is as per GSEL input signal.

"Settings"

1) Title display	Settings contents		
↑ Display order	Setting unit	Settings range (Direct data) (Index data)	Initial value
	Note (Detailed / supplementary explanation related to settings)		

"Settings" [Group 1: GSEL]

1) SEL	Gain selection		
	None	SEL/ON/OFF	SEL
	● Gain is selected. SEL: As per GSEL input signal. ON: GSEL input signal is operated for ON status. OFF: GSEL input signal is operated for OFF status.		
2) TIME.	Timer time		
	0.001 sec	00000.000~99999.999 IX00~IX99	00000.000
	● Timer time is set for changing to gain after starting this command.		

“Operation Example”

“Gain selection operation example_1” (GSEL ON status)

ADDR	CMD	SEL		TIME		Remarks
001	GSEL	ON		0.010		

● By executing this command operation gain is set to GSEL ON status (P111~115) after the command start up 10ms.

“Gain selection operation example_2” (GSEL OFF status)

ADDR	CMD	SEL		TIME		Remarks
001	GSEL	OFF		IX99		

●By executing this command, operation gain is set to GSEL OFF status (P101~110) after the time laps set in IX99 from command start.

“Gain selection operation example_3” (Input signal selection status)

ADDR	CMD	SEL		TIME		Remarks
001	GSEL	SEL		0.000		

●By executing this command, operation gain is as per GSEL input signal after starting the command.

4-3 Group2 command specification

4-3-1 [IMOV] Transfer

"Functions"

●This command transfers the data to index data, which includes the following functions.
(After completion of this command, executes next address command.)

① By executing this command, contents of number (direct) data and index data are transferred to any index data.

②This command is not stopped by block stop signal.

● If NOP command and calculation command are continuously executed, responses like control of input signal/ reply to communication/ /update of display on the control of the controller are delayed.
(Maximum delay of 1 msec per command.)

① Title display	Setting contents		
↑ Display order	Settings unit	Settings range(direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to settings)		

[Settings] <<Group 2:IMOV>>

(1) DST・・	Transfer destination Index data number		
	None	IX00~IX99	IX00
(2) SOC・・	Transfer origin data		
	None	-99999999~99999999 IX00~IX99	00000000

"Operation example"

<<Data transfer operation example_1>>(Index data ← Numeric data)

ADDR	CMD	DST		SOC		Remarks
001	IMOV	IX70		-00002345		

● On executing this command contents of index data [IX70] are changed to [-2345] .

<<Data transfer operation example_2>> (Index data ← Index data)

ADDR	CMD	DST		SOC		Remarks
001	IMOV	IX70		IX00		

● On executing this command contents of index data [IX70] are changed same as contents of "IX00" .

For example, when index data [IX00] is 123.98, index data [IX70] is also123.98.

4-3-2 [ADD] Addition

"Function"

● This command performs addition, which includes following functions.
(After completion of this command, executes command of next address.)

① By executing this command, result after performing addition is transferred to any index data.

②Combinations of additions are as given below.

Operation result	Addition factor1	Addition factor2
Index data ←	Numeric data	+ Numeric data
Index data ←	Numeric data	+ Index data
Index data ←	Index data	+ Numeric data
Index data ←	Index data	+ Index data

[←] indicates transfer of operation result.

③Decimal point of index data is ignored, and treated as an integer.
(Example: If index data are 1.25, it is treated as 125.)

④ Addition result is as follows when setting range of index data exceeds.
- When less than –99999999, it is assumed as –99999999.
- When greater than 99999999, it is assumed as 99999999.

⑤This command is not stopped by block stop signal.

● If NOP command and calculation command are continuously executed, responses like control of input signal/ reply to communication/ /update of display on the control of the controller are delayed.
(Maximum delay of 1 msec per command.)

① Title display	Setting contents		
↑ Display order	Setting unit	Settings range(direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to settings)		

[Settings] <<Group2: ADD>>

① DST・・	Addition result transmission destination Index data number		
	None	IX00~IX99	IX00
②SOC1・・	Addition factor 1		
	None	-99999999~99999999 IX00~IX99	00000000
③ SOC2・	Addition factor 2		
	None`	-99999999~99999999 IX00~IX99	00000000

"Operation example"

<<Data addition operation example_1>>(Index data ← Numeric data + Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	ADD	IX70		00002345	00012000	

● By executing this command, the contents of the index data "IX70" are changed to "14345", the result of "2345+12000"

<<Data addition operation example_2>>(Index data ← Index data + Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	ADD	IX70		IX00	00012000	

● By executing this command, the contents of index data "IX70" is changed by adding "12000" in the contents of "IX00"
For example if the index data [IX00] is 329.00, the index data [IX70] is changed to [44900], the result of [32900+12000].

4-3-3 [SUB] Subtraction

"Function"

●This command performs subtraction, which includes the following functions.
(After completion of this command, executes next address command.)

① By executing this command, result after performing subtraction is transferred to any index data.

②Combinations of subtractions are as given below.

Subtraction result		Subtraction factor1		Subtraction factor2
Index data	←	Numeric data	-	Numeric data
Index data	←	Numeric data	-	Indirect data
Index data	←	Index data	-	Numeric data
Index data	←	Index data	-	Index data

[←] indicates transfer of calculation result.

③Decimal point of index data is ignored, and treated as an integer.
(Example: If index data are 1.25, it is treated as 125.)

④ Addition result is as follows when setting range of index data exceeds.
- When less than –99999999, it is assumed as –99999999.
- When greater than 99999999, it is assumed as 99999999.

⑤This command is not stopped by block stop function.

- If NOP command and calculation command are continuously executed, responses like control of input signal/ reply to communication/ /update of display on the control of the controller are delayed.
(Maximum delay of 1 msec per command.)

① Title display	Settings contents		
↑ Display order	Settings unit	Settings range(direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to settings)		

[Settings] <<Group2: SUB>>

(1) DST･･	Subtraction result transfer destination Index data number		
	None	IX00~IX99	IX00
(2) SOC1･	Subtraction factor 1		
	None	-99999999~99999999 IX00~IX99	00000000
(3) SOC2･	Subtraction factor 2		
	None	-99999999~99999999 IX00~IX99	00000000

"Operation example"

<<Data subtraction operation example_1>>(Index data ← Numeric data -Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	SUB	IX70		00012345	00012000	

● By executing this command, the contents of index data [IX70] are changed to [345], the result of [12345-12000].

<<Data subtraction operation example_2>> (Index data ← Index data - Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	SUB	IX70		IX00	00012000	

●By executing this command, the contents of index data "IX70" are changed by subtracting "12000" from the contents of "IX00".
For example if the index data [IX00] is 329.00, the index data [IX70] is changed to [20900], the result of [32900-12000].

4-3-4 [MUL] Multiplication

"Function"

● This command performs multiplication, which includes the following function.
(After completion of this command, executes next address command.)

① By executing this command, result after performing multiplication is transferred to any index data.

②Combinations of multiplication operation are as given below.

Operation result	Multiplication factor1		Multiplication factor2
Index data ←	Numeric data	×	Numeric data
Index data ←	Numeric data	×	Indirect data
Index data ←	Index data	×	Numeric data
Index data ←	Index data	×	Index data

[←] indicates transfer of calculation result.

③Decimal point of index data is ignored, and treated as an integer.
(Example: Example: If index data are 1.25, it is treated as 125.)

④ Multiplication result is as follows when setting range of index data exceeds.
- When less than –99999999, it is assumed to be –99999999.
- When more than 99999999, it is assumed to be 99999999.

⑤This command is not stopped by block stop function.

● If NOP command and calculation command are continuously executed, responses like control of input signal/ reply to communication/ /update of display on the control of the controller are delayed.
(Maximum delay of 1 msec per command.)

① Title display	Settings contents		
↑ Display order	Settings unit	Settings range(direct data) (Index data)	Initial value
	Remarks(Details/ supplementary explanation about settings)		

[Settings] <<Group2: MUL>>

(1) DST▪▪	Multiplication result transfer destination Index data number		
	None	IX00~IX99	IX00
(2) SOC1▪	Multiplication factor 1		
	None	-99999999~99999999 IX00~IX99	00000000
(3) SOC2▪	Multiplication factor 2		
	None	-99999999~99999999 IX00~IX99	00000000

"Operation example"

<<Data multiplication operation example_1>> (Index data ←Numeric data ×Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	MUL	IX70		00012000	00000020	

● By executing this command, the contents of Index data [IX70] are changed to [240000], the result of [12000×20].

<<Data multiplication Operation example_2>> (Index data ← Index data X Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	MUL	IX70		IX00	00012000	

● By executing this command, the contents of index data "IX70" is changed by multiplying the contents of "IX00"with"12000".
For example if the index data [IX00] are 3.00, the index data [IX70] is changed to [3600000], the result of [300X12000].

4-3-5 [DIV] Division

"Function"

●This command executes division, which includes the following function.
(After completion of this command, executes next address command.)

① By executing this command, result (Quotient and remainder) after performing division is transferred index data.

②Combinations of divisions are as given below.

Remainder	Quotient	Dividend	Divisor
Index data	Index data ← Numeric data	÷	Numeric data
Index data	Index data← Numeric value	÷	Index data
Index data	Index data ← Index data	÷	Numeric data
Index data	Index data ← Index data	÷	Index data

[←] indicates transfer of calculation result.

③ Decimal point of Index data is ignored, and treated as an integer.
(Example: Example: If index data are 1.25, it is treated as 125.)

④If command is executed by divisor [0], auto run is stopped by giving alarm.

⑤This command is not stopped by block stop signal.

● If NOP command and calculation command are continuously executed, responses like control of input signal/ reply to communication/ /update of display on the control of the controller are delayed.
(Maximum delay of 1 msec per command.)

① Title display	Settings contents		
↑ Display order	Settings unit	Settings range (direct data) (Index data)	Initial value.
	Remarks (Details/supplementary explanation about settings.)		

[Settings] <<Group2:DIV>>

(1) DST1▪	Division remainder transfer destination Index data number		
	None	IX00~IX99	IX00
(2) DST2▪	Division quotient transfer destination Index data number		
	None	IX00~IX99	IX00
(3) SOC1▪	Dividend		
	None	-99999999~99999999 IX00~IX99	00000000
(4) SOC2▪	Divisor		
	None	-99999999~99999999 IX00~IX99	00000000

"Operation example"

<<Data division operation example_1>>(Index data Index data ← Numeric data ÷ Numeric data)

(Remainder) (Quotient) (Dividend) (Divisor)

ADDR	CMD	DST1	DST2	SOC1	SOC2	Remarks
001	DIV	IX70	IX71	00012005	00000020	

● By executing this command, contents of index data [IX70] is changed to remainder [5] the result of [12005÷20], and contents of index data [IX71] is changed to quotient [600] the result of [12005÷20].

<<Data division operation example_2>>(Index data Index data ← Index data ÷ Numeric data)

(Remainder) (Quotient) (Dividend) (Divisor)

ADDR	CMD	DST1	DST2	SOC1	SOC2	Remarks
001	DIV	IX70	IX71	IX00	00000400	

● By executing this command, contents of index data "IX00" is changed by dividing the contents of "IX70" by "400" For example, it index data "IX00" is 1201.23, index data "IX70" is changed to "123" remainder of "120123÷400" and index data "IX71" is "300" a quotient of this division.

4-3-6 [AND] Logical AND

"Function"

●This command performs AND, which includes following functions.
(After completion of this command, executes next address command.)

① By executing this command, result after performing AND is transferred to any index data.

②Combinations of logical AND are given below.

Operation result	Logical AND factor 1	Logical AND factor 2
Index data ←	Numeric data AND	Numeric data
Index data ←	Numeric data AND	Indirect data
Index data ←	Index data AND	Numeric data
Index data ←	Index data AND	Index data

[←] indicates transfer of calculation result.

③ Decimal point index data is calculated by converting it to binary.
(Example: If numeric data is 128, it is calculated as binary 10000000.)

④ Decimal point of index data is ignored, and calculated by changing the integers of decimal points in to binary.
(Example: if contents of Index data are 1.29, it is calculated as binary10000001.)

⑤This command is not stopped by block stop signal.

● If NOP command and calculation command are continuously executed, responses like control of input signal/ reply to communication/ /update of display on the control of the controller are delayed.
(Maximum delay of 1 msec per command.)

①Title display	Settings contents		
↑ Display order	Settings unit	Settings range (Direct data) (Index data)	Initial value
	Remarks (Details/ supplementary explanation about settings)		

[Settings] <<Goup2: AND>>

(1) DST	Process result transfer destination Index data number		
	None	IX00~IX99	IX00
(2) SOC1▪	Logical AND factor 1		
	None	-99999999~99999999 IX00~IX99	00000000
(3) SOC2▪	Logical AND factor 2		
	None	-99999999~99999999 IX00~IX99	00000000

"Operation example"

<<Logical product Operation example_1>> (Index data ← Numeric data AND Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	AND	IX70		00000005	00000006	

● By executing this command, contents of index data [IX70] are changed to [4(0100)] result of [5(0101) AND 6(0110)].

<<Logical product Operation example_2>> (Index data ← Index data AND Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	AND	IX70		IX00	00000020	

● By executing this command, contents of index data "IX70" are changed by performing AND with "20(10100)" for the contents of "IX00". For example, when index data "IX00" is 0.07, the index data "IX70" is changed to"4(00100)", the result of "7(00111) AND 20(10100)"

4-3-7 [OR] Logical OR

"Function"

●This command performs OR , which includes following functions.
(After completion of this command, executes next address command.)

① By executing this command, result after performing OR is transferred to any index data.

②Combinations of logic OR are given below.

Operation result		Logical OR factor 1	Logical OR factor 2
Index data	←	Numeric data OR	Numeric data
Index data	←	Numeric data OR	Index data
Index data	←	Index data OR	Numeric data
Index data	←	Index data OR	Index data

[←] indicates transfer of calculation result.

③ Decimal point index data is calculated by converting it to binary.
(Example: If numeric data is 128, it is calculated as binary 10000000.)

④ Decimal point of index data is ignored, and calculated by changing the integers of decimal points in to binary.
(Example: if contents of Index data are 1.29, it is calculated as binary10000001.)

⑤This command is not stopped by block stop signal.

● If NOP command and calculation command are continuously executed, responses like control of input signal/ reply to communication/ /update of display on the control of the controller are delayed.
(Maximum delay of 1 msec per command.)

① Title display	Settings contents		
↑ Display order	Settings unit	Settings range (Direct data) (Index data)	Initial value
	Remarks (Details and supplement related to settings)		

[Settings] <<group2: OR>>

(1) DST	Process result transfer destination Index data number		
	None	IX00~IX99	IX00
(2) SOC1▪	Logical OR factor 1		
	None	-99999999~99999999 IX00~IX99	00000000
(3) SOC2▪	Logical OR factor2		
	None	-99999999~99999999 IX00~IX99	00000000

"Operation example"

<<Logical sum Operation example_1>>(Index data ← Numeric data OR Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	OR	IX70		00000005	00000006	

● By executing this command, contents of Index data [IX70] is [7(0111)] result of [5(0101) OR 6(0110)].

<<logical sum Operation example_2>> (Index data ← Index data OR Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	OR	IX70		IX00	00000020	

● By executing this command, contents of index data "IX70" are changed by performing "OR" with "20(10100)" for the contents of "IX00".For example, when index data "IX00" is 0.07, the index data "IX70" is changed to "23(10111)", the result of "7(00111) OR 20(10100))"

4-3-8 [XOR] Exclusive logical OR

"Function"

●This command performs exclusive OR , which includes following functions.
(After completion of this command, executes next address command.)

① By executing this command, result after performing XOR is transferred to any index data.

②Combinations of exclusive logical OR operation is given below.

Operation result		Exclusive logical OR factor 1		Exclusive logical OR factor 2
Index data	←	Numeric data	XOR	Numeric data
Index data	←	Numeric data	XOR	Index data
Index data	←	Index data	XOR	Numeric data
Index data	←	Index data	XOR	Index data

[←] indicates transfer of calculation result.

③ Decimal point index data is calculated by converting it to binary.
(Example: If numeric data is 128, it is calculated as binary 10000000.)

④ Decimal point of index data is ignored, and calculated by changing the integers of decimal points in to binary.
(Example: if contents of Index data are 1.29, it is calculated as binary10000001.)

⑤This command is not stopped by block stop signal.

● If NOP command and calculation command are continuously executed, responses like control of input signal/ reply to communication/ /update of display on the control of the controller are delayed.
(Maximum delay of 1 msec per command.)

① Title display	Settings contents		
↑ Display order	Settings unit	Settings range (direct data) (Index data)	Initial value
	Remarks (Details and supplement related to setting s)		

"Function <<Group2: XOR>>

(1) DST	Exclusive logical OR result transfer destination Index data number		
	None	IX00~IX99	IX00
(2) SOC1▪	Exclusive logical OR factor 1		
	None	-99999999~99999999 IX00~IX99	00000000
(3) SOC2▪	Exclusive logical OR factor 2		
	None	-99999999~99999999 IX00~IX99	00000000

"Operation example"

<<Exclusive logical OR operation example_1>> (Index data ←Numeric data XOR Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	XOR	IX70		00000005	00000006	

● By executing this command, contents of index data [IX70] are changed to [3(0011)], result of [5(0101) XOR 6(0110)].

<<Exclusive logical OR operation example_2>>(Index data ← Index data XOR Numeric data)

ADDR	CMD	DST		SOC1	SOC2	Remarks
001	XOR	IX70		IX00	00000020	

● By executing this command, contents of index data [IX70] are changed by performing XOR by [20(10100)] for the contents of [IX00].
For example, when index data [IX00] is 0.07, the index data [IX70] is changed to [19(10011)], the result of [7(00111) XOR 20(10100)].

4-4 Group 3 command specifications

4-4-1 [JMP] Unconditional jump

"Function"

● This command performs unconditional jump, which includes the following functions.
(After completion of this command, executes command of the address depending on the execution result of this command.)

①This command jumps to the address in which execution address is set by 'JADR' without any condition.

② If command is executed when address setting value is more than 280, auto-run is stopped by giving an alarm.

③ Numerical value input (direct data specification) or index data specification is possible for jump destination address data.

④ If block stop signal (BSTP) is ON while executing this command, program operation is stopped on completion of this command and it moves to 'waiting for restart' status and auto-run ready signal (PRDY) is output.
Command of jump destination address is executed by restart.

"Setting"

① Title display	Set contents		
↑ Display order	Setting unit	Setting range(Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to setting)		

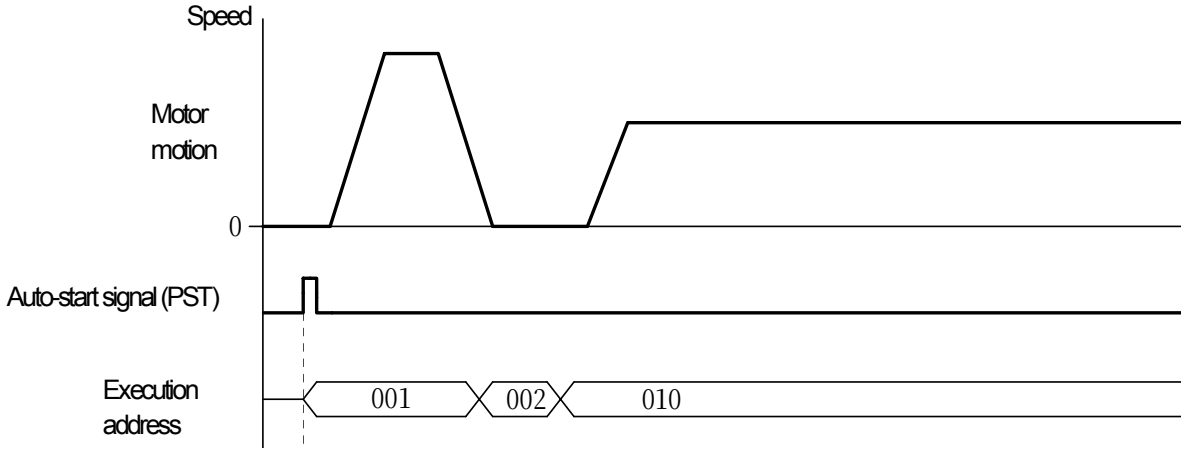
((Group3: JMP))

① JADR ●·	Jump destination address		
	None	000-279 IX00-IX99	000

"Motion example"

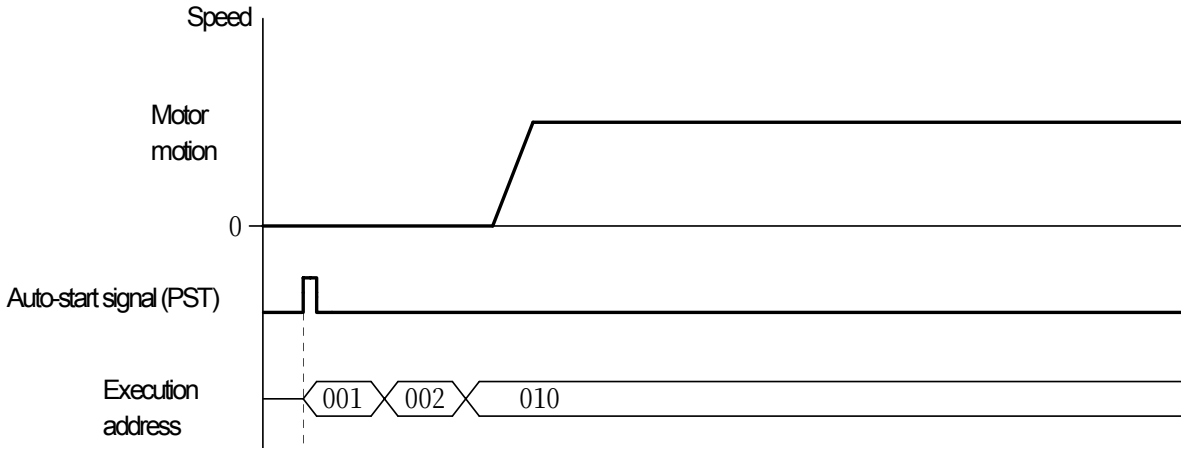
((Example of unconditional jump operation_1)) (Jump address numerical value data setting)

ADDR	CMD	JADR				Remarks
001	SPOS					Omit data of SPOS command
002	JMP	010				
010	SPOS					Omit data of SPOS command



((Example of unconditional jump operation_2)) (Jump address index data setting)

ADDR	CMD	JADR	DST	SOC		Remarks
001	IMOV	—	IX70	10		Set"10"to IX70
002	JMP	IX70	—	—		
010	SPOS					Omit data of SPOS command



4-4-2 [JZ] 0 Jump

"Function"

● This command has following functions and performs conditional jump.
(After completion of this command, executes command of the address depending on the execution result of this command.)

① When contents of condition judgment index data 'SOC' are "0", this command jumps to the address in which execution address is set by 'JADR'.

② This command executes command of next address when contents of condition judgment index data 'SOC' is " Not 0".

③ If this command is executed when contents of 'SOC' are "0" and address setting value is above 280, auto-run is stopped by giving an alarm.

④ Numerical value input (direct data specification) or index data specification is possible for jump destination address data.

⑤ If block stop signal (BSTP) is ON while executing this command, program operation is stopped on completion of this command and it moves to 'waiting for restart' status and auto-run ready signal (PRDY) is output.
Command of "Jump destination address" or "Next address" is executed by restart.

"Setting"

① Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to setting)		

((Group 3: JZ))

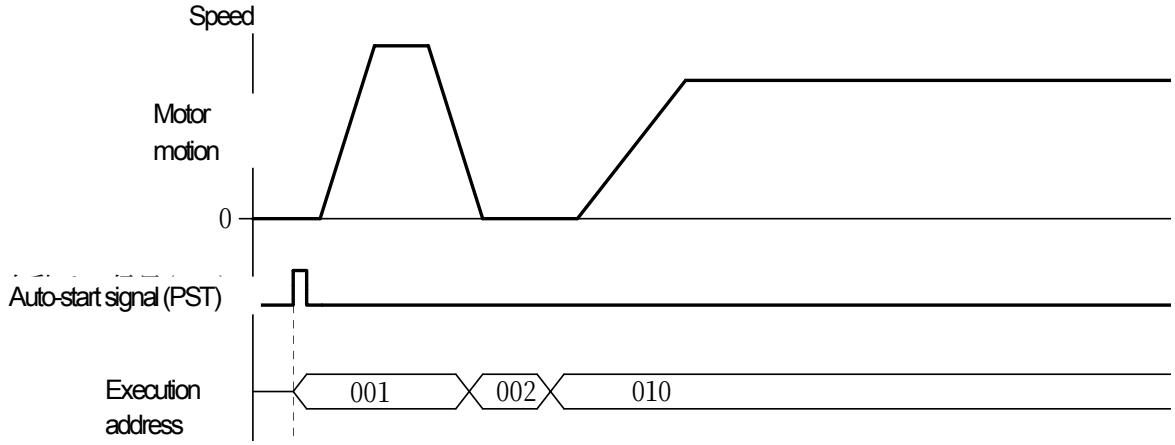
① JADR ●	Jump destination address		
	None	000-279 IX00-IX99	000
② SOC ●●	Branch condition judgment data		
	None	IX00-IX99	IX00

"Motion example"

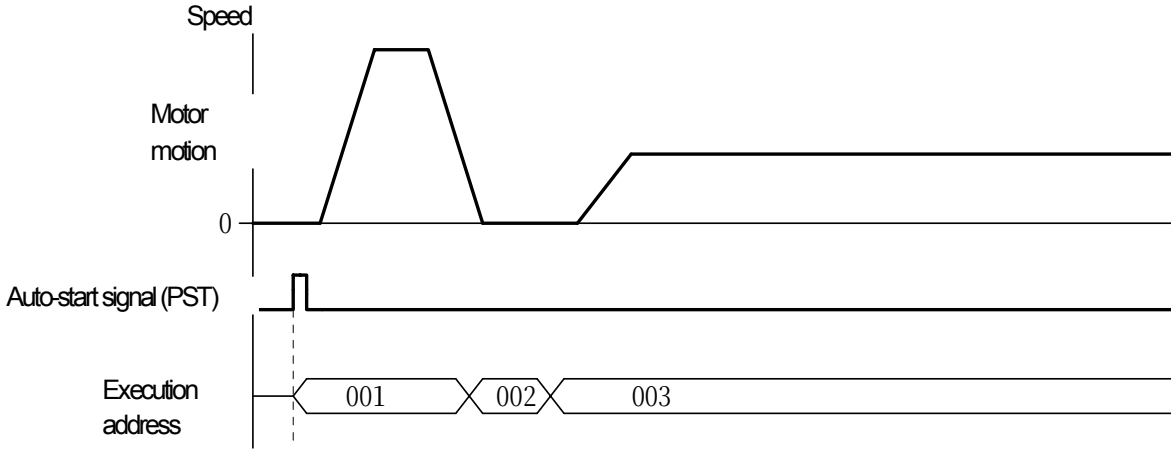
((Example of jump operation if 0_1)) (Jump address numerical value data setting)

ADDR	CMD	JADR	SOC	DST	F	Remarks
001	SPOS					Omit data of SPOS command
002	JZ	10	IX00	—	—	
003	SPOS	—	—	—	30	Omit data other than 'F' value
010	SPOS	—	—	—	60	Omit data other than 'F' value

① When contents of IX00 are "0 (Execute Jump destination address command)



② When contents of IX00 are "Not 0" (Execute command of next address)

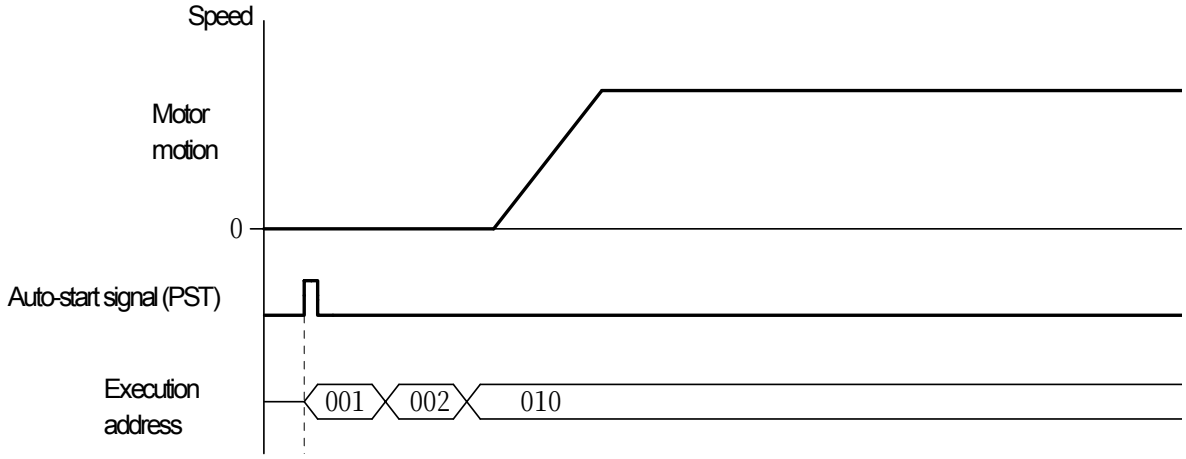


"Motion example"

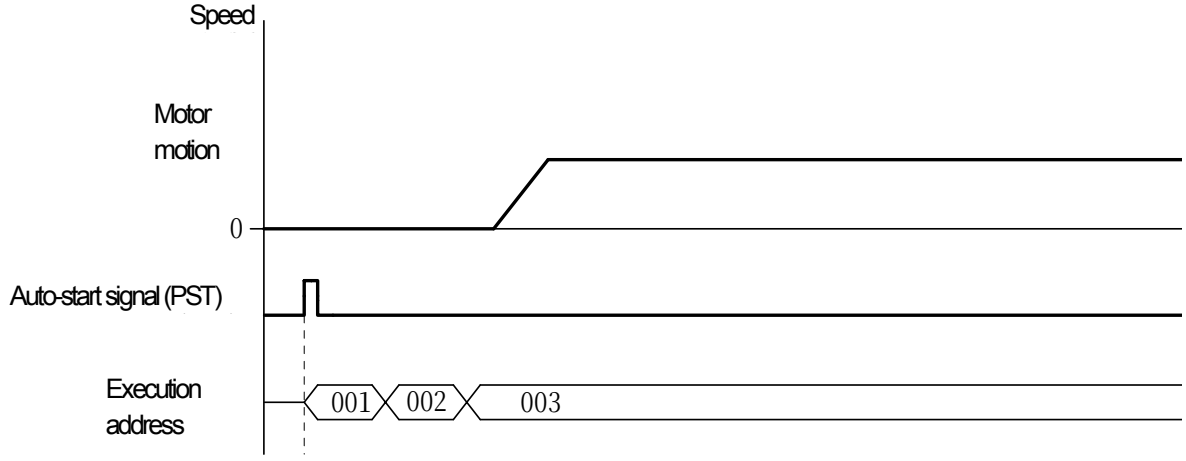
((Example of jump operation if 0_2)) (Jump address index data setting)

ADDR	CMD	JADR	SOC	DST	F	Remarks
001	IMOV	—	10	IX70	—	Set "10" to IX70
002	JZ	IX70	IX00	—	—	
003	SPOS	—	—	—	30	Omit data other than 'F' value
010	SPOS	—	—	—	60	Omit data other than 'F' value

① When contents of IX00 are "0" (Execute command of Jump destination address)



② When contents of IX00 are "Not 0" (Execute command of next address)



4-4-3 [JNZ] Jump if not zero

"Function"

● This command performs conditional jump, which includes the following functions.
(After completion of this command, executes command of the address depending on the execution result of this command.)

① When contents of condition judgment index data 'SOC' are "Not 0", this commands jumps to the address in which execution address is set by 'JADR'.

② This command executes command of next address when contents of condition judgment index data 'SOC' are"0".

③ If this command is executed when contents of 'SOC' are "Not 0"and address setting value is more than 280, auto-run is stopped by giving an alarm.

④ Numerical value input (direct data specification) or index data specification is possible for jump destination address data.

④ If block stop signal (BSTP) is ON while executing this command, program operation is stopped on completion of this command and it moves to 'waiting for restart' status and auto-run ready signal (PRDY) is output.
Command of" Jump destination address" or "Next address" is executed by restart.

"Setting"

① Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to setting)		

((Group 3: JNZ))

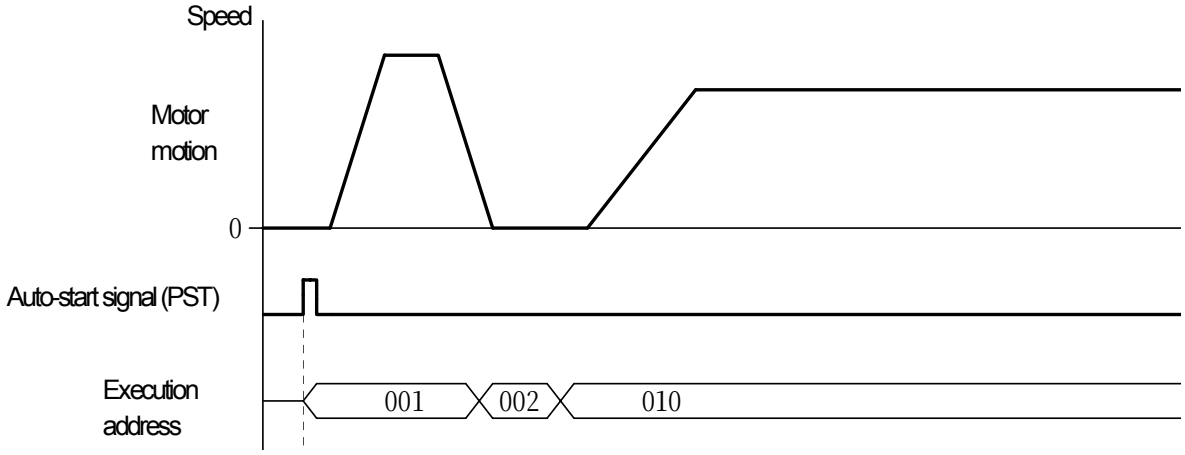
① JADR ●	Jump destination address		
	None	000-279 IX00-IX99	000
② SOC ●●	Branch condition judgment data		
	None	IX00-IX99	IX00

"Motion example"

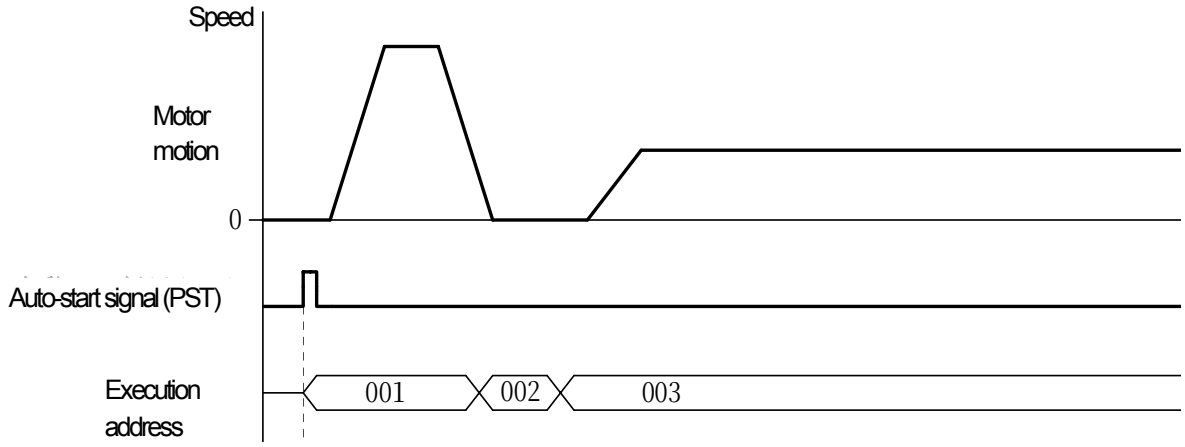
((Example of jump operation if not 0_1)) (Jump address numerical value data setting)

ADDR	CMD	JADR	SOC	DST	F	Remarks
001	SPOS					Omit data of SPOS command
002	JNZ	10	IX00	—	—	
003	SPOS	—	—	—	30	Omit data other than 'F' value
010	SPOS	—	—	—	60	Omit data other than 'F' value

① When contents of IX00 are "Not 0" (Execute command of jump destination address)



② When contents of IX00 are "0" (Execute command of next address)

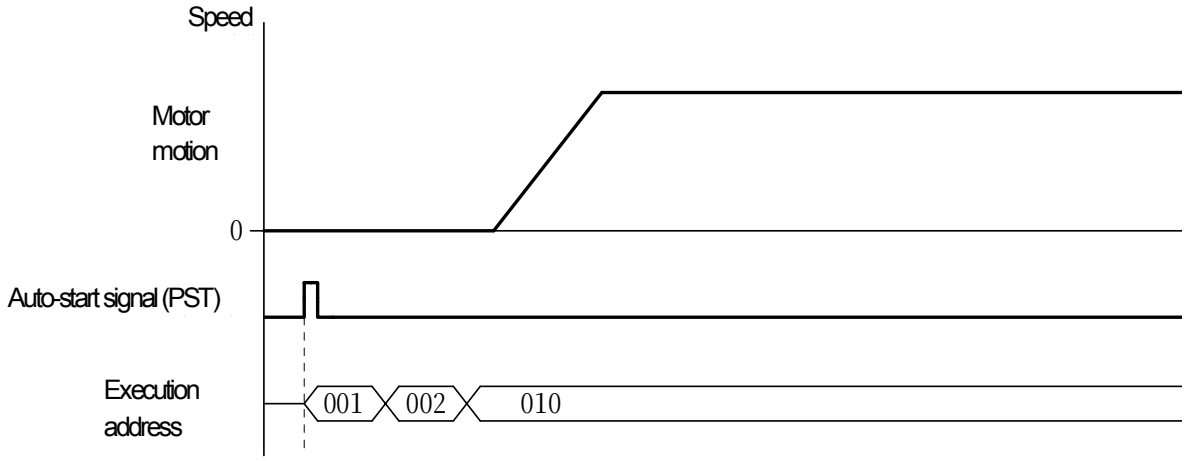


"Motion example"

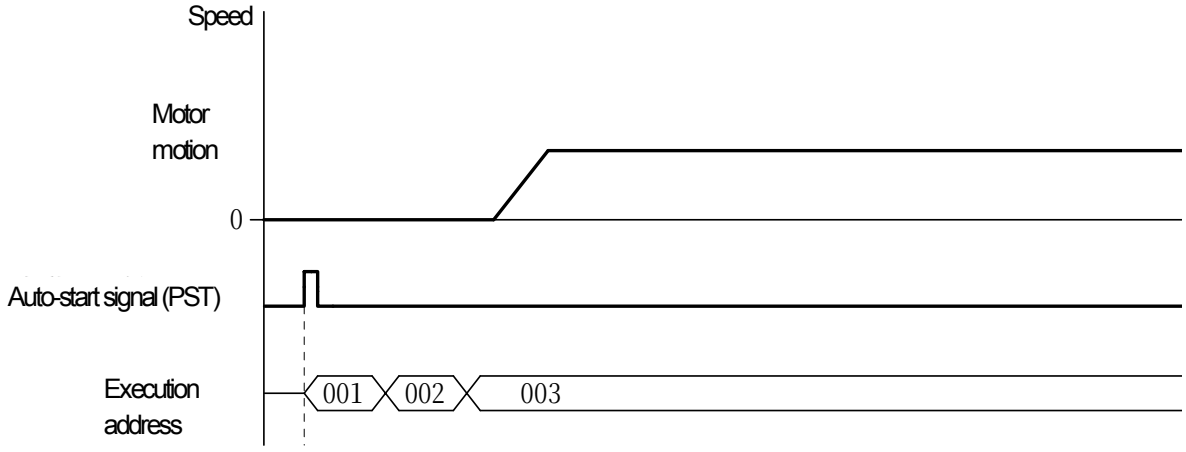
((Example of jump operation if not 0_2)) (Jump address index data setting)

ADDR	CMD	JADR	SOC	DST	F	Remarks
001	IMOV	—	10	IX70	—	Set "10" to IX70
002	JNZ	IX70	IX00	—	—	
003	SPOS	—	—	—	30	Omit data other than 'F' value
010	SPOS	—	—	—	60	Omit data other than 'F' value

① When contents of IX00 are "Not 0" (Execute command of jump destination address)



② When contents of IX00 are "0" (Execute command of next address)



4-4-4 [JG] Jump if greater than 1

"Function"

- This command performs conditional jump, which includes the following functions.
  (After completion of this command, executes command of the address depending on the execution result of this command.)

① When contents of condition judgment index data 'SOC' are "Greater than 1", this command jumps to the address in which execution address is set by 'JADR'.

② This command executes command of next address when contents of condition judgment index data 'SOC' are "less than 0".

③ If this command is executed when contents of 'SOC' are "Greater than 1" and address setting value is more than 280, auto-run is stopped by giving an alarm.

④ Numerical value input (direct data specification) or index data specification is possible for jump destination address data.

⑤ If block stop signal (BSTP) is ON while executing this command, program operation is stopped on completion of this command and it moves to 'waiting for restart' status and auto-run ready signal (PRDY) is output.
Command of" Jump destination address" or "Next address" is executed by restart.

"Setting"

① Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to setting)		

((Group 3: JG))

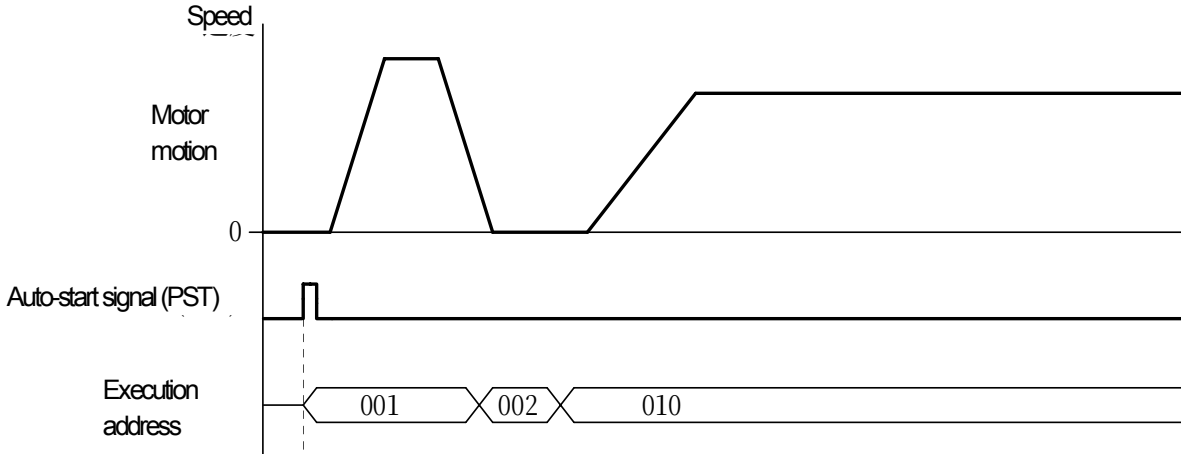
① JADR ●	Jump destination address		
	None	000-279 IX00-IX99	000
② SOC ●●	Branch condition judgment data		
	None	IX00-IX99	IX00

"Motion example"

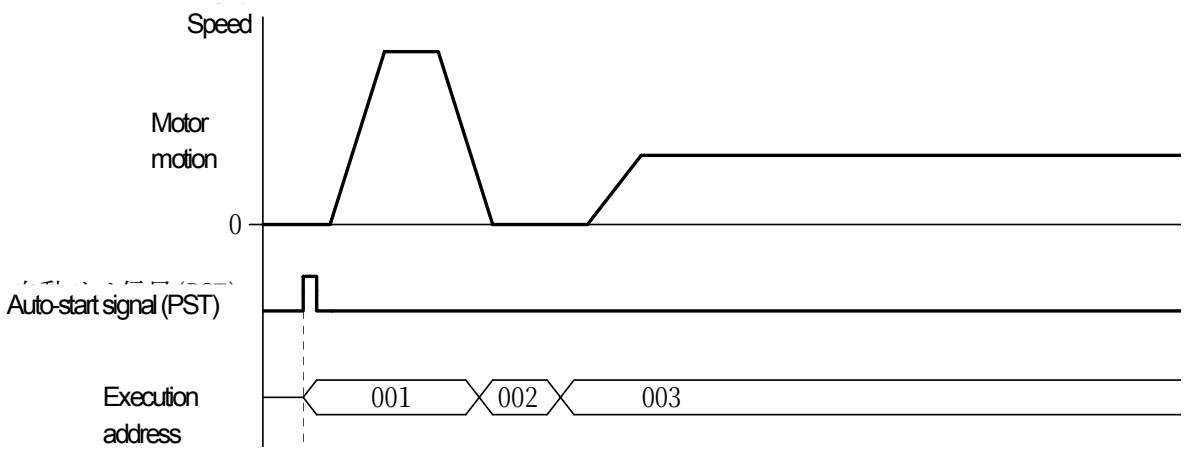
((Example of jump operation if greater than 1_1)) (Jump address numerical value data setting)

ADDR	CMD	JADR	SOC	DST	F	Remarks
001	SPOS					Omit data of SPOS command
002	JG	10	IX00	—	—	
003	SPOS	—	—	—	30	Omit data other than 'F' value
010	SPOS	—	—	—	60	Omit data other than 'F' value

① When contents of IX00 are" Greater than 1" (Execute command of jump destination address)



② When contents of IX00 are" less than 0", (Execute command of next address)

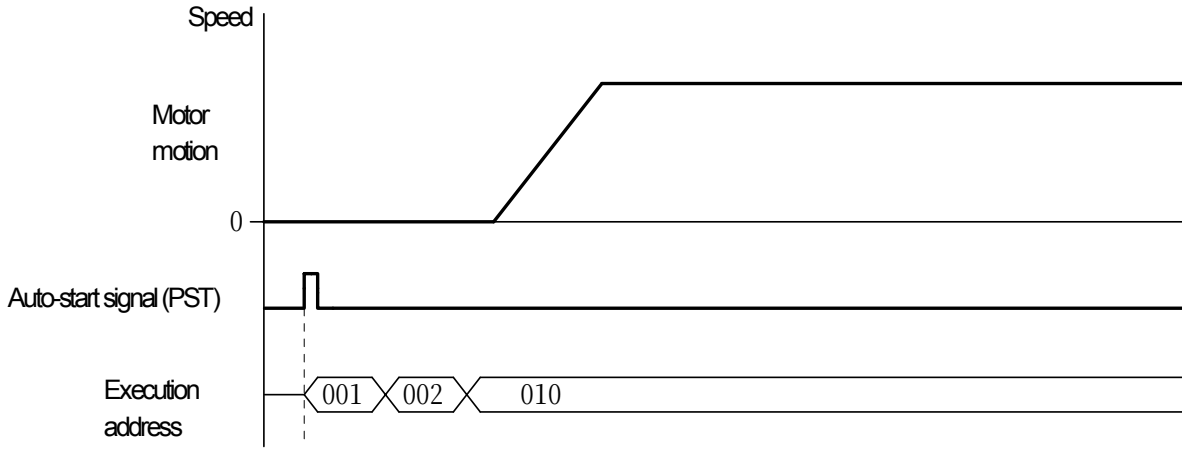


"Motion example"

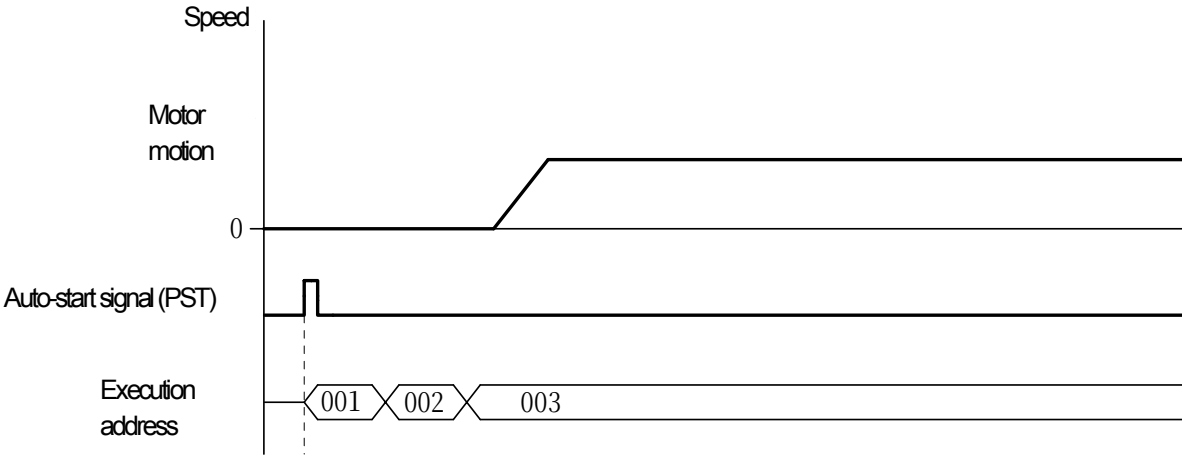
((Example of jump operation if greater than 1_2)) (Jump address index data setting)

ADDR	CMD	JADR	SOC	DST	F	Remarks
001	IMOV	—	10	IX70	—	Set "10" to IX70
002	JG	IX70	IX00	—	—	
003	SPOS	—	—	—	30	Omit data other than 'F' value
010	SPOS	—	—	—	60	Omit data other than 'F' value

① When contents of IX00 are "Greater than 1" (Execute command of Jump destination address)



② When contents of IX00 are" Less than 0" (Execute command of next address)



4-4-5 [JL] Jump if less than -1

"Function"

●This command performs conditional jump, which includes the following functions.
(After completion of this command, executes command of the address depending on the execution result of this command.)

① When contents of condition judgment index data 'SOC' are" less than -1", this command jumps to the address in which execution address is set by 'JADR'.

② This command executes command of next address when contents of condition judgment index data 'SOC' are "Greater than 0".

③ If this command is executed when contents of 'SOC' are "less than -1"and address setting value is more than 280, auto-run is stopped by giving an alarm.

④ Numerical value input (direct data specification) or Index data specification is possible for jump destination data.

⑤ If block stop signal (BSTP) is ON while executing this command, program operation is stopped on completion of this command and it moves to 'waiting for restart' status and auto-run ready signal (PRDY) is output.
Command of" Jump destination address" or "Next address" is executed by restart.

"Setting"

① Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to setting)		

((Group 3: JL))

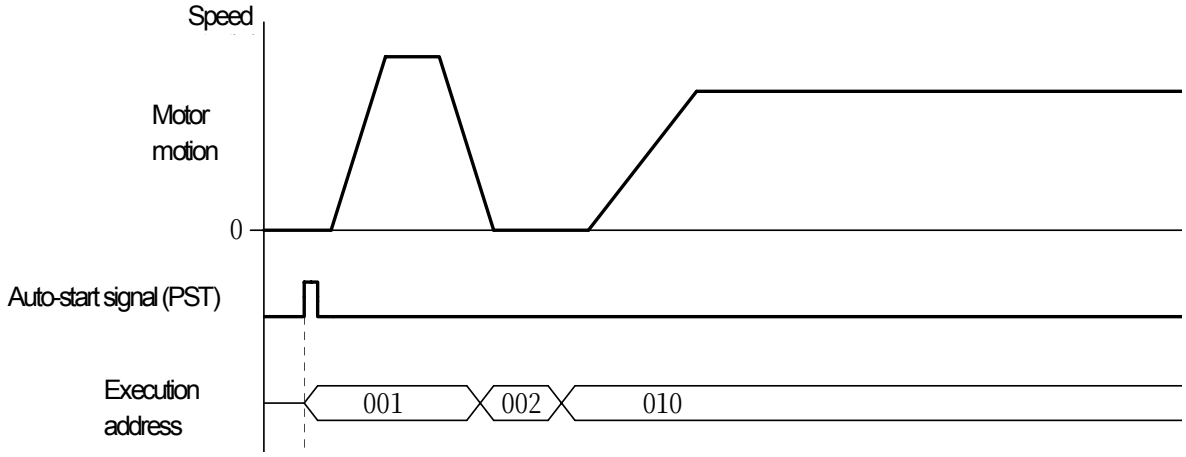
① JADR ●	Jump destination address		
	None	000-279 IX00-IX99	000
② SOC ●●	Branch condition judgment data		
	None	IX00-IX99	IX00

"Motion example"

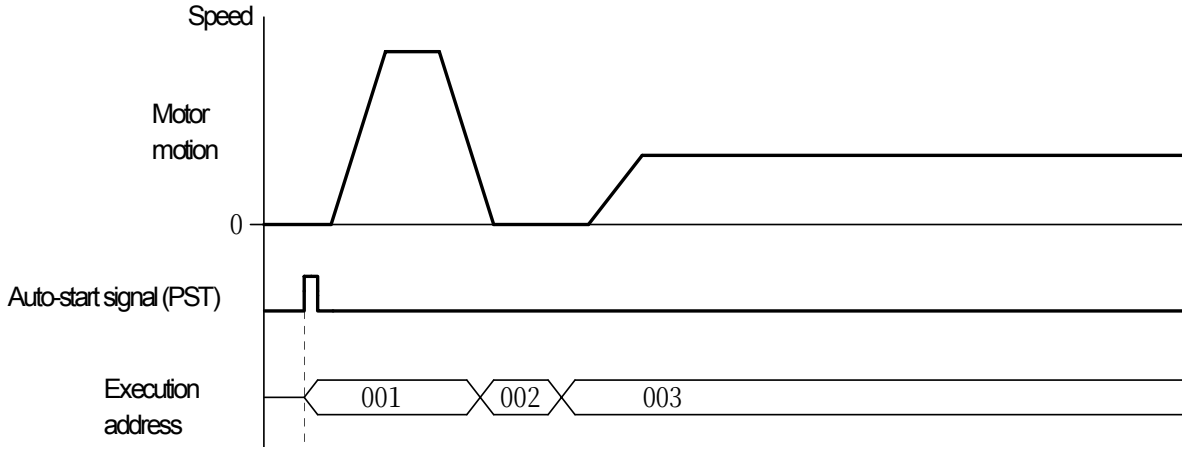
((Example of jump operation if less than -1_1)) (Jump address numerical value data setting)

ADDR	CMD	JADR	SOC	DST	F	Remarks
001	SPOS					Omit data of SPOS command
002	JL	10	IX00	—	—	
003	SPOS	—	—	—	30	Omit data other than 'F' value
010	SPOS	—	—	—	60	Omit data other than 'F' value

① When contents of IX00 are 'less than -1" (Execute command of Jump destination address)



② When contents of IX00 are "Greater than 0" (Execute command of next address)

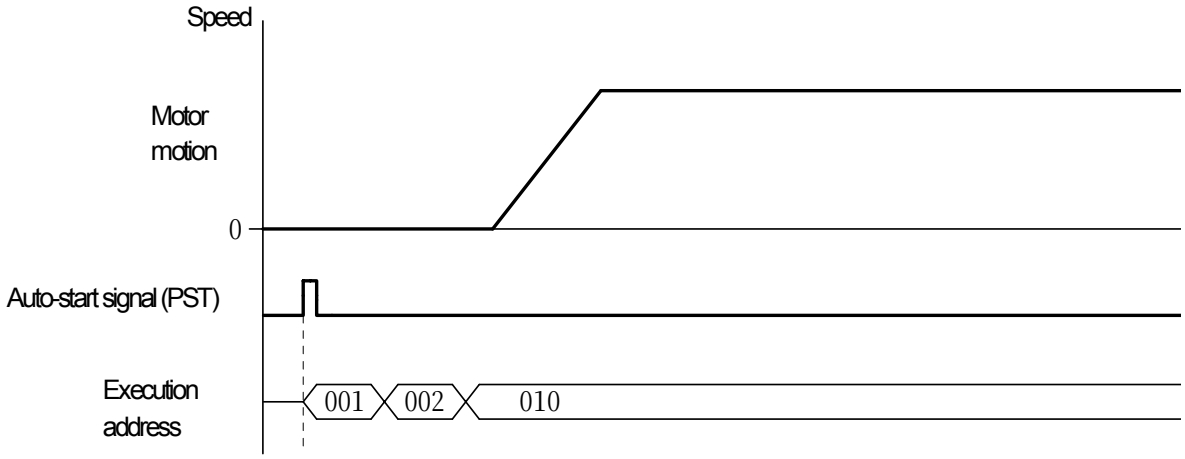


"Motion example"

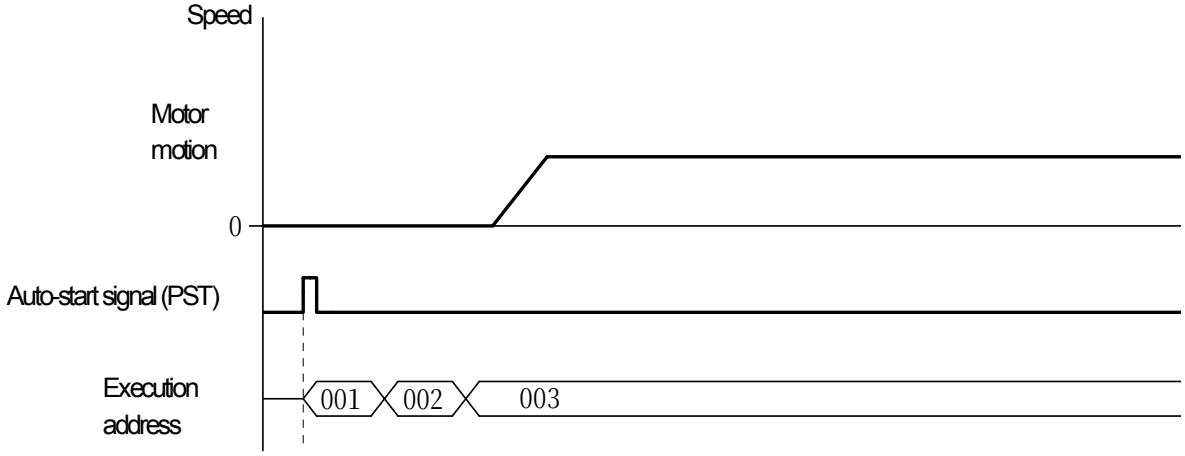
((Example of jump operation if less than -1_2)) (Jump address Index data setting)

ADDR	CMD	JADR	SOC	DST	F	Remarks
001	IMOV	—	10	IX70	—	Set "10" to IX70
002	JL	IX70	IX00	—	—	
003	SPOS	—	—	—	30	Omit data other than 'F' value
010	SPOS	—	—	—	60	Omit data other than 'F' value

① When contents of IX00 are 'less than -1" (Execute command of Jump destination address)



② When contents of IX00 are "Greater than 0" (Execute command of next address)



4-5 Group 4 Command specifications

4-5-1 [TRQ] Torque control

"Function"

- This **command is valid only for "VC-C1".**

- This command has following functions and performs torque control.
  (After completion of this command, executes command of next address.)

① Performs torque control according to torque command selection.

② If"SEL0" is selected in torque command selection, it operates by external torque command (TQH).

③ If"SEL1-3" is selected in torque command selection, it operates by parameter [P137-P139: Torque command value1-3].

④ M is output while starting this command and motion is completed by M completion input (MFIN). Motion is completion means executing next command by servo-lock after deceleration is stopped.

⑤ If hold (HLD) is input during execution of this command, performs servo-lock after deceleration is stopped.

⑥ Motor decelerates and stops in case of motion completion and hold (HLD) are according to [P216: deceleration time 3].

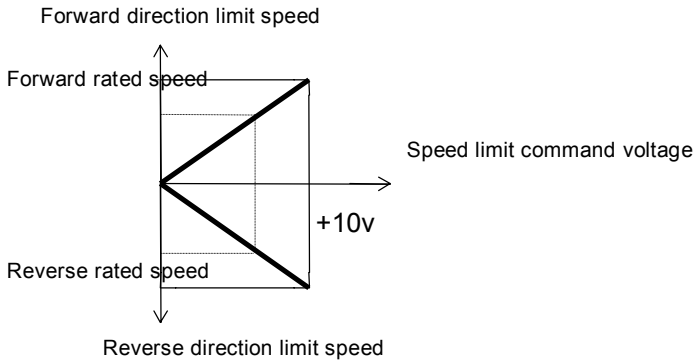
⑦ If restarted after hold (HLD), torque is controlled continuously.
However, in case of M completion during hold (HLD), this command is completed while restarting.

⑧ Torque limit value of torque control signal (TL) can be changed during execution of this command.

⑨ Positioning completion signal (PN) and rough matching signal (PRF) are set to OFF while starting this command.

⑩ Relation of speed limiting command and maximum number of rotations of motor

- Maximum number of rotations of motor can be controlled to restrict the increase in motor rotations of slight load etc in torque control.
- Limit value is any value of external speed limit command (common in external speed command INH) or parameter P133 "Speed limit value" that is lower.
- Maximum number of rotations of motor means the rated number of rotations in DC±10V in proportion to the value of external speed limit command.
- In case of external speed limit command and P133"Speed limit value", common setting is done for forward direction, reverse direction.
- For external speed limit command, valid/invalid can be selected by Parameter P132"External speed limit valid/invalid selection".

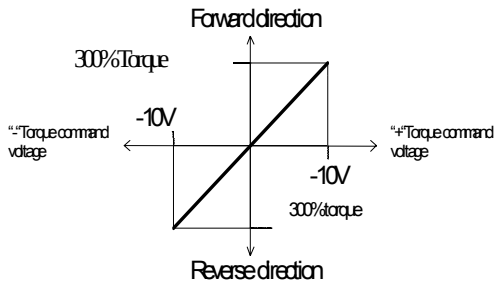


[Fig. 4-2]Relation of speed limit command and number of rotations of motor

(11) Relation between external torque command and motor output torque

・Output torque of motor is the 300% output torque in DC±10 as compared to the external torque command voltage. (When rated torque is considered as 100%)

・Motor gives output torque of forward direction by external torque command of positive voltage. Motor gives output torque of reverse direction by external torque command of negative voltage.



[Fig 4-3] Relation of external torque command and motor output torque

"Setting"

① Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details/supplementary explanation related to setting)		

<<Group 4: TRQ>>

① TRQ●●	Torque command selection		
	None	SEL.0 - SEL.3	SEL.0
	● Compatible to torque command of SEL.0-SEL.3.		

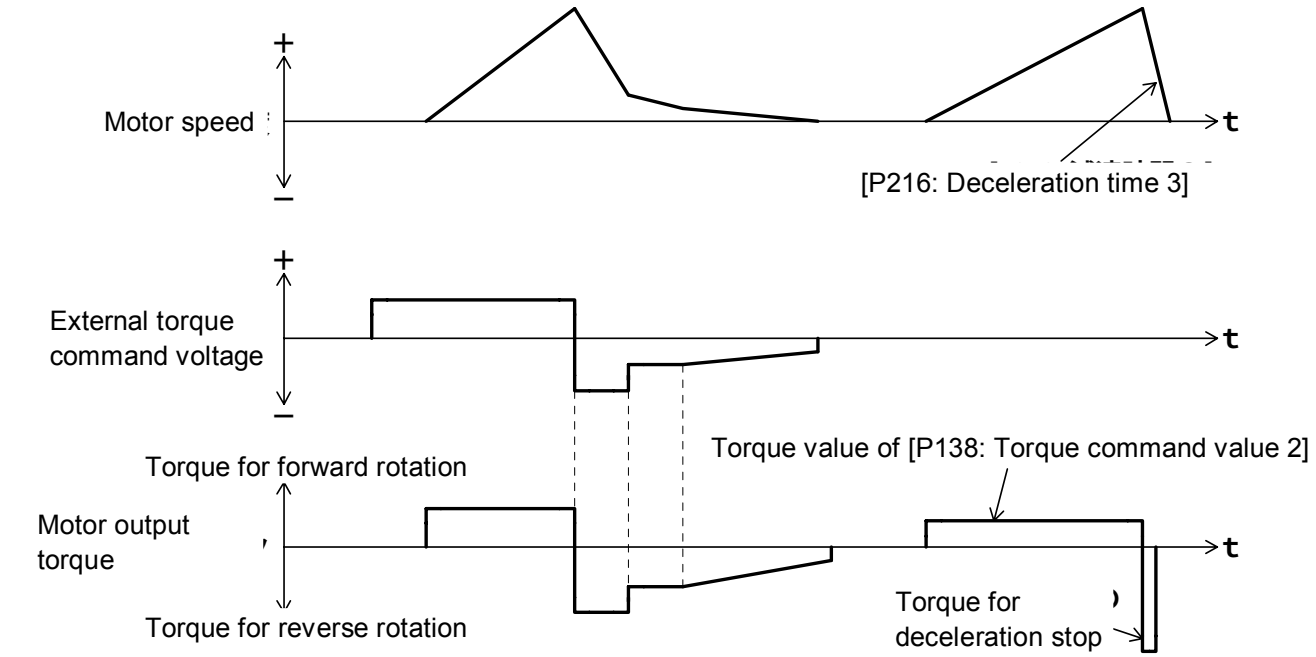
Torque command selection	Torque command value
SEL.0	External torque command (TQH signal)
SEL.1	Parameter [P137: Torque command value1]
SEL.2	Parameter [P138: Torque command value2]
SEL.3	Parameter [P139:Torque command value 3]

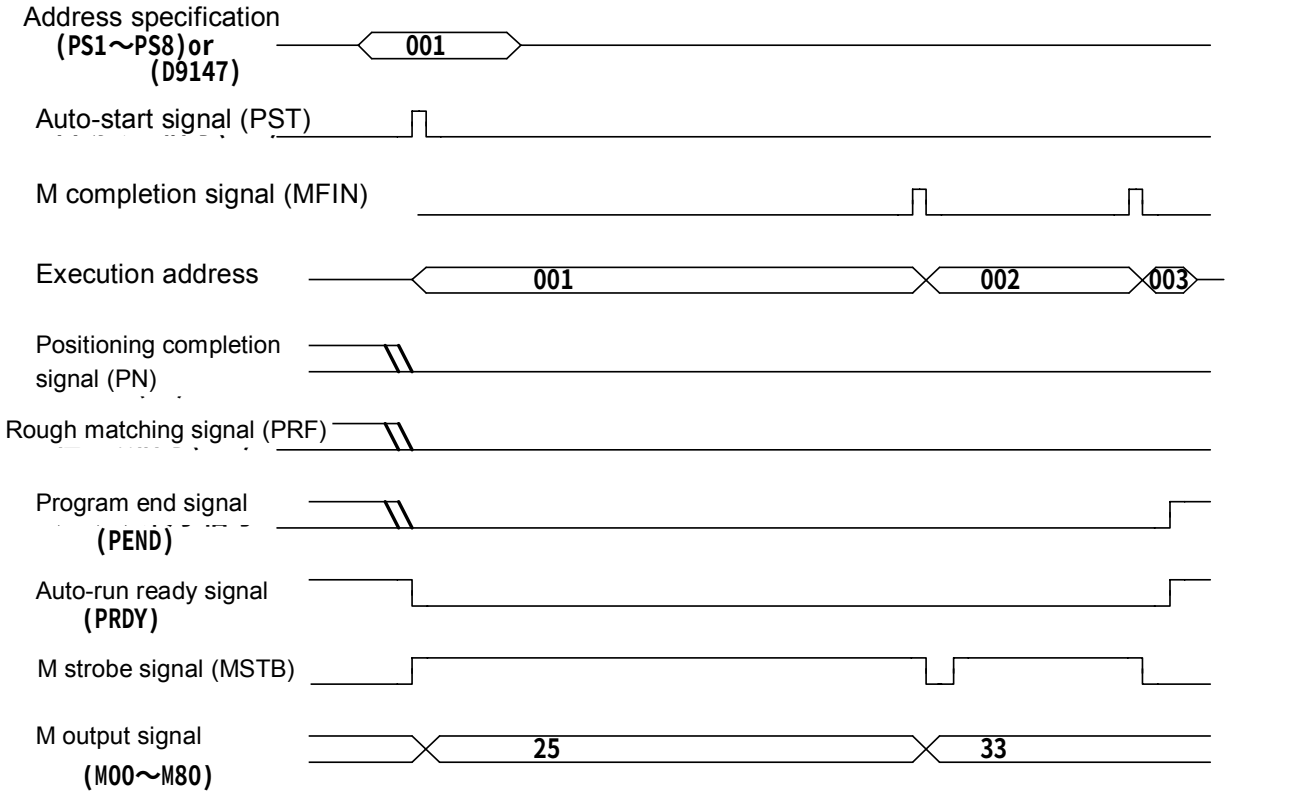
② M ●	M output data		
	BCD2 digits	00-99 IX00-IX99	/00
	● If M output data is invalid, M output data is not output but M strobe (MSTB) is set to ON and M completion is awaited.		

“Motion example”

((Example of torque control operation))

ADDR	CMD	TRQ	M			Remarks
001	TRQ	SEL.0	25			
002	TRQ	SEL.2	33			
003	PEND	-----	-----			





4-5-2 [SPD] Speed control

"Function"

- **This command is valid only for "VC-C1".**

- This command has following functions and performs speed control.
  (After completion of this command, executes command of next address.)

① Performs speed control according speed command selection.

② If"SEL0" is selected in speed command selection, it operates by external speed command (INH).

③ If"SEL1-3" is selected in speed command selection, it operates by parameter [P134- P136: Speed command value1-3].

④ M is output while starting this command and motion is complete by M completion input (MFIN).
Motion completion means executing next command by servo-lock after deceleration is stopped.

⑤ If hold (HLD) is input during execution of this command, deceleration is stopped.

⑥ Motor decelerates and stops in case of motion completion and hold (HLD) are according to [P216: deceleration time 3].

⑦ If restarted after hold (HLD), speed is controlled continuously.
However, in case of M completion during hold (HLD), this command is completed while restarting.

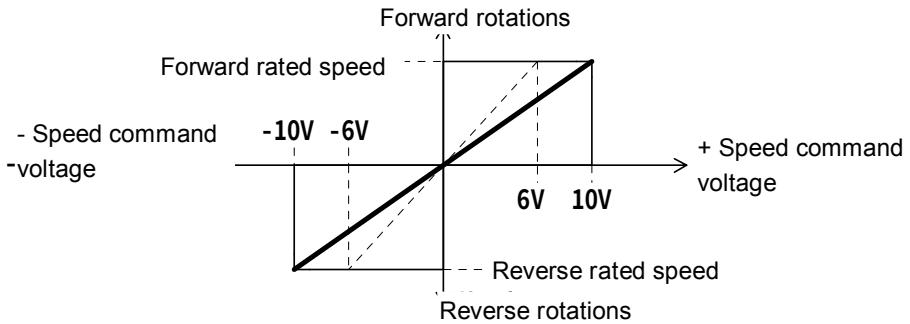
⑧ Positioning completion signal (PN) and rough matching signal (PRF) are set to OFF while starting this command.

⑨ Acceleration during speed control is according to parameter [P213: Speed time 3] and [P216: deceleration time 3].

⑩ If "SEL1-7" is selected by speed command selection and operation is performed, override (OR1-OR4) becomes valid in real time for speed command value.
In other words, if speed command value 1000rpm and override is 70%, operation is performed in 700rpm.

(11) Relation of external speed command and number of motor rotations

- Number of rotations of motor is compared with the external speed command voltage and performs rated operations in DC±10V.
  Again, by parameter P129"Speed command gain", speed command voltage which is rated rotations can be set for motor between DC±6V-±10V.



[Fig. 4-4] Relation of external speed command and number of motor rotations

"Setting"

① Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details/supplementary explanation regarding setting)		

((Group4: SPD))

① SPD●●	Torque command selection		
	Absent	SEL.0 - SEL.3	SEL.0
	● Compatible to torque command of SEL.0-SEL.3.		

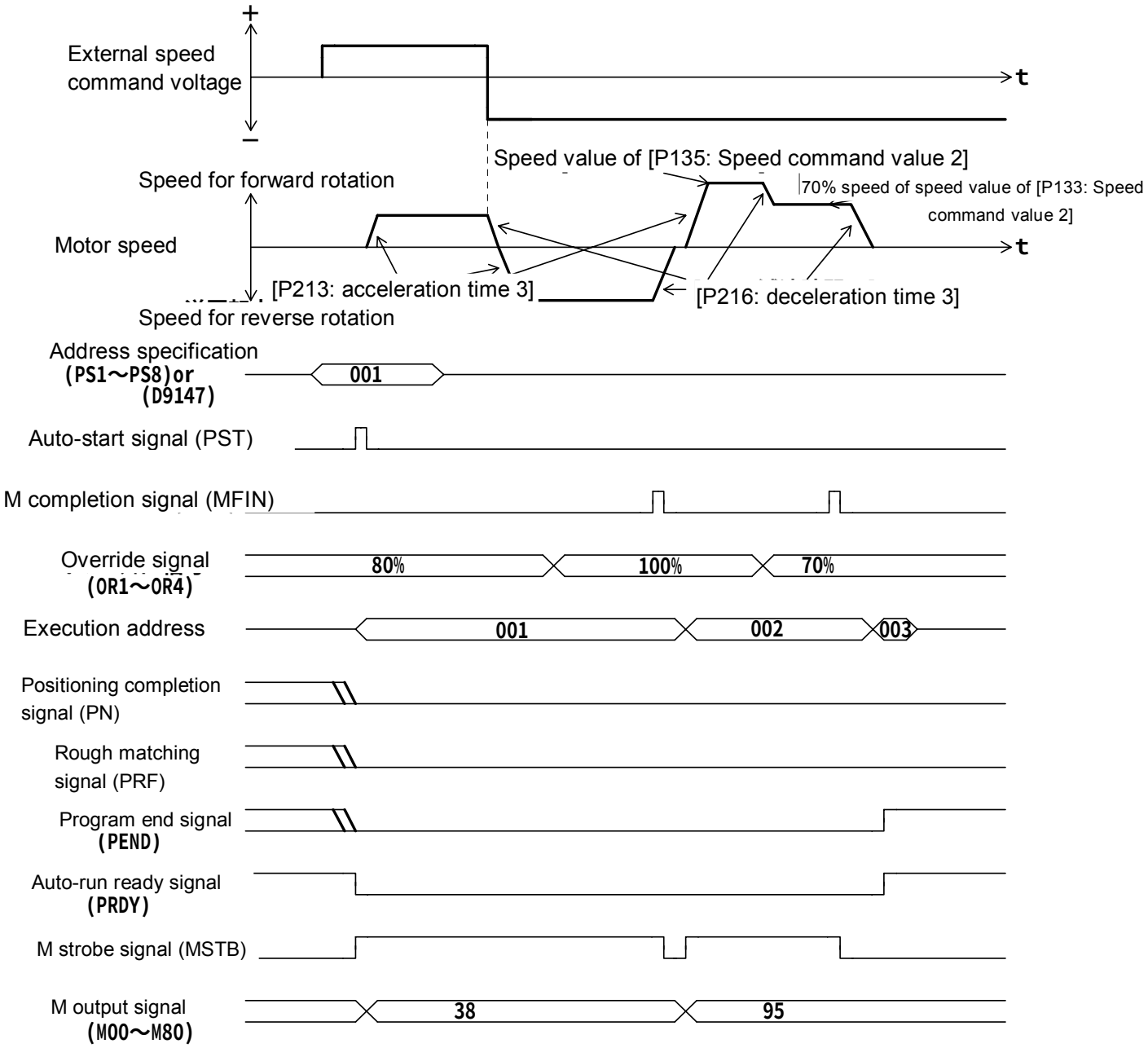
Torque command selection	Torque command value
SEL.0	External speed command (INH signal)
SEL.1	Parameter[P134:Speed command value 1]
SEL.2	Parameter[P135:Speed command value 2]
SEL.3	Parameter[P136:Speed command value 3]

② MM●	M output data		
	BCD 2digits	00-99 IX00-IX99	/00
	●If M output data is invalid, M output data is not output but M strobe (MSTB) is set to ON and M completion is awaited.		

"Motion example"

<<Example of Speed control operation>>

ADDR	CMD	TRQ	M			Remarks
001	SPD	SEL.0	38			
002	SPD	SEL.2	95			
003	PEND	-----	-----			



4-6 Group 5 Command Specifications

4-6-1 [SPNS] Spin speed

[Function]

●This command performs rotation speed control that has the following functions
(After completion of this command, executes next address command.)

(1)By execution of this command, acceleration/deceleration is performed within the time set in 'TIME' from Current rotation speed to rotation speed set in 'RPM'. However, if the setting time of acceleration/deceleration exceeds the maximum limit, acceleration/deceleration is performed with that Maximum time and fixed rotation speed is maintained when reaches the exceeding time.

Rule: Maximum limit for acceleration time from 0 RPM to rated speed is **300.00 secs.**
Maximum limit for deceleration time from rated speed to 0 RPM is **300.00 secs.**
[Example]

(a) In case of Motor rate=3000RPM/Current rotation speed=0 RPM /RPM=3000RPM/ time =**500.00**
->Accelerate in initial **300.00 secs** and fixed speed operation of 3000RPM in remaining **200.00 secs**

(b) In case of Motor rate=3000RPM/Current rotation speed=3000RPM/RPM=2000RPM/ time =**160.00**
->Decelerate in initial **100.00 secs** and fixed speed operation of 2000 RPM in remaining **60.00 secs**

(c) In case of Motor rate=3000RPM/Current rotation speed=2000RPM/RPM=2000RPM/ time =**300.00**
-> Since there is no Speed variation, fixed speed rotation of 2000 RPM within **300.00 secs**

(In place of SPNT)

(2) When the rotation direction of current command and next command differs, deceleration **->stop-> reverse acceleration** is performed from current rotation speed to rotation speed set in 'RPM ' with time set in 'TIME' However, when acceleration/deceleration time exceeds the maximum limit, deceleration **->stop-> reverse acceleration** is performed with that maximum time and fixed rotations speed is maintained when reaches the exceeding time. (Same as rule (1)

(3) At the time of command startup, outputs the data (M00-M99) set in 'M' and retains the data till next M output executes the command of valid setting status

(4) M signal is output by 2 digits BCD code (00-99)

(5) Operation when it reaches the set speed of 'RPM' and operation after the set 'TIME' exceeds, is as follows on the basis of output setting status of 'M' (□Output/□Do not output)
However, when the set speed of 'RPM' is"0", since this command does not substitute SPNT, operation without waiting for the time lapse of 'TIME' that exceeds the maximum limit is as follows.

□In the existing status, outputs M strobe signal (MSTB) and holds the input of M completion signal (MFIN)
By input of M completion signal, output of M strobe signal is set to OFF and this command ends
□This command ends.

(6) If this command is executed in M completion signal input status, M strobe signal is not output till input of M completion signal turns OFF.

(7) Operation as per the execution of this command ends by Spin Positioning command.

(8)When hold signal (HLD) is input during execution of this command, as per the setting of [P214: deceleration time 1], deceleration is stopped (At this time, M strobe signal retains the status)
If goes to restart standby status, outputs automatic rotation ready signal (PRDY).

(9) As per the restart after hold, "M" strobe signal output is turned OFF "or" Remaining Spin operation block is skipped" and executes next address command of SPNP command.

(10) Alarm stops if command other than spin command is executed by next command of this command

(11) Setting value of [P305: Rotor position range] is "0" and alarm stops after executing this command

(12) For override, input condition at the time of this command execution startup is the override value till spin operation is concluded. (In Spin operation, override value cannot be changed)

(13) When current rotation speed and rotation speed set in 'RPM'I is same, this command ends after waiting for lapse of time set in 'TIME' (Substitute SPNT)

(14) For rotation speed, Acceleration/deceleration time, M output data, numerical value input (Direct data Specification) or Index data specifications are possible.

(15) This command does not execute stop as per the block stop signal.

[Setting]

(1) Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details/ Supplementary explanation related to setting)		

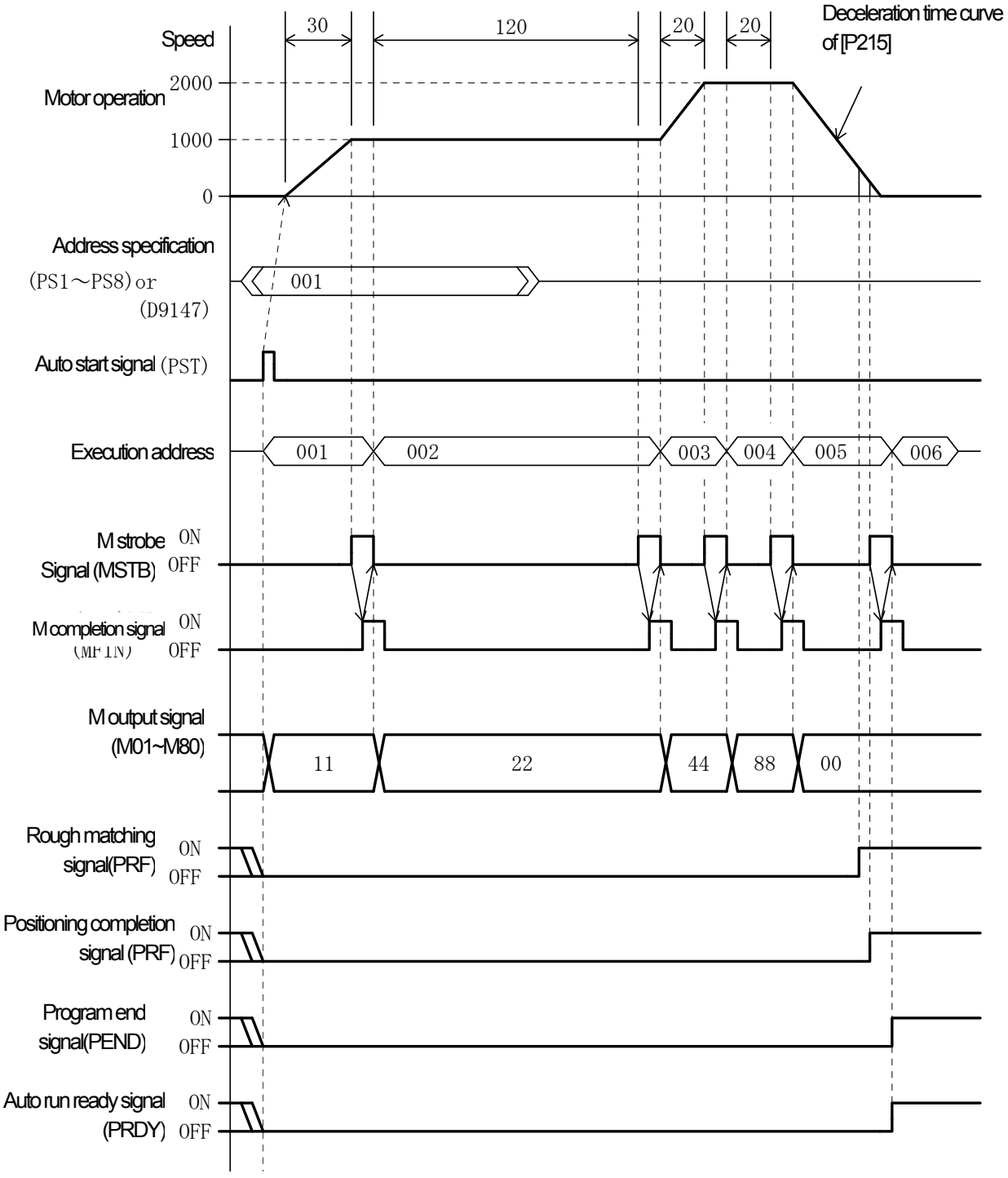
{Group 5: SPNS}

(1) RPM…..	Rotor actual rotation speed (Arrival speed)		
	RPM	-9999-9999 IX00-IX99	0000
	●In setting, actual rotation speed of rotor is set.		
(2) TIME…..	Acceleration/deceleration time		
	0.01 sec	000.00-655.35 IX00-IX99	000.00
	● For Acceleration/deceleration time, time to reach target rotation speed is set ●Acceleration/deceleration time is specified in index data and when the specified index data value is negative data , pin speed command and spin time command after this command(including this command) are cancelled and Spin positioning command for spin operation completion is executed.		
(3) M…	M output data		
	BCD 2 digits	00-99 IX00-IX99	/00
	●For setting method, refer to "Chapter 3 Setting"		

[Motion Example]

{Spin Motion Example_1} (When rotation direction during operation is fixed)

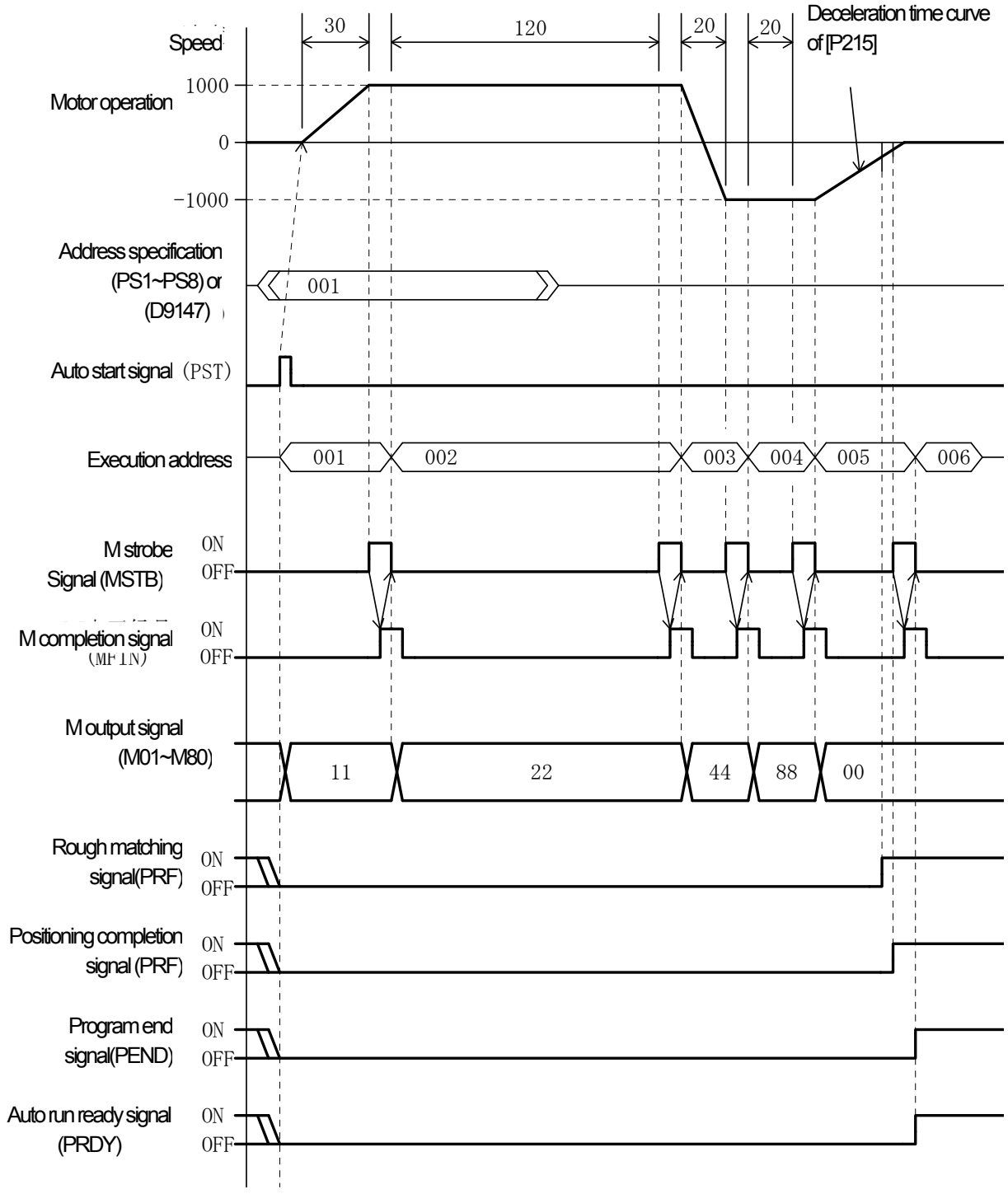
ADDR	CMD	RPM	POS	TIME	DOWN	M	Remarks
001	SPNS	1000	–	30.00	—	11	
002	SPNT	—	–	120.00	—	22	
003	SPNS	2000	–	20.00	—	44	
004	SPNT	—	–	20.00	—	88	
005	SPNP	—	0.0	–	SEL.2	00	
006	PEND	—	–	–	—	–	



[Motion Example]

{Spin Motion Example_2}(When rotation direction during operation is to be changed)

ADDR	CMD	RPM	POS	TIME	DOWN	M	Remarks
001	SPNS	1000	–	30.00	—	11	
002	SPNT	—	–	120.00	—	22	
003	SPNS	-1000	–	20.00	—	44	
004	SPNT	—	–	20.00	—	88	
005	SPNP	—	0.0	–	SEL.2	00	
006	PEND	—	–	–	—	–	



4-6-2 [SPNT] Spin Timer

[Function]

●This command executes the time control that has the following functions.
(After completion of this command, executes next address command.)

(1) For status when rotates with speed set by Spin speed command, time set in 'TIME' is retained.

(2) At the time of command startup, outputs the data (M00-M99) set in 'M' and retains the data till next M output executes the command of valid setting status

(3) M signal is output by 2 digits BCD code (00-99)

(4)'Operation after the time set in 'TIME' exceeds, is as follows on the basis of output setting status Of M' (□Output/□Do not output)

□In the existing status, outputs M strobe signal (MSTB) and holds the input of M completion signal (MFIN)By input of M completion signal, output of M strobe signal is set to OFF and this command is completed.
□This command ends.

(5) If this command is executed in M completion signal input status, M strobe signal is not output till input of M completion signal turns OFF.

(6) Operation as per the execution of this command ends by Spin Positioning command.

(7) When hold signal (HLD) is input during execution of this command, deceleration is stopped as per the setting of [P214: deceleration time1] (At this time, M strobe signal retains the same status)
If goes to restart standby status, outputs automatic rotation ready signal (PRDY).

(8)As per the restart after hold, "M strobe signal output is turned OFF" or "Remaining Spin operation block is skipped" and executes next address command of SPNP command.

(9) Alarm stops if this command is executed in status other than status where rotates with speed set in Spin speed command

(10) Alarm stops if command other than spin command is executed by next command of this command

(11) For data of retention time and M output, numerical value input (direct data specification) or index data specification is possible.

(12) This command does not execute stop as per the block stop signal.

● For Motion Example, refer to example of Spin speed command.

(1) Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details/ Supplementary explanation related to setting)		

[Setting] {Group 5: SPNT}

(1) TIME…	Retention Time		
	0.01 sec	000.00-999999.99 IX00-IX99	000.00
	●Retention time sets the time for retaining the rotation speed at the time of execution of this command ●Retention time is specified by Index data and if the specified index data value is negative, cancels the spin speed command and spin Timer command after this command(including this command) and executes the Spin Positioning command for Spin operation conclusion.		
(2) M……	M output data		
	BCD 2 digits	00-99 IX00-IX99	/00
	●For setting method, refer to "Chapter 3 Setting"		

4-6-3 [SPNP] Spin Positioning

[Function]

This command executes the positioning in spin operation status that has the following functions.
(After completion of this command, executes next address command.)

(1) Deceleration is stopped (= Positioning) on the position of 'POS' with time selected by 'DOWN' from status operated by Spin speed or Spin Timer command.

(2) Positioning position 'POS' is as per the absolute setting.

(3) Deceleration time is selected from [P214-P216: deceleration time 1-3]

(4) When this command is executed at the time of rotation speed "0 RPM", by ignoring the value set in 'POS', positioning is completed on that location (Spin operation is complete) and this command ends

(5) At the time of command startup, outputs the data (M00-M99) set in 'M' and retains the data till next M output executes valid setting status command

(6) M signal is output by 2 digits BCD code (00-99)

(7) After execution of this command, outputs the rough matching signal(PRF) when current position reaches to [P703: fault matching range]

(8) After execution of this command, outputs positioning completion signal (PN) when position deviation pulse reaches [P202: Positioning completion range]

(9) Operation after positioning is done on the position set in 'POS' is as follows on the basis of 'M' output setting
(□Output/□Do not output)

□ Outputs M strobe signal (MSTB) and waits for input of M completion signal (MFIN). After input of M completion signal, turns OFF the output of M strobe signal and completes this command
□ This command ends.

(10) If this command is executed in M completion signal input status, M strobe signal is not output till input of end signal is turned OFF

(11) When hold signal (HLD) is input during execution of this command, stops the deceleration by time selected in 'DOWN', turns OFF the output of M strobe signal and this command ends.
When goes to restart standby status, outputs auto run ready signal. (PRDY)

(12) If this command is executed in block stop signal (BSTP) ON status, program operation is stopped on completion of this command and after returning to restart standby status, outputs auto run ready signal (PRDY).
After re-start, executes next address command.

(13) Alarm stops when this command is executed in status other than rotation by Spin speed command setting Speed

(14) For positioning position, M output data, numeric input (Direct data specification) or Index data specification is possible.

●For Motion Example, refer to example of Spin speed command.

[Setting]

(1) Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details/ Supplementary explanation related to setting)		

{Group 5: SPNP}

(1) POS...	Positioning position (Absolute position)		
	mm, °, inch	00000000-99999999 IX00-IX99	00000000
	●Positioning position is set by Absolute position		
(2) DOWN.	Deceleration time selection		
	None	SEL.1/SEL.2/SEL.3	SEL.1
	● For Selection/Setting method of Deceleration time, refer to "Chapter 3 Setting"		
(3) M....	M output data		
	BCD 2 digits	00-99 IX00-IX99	/00
	●For setting method, refer to "Chapter 3 Setting"		

4-6-4 [SPOS] Positioning

[Function]

●This command executes the positioning operation that has the following functions
(After completion of this command, executes next address command.)

(1) As per Absolute position or Relative position specification' A/I', positioning is done on position' POS 'by speed'0'.

(2) Acceleration/deceleration time is controlled as per the Acceleration/deceleration time Selection' UPDN'

(3) As per the input of External trigger signal (TRG), executes external trigger positioning operation on position 'TRG'.
- On the basis of [P411: external trigger level selection], selects "TRG.EDGE" and when signal is input after this command execution, external trigger Positioning is done from the position where input Is received
- On the basis of [P411: external trigger level selection], selects "TRG.LEVEL" and when this command is executed in signal input status, external trigger Positioning is done from the position where operation starts.

(4) When 'TRG' set value is small and specified deceleration is not possible from speed when external trigger signal is input, positioning is done by sudden deceleration. But, [deviation over flow] or [Deviation abnormality] occurs due to machine inertia since it does not comply with motion of motor.

(5) Deceleration is stopped as per the 'UPDN' when hold signal (HLD) is input during operation, goes to restart standby status and outputs auto run ready signal (PRDY).
After restart, positioning from stop position is resumes.

(6) When block stop signal (BSTP) is ON at the time of execution of this command, program operation stops on completion of this command goes to restart standby status and outputs auto run ready signal (PRDY)
After restart, executes next address command.

(7) For positioning position, if it reaches to [P703: rough matching range], outputs rough matching signal (PRF).

(8)After completion of positioning command, when reaches to position deviation pulse [P202: Completion range], outputs positioning completion signal (PN) and then this command ends

(9) For Positioning position, speed, external trigger position, General-purpose output data, numeric input (Direct data specification) or Index data specification is possible.

(10) General-purpose output is output on command startup.

(1) Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details/ Supplementary explanation related to setting)		

[Setting] {Group 5: SPOS}

(1) POS...	Position data and Positioning direction		
	mm, ° , inch	-99999999-99999999 IX00-IX99	00000000
	●Increment data: Sets Positioning volume and Positioning direction from current position. (Relative position) ●Absolute data: Sets target position and direction from position data base point. (Absolute position) ●Decimal point position of Setting value is as per [P302: Command unit]		

(2) A/I..	Position data types (Absolute position/relative position)		
	Absent	ABSOLUTE/INCREMENT	INCREMENT

(3) F....	Positioning speed		
	mm/s, °/s, inch/s	0000000-9999999 IX00-IX99	000000
	●Decimal point position of Setting value is as per [P302: Command unit] ●When Setting value is "0", operates with minimum set unit speed.		

(4) UPDN.	Acceleration/deceleration time selection		
	None	SEL.1/SEL.2/SEL.3	SEL.1
	●For selection/setting method of Acceleration/deceleration time, refer to "Chapter 3 Setting"		

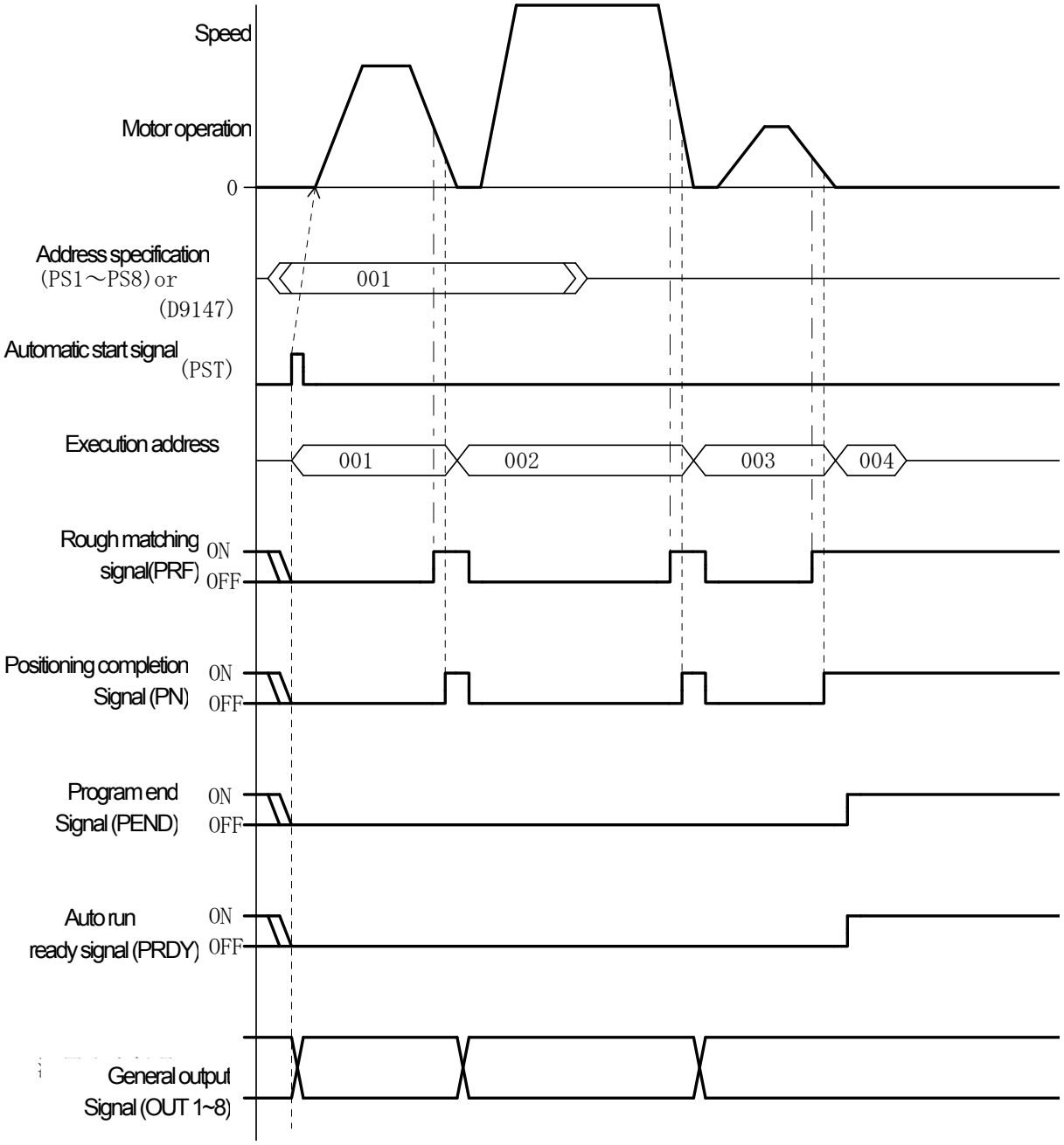
(5) TRG..	External trigger position data		
	mm, °, inch	00000000-99999999 IX00-IX99	00000000
	●Decimal point position of Setting value is as per [P302: Command unit] ●Positioning direction is as per "POS" data. ●When Setting value is "0", external trigger positioning is not executed		

(6) OUT..	General-purpose output data		
	Binary	00000000-11111111 IX00-IX99	/00000000
	●For setting method, refer to "Chapter 3 Setting"		

[Motion Example]

{Positioning Motion Example} *Other than signal timing chart, same as POS command.

ADDR	CMD	POS	A/I	F	UPDN	TRG	OUT	Remarks
001	SPOS							SPOS COMMAND DATA IS OMITTED
002	SPOS							SPOS COMMAND DATA IS OMITTED
003	SPOS							SPOS COMMAND DATA IS OMITTED
004	PEND	—	–	–	—	–	–	SPOS COMMAND DATA IS OMITTED



4-6-5 [CONT] Simple continual Positioning

[Function]

●This command carries out simple continual positioning operation that has following function.
(After completion of this command, executes next address command.)

(1) When motion is continuous and in the same direction, this command performs continual positioning Without stopping between blocks.

(2) The command can perform continual positioning for maximum 279 blocks, but due to (3), continual positioning normally up to 5 blocks can be performed.

(3) Operation start up time of this command (completion of previous block and motor operation start up time of start up signal input), is prolonged according to the number of serial blocks (this command) and as per the next criterion.

This command Operation start up time = command +(no of serial block × 0.5 ms)

Again, control of input signal/reply of correspondence/update of display etc are awaited in above mentioned time.

(4) Per each block, in position 'POS' as per absolute position and relative position specification 'A/I', continual positioning is performed by velocity' F' without stopping.

(5) Acceleration/deceleration time in continuous motion follows Acceleration/deceleration time selection 'UPDN' of continual start up block.

(6) External trigger Positioning during continuous motion, when external trigger position data of continuous start up block is taken as an effective value, performs external trigger positioning operation in position ' TRG', set up in continuous start up block as per the input of external trigger signal (TRG).
Again, from start up position external trigger positioning becomes General-purpose output 'OUT' and speed' F' set in last serial block.

(7) When specified deceleration from the speed at the time of small external trigger signal input is not carried out as per set value of 'TRG', positioning is done by performing urgent deceleration.
But, due to the inertia of machine, "deviation overflow" and "deviation abnormality" is generated since it does not comply with motion of motor.

(8)During motion, when temporary hold signal (HLD) is input, deceleration is stopped following 'UP DN' of continuous start up block. There is a stand by condition till restart. Automatic run ready signal (PRDY) is output.
After restart, continuous positioning of stop position is reopened.

(9) At the time of execution of this command, if block stop signal (BSTP) is ON, "motion direction is identical" and continuous".
When last block of this command ends, program run is stopped and standby condition for restart occurs. Also there is output of automatic run ready signal (PRDY).
After restart, next address command is executed.

(10) For positioning the position (stop position of continuous positioning) on reaching [P703: fault matching Range], there is output of flaw matching signal (PRF).

(11) After positioning command completion (command completion up to stop position of continuous positioning), if position deviation pulse reaches [P202: completion range], then output of positioning completion Signal (PN) is done, and this command ends.

(12) For data of positioning position, speed, external triggers position, General-purpose output, numerical Value input (Direct data specification) and index data specifications are possible.

(13) Generic-purpose output is done at the time of command start up.

● To control speed at the time of continual positioning and exchange position of generic-purpose output by **Command position,** there are variations according to the number of position deviation pulses.
Again in control, there are variations of 1ms.

(1) Title display	Setting contents		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details/ Supplementary explanation related to setting)		

[Setting] {Group5: CONT}

(1) POS...	Position data and Positioning direction		
	mm, °, inch	-99999999-99999999 IX00-IX99	00000000
	●Increment data: Sets Positioning volume and Positioning direction from current position. (Relative position) ●Absolute data: Sets target position and direction from position data base point. (Absolute position) ●Decimal point position of Setting value is as per [P302: Command unit]		

(2) A/I..	Position data types (Absolute position/relative position)		
	None	ABSOLUTE/INCREMENT	INCREMENT

(3) F....	Positioning speed		
	mm/s, °/s, inch/s	0000000-9999999 IX00-IX99	000000
	●Decimal point position of Setting value is as per [P302: Command unit] ●When Setting value is "0", operates with minimum set unit speed.		

(4) UPDN.	Acceleration/deceleration time selection		
	None	SEL.1/SEL.2/SEL.3	SEL.1
	●For Selection/setting method of Acceleration/deceleration time, refer to "Chapter 3 Setting"		

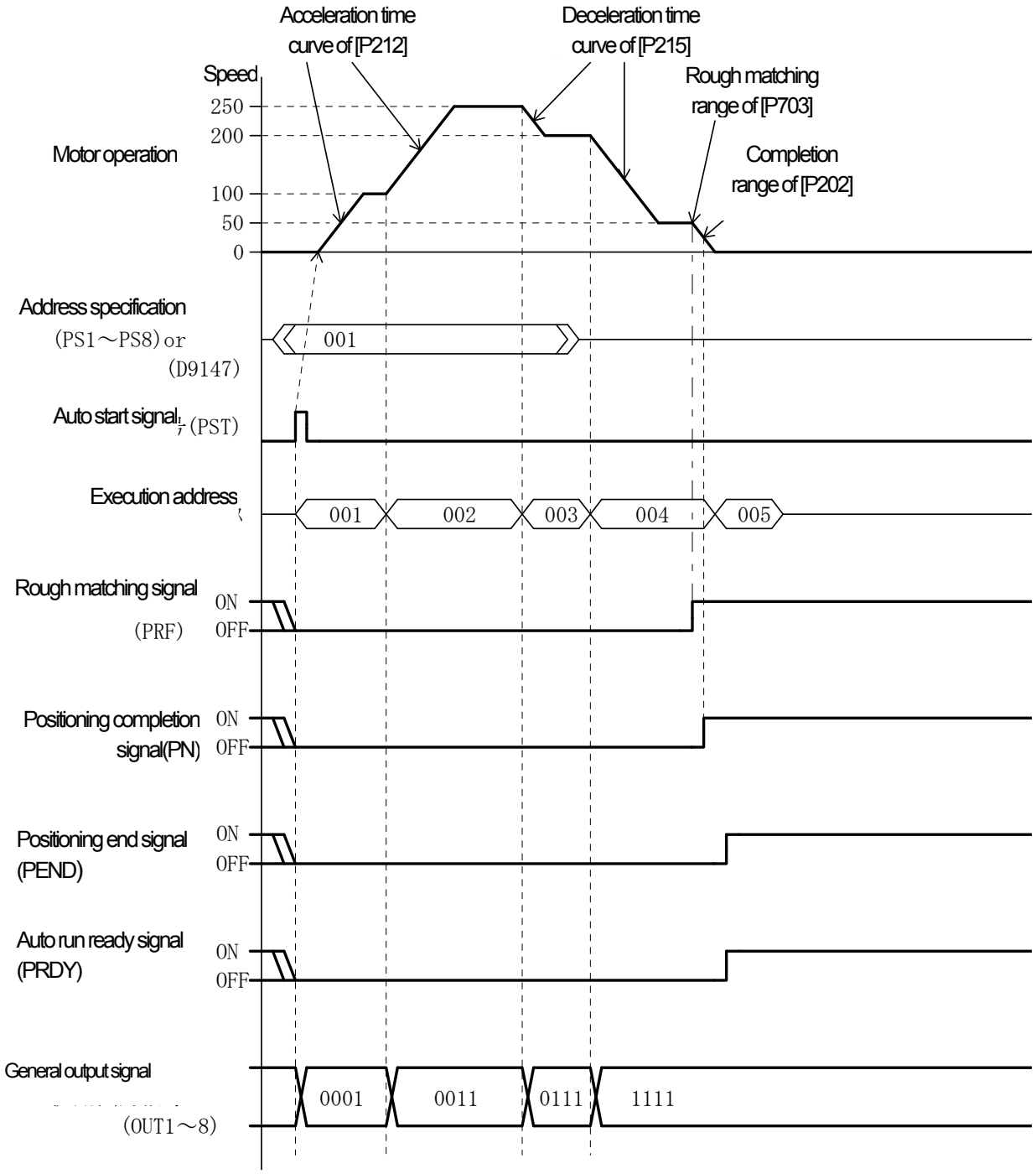
(5) TRG..	External trigger position data		
	mm, °, inch	00000000-99999999 IX00-IX99	00000000
	●Decimal point position of Setting value is as per [P302: Command unit] ●Positioning direction is as per "POS" data. ●When Setting value is "0", external trigger positioning is not executed		

(6) OUT..	General-purpose output data		
	Binary	00000000-11111111 IX00-IX99	/00000000
	●For setting method, refer to "Chapter 3 Setting"		

[Motion example]

{Motion example_1 determining simple continual position}

ADDR	CMD	POS	A/I	F	UPDN	TRG	OUT	Remarks
001	CONT	600	INC	100	SEL.2	0	00000001	
002	CONT	1800	INC	250	X	X	00000011	Invalid data though X is set
003	CONT	900	INC	200	X	X	00000111	Invalid data though X is set
004	CONT	300	INC	50	X	X	00001111	Invalid data though X is set
005	PEND	——	—	—	—	——	——	

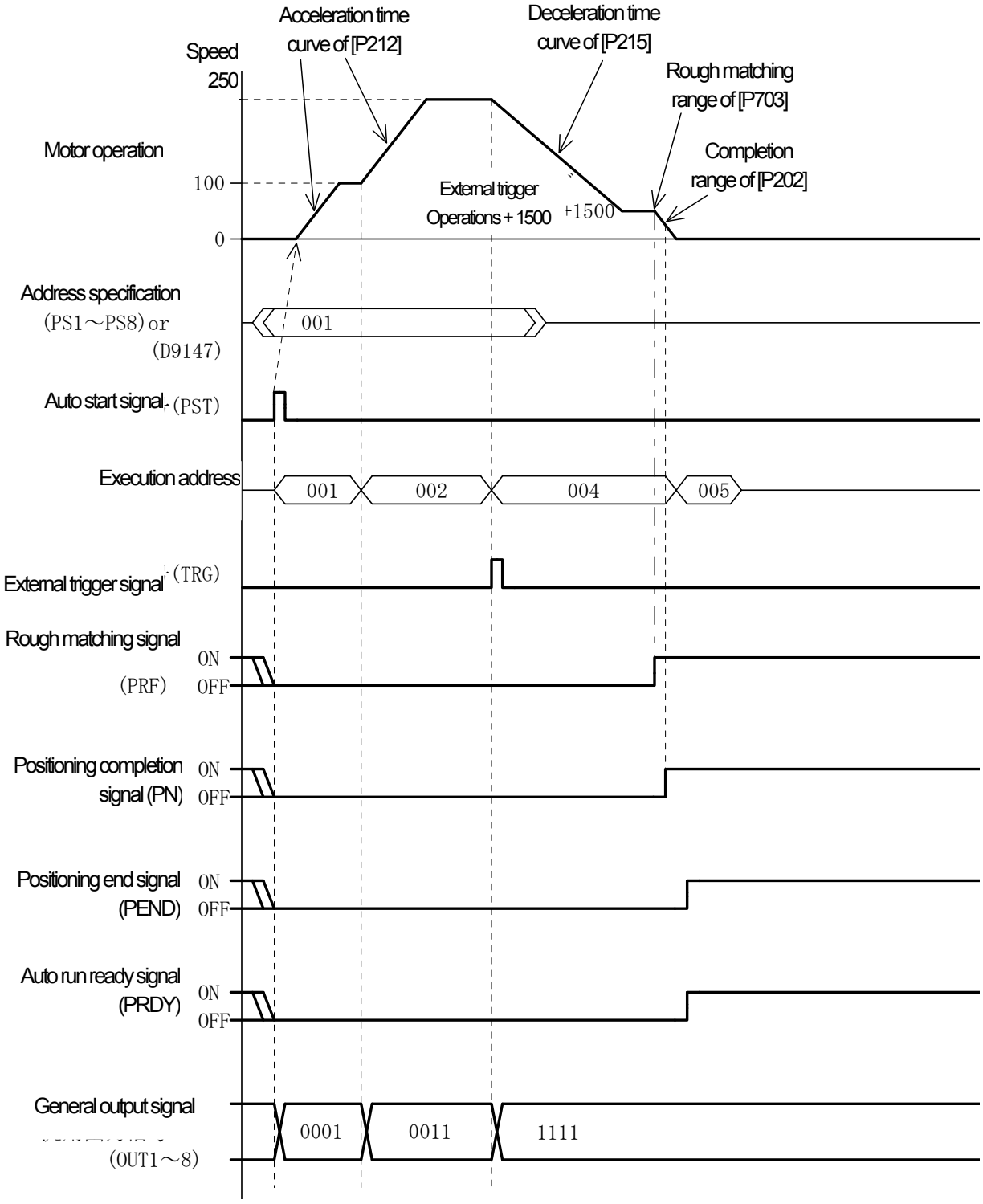


[Motion example]

{Motion example _2 determining simple continual status_2}

(When external trigger position is to be determined)

ADDR	CMD	POS	A/I	F	UPDN	TRG	OUT	Remarks
001	CONT	600	INC	100	SEL.2	1500	00000001	
002	CONT	1800	INC	250	X	X	00000011	Invalid data though X is set
003	CONT	900	INC	200	X	X	00000111	Invalid data though X is set
004	CONT	300	INC	50	X	X	00001111	Invalid data though X is set
005	PEND	——	—	—	—	——	——	



4-6-6 [REPT] Repetitive positioning

[Function]

- This command performs the following positioning operation which includes the following functions
  (After completion of this command, executes the next address command)
  (1)In relative position 'POS', positioning of speed 'F' is executed after repeating for the frequency set in 'REPT'
  (2)Accel. /Decel. time is controlled as per the Accel. /Decel. time selection 'UPDN'
  (3)After input of external trigger signal (TRG) on position TRG', performs external trigger positioning.
  If the 'TRG' set value is small and specified deceleration is not possible by the speed at the time of external trigger signal input, positioning is done by sudden deceleration. But, [deviation over flow] or [deviation abnormality] occurs due to machine inertia since it does not comply with motion of motor.
  (4)On starting this command, outputs the data (M00-M99) set in 'M' and this data is maintained till next M output executes the valid setting status command.
  (5) M sign in output in 2 digits BCD code (00-99).
  (6) After startup of this command, outputs the rough matching sign (PRF) when current position reaches [P703: rough matching range]
  (7) After startup of this command, outputs the positioning completion signal (PN) till position deviation pulse reaches [P202: Positioning completion range]
  (8) Positioning done on position set in "POS', is as follows on the basis of output setting conditions 'M'
  (▪ Output / ▪ Do not output)
  ▪ ▪ Outputs M strobe signal (MSTB) and waits for input of M completion signal (MFIN). After the M completion signal is input, turns OFF the output of M strobe signal and then remaining operations of this command , completion of this command is done.
  ▪ Remaining operations of this command probably completion of this command is done.
  (9) If this command is executed when M completion signal is entered, M strobe signal is not output till M finish signal input is turned to OFF.
  (10) While operating, if hold signal (HLD) is entered, stops the deceleration as per 'UPDN' goes in Waiting to restart status and outputs auto run ready signal (PRDY)
  Restarts repetitive positioning from stop position as per re-start.
  (11) When hold signal (HLD) is entered while M completion signal (MFIN) is in "Waiting to input' status, returns to 'Waiting to restart' status with M output signal data held in the existing status and outputs automatic operation ready signal(PRDY)
  Further, when M completion signal is input in 'Waiting to restart' status, turns OFF the output of M strobe signal and reopens the repetitive positioning after restart.
  (12) At the time of this command execution, when block stop signal (BSTP) is ON, stops the program operation when the entire set frequency positioning is complete (Input of M completion signal when M output is valid). Then returns to 'Waiting to restart status' and outputs auto run ready signal (PRDY)
  Executes next address command after restart.
  (13) For data of positioning position, speed, general-purpose output, and numeric value input (Direct data Specification or index data specification is possible.

(1) Title display	Settings contents		
↑ Display sequence	Settings unit	Settings range (Direct data) (Index data)	Initial value
	Remarks (Details and supplement related to settings)		

[Setting] {Group 0: REPT}

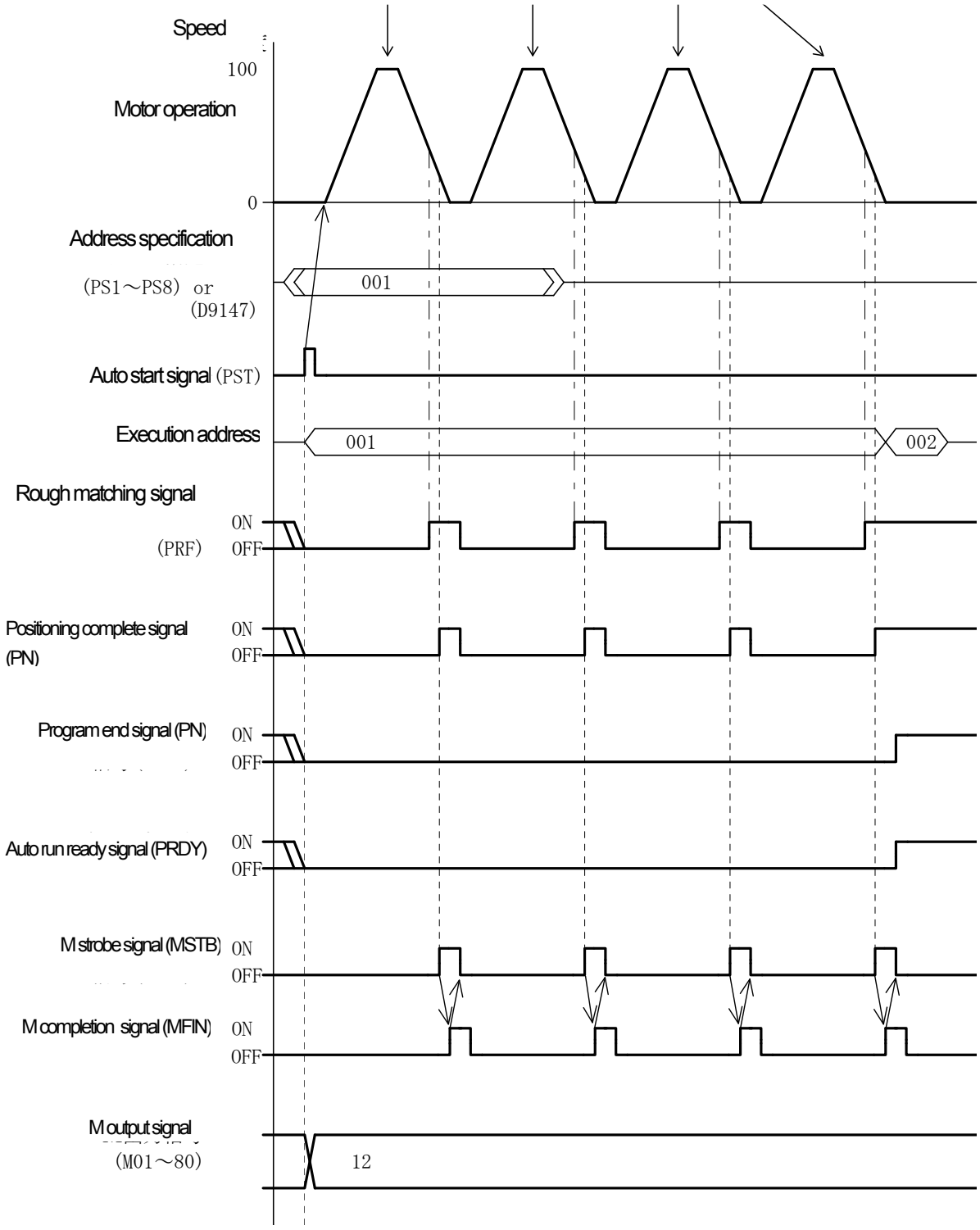
(1) POS…	Position data and positioning direction		
	mm, °,inch	-99999999-99999999 IX00-IX99	00000000
	●Increment data: Sets the positioning amount and positioning direction from current position. (Relative position) ●Absolute data : Sets the target position and direction from position data standard point (Absolute position) ●Decimal point position of set value is as per the [P302: Command unit]		
(2) AM..	TYPE of positioning data (Absolute position /Relative position)		
	None	ABSOLUTE/INCREMENT	INCREMENT
	●Usually, INCREMENT is set.		
(3) F…..	Positioning speed		
	mm/s, °/s, inch/	0000000-9999999 IX00-IX99	0000000
	●Decimal position of set value is as per the [P302: Command unit] ●When set value is "0", operates with minimum set unit speed.		
(4) UPDN…	Selecting Accel./Decel. speed time Accel./Decel. time		
	None	SEL.1/SEL.2/SEL.3	SEL.1
	●For selection/setting method of Accel./Decel. speed time, refer to "Chapter 3 Settings"		
(5) TRG…	External trigger position data		
	mm, °,inch	00000000-99999999 IX00-IX99	00000000
	●Decimal position of set value is as per the [P302: Command unit] ●Positioning direction is as per the "POS" data. ●When set value is "0", does not perform external trigger positioning		
(6) M…	M output data		
	BCD 2 digits	00-99 IX00-IX99	/00
	●For setting method, refer to "Chapter 3 Settings"		
(7) REPT.	Positioning repetition frequency		
	None	00000-65535 IX00-IX99	00000
	●When set value is "0", does not perform repetitive positioning		

[Motion example]

{Repetitive positioning Motion example}

ADDR	CMD	POS	A/I	F	UPDN	TRG	M	REPT	Remarks
001	REPT	80	INC	100	SEL.2	0	12	4	
002	PEND	—	—	—	—	—	—	—	

※ Each positioning is same as the POS command



4-6-7 [SHOM] Zero return

[Function]

●This command executes the Zero return operation that has the following functions
(After completion of this command, executes next address command)

(1)Points other than the following are same as the operation of zero return operation

(2)Zero return method is as per the settings of 'TYPE'

(3)Zero return direction is as per the settings of 'DIR'.

(4) When hold signal (HLD) is entered during operation, decelerates and stops as per the [P214: Deceleration time 1]. Then it returns to Waiting to restart status and outputs auto run ready signal (PRDY).
Executes this command from the beginning after restart

(5) At the time of executing this command, when block stop signal (BSTP) is ON, stop program operation on completion of this command. It returns to "Waiting to restart' status and outputs auto run ready signal (PRDY).
Executes the next command after restart

(6)After the completion of Zero return , output rough matching signal(PRF) and positioning completion signal (PN) and complete this command.

(7)For data of general output, numerical value input (Direct data specification) or direct data specification is possible.

(8)General output is given while starting the command.

●For Motion example, refer to example of HOME command.
However, for output timing of program end signal (PEND) and auto run ready signal (PRDY) refer to example of POS command.

(1) Title display	Setting contents		
↑ Display sequence	Set units	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details and supplement related to settings)		

[Setting] {Group 5 :SHOM }

(1) TYPE….	Zero return method		
	None	STD.HOME/LS LESS /STOP HOME /OT HOME	STD.HOME
	●Specification of each method is same as parameter [P402:Zero return method selection] .		
(2) DIR..	Zero return Direction		
	None	FORWARD/REVERSE	FORWARD
	●Definition of rotation Direction is same as parameter [P300:Rotation Direction selection]		
(3) OUT..	General output data		
	Binary	00000000-11111111 IX00-IX99	/00000000
	●For setting method, refer to “Chapter 3 Settings”.		

4-6-8 [SIND] Positioning position

[Function]

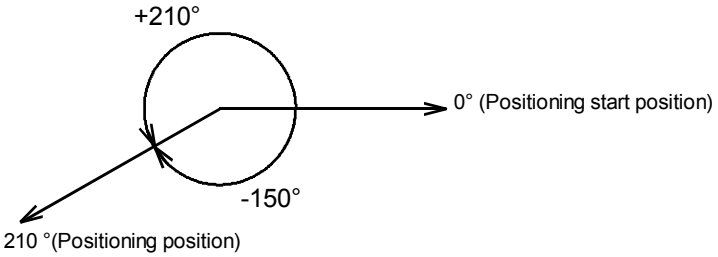
- This command performs the Positioning position operation of rotor which includes the following functions.

(After completion of this command, executes next address command)

(1) Positioning of rotor is done by speed 'F' on absolute position 'POS' by small rotation

For example, when positioning is to be done from 0° to 210° by a rotor, that rotates 360° in one rotation, rotates 210° in positive direction and 150° towards negative direction.

Then positioning is done with the smallest "negative direction" in rotation operation.



[Diagram 4-5] Concept of positioning

(2) Set 1 rotation data in [P305: Rotation unit position range]

However, for setting of 1 rotation data, alarm rings and then stops when this command is executed by "0"

(3) When 'POS' setting value is more than "1 rotation data", rotate for set volume and stop.

(4) Accel./Decel. time is controlled as per the Accel./Decel. time selection 'UPDN'

(5)While operating, once the stop signal (HLD) is entered, stops the deceleration as per 'UPDN' goes in Waiting to restart status and outputs auto run ready signal(PRDY)

Restarts positioning position from stop status as per re-start.

(6)This command stops the program operation upon completion of this command when block stop signal(BSTP) is ON at the time of execution of this command. Returns to restart awaited status and outputs automatic operation ready signal(PRDY)

Executes next address command as per re-start.

(7) When positioning position reaches [P703:fault-matching range], output rough matching signal(PRF)

(8)After positioning command completion, when the positioning deviation pulse reaches [P202: completion Range], output positioning completion signal (PN) and this command is complete

(9)For data of positioning position, speed, general-purpose output, numeric value input (Direct data) or index data specification is possible.

(10)General-purpose output is output at command startup.

●For Motion example, refer to INDX command example

However, for output timing of program end signal (PEND) and auto run ready signal (PRDY), refer to POS command example

(1) Title display	Set contents		
↑ Display sequence	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details and supplement related to settings)		

[Setting] {Group 5: SIND}

(1) POS..	Position data		
	mm, °,inch	00000000-99999999 IX00-IX1999	00000000
	●Position data sets the positioning of rotating unit from position data standard point ●Decimal point position of set value is as per [P302 : Command Unit]		
(2) F….	Positioning speed		
	mm/s, °/s, inch/s	0000000-9999999 IX00-IX99	000000
	●Decimal point position of set value is as per [P302 : Command Unit] ●When set value is "0", operates with minimum set unit speed.		
(3) UPDN.	Accel./Decel. time selection		
	None	SEL.1/SEL.2/SEL.3	SEL.1
	●For selection/setting method of Accel./Decel. time, refer to "Chapter 3 Settings"		
(4) OUT.	General output data		
	Binary	00000000-11111111 IX00-IX99	/00000000
	●For setting method, refer to "Chapter 3 Settings".		

4-7 Group 6 Command Specifications (VC-C1)

4-7-1 [CPOS] Continuous position control

[Function]

●This command is valid to only machine type [VC-C1].

●This command controls the position which includes the following function.
(After completion of this command, executes the next address or specified next address command.)

(1)This command controls the position using the combination of the following continuous control commands.

- •Continuous Position Control Command 'CPOS'
- •Continuous Speed Control Command 'CPSD'
- •Continuous Torque Control Command 'CTRQ'
- •Continuous Control End Command 'CEND'

However, there are following restrictions while executing a command with the combination of this command.

- •While executing this command from Speed Control Command 'CPSD' or Torque Control Command 'CTRQ', execute it from the halt condition.
  While executing this command in operating status, it controls the position after emergency stop.
  If tracking is not possible at the time of sudden stop of motor then alarm for overflow, deviation error, overload error etc rings.
- •Don't use this command for reversing the motor direction in combination with other commands.
  If the operating direction is reversed, controls the position in reserved direction after emergency stop.
  If tracking is not possible at the time of emergency stop of motor then alarm for overflow, deviation error, overload error etc rings.

(2) Set 'POS' in position and 'F' in speed as per absolute position or Increment specification 'A/I'

(3) Controls Accel./ decal. time as per the selection of Accel./ decal. time 'UPDN'.

(4) Following are the types of method to end this command.

- •After completing the positioning command, if the position deviation pulse reaches [P202: Completion range] then end this command and execute the command of next address.
  And, at that time output the positioning completion signal (PN).
  However, when speed setup value (F) is 0, in this condition this command does not end.
- •After external trigger delay operation by external trigger signal (TRG), end this command and execute the command of next address.
- •End this command in accordance with the internal end conditions and execute the command of specified address.
  When internal end conditions matches even during internal trigger delay operations, end the command.
  Refer to [4-7-5 Internal end condition] for the details of internal end conditions.

(5) Execute external trigger delay operations by input of external trigger signal (TRG).
External trigger delay operation means, keeping the position at the time of external trigger signal input as base and end the command under execution and execute the command of next address after the distance operation by external trigger delay distance ‘‘TRG’.
For the Operation speed of External trigger delay operations, maintain the speed at the time of external trigger signal input, and when the speed is maintained execute the command of next address.
In this command the external trigger signal (TRG) is valid in ON edge regardless of [P411: External trigger level selection].

(6) When Hold (HLD) is input during operations, motor decelerates and stops according to ‘UPDN’, it moves to ‘Waiting for restart’ status and auto run ready signal (PRDY) is output.
While restarting, start from continuous control end command ‘CEND’.

(7) If [P703: Rough matching range] is reached regarding the positioning position, rough matching signal is output.

(8) General output is output while starting the command.

(9) When this command is being executed, override signal is invalid.

(10) When this command is being executed, changing the torque restrictions value in torque limit signal (TL) is valid.

(11) This command cannot be stopped by block stop signal.

[Settings]

(1) Title Display	Settings		
↑ Display order	Setting Unit	Setup Range (Direct Data) (Index Data)	Initial value
	Remarks (Details and Supplementary explanation related to setting)		

((Group 6: CPOS))

(1)POS・・	Position and positioning methods		
	mm, °,inch	-99999999~99999999 IX00~IX99	00000000
	●Increment Data: Setup positioning amount and positioning direction from current position. (Increment) ● Absolute Data: Setup the target position and direction from Position data standard point. (Absolute position) ● For decimal point position of the value set is according to [P302: Command unit].		
(2) A/I・・	Type of Position data (Absolute /Increment position)		
	None	ABSOLUTE/INCREMENT	INCREMENT
(3) F・・・・	Speed		
	Mm/s,°/s,inch/s	0000000~9999999 IX00~IX99	000000
	●For decimal point position of the value set is according to [P302: Command unit]. ●When setting value is 0; the speed is set to the lowest setting unit. ●When [IX60] is set; the speed is same as while starting the operation. ●When [IX64] is set; it operates with the speed according to Speed command analog input. At this time when the speed command is below 0, then speed is of the lowest set unit. ●In setup of index data specification, if the contents of index data are changed during operations and the changed speed is reflected during execution. However, in the following cases the speed is not reflected during execution. •When speed is changed due to the changes in index data number. •When [IX60] is specified. •During external trigger delay operations.		
(4) UPDN・	Accel. / Decel. time selection		
	None	SEL.1/SEL.2/SEL.3	SEL.1
	● Refer to [Chapter 3 Settings] for the details of Accel./ Decel. time selection and setting methods.		
(5) TRG・・	External trigger delay distance		

	Mm, °, inch	-99999999~99999999 IX00~IX99	00000000
	●For decimal point position of the value set is according to [P302: Command unit]. ●Position direction is according to operation direction. ●When setup value is [0]; there is no external trigger delay operation. ●When setup value is negative, execute next command when the external trigger signal is input.		

(6) OUT・・	General output data		
	Binary	00000000~11111111 IX00~IX99	/00000000
	● Refer to [Chapter3 Settings].		
(7) COND・	Internal end condition		
	None	00000~65535 IX00~IX99	00000
	● When numerical value data is specified, internal end condition becomes invalid. ● When index data is specified, internal end conditions are assessed in the specified index data contents and this command ends. ● Refer to [4-7-5 Internal end conditions] for the contents of internal end condition.		

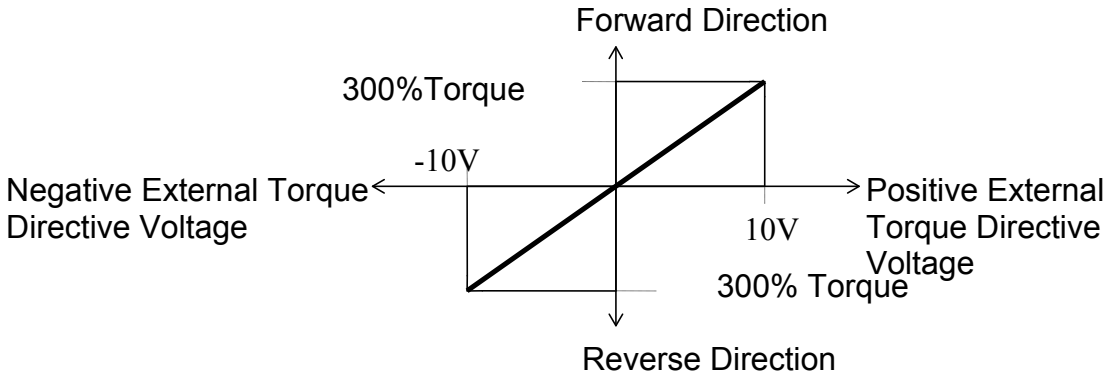
4-7-2 [CTRQ] Continuous Torque Control

[Function]

●This command is valid only for [VC-C1] machine type.
●This command controls the torque with the following functions.
(After completion of this command, execute the command of next address or specified address.)

(1) This command controls the torque in combination with following continuous control command.
- •Continuous position control command 'CPOS'
- • Continuous speed control command 'CPSD'
- • Continuous torque control command 'CTRQ'
- • Continuous control end command 'CEND'

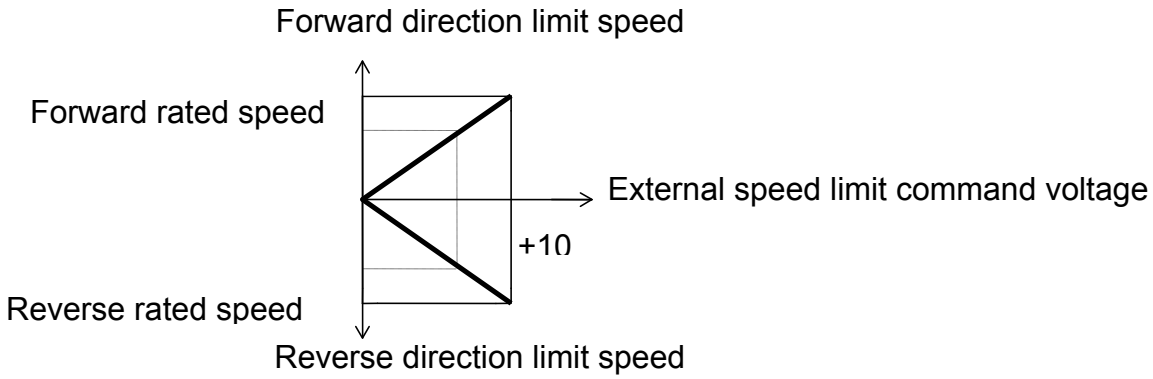
(2) Execute Torque control as per the torque command 'TRQ%'.
If [IX65] is selected by torque command, operations are performed by External torque command (TQH).
Relation between external torque command voltage and motor output torque is as follows.
- • Motor output torque is compared with the external torque command voltage and it is output torque of 300% in DC±10V. (Rated value torque is 100%)
- • Motor in external torque command of positive voltage output voltage generates in forward direction.
Motor in external torque command of negative voltage output voltage generates in reverse direction.



［Fig 4-6］ Relation of external torque command voltage and motor output torque

(3) Controls the torque by restricting the speed as per speed restrictions 'F'.
In this command, speed is not restricted by P133 [Speed limit value].
In this command, when 'external speed limit valid' is selected in parameter P132 [External Speed Limit valid/invalid selection], speed is controlled with external speed control command (INH) or speed limit 'F' whichever is lower.
Relation between External speed limit command voltage and Speed limit command motor output torque is as follows.

•Motor's largest rotation value is compared with the value of external speed limit command and rated rotation value is reached with DC+10V.
•External speed limit command is a common setting to both Forward direction and Reverse direction.



［Fig. 4-7］ Relation between speed limit command and number of motor rotations

(4)The method to end this commands are as follows.
•After External trigger delay operation by External trigger signal (TRG), end this command and execute the command of next address.
•End this command matching with the internal end conditions and execute the command of specified address.
When the internal end conditions matches even during external trigger delay operations, end the command.
Refer to "4-7-5 Internal End Conditions"for details.

(5) Perform external trigger delay operation by input of external trigger signal (TRG).
External trigger delay operation means, keeping the position at the time of external trigger signal input as base and after the range operation as per the external trigger delay distance ''TRG', ends the command which is in execution and executes the command of next address.
For the Operation speed of External trigger delay operations, maintain the speed at the time of external trigger signal input, and when the speed is maintained execute the command of next address.
In this command the external trigger signal (TRG) is valid in ON edge regardless of [P411: External trigger level selection].

(6) When Hold (HLD) is input during operations, motor decelerates and stops according to 'P216: Decel. time 3", it moves to 'servo locked' status and auto run ready signal (PRDY) is output.
While restarting, start from continuous control end command 'CEND'.

(7)General output is output while starting the command.

(8) When this command is being executed, override signal is invalid.

(9) When this command is being executed, changing the torque restrictions value in torque limit signal (TL) is valid.

(10) When this command is started, the positioning completion signal (PN) and rough matching signal (PRF) are OFF.

(11)This command cannot be stopped by block stop signal.

[Setting]

(1) Title Display	Settings		
↑ Display order	Setting unit	Setup range (Direct Data) (Index data)	Initial value
	Remarks (Details and Supplementary explanation related to setting)		

((Group6: CTRQ))

(1) TRQ% ・	Torque Command		
	%	-300.0~300.0 IX00~IX99	000.0
	● When [IX65] is set, operation on torque is done by torque command analog input. ● When index data is updated in index data specifications during operations, the updated torque will be reflected. However, the torque cannot be updated by updating the index data number.		
(2) F ・・・・	Speed Limits		
	mm/s,°/s, inch/s	0000000~9999999 IX00~IX99	000000
	● Decimal point position of setting value is according to [P302: Command Unit]. ● When the setting value is [IX60], the operation speed while starting the command is the limit speed. ● When index data is updated in index data specifications during operations, the updated torque will be reflected. However, the speed cannot be updated in following cases. • When the speed is changed due to changes in index data number. •When [IX60] is specified.		
(3) TRG ・・	External trigger delay distance		
	mm, °,inch	-99999999~99999999 IX00~IX99	00000000
	● Decimal point position of setup value is according to [P302: Command Unit]. ● Position direction is according to [Torque value] data. ● When setting value is [0], the external trigger delay operation is not performed. ● When setup value is negative, execute next command when external trigger signal is input.		
(4) OUT ・・	General output		
	Binary	00000000~11111111 IX00~IX99	/00000000
	● Refer to [Chapter 3 Setting] for setting method.		
(5) COND ・	Internal end condition		

	No	00000~65535 IX00~IX99	00000
	● When numerical data is specified, internal end condition is considered as invalid. ● When Index data is specified, internal end conditions are assessed in the specified index data contents and this command ends. ● Refer to [4-7-5 Internal end condition] for the contents of internal end conditions.		

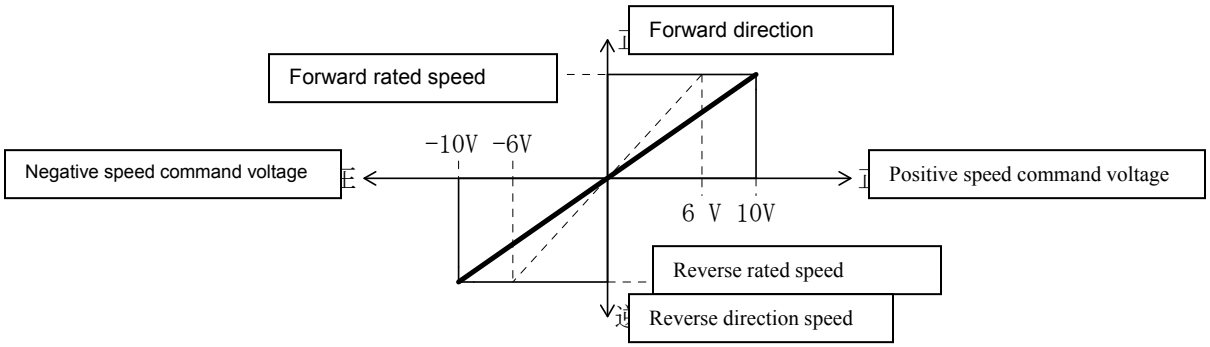
4-7-3 [CSPD] Speed Control

[Function]

●This Command is valid only for [VC-C1] machine type.
●This command controls the speed which includes the following functions.
(After completion of this command, executes the command of next address or specified address.)

(1) This command controls the speed using the combination of the following continuous control commands.
- Continuous position control command 'CPOS'
- Continuous speed control command 'CPSD'
- Continuous torque control command 'CTRQ'
- Continuous control end command 'CEND'

(2) Controls the speed according to the speed command 'F+－'.
If [IX64] is selected by speed command, the speed is controlled by external speed command (INH).
Relation between external speed command and speed is as follows.
- Speed is compared with the external speed command voltage and it is the speed in case of rated rotation in DC±10V.
Also, by parameter P129 "Speed command gain", it is possible to set the speed command voltage range between DC±6V~±10V for which the motor is run in rated rotations.



[Fig. 4-8] Relation between external speed command and motor rotation speed

(3) The accel. / decal. speed during execution of this command, is according to parameter [P213: Acceleration time 3] and [P216: Deceleration time 3].

(4) Limit the torque as per torque limit 'LIM%'.

(5) Following are the types of method to end the commands.
- After external trigger delay operation by external trigger signal (TRG), end this command and execute the command of next address.
- End this command by conditions matching with internal end conditions and execute the command of the specified address.

End this command when internal end conditions are matching even during delay operations of external trigger.
Refer to [4-7-5 Internal end conditions] for the details of internal end conditions.

(6) Perform external trigger delay operation by input of external trigger signal (TRG).
External trigger delay operation means, the position at the time of external trigger signal input is considered as base and after the range operation as per the external trigger delay distance ‘‘TRG’, the command which is in execution is completed and the command of next address is executed.
For the operation speed of external trigger delay operation maintain the speed at the time of external trigger signal input, and when that speed is maintained execute the command of next address.
In this command the external trigger signal (TRG) becomes valid in ON edge regardless of [P411: External trigger level selection].

(7) While in motion with the input of halt signal (HLD), following [P216: Deceleration time 3] there is a deceleration stop and servo lock condition occurs. Also there is output of Automatic drive or start ready signal (PRDY).
At restart, the start is from Serial control end command ‘CEND’.

(8) General output is output at the start of command.

(9) While this command is in execution, override signal is ineffective or invalid.

(10) While this command is in execution, changing of torque limiting value in Torque limit signal(TL) is valid.

(11) At start of this command, the Positioning completion signal (PN) and Fault matching signal (PRF) are Off.

(12) This command cannot be stopped with block stop signal.

[Settings]

(1) Title Display	Settings Contents		
↑ Display sequence	Settings unit	Settings range (Direct data) (Index data)	Initial value
	Remarks(Details and supplement related to settings)		

((Group 6 :CSPD))

(1) F+ - • •	Speed command		
	Mm/s,°/s,inch/s	-9999999~9999999 IX00~IX99	000000
	● Decimal point position of set value is according to [P302: Command Unit]. ● When the set value is [IX60], the motion speed when starting the command becomes the speed command. ● When settings are [IX64], the speed is according to speed command analog input. ● When the contents of index data in settings of that index data specification are changed during the motion, the changed speed is reflected. However, the changed speed can not be reflected in the following cases. • When the speed is changed according to the index data number. • When [IX60] is specified.		
(2) LIM % •	Torque Limit		
	%	000.0~300.0 IX00~IX99	000.0
	●Torque limit direction follows the sign of speed command (F+ -). Torque limit is in positive direction, when speed command (F+ -) is positive, Torque limit is in negative direction, when speed command (F+ -) is negative, The torque limit when Speed command (F+ -) is 0 is invalid. ● When set value is [0], torque limit cannot be set by these settings. ● The smallest value amongst highest torque value of motor, parameter P109~P110 and this settings is set as torque limit value. When TL signal is ON, then parameter P111~P112 become valid. ● When the contents of index data in settings of that index data specification are changed during the motion, the changed torque is reflected. However, you cannot change the torque according to index data number.		
(3) TRG • •	External torque delay distance		
	mm, °,inch	-99999999~99999999 IX00~IX99	00000000
	● Decimal point position of set value is according to [P302: Command Unit]. ● Position direction is according to [Speed command value] data. ●When Set value is [0], the External trigger delay operation is not performed. ● When set value is negative the next command is executed when external trigger signal is input.		
(4) OUT • •	General output		
	Binary	00000000~11111111 IX00~IX99	/00000000

	● Refer to [Chapter 3 Settings] for settings method.		
(5) COND・	Internal end condition		
	No	00000~65535 IX00~IX99	00000
	● When numerical data is set, Internal end condition is considered as invalid. ● When index data is set, internal end condition is judged by the contents of specified index data and this command is completed. ● Refer to “4-7-5 Internal end condition” for the contents of Internal end condition		

4-7-4 [CEND] Continuous Control End

[Function]

●This command is valid only for [VC-C1].

●This command executes continuous control end which includes the following functions.
(After completion of this command, executes next address command.)

(1) This command executes continuous control end with the combination of the following continuous control commands.
- •Continuous Position Control Command ’CPOS’
- •Continuous Speed Control Command ‘CPSD’
- •Continuous Torque Control Command ‘CTRQ’

In control end of continuous control command, the motor moving status changes to ‘Servo lock’ status due to motor deceleration and stoppage as per [P216: Deceleration Time 3]. The alarm rings when continuous control command is not ended by this command.

(2) General output is given when the command starts.

(3) The Positioning completion signal (PN) and Rough matching signal (PRF) maintain the status before this command is executed.

(4)This command cannot be stopped by block stop signal.

[Settings]

(1) Title Display	Settings contents		
↑ Display sequence	Settings unit	Settings range (Direct data) (Index data)	Initial value
	Remarks(Details and supplement related to settings)		

((Group 6 :CEND))

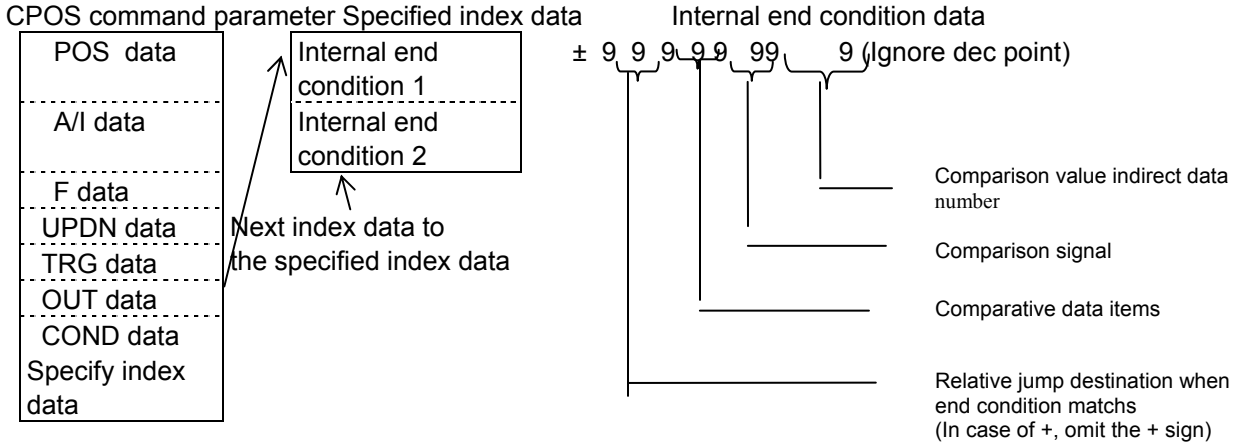
(1) OUT・	General output		
	Binary	00000000~11111111 IX00~IX99	/00000000
	●Refer to [Chapter 3 Settings] for settings method.		

4-7-5 Internal End Condition

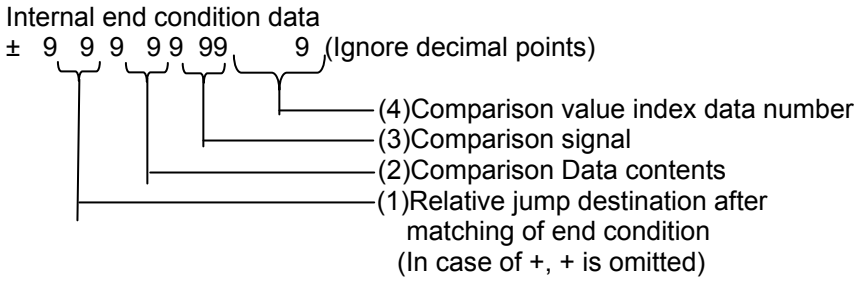
With internal end condition, continuous control command is ended and it is set by the parameter [COND] of the continuous control command.
Two types of internal end conditions such as internal end condition 1 and internal end condition 2 can be set.
The Internal end condition 1 and internal end condition 2 are judged separately in this controller and when any of the condition is matched, the executing command ends and the status changes to the address destination specified in the condition.

(1) Entire diagram of Internal End Condition Settings

The Settings of Internal end condition are given below with the example of CPOS command.



(2) Contents of Internal End Condition Data



(1) Jump to relative destination on matching the end condition

Specify the jump destination after matching of internal end condition.
Assuming current execution address as 0, specify by relative address.
However, there are the following exceptions.

- When 0 is specified internal end condition becomes invalid.
- When + 9 is specified, then jumps to the last address of the continuous control command currently in execution.

Example)

Current execution address	Relative jump destination set value after matching of end condition	Execution address after match of end condition
15	-5	10(15-5)
15	0	Internal end condition invalid
15	+1	16 (15+1)
15	+5	20 (15+5)
15	+9	Address of CEND command

(2) Data contents for comparison

Specify the comparison Data contents of internal end condition.
Set value of Data contents in comparison and item contents are as follows.

Comparison data contents value	Comparison data contents	Unit
00 ※1	Data 0	No
01 ※2	Remaining distance to be traveled for positioning	Settings unit
02	Relative position (Relative position assuming command start position as 0)	Settings unit
03	Absolute position	Settings unit
04	Feedback speed	Settings unit /sec
05	Actual torque command value	0.1%
06	Time (Time assuming command starting time as 0)	10ms

07	Index data 64 (Speed command analog input value)	DA analysis
08	Index data 65 (Torque command analog input value)	DA analysis
09~99	Exclusively used manufacturer (Do not select.)	

※1: Assuming comparison data as [0] compare with the comparison value.

※2: Remaining distance to be traveled for positioning is valid by CPOS command. However, internal end conditions are invalid during external trigger delay motion. Remaining distance to be traveled for positioning is set for any command When Remaining distance to be traveled for positioning is set by the command other than CPOS command, internal end conditions become invalid.

(3) Comparison Signal

Specify the comparison data contents, comparison value index data contents and comparison symbols of internal end conditions.

The comparison symbol set value and comparison signal contents are as given below.

Comparison signal Set value	Comparison signal
0	≥(Contents of comparison data ≥ Contents of comparison value index data number)
1	≤ (Contents of comparison data ≤Contents of comparison value index data number)
2	>(Contents of comparison data >Contents of comparison value index data number)
3	<(Contents of comparison data <Contents of comparison value index data number)
4	=(Contents of comparison data =Contents of comparison value index data number)

(4) Comparison value index data number

Specifies the index data number which includes comparison data contents and comparison value to be compared of internal end conditions.

Settings range is from 0~99 and 1000 controllers reflect offset of index data 61.

For details of Index data, refer to [VC-C1User's Manual]-[Chapter 8 Index data].

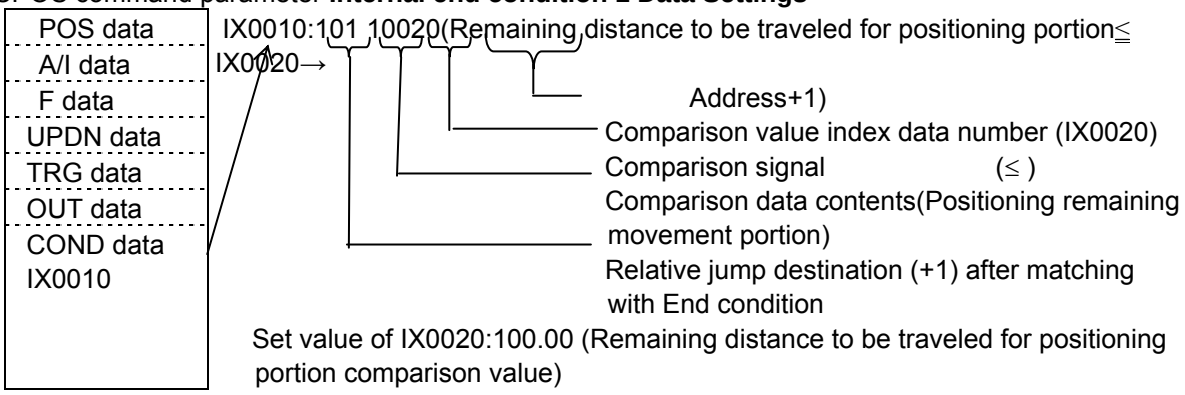
(5) Example of internal end condition settings

Example of internal end condition is as given below.

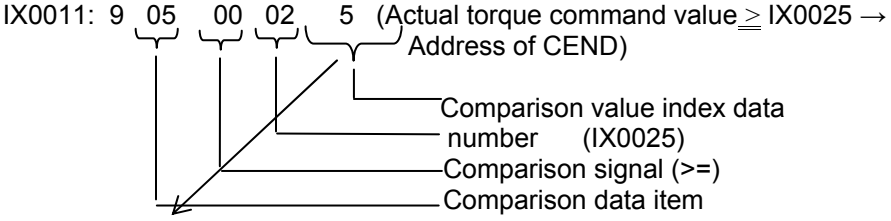
Internal end condition 1: Jump to next address if the positioning remaining movement is less than 100.00 mm.

Internal end condition 2: End continuous control if actual torque command value is more than 150.0%.

CPOS command parameter **Internal end condition 1 Data Settings**



Internal end condition 2 Data Settings



(Actual torque command voltage)
Relative jump destination (+1) after matching the end condition (to address of CEND)

IX0025:1.5.00 (Actual torque command comparison value)
Therefore, % data is in 0.1% unit ignoring the decimal point.

(6) Restrictions of internal end conditions

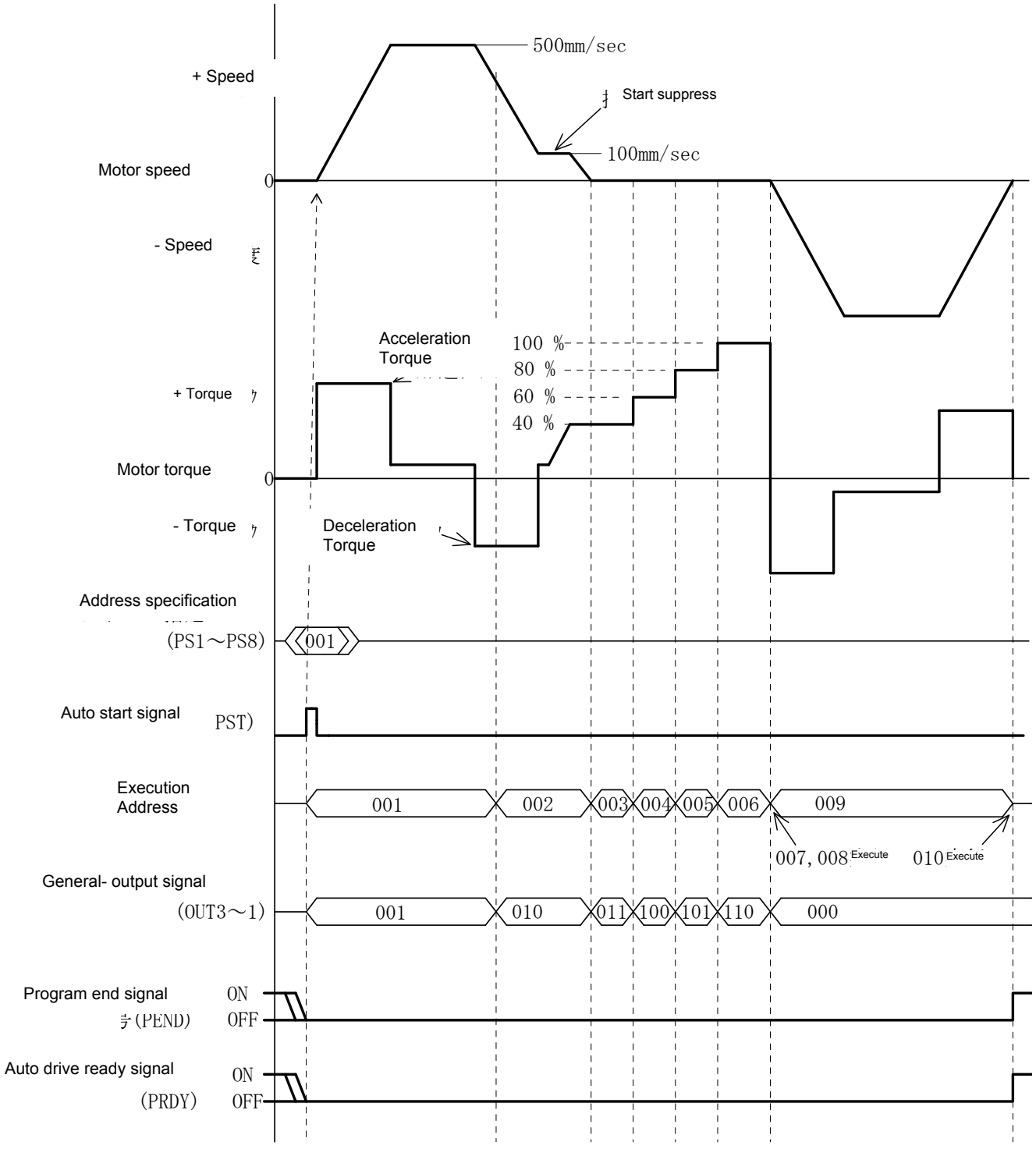
In the following cases the alarm is stopped.

- When jump destination after matching of internal end condition is other than continuous control command. [CONT ERR] alarm
- When jump destination after matching of internal end condition is 0. [ADDR ERR] alarm
- When jump destination after matching of internal end condition is other than or outside the address range. [ADDR ERR] alarm
- When comparison value index data number is set outside the settings range. [IXNO ERR] alarm
- When internal end condition 1 and 2 match at the same time, then priority is for internal end condition 1.
- Internal end condition data is decided while starting the command, i.e. even though internal end condition data is changed during execution, it will not be reflected. However, if the comparison value indicated by comparison value index data is changed during execution, then the comparison is done with the changed value.
- Do not specify the Index data 99 (IX99) in internal end condition. When this Index data is specified, internal end condition 2 becomes invalid.

4-7-6 Example of continuous control command operation

((Operation example_1)) Suppress control for specified time
Reach to a position to be suppressed using position control and start suppressing using speed control on reducing the speed.
After this, change the torque value for each specified time and execute suppressing .

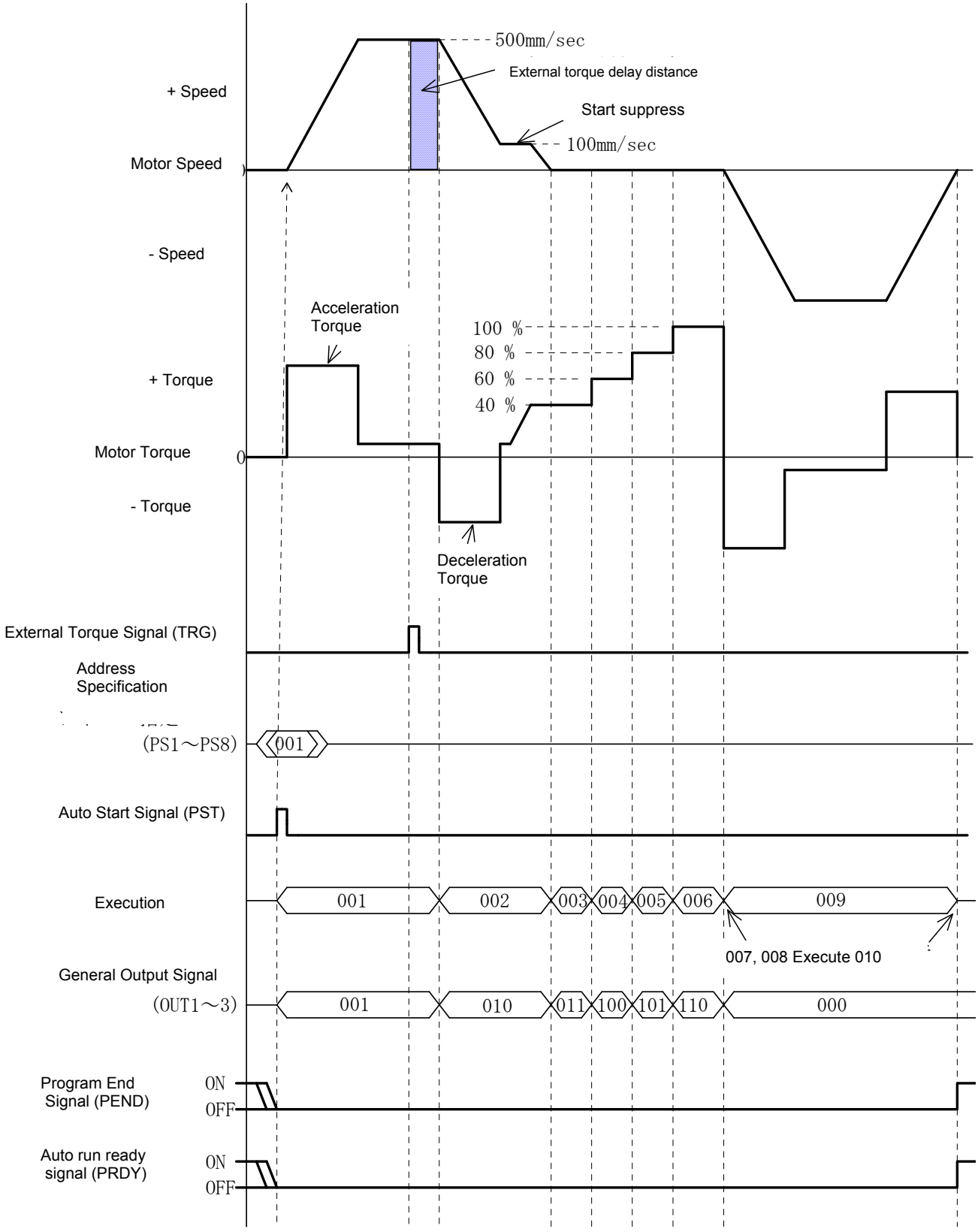
ADDR	CMD	POS/TRQ%/LIM%	A/I	F/F+ -	TRG	OUT	UPDN	Remarks
		In COND ( ) / IX+1 number	IX+0 data / IX+1 data	Explanation of internal end condition 1 / Index data contents are in ( ) / Explanation of internal end condition 2 / Index data contents are in ( )				
001	CPOS	POS 1000	ABS	500	0	00000001	SEL.1	
		IX0010 (IX0011)	10110000	Remaining distance to be traveled for positioning ≦ IX0000 (160mm) → to next ADDR				
			0000000	Invalid				
002	CSPD	LIM% 40.0	---	100	0	00000010	-----	
		IX0012 (IX0013)	10500001	Actual torque command value≥IX0001 (40.0%) → to next ADDR				
			0000000	Invalid				
003	CTRQ	TRQ% 40.0	---	100	0	00000011	-----	
		IX0014	10600002	Time ≥IX02 (150ms) → to next ADDR				
		(IX0015)	0000000	Invalid				
004	CTRQ	TRQ% 60	---	100	0	00000100	-----	
		IX0014	10600002	Time ≥IX02 (150ms) → to next ADDR				
		(IX0015)	0000000	Invalid				
005	CTRQ	TRQ% 80.0	---	100	0	00000101	-----	
		IX0014	10600002	Time ≥IX02 (150ms) → to next ADDR				
		(IX0015)	0000000	Invalid				
006	CTRQ	TRQ% 100.0	---	100	0	00000110	-----	
		IX0014	10600002	Time ≥IX02 (150ms) → to next ADDR				
		(IX0015)	0000000	Invalid				
007	CTRQ	TRQ% 100.0	---	100	0	--------	-----	
		IX0016	10440099	Speed＝IX99 (0mm/s) → to next ADDR				
		(IX0017)	0000000	Invalid				
008	CEND	----------	---	-----	-------	00000000		
009	SPOS	0	ABS	500	0	--------		
010	PEND	----------	---	-----	-------	--------		


500mm/sec
+ Speed
Start suppress
100mm/sec
Motor speed
0
- Speed
Acceleration
Torque
100 %
80 %
60 %
40 %
+ Torque
Motor torque
0
- Torque
Deceleration
Torque
Address specification
(PS1～PS8)
001
Auto start signal
PST)
Execution
Address
001
002
003
004
005
006
009
007, 008 Execute
010 Execute
General- output signal
(OUT3～1)
001
010
011
100
101
110
000
Program end signal
ON
(PEND)
OFF
Auto drive ready signal
ON
(PRDY)
OFF

((Operation example_2)) Suppress control with external torque delay operation for specified time

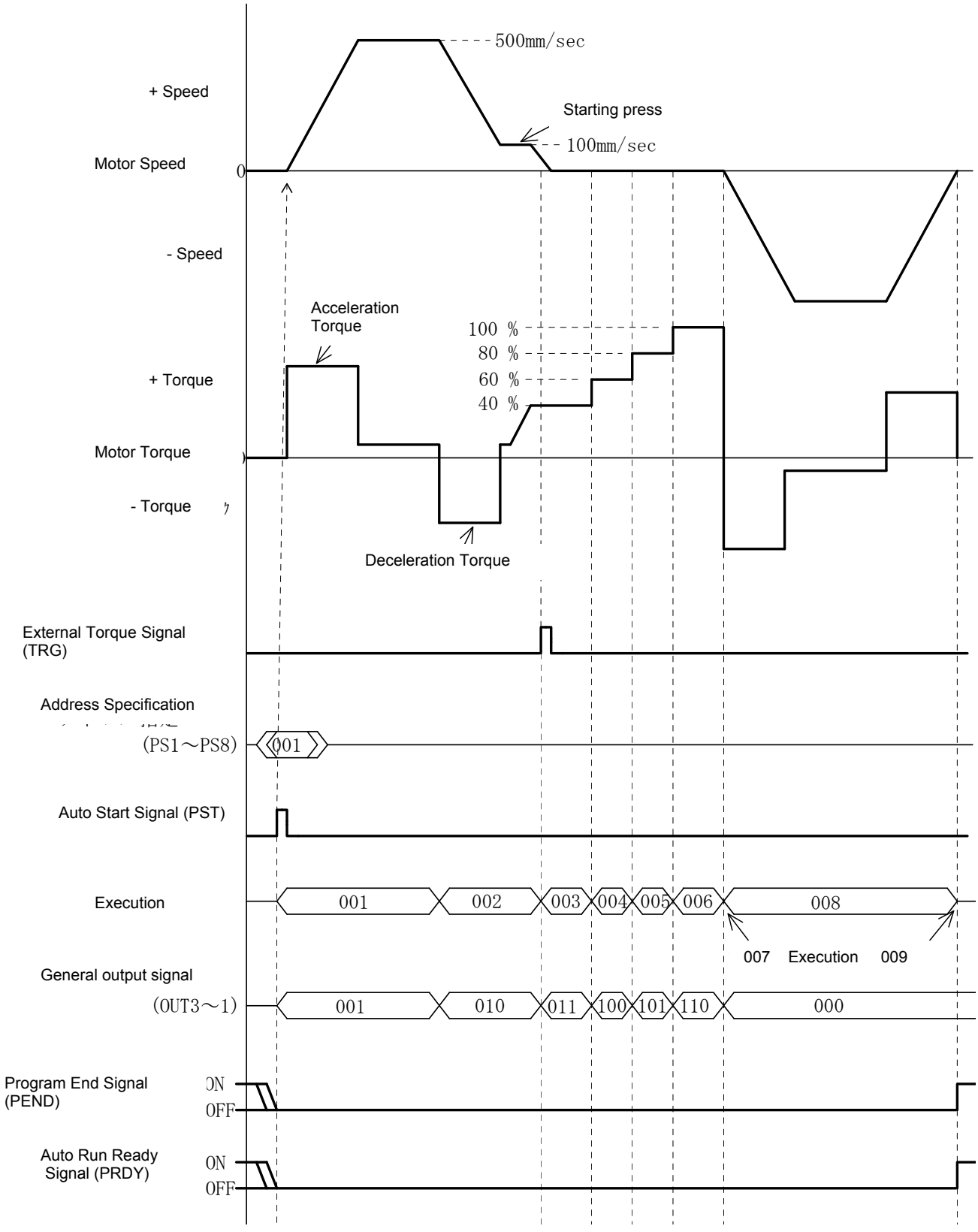
Taking external torque signal input as standard, reach to the position to be suppressed using position control and start the suppressing using speed control on reducing the speed. After this, change the torque value for each specified time and execute suppressing.

ADDR	CMD	POS/TRQ%/LIM%	A/I	F/F+-	TRG	OUT	UPDN	Remarks
		COND Inside ( ) is IX+1 number	IX+0 data	Explanation of internal end condition 1 Index data contents are in ( )				
			IX+1 data	Explanation of internal end condition 2 Index data contents are in ( )				
001	CPOS	POS 9000	ABS	500	250	00000001	SEL.1	Waiting for external trigger signal input
		IX0010	0000000	Invalid				
		(IX0011)	0000000	Invalid				
002	CSPD	LIM% 40.0	---	100	0	00000010	-----	
		IX0012	10500001	Actual torque command value≥IX0001 (40.0%) → to next ADDR				
		(IX0013)	0000000	Invalid				
003	CTRQ	TRQ% 40.0	---	100	0	00000011	-----	
		IX0014	10600002	Time ≥IX02 (150ms) → to next ADDR				
		(IX0015)	0000000	Invalid				
004	CTRQ	TRQ% 60.0	---	100	0	00000100	-----	
		IX0014	10600002	Time ≥IX02 (150ms) → to next ADDR				
		(IX0015)	0000000	Invalid				
005	CTRQ	TRQ% 80.0	---	100	0	00000101	-----	
		IX0014	10600002	Time ≥IX02 (150ms) → to next ADDR				
		(IX0015)	0000000	Invalid				
006	CTRQ	TRQ% 100.0	---	100	0	00000110	-----	
		IX0014	10600002	Time ≥IX02 (150ms) → to next ADDR				
		(IX0015)	0000000	Invalid				
007	CTRQ	TRQ% 100.0	---	100	0	--------	-----	
		IX0016	10440099	Speed＝IX99 (0mm/s) → to next ADDR				
		(IX0017)	0000000	Invalid				
008	CEND	----------	---	-----	-------	00000000		
009	SPOS	0	ABS	500	0	--------		
010	PEND	----------	---	-----	-------	--------		


500mm/sec
External torque delay distance
+ Speed
Start suppress
100mm/sec
Motor Speed
- Speed
Acceleration
Torque
100 %
80 %
60 %
40 %
+ Torque
Motor Torque
0
- Torque
Deceleration
Torque
External Torque Signal (TRG)
Address
Specification
(PS1～PS8)
001
Auto Start Signal (PST)
Execution
001
002
003
004
005
006
009
007, 008 Execute 010
General Output Signal
(OUT1～3)
001
010
011
100
101
110
000
Program End
Signal (PEND)
ON
OFF
Auto run ready
signal (PRDY)
ON
OFF

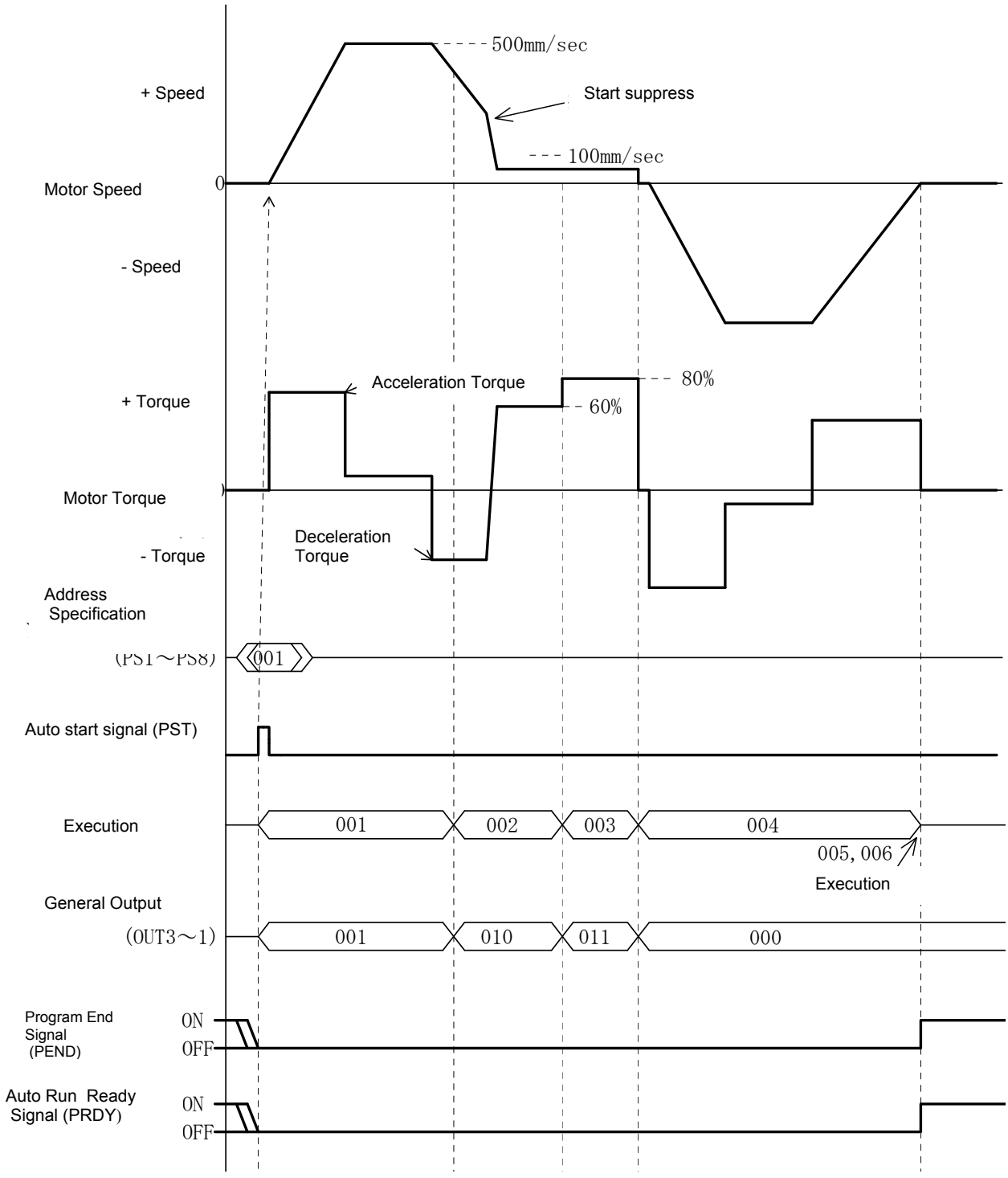
((Operation example_3)) Suppress control for specified time after external signal input.
Reach to a position to be suppressed using position control and start suppressing using speed control on reducing the speed.
After this, change the torque value for each specified time by external torque signal input and execute suppressing.

ADDR	CMD	POS/TRQ%/LIM%	A/I	F/F+-	TRG	OUT	UPDN	Remarks
		COND Inside ( ) is IX+1 number	IX+0 data	Explanation of internal end condition 1 Index data contents are in ( )				
			IX+1 data	Explanation of internal end condition 2 Index data contents are in ( )				
001	CPOS	POS 1000	ABS	500	0	00000001	SEL.1	
		IX10 (IX11)	10110000	Remaining distance to be traveled for positioning ≤ IX00 (160mm) → to next ADDR				
			0000000	Invalid				
002	CSPD	LIM% 40.0	---	100	-1	00000010	-----	Waiting for external trigger signal input
		IX12 (IX13)	0000000	Invalid				
			0000000	Invalid				
003	CSPD	LIM% 40.0	---	100	0	00000010	-----	Waiting for the specified time after input of external trigger signal
		IX14 (IX15)	10600002	Time ≥IX02 (200ms) → to next ADDR				
			0000000	Invalid				
004	CTRQ	TRQ% 60.0	---	100	0	00000100	-----	
		IX14 (IX15)	10600002	Time ≥IX02 (150ms) → to next ADDR				
			0000000	Invalid				
005	CTRQ	TRQ% 80.0	---	100	0	00000101	-----	
		IX14 (IX15)	10600002	Time ≥IX02 (150ms) → to next ADDR				
			0000000	Invalid				
006	CTRQ	TRQ% 100.0	---	100	0	00000110	-----	
		IX14 (IX15)	10600002	Time ≥IX02 (150ms) → to next ADDR				
			0000000	Invalid				
007	CEND	----------	---	-----	-------	00000000		
008	SPOS	0	ABS	500	0	--------		
009	PEND	----------	---	-----	-------	--------		


500mm/sec
+ Speed
Starting press
100mm/sec
Motor Speed
0
- Speed
Acceleration
Torque
100 %
80 %
60 %
40 %
+ Torque
Motor Torque
- Torque
Deceleration Torque
External Torque Signal
(TRG)
Address Specification
(PS1～PS8)
001
Auto Start Signal (PST)
Execution
001
002
003
004
005
006
008
007 Execution 009
General output signal
(OUT3～1)
001
010
011
100
101
110
000
Program End Signal
(PEND)
ON
OFF
Auto Run Ready
Signal (PRDY)
ON
OFF

((Operation example_4))Specified position suppress control
Reach to the position to be suppressed using position control and start suppressing using speed control.
After this, change the torque value for each specified position and execute suppressing.

ADDR	CMD	POS/TRQ%/LIM %	A/I	F/F+-	TRG	OUT	UPDN	Remarks
		COND Inside ( ) is IX+1 number	IX+0 data	Explanation of internal end condition 1 Index data contents are in ( )				
			IX+1 data	Explanation of internal end condition 2 Index data contents are in ( )				
001	CPOS	POS 1000	ABS	500	0	00000001	SEL.1	
		IX10 (IX11)	10300001	Absolute position ≧IX01 (850mm) → to next ADDR				
			0000000	Invalid				
002	CSPD	LIM% 60.0	---	100	0	00000010	-----	
		IX12 (IX13)	10300002	Absolute position ≥IX02 (950mm) → to next ADDR				
			0000000	Invalid				
003	CTRQ	TRQ% 80.0	---	100	0	00000011	-----	
		IX14 (IX15)	10300003	Absolute position ≥IX03 (1000mm) → to next ADDR				
			0000000	Invalid				
004	CPOS	POS 0	ABS	500	0	00000000	SEL.1	
		IX16 (IX17)	0000000	Invalid				
			0000000	Invalid				
005	CEND	----------	---	-----	-------	00000000		
006	PEND	----------	---	-----	-------	--------		


+ Speed
500mm/sec
Start suppress
100mm/sec
Motor Speed
0
- Speed
+ Torque
Acceleration Torque
80%
60%
Motor Torque
Deceleration
Torque
- Torque
Address
Specification
(PS1～PS8)
001
Auto start signal (PST)
Execution
001
002
003
004
005, 006
Execution
General Output
(OUT3～1)
001
010
011
000
Program End
Signal
(PEND)
ON
OFF
Auto Run Ready
Signal (PRDY)
ON
OFF

((Operation example_5))Suppress control with external torque sensor monitoring

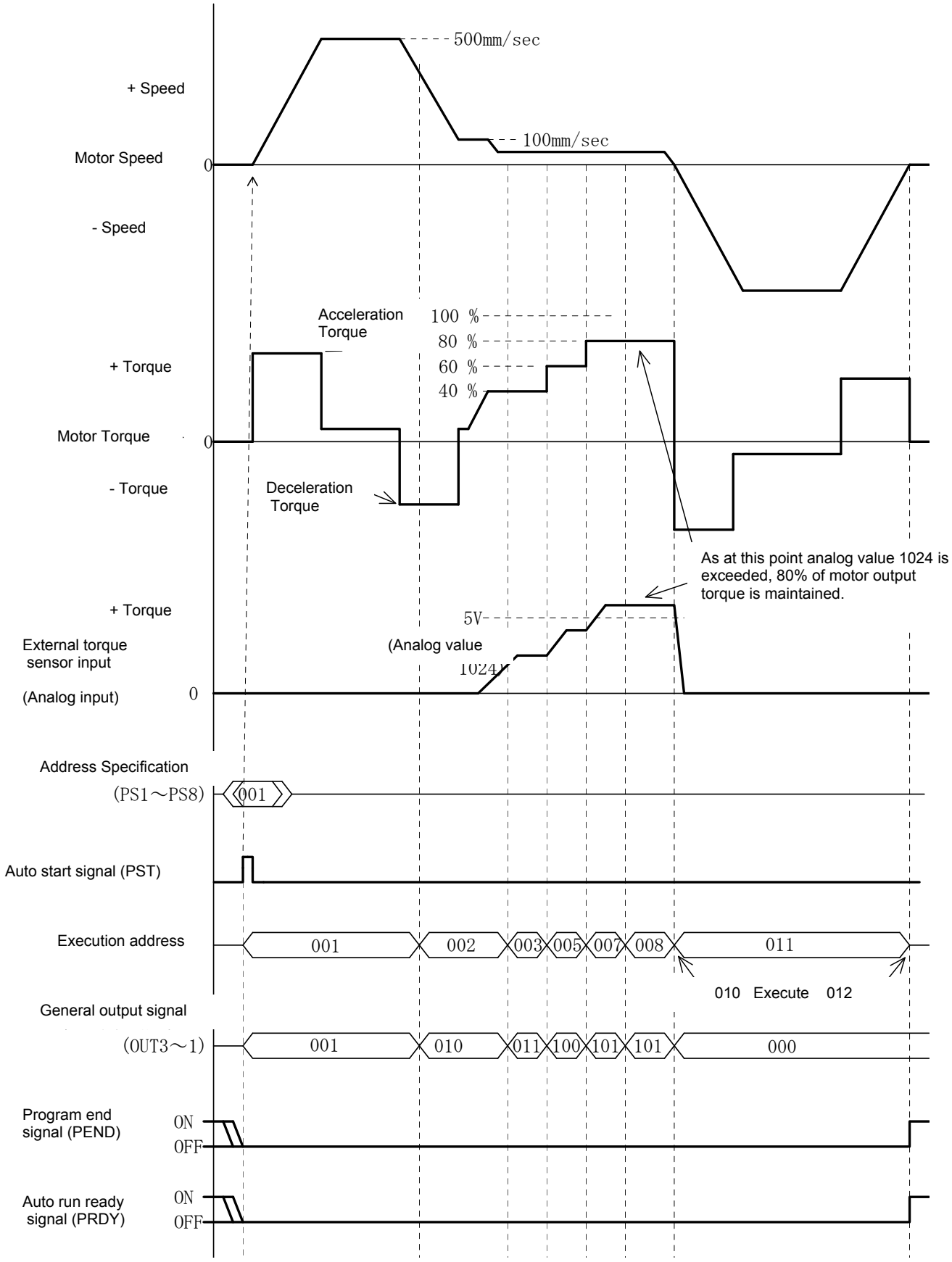
While suppressing resin etc., reach to the position to be suppressed with position control and start suppressing using speed control on reducing the speed.

And, in this control, suppress torque is controlled by external torque sensor and suppress when external torque sensor input value is more than specified value.

Continuous control ends at specified absolute position.

ADDR	CMD	POS/TRQ%/LIM%	A/I	F/F+-	TRG	OUT	UPDN	Remarks
		COND Inside ( ) is IX+1 number	IX+0 data	Explanation of internal end condition 1 Index data contents are in ( )				
			IX+1 data	Explanation of internal end condition 2 Index data contents are in ( )				
001	CPOS	POS 1000	ABS	500	0	00000001	SEL.1	
		IX10 (IX11)	10110000	Remaining distance to be traveled for positioning ≤ IX00 (160mm) → to next ADDR				
			0000000	Invalid				
002	CSPD	LIM% 40.0	---	100	0	00000010	-----	
		IX12 (IX13)	10500001	Actual torque command value≥IX01 (40.0%) → to next ADDR				
			0000000	Invalid				
003	CTRQ	TRQ% 40.0	---	100	0	00000011	-----	
		IX14 (IX15)	10600002	Time≥IX02 (150ms) → to next ADDR				
			90300004	Absolute position≥IX04 (1200mm) →to ADDR10				
004	CTRQ	TRQ% 40.0	---	100	0	00000011	-----	Use torque command analog input for external torque sensor input
		IX16 (IX17)	10810003	External torque sensor input ≤ IX03 (1024) → to next ADDR				
			90300004	Absolute position ≥ IX 04 (1200mm) →To ADDR10				
005	CTRQ	TRQ% 60.0	---	100	0	00000100	-----	
		IX14 (IX15)	10600002	Time ≥IX02 (150ms) → to next ADDR				
			90300004	Absolute position ≥IX04 (1200mm) → To ADDR10				
006	CTRQ	TRQ% 60.0	---	100	0	00000100	-----	
		IX16 (IX17)	10810003	External torque sensor input ≤ IX03 (1024) → to next ADDR				
			90300004	Absolute position ≥IX04 (1200mm) → To ADDR10				
007	CTRQ	TRQ% 80.0	---	100	0	00000101	-----	
		IX14 (IX15)	10600002	Time≥IX02 (150ms) → to next ADDR				
			90300004	Absolute position ≥IX04 (1200) →To ADDR10				
008	CTRQ	TRQ% 80.0	---	100	0	00000101	-----	
		IX16 (IX17)	10810003	External torque sensor input ≤IX03 (1024) → to next ADDR				
			90300004	Absolute position ≥IX04 (1200mm) → To ADDR10				

009	CTRQ	TRQ%	100.0	---	100	0	00000110	-----	
		IX18 (IX19)	90300004		Absolute position ≥IX04 (1200mm) → To ADDR10				
			0000000		Invalid				
010	CEND	----------		---	-----	-------	00000000		
011	SPOS	0		ABS	500	0	--------		
012	PEND	----------		---	-----	-------	--------		


500mm/sec
+ Speed
100mm/sec
Motor Speed
0
- Speed
Acceleration
Torque
100 %
80 %
60 %
40 %
+ Torque
Motor Torque
0
- Torque
Deceleration
Torque
As at this point analog value 1024 is exceeded, 80% of motor output torque is maintained.
+ Torque
5V
External torque
sensor input
(Analog value
1024)
(Analog input)
0
Address Specification
(PS1～PS8)
001
Auto start signal (PST)
Execution address
001
002
003
005
007
008
011
010 Execute 012
General output signal
(OUT3～1)
001
010
011
100
101
101
000
Program end
signal (PEND)
ON
OFF
Auto run ready
signal (PRDY)
ON
OFF

4-8 Group 6 Command specifications (VC-C6)

4-8-1 [FCM] Free curve motion

"Function"

- **This command is valid only for "VC-C6".**
- This command controls free curve motion, which includes the following functions.
  (After completion of this command, executes next address command.)

  (1) Executes free curve motion as per specified pattern by executing this command.

  (2) Specification of master axis can be selected by using master axis selection signal (D18) for input of Internal master axis (Internal master axis speed is generated automatically by P808: Internal master axis speed 1, P809: Internal master axis speed 2, P810: Internal master axis acceleration time and P811: Internal master axis deceleration time) or external master axis can be selected by using master axis selection signal (D18) for specification of master axis

  (3) When valid data is set in 'TRG' (except 0 or invalid data), synchronous start adjustment function is valid at the time of execution of this command
  Synchronous start adjustment function waits to start the motion of slave axis till input of TRG signal after execution of command. When master axis pulse train signal is used, motion starts within high precision of 0.2 ms for master axis pulse deviation during input of TRG signal.
  When pulse train communication is used, motion begins with high precision of 0.5ms of inter pulse interval for master axis at the time of TRG signal input.

  (4) Free curve 'executing' signal (FC) is ON, if actual free curve motion control is started (after synchronous start adjustment when (3) is valid) after starting this command.

  (5) This command ends when master axis command moves beyond the standard position and cycle end signal (D21) is detected. Moreover, free curve 'executing' signal (FC) is OFF at the end of this command.

  (6) Following supporting functions are valid during execution of this command.
  - Phase adjustment function
    When signal (FC) is ON during execution of Free curve and ON edge of Phase regulation signal (Phase lead (D11), Phase lag (D12)), is detected, phase corresponding to master axis is moved once.
    (Internally, master axis position is moved and adjusted.)
    Moreover, one time adjustment is set by parameter (P806: Phase regulation).
    As per this adjustment, standard position of pattern during execution is corrected automatically.
    (Result of phase adjustment also reflects next motions.)

  - Electronic clutch function
    When master axis command moves beyond the standard position and electronic clutch signal (D14) is detected, it is considered as electronic clutch status.
    In electronic clutch status, master axis position is counted continuously without any motion of slave axis.
    In electronic clutch status, electronic clutch 'stopping' signal (FCRP) is ON.
    In electronic clutch status, if electronic clutch 'stopping' signal (D14) is OFF, slave axis is not moved till master axis position moves beyond standard position and motion starts when master axis is moved.

  - Pattern magnification function
    Magnification of slave position is corrected for 'executing' pattern.
    For Magnification data, each and every data in numerator and denominator is set in parameter and index data indicated by parameter.

When negative value is set in this magnification data, direction of motion is in opposite direction.
However, when 0 is set in 'magnification data denominator', magnification is corrected.
This magnification function is valid even in FRR command (Return to free curve standard position) and FMR command (Return to free curve master axis position).

- Pattern selection function
  When master axis command moves beyond standard position, pattern selection signal 1~ 3 (D22/24/28) or dedicated device area (Refer to [VC-C6 Instruction manual]) is reevaluated and moved to specific pattern data.

• Caution

There are following restrictions to change the pattern to real time during execution of free curve motion.
(1) Standard position is 0 (starting point of pattern).
(2) Shift quantity in one cycle is identical.
Following events occur when pattern is changed in the conditions other than described above.
(1) Track deviates at joining of pattern.
(2) Track deviates between end point and start point (or start point and end point).

(7) When hold signal (HLD)) is input while executing this command, motor decelerates and stops according to settings of command parameter PSEL and free curve 'executing' signal (FC) is OFF.
After stopping the motor, this command is canceled and waits for executing the next step.
Auto run ready signal (PRDY) is output in this 'waiting for start' status.

(8) If block stop signal (BSTP) is ON while executing this command, program stops on completion of this command, and it moves to 'waiting for restart' status and auto run ready signal (PRDY) is output.
Next address command is executed by restart.

(9) [Standard position], [Delay length when running], [Pattern magnification denominator] and [pattern magnification numerator] to be used in this command, are selected in PSEL of command parameter.

[Settings]

(1) Title display	Settings		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to setting)		

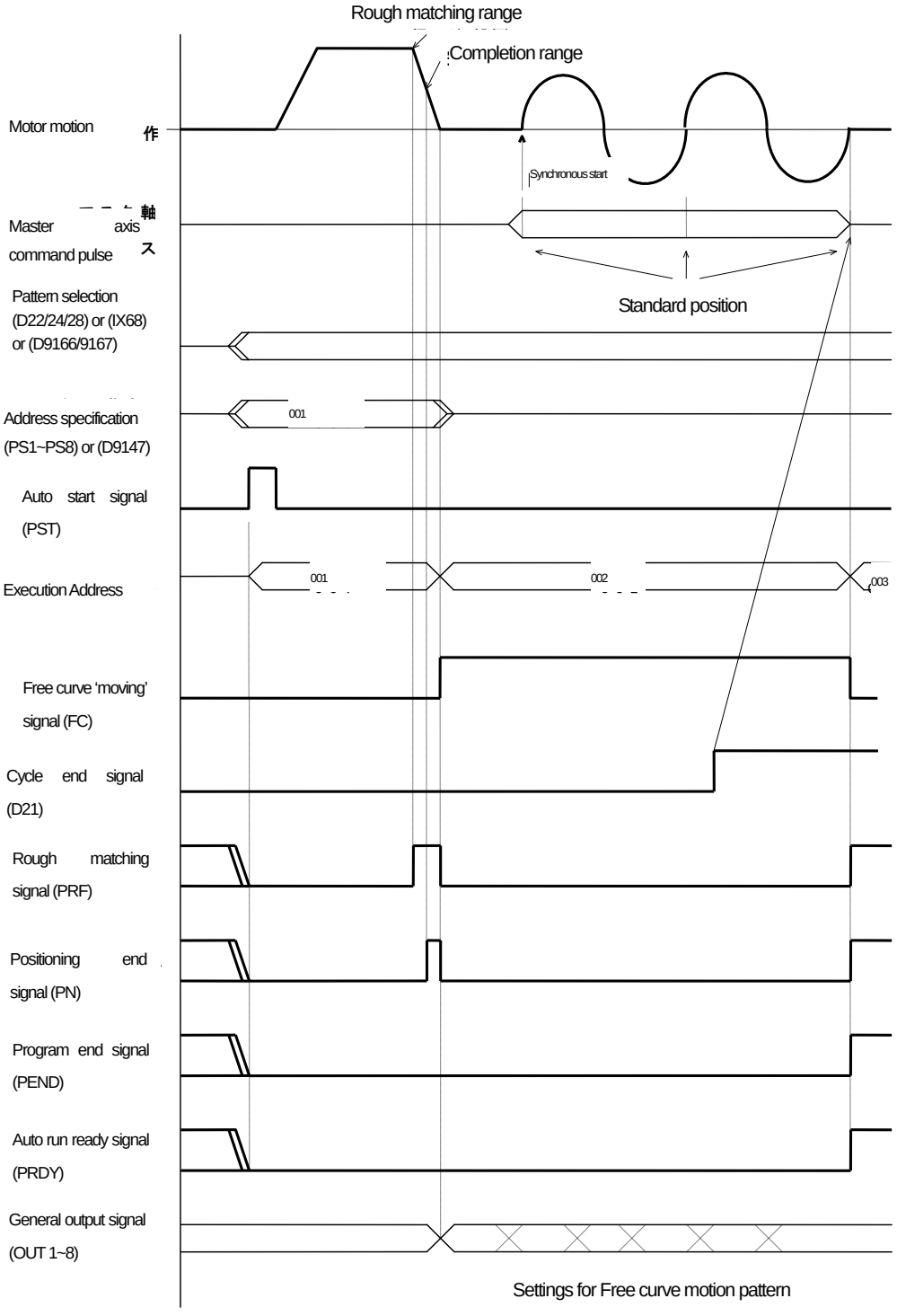
((Group 6: FCM))

(1) TRG●●	Selection of synchronous start adjustment function		
	None	00000000~99999999 IX00~IX99	00000000
	• Sets validity and invalidity of synchronous start adjustment function When 0 or invalid: Synchronous start adjustment function is invalid Otherwise : Valid		
(2) PSEL●	Selection of motion parameter		
	None	SEL.1/SEL.2/SEL.3	SEL.1
	• Refer to [Chapter 3 Settings] for selection / setting method of motion parameter		

[Motion example]

((Free curve motion example_1)) (When synchronous start adjustment is invalid)

ADDR	CMD	MPOS	F	TRG	PSEL	Remarks
001	FRR	-----	10000	-----	SEL.1	Select pattern to be used before starting
002	FCM	-----	-----	0	SEL.1	
003	PEND	-----	-----	-----	--	

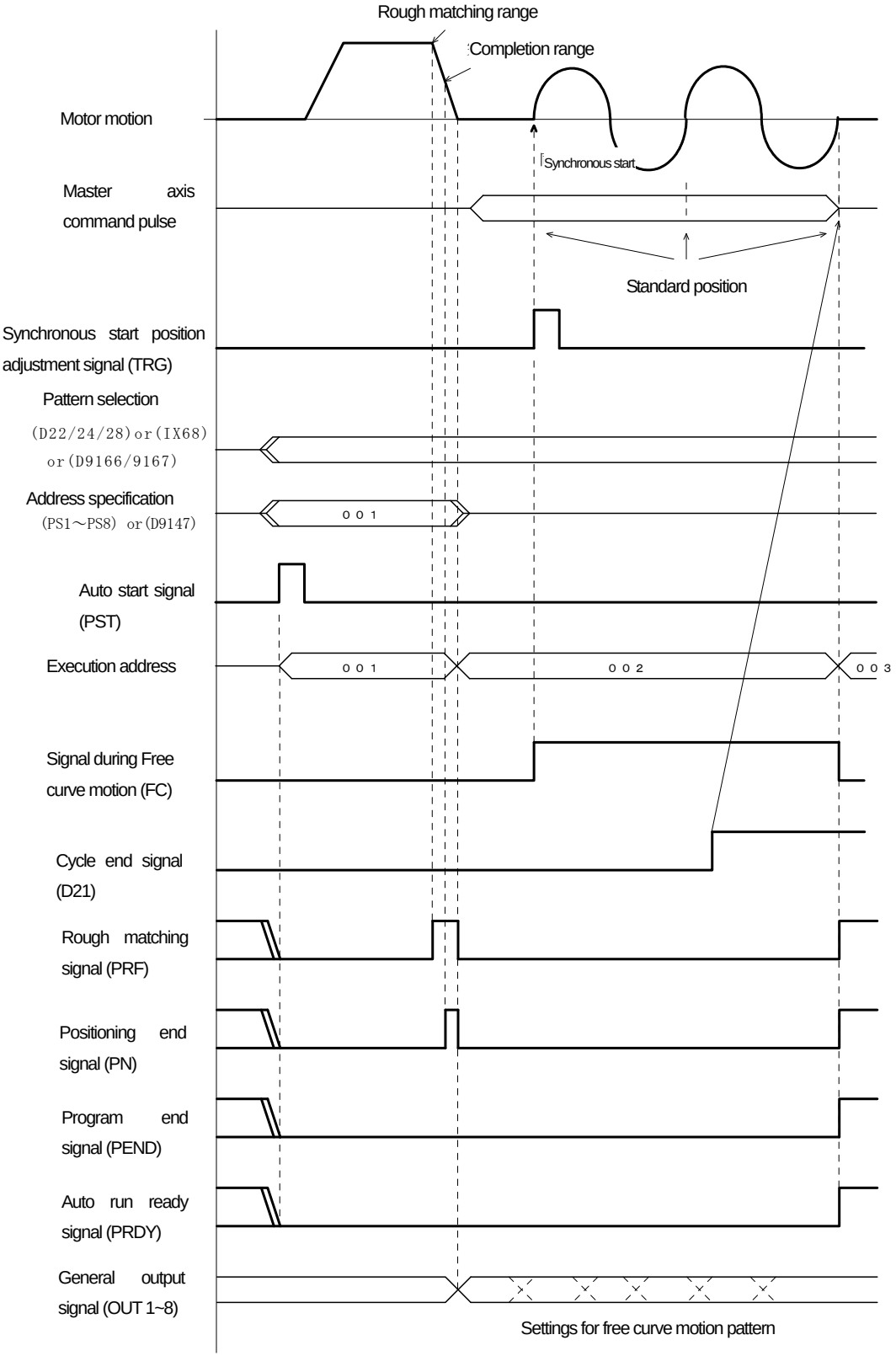


Settings for Free curve motion pattern

[Motion example]

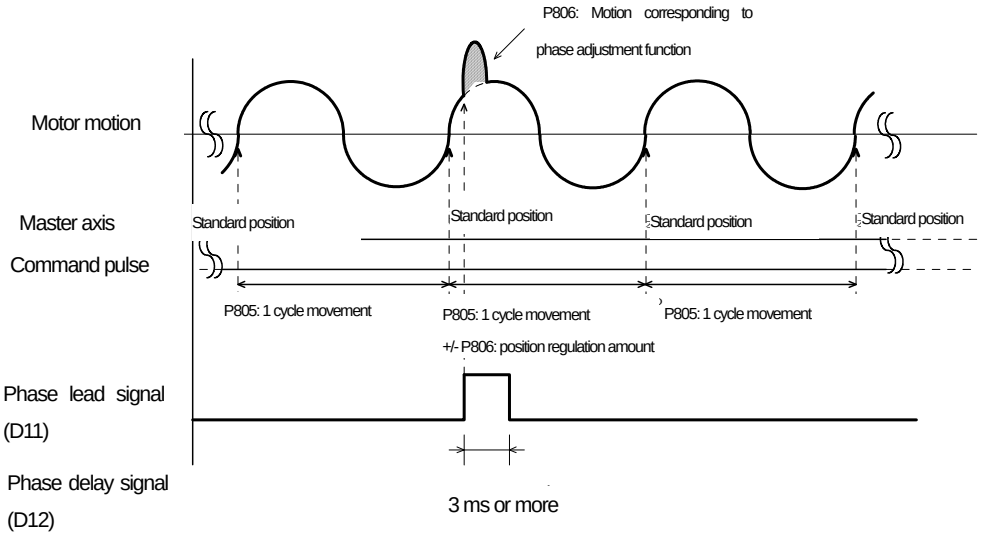
((Free curve motion example_2)) (When synchronous start adjustment is valid)

ADDR	CMD	MPOS	F	TRG	PSEL	Remarks
001	FMR	0	10000	-----	SEL.1	Select pattern to be used before starting
002	FCM	-----	-----	1	SEL.1	
003	PEND	-----	-----	-----	--	



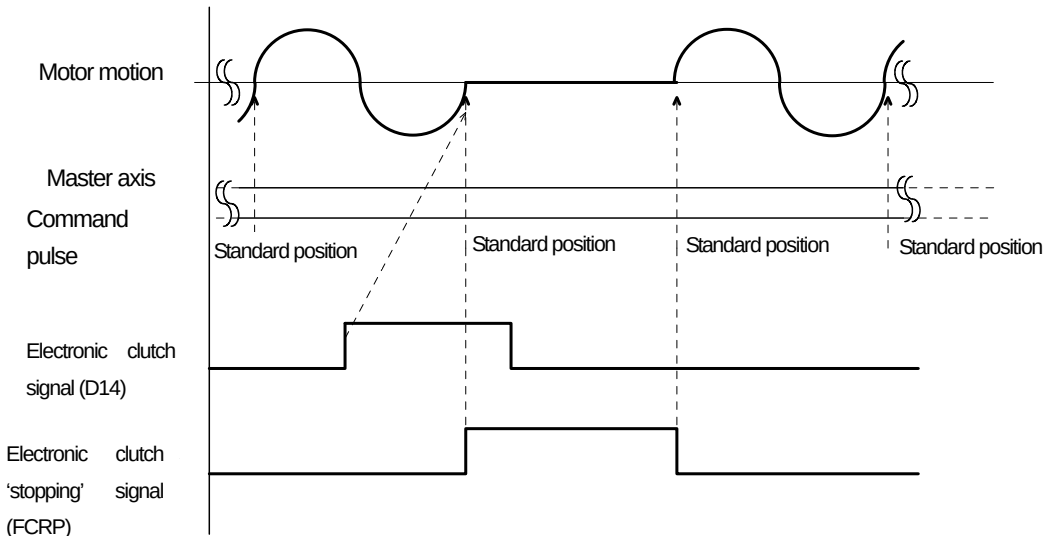
[Motion example]

((Free curve motion example_3)) (Example while executing phase adjustment function)



[Motion example]

((Free curve motion example_4)) (Example while executing electronic clutch function)



4-8-2 [FRR] Return to Free curve standard position

[Function]

- **This command is valid only for [VC-C6]**.
- This command returns free curve standard position, which includes the following functions.
  (After completion of this command, executes next address command.)

(1) By executing this command, corresponding slave axis position is calculated and positioned with specified pattern and master axis standard position of motion parameter. Relation between master axis and slave axis is also decided.

(2) If speed data 'F' is [0] at the time of execution of this command, current position is related as standard position without any motion of motor. At this time, current position (absolute position) can be rewritten for this motion. However, when speed data 'F' is [-1], controlling position is related as standard position without any motion of the motor. At this time, current position (absolute position) cannot be rewritten for this motion.

(3) Alarm rings when specified parameter is inconsistent (such as specified standard position is greater than P805: Movement of 1 cycle of master axis) and inconsistency in the data and specified pattern such as pattern which is not available is selected.

(4) When hold signal (HLD) is input during execution of this command, motor decelerates and stops as per deceleration time set in command.
After stopping the motor, this command is canceled and waits for executing the next step.
Auto run ready signal (PRDY) is output in this 'waiting for start' status.

(5) If block stop signal (BSTP) is ON while executing this command, program stops on completion of this command, and it moves to 'waiting for restart' status and auto run ready signal (PRDY) is output.
Next address command is executed by restart.

- For motion example, refer to example of free curve motion (FCM) command.

[Settings]

(1) Title display	Settings		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to settings)		

((Group6: FRR))

(1) F●●●●	Positioning speed		
	mm/s,°/s,inch/s	-0000001~9999999 IX00~IX99	0000000
	• Decimal point position of setting value is as per [P302: Command unit]. • If set value is [0], assume current position as standard position and match the positions of master axis and slave axis without any motion of motor. (Current position can be overwritten) • If set value is [-1], assume control position as standard position and match the positions of master axis and slave axis without any motion of motor. (Current position cannot be changed.)		
(2) PSEL●	Selection of motion parameter		
	None	SEL.1/SEL.2/SEL.3	SEL.1
	• Refer to [Chapter 3 Settings] for selection / setting method of motion parameter.		

4-8-3 [FMR] Return to free curve master axis position

[Function]

- **This command is valid only for [VC-C6].**
- This command returns free curve master axis position, which includes the following functions.
  (After completion of this command, executes next address command.)

(1) By executing this command, with specified pattern and specified master axis position of motion parameter, corresponding slave axis position is calculated and positioned. Relation between master axis and slave axis is also decided.

(2) If speed data is 'F' is [0] at the time of execution of this command, current position is related as standard position without any motion of motor. At this time, current position (absolute position) can be rewritten for this motion.
However, when speed data 'F' is [-1], only controlling position is related as standard position without any motion of the motor. At this time, current position (absolute position) cannot be rewritten for this motion.

(3) Alarm rings when there is inconsistency in the data and specified pattern, like specified master axis position is greater than P805: movement of 1 cycle of master axis and pattern which is not available is selected.

(4) When hold signal (HLD) is input during execution of this command, motor decelerates and stops as per deceleration time set in command.
After stopping the motor, this command is canceled and waits for executing the next step.
Auto run ready signal (PRDY) is output in this 'waiting for start' status.

(5) If block stop signal (BSTP) is ON while executing this command, program stops on completion of this command, and it moves to 'waiting for restart' status and auto run ready signal (PRDY) is output.
Next address command is executed by restart.

- For motion example, refer to example of free curve motion (FCM) command.

[Settings]

(1) Title display	Settings		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to settings)		

((Group6: FMR))

(1) MPOS •	Master axis position		
	mm, ^{0}, inch	00000000~99999999 IX00~IX99	00000000
	• Set the master axis position, which performs positioning. • Decimal point position of set value is as per [P801: Master axis command unit].		

(2) F • • • •	Positioning speed		
	mm/s, ^{0} /s,inch/s	-0000001~9999999 IX00~IX99	0000000
	• Decimal point position of set value is as per [P302: Command unit]. If set value is [0], set the position as slave axis position corresponding to currently set master axis position, without any motion of motor. (Current position can be overwritten) • If set value is [-1], set the position as slave axis position corresponding to master axis position set as control position, without any motion of motor. (Current position cannot be changed)		

(3) PSEL •	Selection of motion parameter		
	None	SEL.1/SEL.2/SEL.3	SEL.1
	• Refer to [Chapter 3 Settings] for selection / setting method of motion parameter.		

4-8-4 [PCLR] Clear free curve pattern

[Function]

- **This command is valid only for [VC-C6]**.
- This command clears the free curve pattern data, which includes the following functions.
  (After completion of this command, executes next address command.)

(1) By executing this command, data of pattern specified by 'PTAN' (both position and general output) is deleted.

(2) If 'PTAN' is [0] while executing this command, all patterns are deleted.

(3) Alarm rings if pattern, which is not available, is selected.

[Setup]

(1) Title display	Settings		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to settings)		

((Group6: PCLR))

(1) PTAN •	Pattern selection		
	None	000~500 IX00~IX99	000
	• Pattern to be deleted is set. • All patterns are deleted when 0 is set.		

[Motion example]

((Clear free curve pattern motion example_1)) (Clears specified pattern)

ADDR	CMD			PTAN		Remarks
001	PCLR			1		

- Free curve pattern 1 is cleared by executing this command.

((Clear free curve pattern motion example_2)) (Clears all pattern)

ADDR	CMD			PTAN		Remarks
001	PCLR			0		

- All free curve patterns are cleared by executing this command.

4-8-5 [PSET] Set free curve point

[Function]

- **This command is valid only for [VC-C6].**
- This command sets free curve pattern data.
  (After completion of this command, executes next address command.)

(1) By executing this command, point corresponding to master position, which is specified by 'MPOS' of pattern specified by 'PTAN' is calculated and slave axis position and general output are set.

Moreover, round off the remainder while calculating point from master position.
Ex. P805: 1 cycle movement of master axis -> 1000 mm
P802: 1 cycle resolution -> 300
'MPOS': Specified master position -> 333 mm
Setting point= 300×333/1000=99.9-> 99

(2) Alarm rings when there is inconsistency in the data and specified pattern, like specified master axis position is greater than P805: 1 cycle movement of master axis and pattern, which is not available, is selected (includes 0).

(3) After setting free curve pattern data by this command, [PCNV] command is executed and "Set data" is converted to "Executable data".

[Settings]

(1) Title display	Settings		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to setting)		

((Group6: PSET))

(1) PTAN •	Pattern selection		
	None	000~500 IX00~IX99	000
	• Set the pattern, which sets the points.		
(2) MPOS •	Master axis position		
	mm, ^{0},inch	00000000~99999999 IX00~IX99	00000000
	• Set the master axis position, which performs positioning. • Decimal point position of set value is as per [P801: Master axis command unit].		
(3) POS • •	Slave axis position		
	mm, ^{0},inch	-99999999~99999999 IX00~IX99	00000000
	• Decimal point position of set value is as per [P302: Command unit].		
(4) OUT • •	General output data		
	Binary	00000000~11111111 IX00~IX99	／00000000
	• Refer to [Chapter 3 Settings] for selection / setting method of motion parameter.		

[Motion example]

((Set free curve point motion example_1))

ADDR	CMD	MPOS	POS	PTAN	OUT	Remarks
001	PSET	180.0	50.0	1	11111111	

- By executing this command, [Slave position: 50.0] and [General output: 11111111] is set at appropriate point of [Master axis position: 180.0] of [Free curve pattern1].

((Set free curve point motion example_2))

ADDR	CMD	MPOS	POS	PTAN	OUT	Remarks
001	PSET	000.0	0.0	100	/00000000	General output is invalid.

- By executing this command, [Slave position: 00.0] and [General output: Invalid] is set at appropriate point of [Master axis position: 000.0] of [Free curve pattern100].

4-8-6 [POUT] Set free curve output

[Function]

- **This command is valid only for [VC-C6].**
- This command sets free curve pattern data.
  (After completion of this command, executes next address command.)

(1) By executing this command, point corresponding to master position, which is specified by 'MPOS' of pattern specified by 'PTAN' is calculated and slave axis position and general output are set.

Moreover, round off the remainder while calculating point from master position.

Example P805: 1 cycle movement of master axis -> 1000 mm
P802: 1 cycle resolution-> 300
'MPOS': Specified master position-> 333 mm
Setting point= 300×333/1000=99.9->99

(2) Alarm rings when there is inconsistency in the data and specified pattern, like specified master axis position is greater than P805: 1 cycle movement of master axis and pattern, which is not available, is selected (includes 0).

(3) After setting free curve pattern data by this command, [PCNV] command is executed and "Set data" is converted to "Executable data".

- For motion example, refer to example of free curve point data (PSET) command.

[Settings]

(1) Title display	Settings		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to setting)		

((Group6: POUT))

(1) PTAN •	Pattern selection		
	None	000~500 IX00~IX99	000
	• Set the pattern, which sets the points.		
(2) MPOS •	Master axis position		
	mm, ^{0},,inch	00000000~99999999 IX00~IX99	00000000
	• Set the master axis position, which sets the points. • Decimal point position of set value is as per [P801:Master axis command unit]		
(3) OUT • •	General output data		
	Binary	00000000~11111111 IX00~IX99	／00000000
	• Refer to [Chapter 3 Settings] for setting method.		

[Motion example]

((Set free curve output motion example))

ADDR	CMD	MPOS		PTAN	OUT	Remarks
001	POUT	180.0		1	11111111	

- By executing this command, [General output: 11111111] are set at appropriate point of [Master axis position: 180.0] of [Free curve pattern1]

4-8-7 [ＰPCNV] Convert free curve pattern

[Function]

- **This command is valid only for [VC – C6].**
- This command converts free curve pattern data to executable data.
  (After completion of this command, executes next address command.)

(1) By executing this command, data is converted to executable data of pattern specified by 'PTAN'.

(2) By executing this command, all patterns are converted when 'PTAN' is 0.

(3) Alarm rings when pattern, which is not available, is selected.

[Settings]

(1) Title display	Settings		
↑ Display order	Setting unit	Setting range (Direct data) (Index data)	Initial value
	Remarks (Details / supplementary explanation related to setting)		

((Group 6: PCNV))

(1) PTAN •	Pattern selection		
	None	000~500 IX00~IX99	000
	• The pattern to be converted is set. • All patterns are converted when 0 is set.		

[Motion example]

((Convert free curve pattern motion example_1)) (Converts specified pattern)

ADDR	CMD			PTAN		Remarks
001	PCNV			1		

- By executing this command, free curve pattern1 is converted to executable data

((Convert free curve pattern motion example_2)) (Converts all patterns)

ADDR	CMD			PTAN		Remarks
001	PCNV			0		

- By executing this command, all free curve patterns are converted to executable data