SHARP®

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Produced in February, 2004

Sharp Programmable Controller

NEW Satellite JW50H/70H/100H

Pulse output module

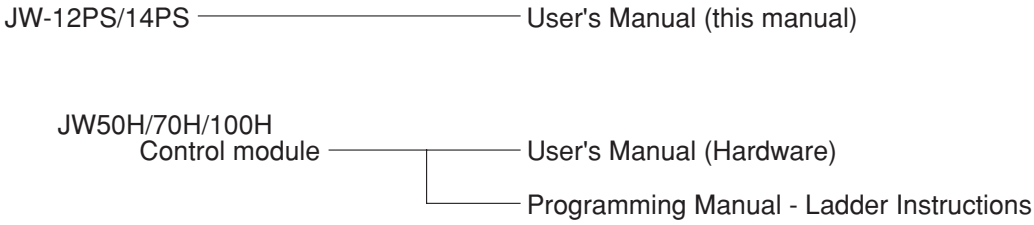
Model name

For two axes : JW-12PS

For four axes : JW-14PS

User's Manual

Thank you for buying the pulse output module (JW-12PS/14PS) for the Sharp Programmable Controller JW50H/70H/100H.
This manual describes how to install and use the JW-12PS/14PS.
Before you start to use the JW-12PS/14PS, be sure to thoroughly read this manual and fully understand its features and functions to ensure correct use.
Be sure to store this manual in a safe place so that they can be easily retrieved whenever they are needed.
The following manuals are also provided for the JW-12PS/14PS and JW50H/70H/100H. Read these manuals in addition to this manual.



Request

- Every effort has been made in the preparation of this document. Should you have any questions or inquiries, please feel free to contact your dealer.
- Reproduction of this document in part or in whole is prohibited.
- The content of this document is subject to change without notice in the interest of product improvement.

Safety Precautions

Read this user's manual and the attached documents carefully before installing, operating, or performing any maintenance, in order to keep the machine working correctly. Make sure you understand all of the equipment details, safety information, and cautions before using this machine. In this user's manual, the safety precautions are divided into "Dangers" and "Cautions" as follows.

Danger : Improper handling is likely to lead to death or serious injury.

Caution : Improper handling may lead to injury or damage to equipment.

Even when only a **Caution** is given, serious results may occur depending on the circumstances. In all cases, important points are described. Be sure to follow the advice given.

The following symbols are used to prohibit or explain required action.

: This means do not do what is described. For example, prohibited disassembly is shown as  .

: This means an action you must take. For example, a ground connection that must be made is shown as  .

1. Installation

Caution

- Use only in the environments specified in the catalog, instruction manual, or user's manual. Electric shock, fire or malfunction may result if used in high temperature, high humidity, dusty or corrosive environments, or if excessive vibration or impact occurs.
- Install the equipment only as described in the manual. An improper installation may cause the equipment to fail, breakdown, or malfunction.
- Never leave wire cuttings or any other foreign matter lying about. A fire, breakdown or malfunction may result from inappropriate objects left near the equipment.

2. Wiring

Compulsory

- Wiring should be performed by a qualified electrician. Improper wiring may lead to a fire, machine failure or electric shock.

Caution

- Connect only to the specified power source. Connection to the wrong power source may cause a fire.

3. Use

Danger

- Provide a safety fence around the facilities used for positioning.
- Assemble an external emergency stop circuit, interlock circuit or other means outside of the pulse output module. Otherwise, a breakdown or damage to the other equipment may occur due to a problem with the pulse output module.
- The motor may operate suddenly due to a deviation when the mains power supply is turned OFF when power is being supplied to the encoder even if the mains power supply of the servo driver (amplifier) is turned OFF. Accordingly, press the emergency stop button to reset the error before turning the mains power supply, and then clear the error and deviation after the mains power supply is turned ON.

⚠ Caution

- Take special care to follow all safety guidelines if you are changing the parameters for the operating conditions or performing a "forced output," "run," or "stop" during operation. Misoperation may damage the machine or cause an accident.
- Turn ON the power supplies in the specified sequence. Turning ON the supplies in the wrong order may lead to a machine breakdown or cause an accident.

4. Maintenance

Prohibit

- Do not disassemble or modify the pulse output module.
  Fires, breakdowns or malfunctions may occur, if the pulse output module is disassembled.

⚠ Caution

- Turn OFF the power source before connecting or disconnecting the pulse output module Otherwise, electric shocks, malfunctions or breakdown may occur.

Precautions during Use

Pay attention to the following precautions during use of this module

(1) Installation site/storage

Avoid installing or storing the pulse output module in the following locations:

1. Location subject to the direct sunlight
2. Locations outside of the ambient operating temperature range of 0 to 55°C and storage range of -20 to +70°C
3. Locations outside of the ambient relative humidity of 35 to 90%
4. Locations subject to sudden temperature changes that might cause condensation
5. Locations subject to corrosive gases or flammable gases
6. Locations subject to direct vibration or impact

(2) Installation

1. Before removing or attaching the rack panel, turn the PC OFF.
2. Firmly tighten the fastening screws of this module.

(3) Wiring

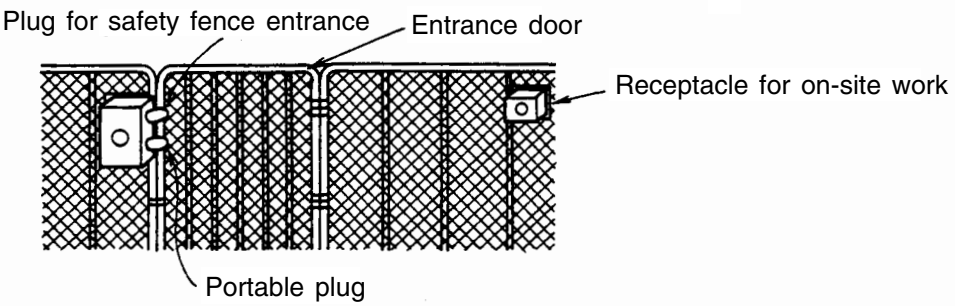
1. Avoid wiring input, output and power leads near to and in parallel with heavy-current lines and power lines.
2. To prevent damage to machinery and accidents to personnel, assemble an external emergency stop circuit, interlock circuit or other means outside of the pulse output module, and integrate a stop output for the JW50H/70H/100H.

(4) Use

1. Before turning the switch ON and OFF, turn the PC OFF.
   Otherwise, the pulse output module may malfunction.
2. On JW50H/70H/100H mounted with this module, be sure to set the I/O addresses of the control module by optional I/O registration. (I/O addresses cannot be set by automatic I/O registration.)
   (Reason) Though this module is the special I/O module for the JW50H/70H/100H, it differs from regular special I/O modules in that 256 bytes of special I/O data registers area is occupied.
3. Be sure to set the JW50H/70H/100H scan time to 2 ms or more. If the scan time is set to a lower value, data sometimes cannot be transferred to this module.
   (For details on setting the scan time, →see the JW50H/70H/100H Programming Manual.)
4. This module cannot be used (mounted) on the JW50H/70H/100H remote I/O slave module.
5. When the JW50H/70H/100H is turned OFF, the data on this module is overwritten. Accordingly, after writing block data, be sure to save the new data to flash ROM (for backing up data) by the block data save relay.
6. The housing of this module is provided with ventilation holes to prevent the inside of this module from heating up. Do not block these ventilation holes or block the flow of air into and out from these holes.
7. If you detect any malfunction or abnormality () with this module, immediately stop use, and contact your dealer.

(5) Work safety during operation (→See the figure on the following page.)

- Provide a safety fence around robots.
- Provide a plug for entry/exit on the safety fence, and provide a structure so that robot operation stops when the safety fence door is opened when a worker enters the area inside the safety fence.
- Provide a portable plug on the safety fence so that robot operation stops when that plug is extracted, and robot operation stays stopped even if a worker enters the area inside the safety fence and closes the safety fence door still holding the plug.
- Provide a receptacle for on-site work for operating the robot inside the safety fence at the worker's discretion. The robot operates by inserting the portable plug into this receptacle. When performing teaching, for example, inside the safety fence to operate the robot, make sure that the worker is outside of the robot's operation envelope.



(6) Static electricity

In abnormally dry locations, excessive amounts of static electricity may be generated on the human body. To prevent adverse influence caused by static electricity, discharge any static electricity from the human body before touching or handling this unit by touching a grounded metallic object.

(7) Cleaning

Use a soft, dry cloth to clean the pulse output module. Do not use volatile solvents (alcohol, paint thinner, etc.) or wet rags to clean the module. Otherwise, the module may be deformed or discolored.

Contents

Chapter 1 Features, System Configuration and Basic Functions

The JW-12PS/14PS (simply called "this module" from here on) is the pulse output module for the programmable controller (simply called "PLC" from here on) JW50H/70H/100H. (The JW-12PS is for two axes, while the JW-14PS is for four axes.)
The pulse train is output to a stepping motor driver or servo motor driver by instructions from the JW50H/70H/100H to achieve various positioning control.
As position signals are loaded directly from an encoder, closed loop control can be achieved even though the output type is pulse train, thus configuring a more reliable system.

1-1 Features, basic system configuration

■ Main features

1. Sinusoidal acceleration/deceleration characteristics

Multi-stage sinusoidal acceleration/deceleration can be selected. This achieves acceleration/deceleration characteristics matched to the positioning target, suppresses overshooting and undershooting, and enabled smooth, high-speed operation.

2. Signals input from an encoder can be captured and used in closed loop control.

This module has integrated encoder input, which enables a closed loop to be configured for loading position signals from the operation system. Position data from the instruction system can be compared with position data from the operation system to perform compensation, thus building a highly reliable system.

3. Various operation data from the dedicated support software that runs on Windows 95/98 can be set.

Various operation data can be set and edited on a third-party personal computer (Windows 95/98). This data can be written to this module, and data on this module can be read, saved and output. (scheduled to be supported in the near future)

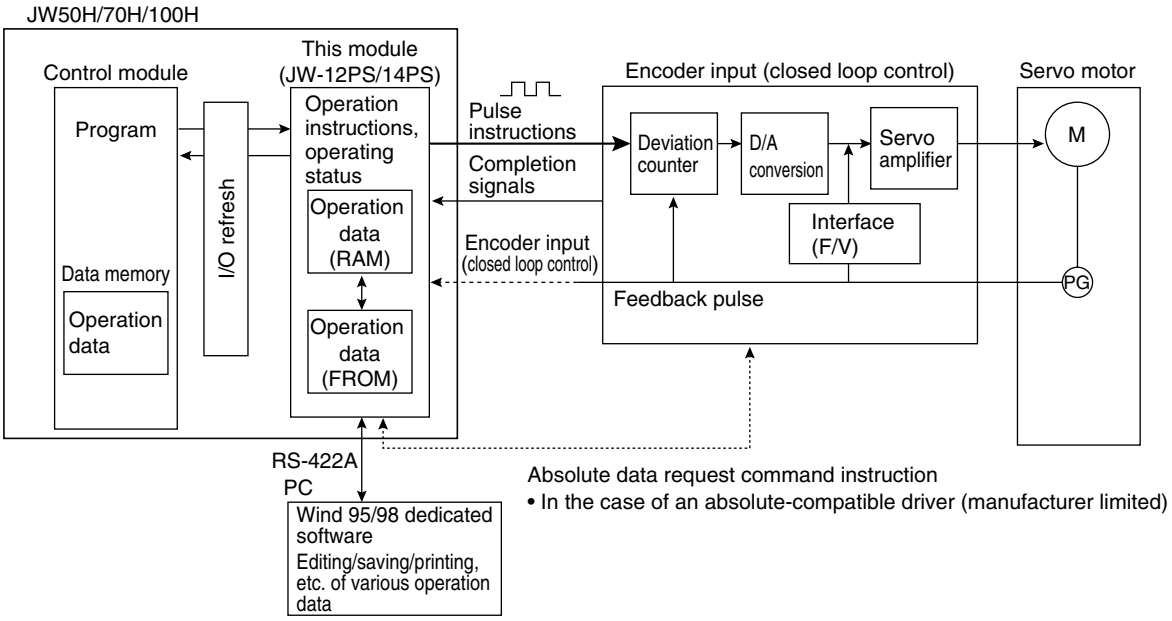
4. Integrated general-purpose inputs (1 input/axis), general-purpose outputs (1 output/axis)

This module is provided with an integrated general-purpose input (1/axis) and an general-purpose output (1/output) that allow direct I/O. This achieves high-speed response in interrupt startups and interrupt outputs that do not pass via the PLC.

5. Absolute positioning systems (absolute systems)

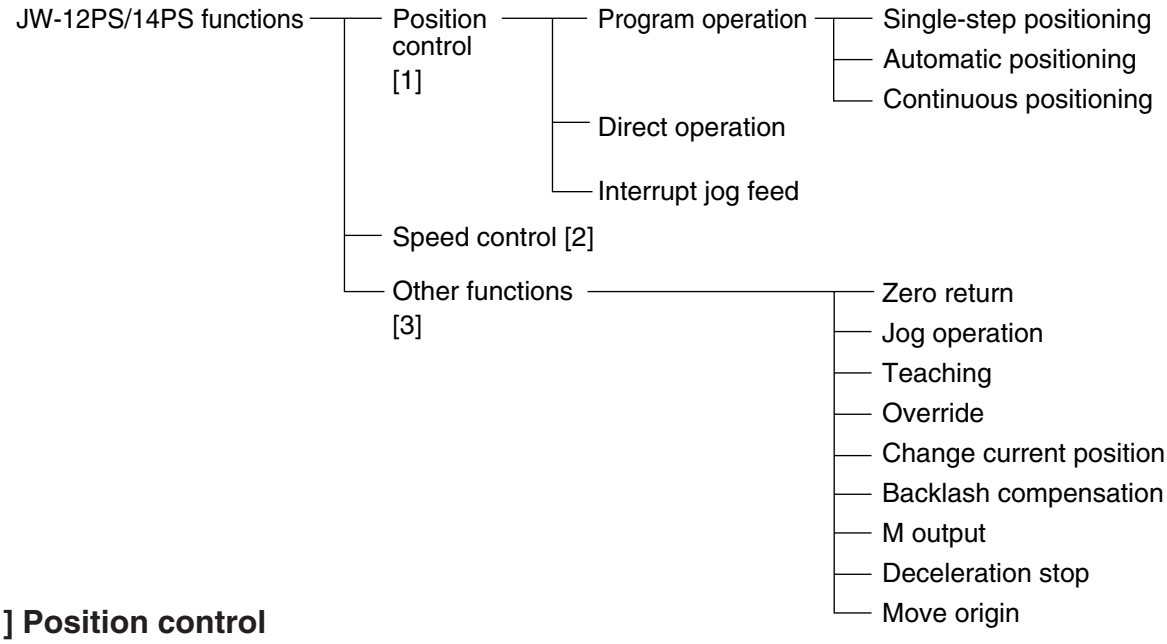
Communications with absolute-compatible servo drivers, thus enabling systems that do not require zero return at a power interruption to be configured. (Consult your dealer for details of servo drivers and motors that are compatible with absolute systems.)

■ Example of basic system configuration



1-2 Basic functions and general outline

The following shows the basic functions of this module.



[1] Position control

Two types of travel, absolute travel and relative travel are possible. With absolute travel (positioning by absolute values), positioning is performed by absolute values from the origin, and with relative travel (positioning by incremental values), positioning is performed by incremental values fro the present position.

There are two positioning modes "program operation" and "direct operation."

"Interrupt jog feed" by which operation is stopped after travel by a specified travel distance is also possible by the interrupt input signal.

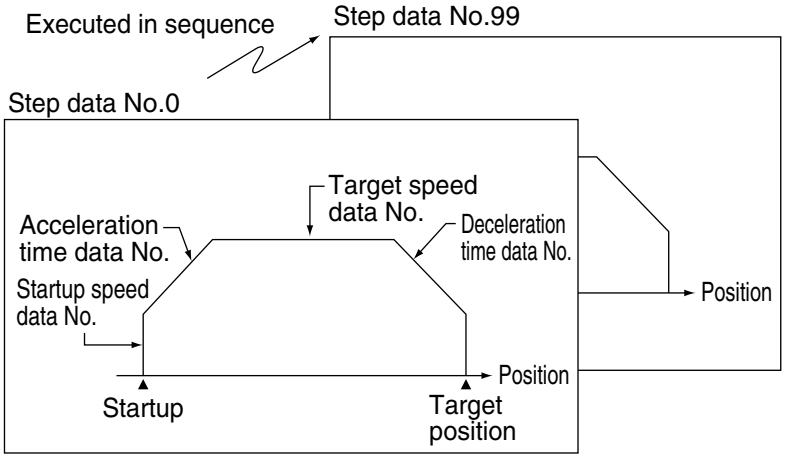
(1) Program operation

With program operation, data (simply called "step data" from here on) such as position and speed data is transferred beforehand to this module, and positioning is performed by specifying the No. of that step data from PC.

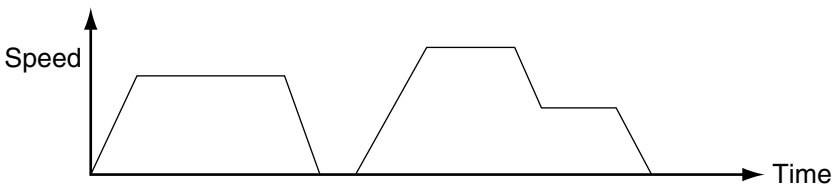
Up to 99 steps for a single axis can be set as the step data.

Step data is executed in sequence from the specified step data No.

Note, however, that execution of step data jumps to a jump destination if a jump is programmed.

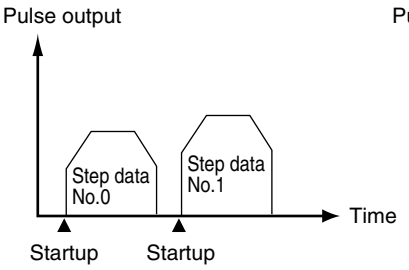


■ **Positioning control (Positioning by linear interpolation and on two independent axes is possible.)**

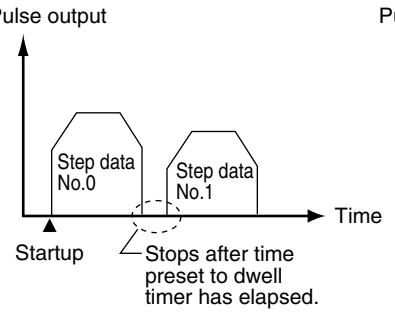


There are three positioning control modes "single-step positioning," "automatic positioning" and "continuous positioning" depending on the end pattern to be set to the step data.

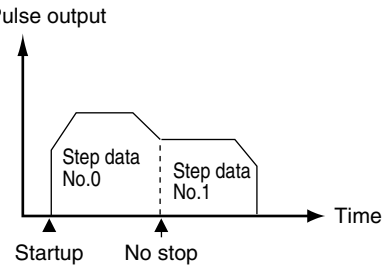
• Single-step positioning



• Automatic positioning



• Continuous positioning

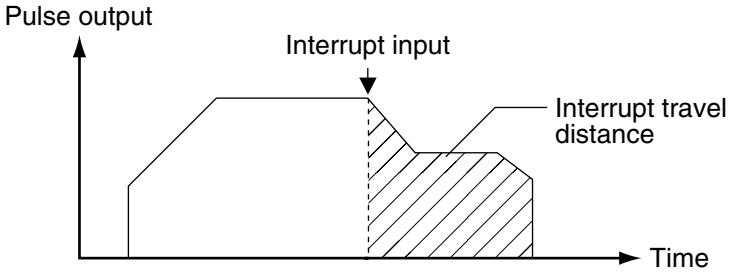


(2) Direct operation

With direction operation, positioning is performing by directly setting position data (or position No.) and speed data (or speed No.) from the PLC to an area assigned on the PLC's data memory.

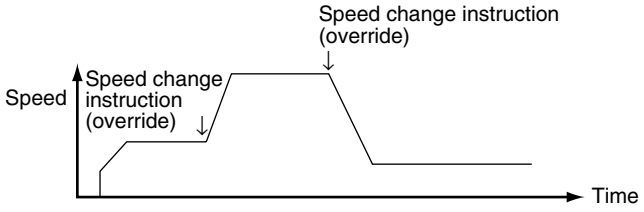
(3) Interrupt jog feed

The axes move by the specified travel and come to a stop when the interrupt input signal is entered.

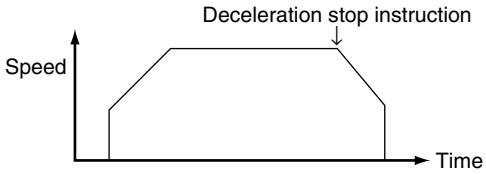


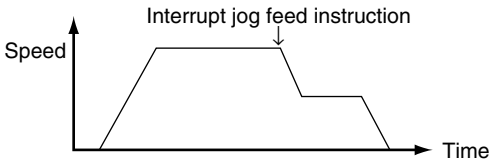
[2] Speed control

With speed control, the pualse is output continuously by a single startup, and the speed can be changed any number of times during operation.



To stop operation, use the deceleration stop instruction of the interrupt jog feed instruction.





Both program operation and direct operation is possible in speed control.

[3] Other functions

(1) Zero return

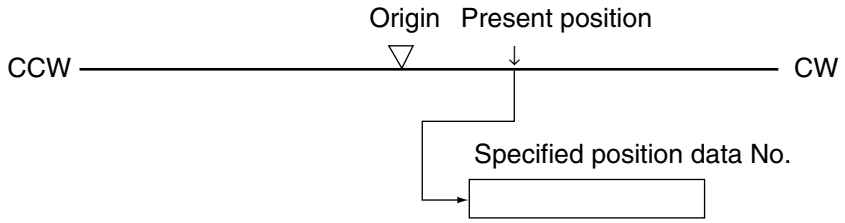
This function determines the origin of a specified axis.

(2) Jog operation

This function is the operation of starting up and stopping travel on a specified axis at a specified speed.

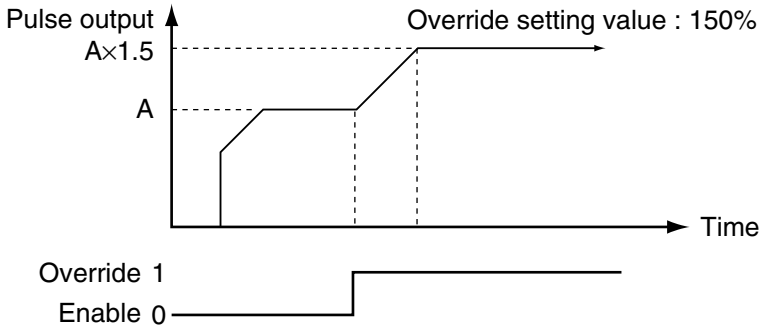
(3) Teaching

This function is the operation of loading the present position to specified position data.



(4) Override function

This function changes the target speed to a speed obtained by applying an override according to the override enable instruction during positioning.



(5) Change present position

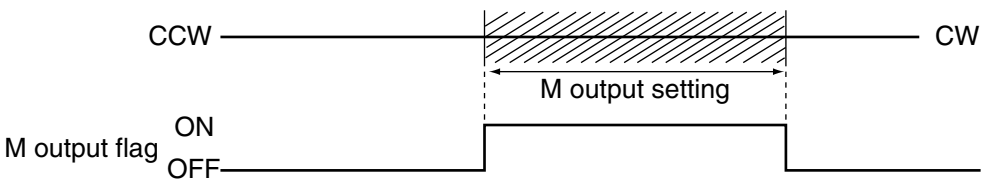
This function changes the present position to specified data according to the present position preset instruction.

(6) Backlash compensation

This function compensates for error that occurs in gear meshing in mechanical systems.

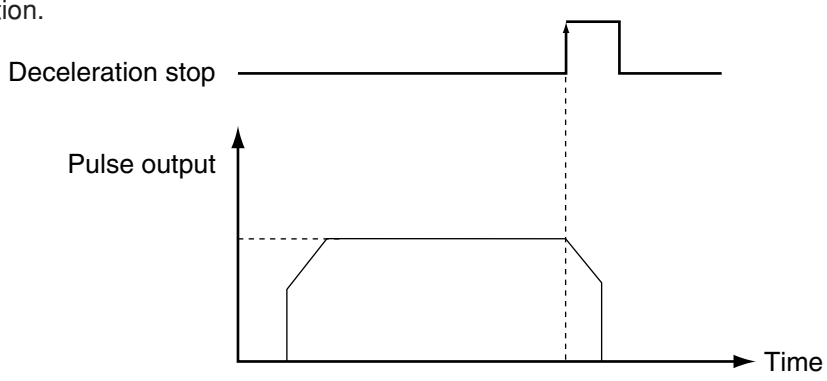
(7) M output

This function turns the M output flag when the present position is within a specified range.



(8) Deceleration stop

This function causes operation to decelerate and come to a stop according to the deceleration stop instruction.



(9) Move origin

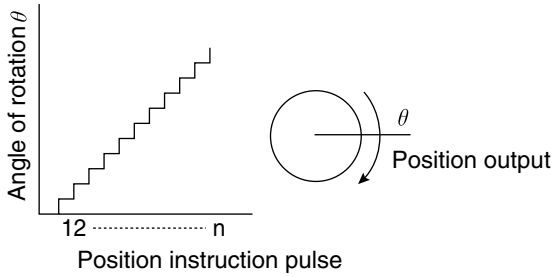
This function returns the axes to a preset origin.

• This function is enabled only when the origin has been confirmed.

1-3 Principle of operation of control systems, simple design of a positioning system

[1] Principle of operation of control systems

This module adopts a pulse output type open loop control system. "Open loop control" is a system where control is performed without positional feedback on the assumption that the motor operates according to given input pulses. Stepping motors are often used in this control system. Stepping motors rotate for the predetermined angle each time that a pulse signal is given. Accordingly, the rpm of stepping motors is proportional to the number of pulses of the pulse train from this module, and the rotation speed is proportional to the frequency of the pulse train.

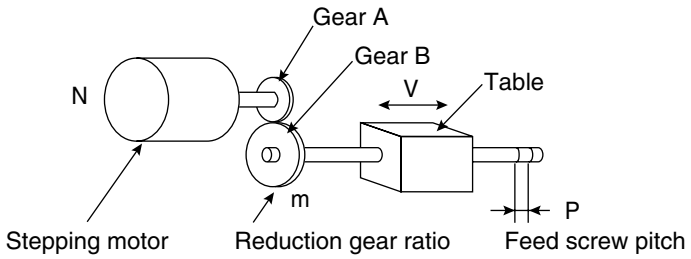


- When open loop control is used on this module, all speed data (p/s) and coordinate data (p) are set referenced to pulses.

[2] Simple design of a positioning system (method of converting position and speed to pulse)

(1) Linear operation

The following describes linear operation by positioning such as below a stepping motor.



θ : Angle of rotation per pulse (angle/pulse -> deg/p)
β : Rotary pulse coefficient, number of pulses per rotation (number of pulses/single motor rotation → p/rotation)
m : Reduction gear ratio → number of teeth of gear A/number of teeth of gear B)
α : Pulse rate coefficient (travel distance per pulse)
P : Feed screw pitch (travel distance/rpm → mm/rotation)
v : Table travel speed (travel distance/sec → mm/s)
V_P : Set pulse speed (speed to set to this module, number of pulses/sec → p/s)
L : Set travel distance (mm)
P_L : Number of set travel pulses

● **Formula for calculating the pulse rate**

First, the rotation pulse coefficient β. (number of pulses per single rotation)

$\beta=360° / \theta$ (p/rotation) is calculated:

Thus, the pulse rate coefficient becomes:

$\alpha=P/(\beta \times m)=(P \times \theta) / (360 \times m)$ (mm/P)

Next, the pulse speed VP (speed to set to this module) when the table travel speed v is generated from this coefficient:

$V_P=v/\alpha=v \times (360 \times m)/(P \times v)$ (p/s)

The number of pulses (P_L) for arriving at the set travel distance is calculated as follows:

$P_L=L/\alpha=L \times (360 \times m)/(P \times \theta)$ (p)

■ Example

The data to set to this module is as follows when positioning is performed at a set speed of 5000 (mm/s) and set coordinates 20000 (mm).

1

<Conditions>

500 pulses are required for a single rotation of the motor.

The number of teeth of gear A is 50, and the number of teeth of gear B is 100.

The feed screw pitch is 10 (mm/rotation).

The following value is calculated from the above conditions:

$m=100/50=2$

$\beta=500$

$P=10$

$v=5000$

$L=20000$

First, calculate the pulse rate coefficient.

$\alpha=P/(\beta \times m)=10/1000=0.01$

Accordingly, the pulse speed to set to this module becomes:

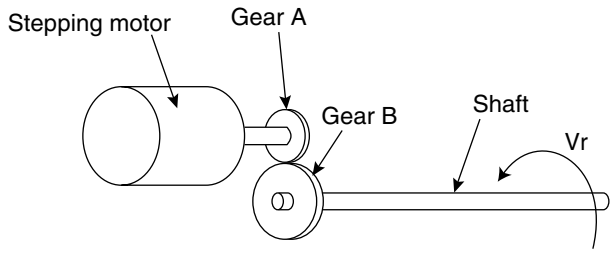
$V_P=v/\alpha=5000/0.01=500000(p/s)$

And, the pulse travel distance to set to this module becomes:

$P_L=L/\alpha=20000/0.01=2000000(p)$

(2) Rotary operation

The following describes rotary operation by positioning such as below a stepping motor.



θ : Angle of rotation per pulse (angle/pulse → deg/p)
β : Rotary pulse coefficient, number of pulses per rotation (number of pulses/single motor rotation → p/rotation)
γ : Rotation pulse rate coefficient (number of pulses/single rotation of shaft → p/rotation)
m : Reduction gear ratio → number of teeth of gear A/number of teeth of gear B)
V_r : Shaft rotation speed (number of rotations/sec → rps)
V_p : Set pulse speed (speed to set to this module, number of pulses/sec → p/s)
R : Shaft rpm (rpm)
P_L : Number of set travel pulses

The rotary pulse coefficient is calculated:

$\beta=360/\theta$ (number of pulses/rpm → p/rotation)

Thus, the pulse rate coefficient becomes:

$\gamma=\beta m=360\times m/\theta$ (p/rotation)

Next, the pulse speed VP (speed to set to this module) when the table travel speed Vr (rps) is generated from this coefficient:

$V_P=Vr\gamma=Vr\times360\times m/\theta$ (p/s)

The number of pulses (PL) for arriving at the set rpm is calculated as follows:

$P_L=R\times\gamma=R\times(360\times m/\theta)$ (p)

■ Example

The data to set to this module is as follows when rotation is performed at a shaft rotary speed of 20 (rps) and number of shaft rotations of 100.

1

<Conditions>

2 pulses are required for a 1° (deg) rotation of the motor.

The number of teeth of gear A is 50, and the number of teeth of gear B is 200.

The following value is calculated from the above conditions:

First, calculate the pulse rate coefficient.

$m=200/50=4$

$\theta=1/2=0.5$

$\beta=360/0.5=720$(p/rotation)

The rotary pulse rate coefficient is calculated from these values as follows:

$\gamma=720\times4=2880$(p/rotation)

Accordingly, the pulse speed to set to this module becomes:

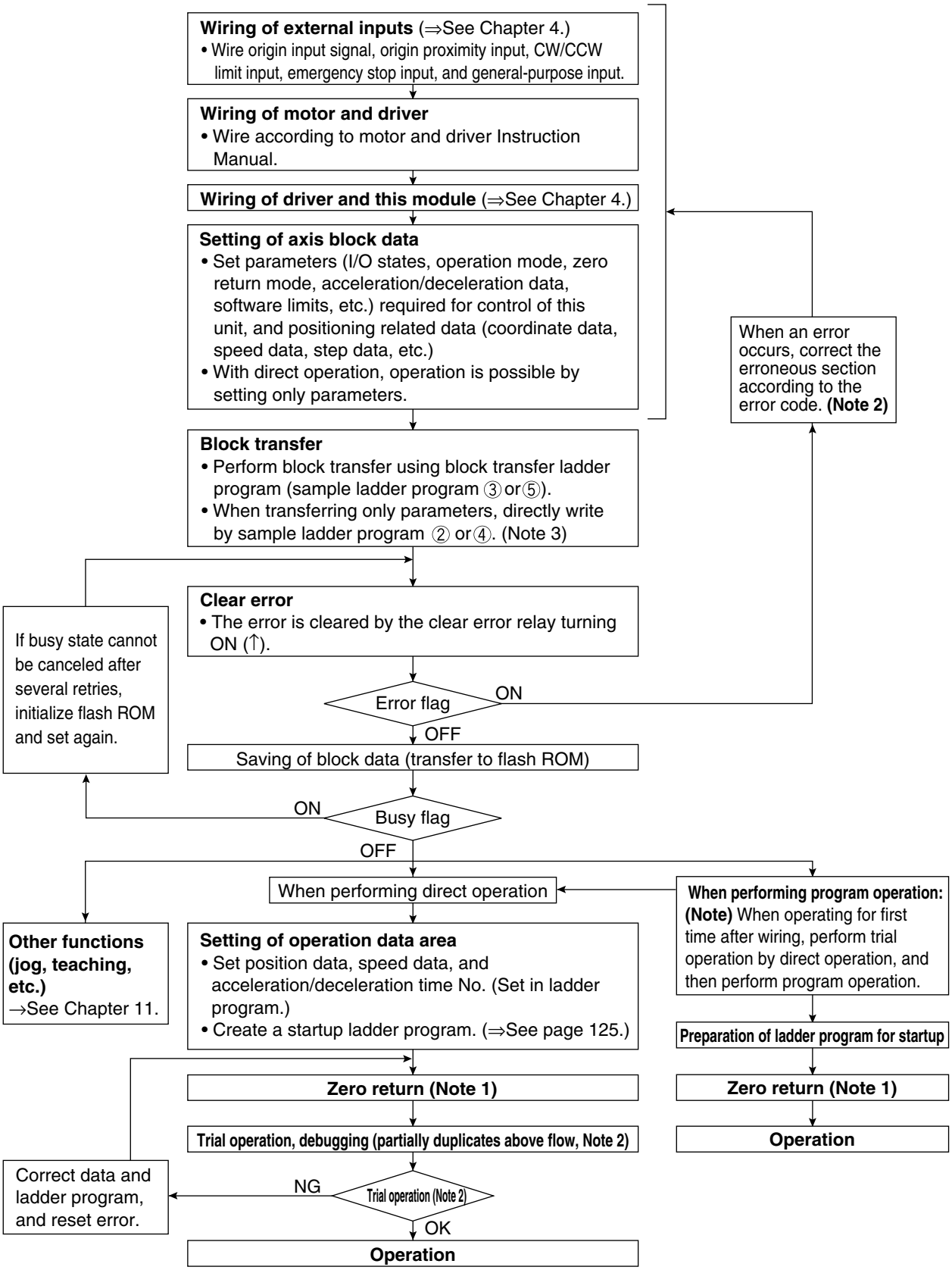
$V_P=Vr\gamma=20\times2880=57600$(p/s)

And, the pulse travel distance to set to this module becomes:

$P_L=R\gamma=100\times2880=2880000$(p)

- When the value of PL exceeds 9999999, perform speed control. In this case, the rotation speed cannot be managed.

1-4 Procedure up to start of operation



(Note 1) Regarding functions that do not operation unless origin is confirmed, be sure to perform a zero return and change the present position before executing operation to confirm the origin.

(Note 2) For details on the operation flow when an error occurs, see "Chapter 13 Troubleshooting."

(Note 3) Selection of the sample ladder program (③ and ⑤, ② and ④) is determined by the top address by optional I/O registration.

Chapter 2 Specifications

[1] General specifications

Item	Specifications	
	JW-12PS	JW-14PS
Storage temperature	-20 to 70°C	
Ambient temperature	0 to 55°C	
Ambient humidity	35 to 90%RH (condensation not allowed)	
Vibration resistance	JIS C0911 compliant • Peak-to-peak amplitude 0.15mm(10 to 58Hz), 9.8m/s^2(58 to 150Hz)(2 hrs on each of X, Y and Z axes)	
Vibration resistance	JIS C0912 compliant 147m/s^2 (3 times on each of X, Y and Z axes)	
Power consumption (5 VDC)	Max.450mA *	Max.550mA *
External dimensions	33.5mm × 250mm × 105mm(w/out connector connection)	
Weight	Approx. 500 g	Approx. 550 g
Atmosphere	Corrosive gases not allowed	
Accessories	• 50-pin connector (for shaft connection) 10150-3000VE(50-pin receptacle soldered type)1 p'ce 10350-52F0-008(shell) 1 p'ce	• 50-pin connector (for shaft connection) 10150-3000VE(50-pin receptacle soldered type)2 p'ces 10350-52F0-008(shell) 2 p'ces

*Supplied from JW50H/70H/100H rack panel

[2] Functional specifications

(1) Performance specifications

Item	Specifications (JW-12PS/14PS)	
Applicable PLC	JW50H/70H/100H Series	
Number of occupied I/Os	I/O relays: 2 bytes, data registers: 256 bytes (special I/O area)	
Control target driver	Pulse train input servo driver or driver for stepping motor	
Control method	Open or closed loop control based on pulse train output	
Number of controlled axes	JW-12PS:2 axes(X,Y),JW-14PS:4 axes(X,Y,Z,A)	
Control unit	Pulse	
Control modes	Single-step operation, linear interpolation operation, speed control, interrupt jog feed (speed->position control)	
Operation modes	Zero return, jog operation, direct positioning operation, program positioning operation.	
Pulse output	System	CW, CCW format or signed pulse system
	Signal	Open collector output or line driver output
Position instructions	System	Absolute value or relative value instruction
	Data	-9999999 to 9999999 Pulse
	Number of data items	99/axis (number of data items in program operation *unlimited in direct operation)
Speed instructions	Data	1 to 500 kpps *1 to 250 kpps when the pulse output signal format is open collector
	Speed resolution	4
	Number of data items	64/axis (number of data items in program operation *unlimited in direct operation)
Acceleration/ deceleration instructions	System	Ramp or sinusoidal (sinusoidal coefficient of 0 to 99% set to each axis)
	Data	1 to 250000 ms
	Number of data items	9/axis
Instructions for program operation	Number of steps	99 steps/axis (position, speed and acceleration/deceleration data same as above)
	Operation pattern	Single-step, automatic, continuous, continuous control, interrupt jog feed
	Dwell timer	Each axis settable to 0 to 9.99 sec. (in 10-ms increments) (16 patterns settable to each axis)
Zero return	Origin proximity input signal: OFF, a contact, b contact Origin input signal: b contact, a contact Origin compensation data: -9999999 to +9999999 pulse	
	6 basic zero return operation modes ① Stop by origin input signal after escape from origin proximity ② Origin proximity edge detection 1 (count method 1, origin input signal used) ③ Origin proximity edge detection 2 (count method 2, origin input signal not used) ④ Origin proximity signal not used ⑤ Inversion at limit end, zero return operation at low speed, and stop at origin ⑥ Origin proximity signal and origin signal both unused	
Jog operation	Possible by instructions from PLC or instructions from personal computer (running dedicated software)	
Teaching	① Present position registered to specified No. data by instruction from PLC ② Present position registered to specified No. data by instruction from personal computer (running dedicated software)	
Deceleration stop	Deceleration stop according to deceleration time by deceleration stop instruction	
Emergency stop	Pulse output immediately stopped by external emergency stop signal	
Change present position	Present position changed to preset value by present value position preset instruction	
Override	Speed is changed to speed obtained by applying override coefficient to target speed by override instruction during operation (settable within range 0 to 999%)	
Backlash compensation	0 to 9999 Pulse	

↓
Continued on next page

From previous page

Item	Specifications (JW-12PS/14PS)
Software limit	Settable within range -9999999 to +9999999 pulses
Auxiliary output (M output)	8 outputs/axis (output to external relay)
General-purpose input	1 input/axis, real-time external input not via PLC (used for interrupt jog feed, etc.)
General-purpose output	1 input/axis, real-time external input not via PLC (used for interrupt output)
Setting method for operation data	① Set by ladder program on PLC ② Set from personal computer (dedicated software required, scheduled to be supported in the near future)
Saving of operation data	Backed up by internal flash ROM on this module * Data can be saved to hard disk or other storage media on personal computer by dedicated software running on personal computer. (Dedicated software is scheduled to be supported in the near future.)

(2) Pulse output specifications

Item	Specifications (JW-12PS/14PS)	
Signal names	CW, CCW (open collector output)	CW, CCW (line driver output)
Output system	NPN transistor (sync output)	Differential output (AM26LS31 or equivalent, RS-422A compliant)
Rated output voltage	5/12/24VDC	
Output voltage range	4.75 to 26.4VDC	
Output current	Max. 30 mA	
On voltage	1 V or less	
OFF leak current	0.2 mA or less	
Pulse output start time	8 ms or less * Time from acceptance of PLC startup signal up to output of pulse	
Max. output pulse frequency	250 kpps	500 kpps
Breakdown voltage	500 VAC (across external input terminal and secondary circuit) *photocoupler insulation	

(3) Input specifications

Item	Specifications (JW-12PS/14PS)	
Signal name	Driver error, positioning completed, origin proximity, origin (24 V), upper limit, lower limit, general-purpose input, emergency stop	Encoder A/B/Z phase input (line driver output and 5V open collector output supported)
Rated input voltage (range)	24VDC (21.4 to 26.4VDC)	5VDC (3 to 5.5VDC)
Rated input current	5.8mA (24V) <12mA (24V)> *	20mA (5V)
Input ON level	20 V/5 mA or less (20 V/12 mA or less)*	3V/ 12 mA or less
Input OFF level	6 V/1.5 mA or less (6 V/2 mA or less)*	1 V/ 2 mA or more
Input response time	1 ms or less (ON→OFF, OFF→ON)	4X, 500 kpps
Breakdown voltage	500 VAC (across external input terminal and secondary circuit) *photocoupler insulation	

* Figures in parentheses "()" are for origin (24 V) only.

(4) Output specifications

Item	Specifications (JW-12PS/14PS)
Signal names	Clear deviation/general-purpose output
Output type	NPN transistor output (sync output)
Rated output voltage (range)	5/12/24VDC (4.75 to 26.4VDC)
Output current	Max. 30 mA (integrated surge protection for general-purpose output)
ON voltage	1.5 V or less
OFF leak current	0.2 mA or less
Output response time	1 ms or less (ON→OFF, OFF→ON)
Breakdown voltage	500 VAC (across external input terminal and secondary circuit) *photocoupler insulation

(5) External 24 V power input specifications

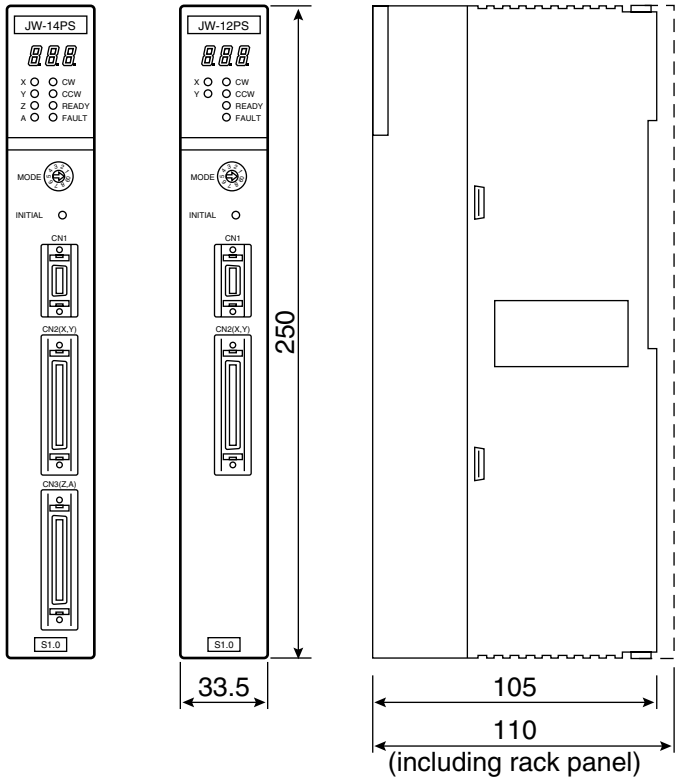
Item	Specifications	
	JW-12PS	JW-14PS
Rated input voltage (range)	24VDC (21.6 to 26.4VDC)	
Input current	Max. 80 mA	Max. 150 mA

(6) Communications port (communications between support tool and specified driver)

Item	Specifications (JW-12PS/14PS)	
Communications standard	RS-422A (1:N communications allowed)	(Remarks) • Communications with personal computer (running dedicated software) • Communications with servo driver made by specific manufacturer
Transmission speed	38400bps	
Data length	8 bits	
Parity bit	None	
Stop bit	1 bit	
Connector	Half 14-pin (receptacle side on this module)	

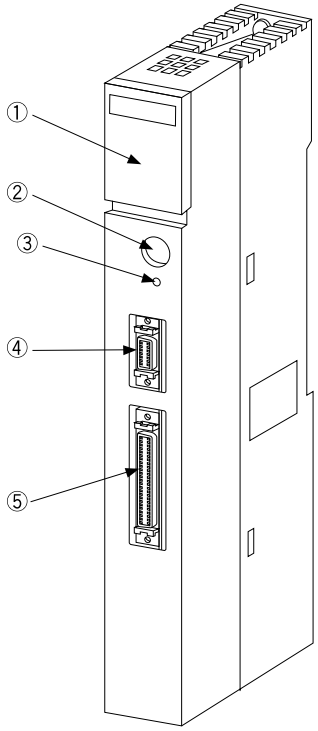
[3] External dimensions

• JW-14PS • JW-12PS

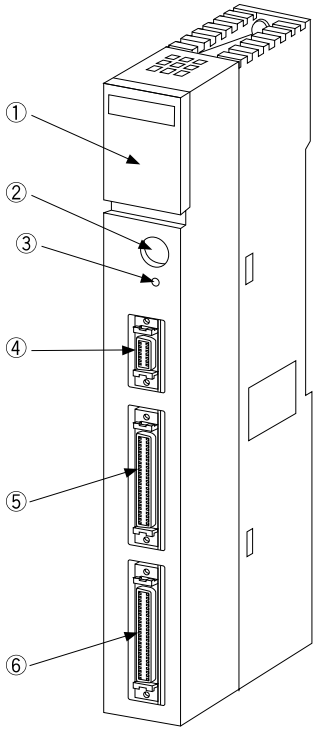


Chapter 3 Names and Functions of Parts

JW-12PS



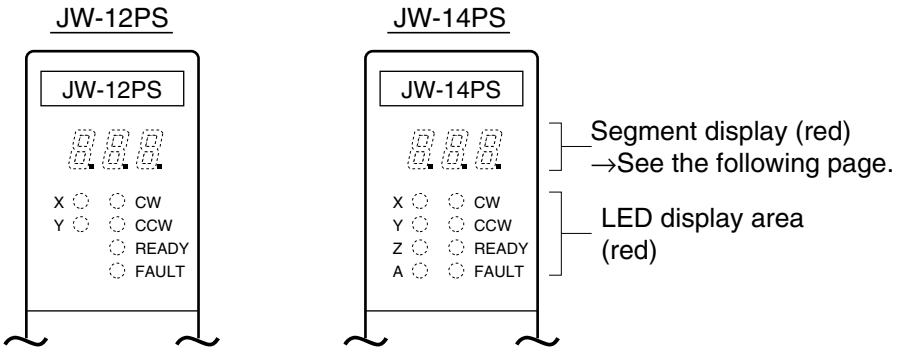
JW-14PS



	Name	Function	
①	Display panel	Displays the point No., axis operating state and other information using the segment LED (three digits) and indicators (X, Y, CW, CCW, etc.).	
②	MODE switch	Sets the operation mode.	For details, →see page 3-4.
③	INITIAL switch	Initial switch	
④	Connection for tool connector (CN1)	This connector is for connecting to a Windows machine (OS: Windows 95/98). • An exclusive cable and communications adapter (JW-100SA) are used for the connection. This connector is for the communications with a driver in an absolute system.	
⑤	Connector for X-/Y-axes (CN2)	This connector is for connecting to the servo driver for the X-/Y-axes. • The module side connector of the connector cable is provided with this module.	
⑥	Connector for Z-/A-axes (CN3: JW-14PS only)	This connector is for connecting to the servo driver for the Z-/A-axes. • The module side connector of the connector cable is provided with this module.	

[1] Display panel

The operation status of this module is indicated by the state (lit, out, blinking) of LEDs on the display panel.



(1) LED display

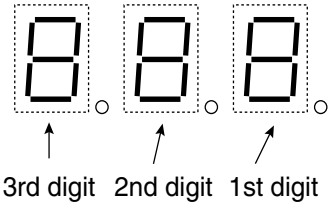
LED Name	Description
X	Operation state of X-axis • At normal operation: lit, During a stop: out, During an error: blinking
Y	Operation state of Y-axis • At normal operation: lit, During a stop: out, During an error: blinking
Z (JW-14PS only)	Operation state of Z-axis • At normal operation: lit, During a stop: out, During an error: blinking
A (JW-14PS only)	Operation state of A-axis • At normal operation: lit, During a stop: out, During an error: blinking
CW	Lit at CW pulse output of axis (*)
CCW	Lit at CCW pulse output of axis (*)
READY	Ready signal • Lit when parameters, etc. are normally set and the unit is ready for operation
FAULT	Error state • Blinking when an error occurs (Error code is displayed on segment LED.) • Lit when a watchdog timer error occurs (CPU runaway, etc.)

* The axis turned on by "X, Y, Z, A" of a lamp

(2) Segment display (3 digits)

The data No., error code, etc. are indicated in each operation mode.

Segment display: 3-digit display (0 to 9, -, P, d, F, J, t, H, h)

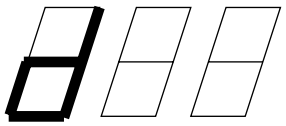


The following table shows the main content that is displayed.

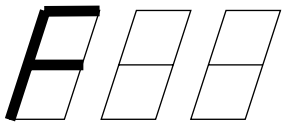
State		Description on segment display
Regular operation mode	Normal	Position data No, step data No., etc.
	Error	Error No., etc. • FAULT indicator blinks.
During teaching		Position data No., etc. • When the position data No. is selected, the segment display does not blink. The segment display is lit after teaching is executed.
In system maintenance mode		System information (version information, etc.)

The following describes the indication of the 3rd digit.

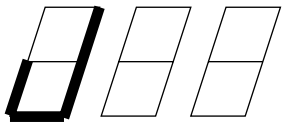
• Program operation "execution in progress" indication
• Lower two digits are step No.



• Direct operation "execution in progress" indication

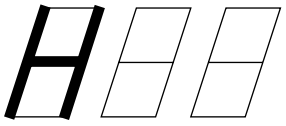


• During block data save (transfer to flash ROM)

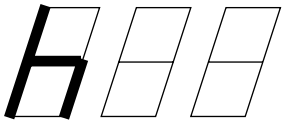


• Jog operation "execution in progress" indication

• Indication during teaching or at end of teaching
• Lower two digits are teaching No. Blinks during teaching, and is lit at end of teaching.
• During teaching, other indications for that axis are not output. However, priority is given to other axis if execution of other axis is started during teaching.



• Zero return "execution in progress" indication



• Move origin indication

Indication of the CW and CCW LEDs is interlocked with the above indications.

[2] Switches (MODE, INITIAL)

Name	Type	Description of functions
MODE	Rotary switch 0 to 9 (4 bits)	Sets the operation mode: 0: Regular operation mode (startup axis enable display mode) *1 1: Regular operation mode (X-axis enable display mode) 2: Regular operation mode (Y-axis enable display mode) 3: Regular operation mode (Z-axis enable display mode) 4: Regular operation mode (A-axis enable display mode) 5: - (unused) 6: - (unused) 7: - (unused) 8: System maintenance mode (system version upgrade, etc.) 9: Setting prohibited
INITIAL	Push switch	The INITIAL switch has the following two functions: ①For initial start (same as restart by power ON When the MODE switch is set to 0 to 4, and the INITIAL switch is held down for at least 5 seconds, the data recorded to flash ROM is read to RAM area (*2). ②For initialization When the MODE switch is set to 8, and the INITIAL switch is held down for at least 5 seconds, RAM area is initialized (set to the default or factory setting state).

*1 The latest startup data is indicated for the display when "10" is set.
[Example] When direct operation is applied on the Y-axis during program operation on the X-axis, the information of the Y-axis is displayed.
Note, however, that the information of the first axis to be started up is not indicated even during operation if the axis that started up later has stopped.

*2 Memory that is used during actual operation

Chapter 4 Installation and Connection

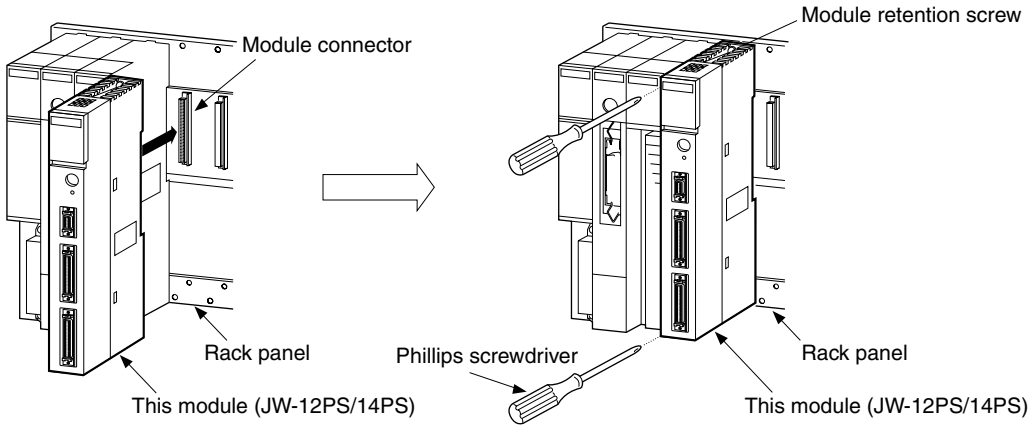
4-1 Installing this module

This module is installed on the I/O slots of the rack panel (JW-6BU/13BU, etc.) for the JW50H/70H/100H. It is not installed on the option slots.

① Turn the JW50H/70H/100H OFF.

↓

② Insert the connector for this module into the module connector on the rack panel, and tighten the module fixing screws at the top and the bottom with the Phillips screwdriver.



• Two or more of these modules can be mounted in any of the I/O slots.

Cautions

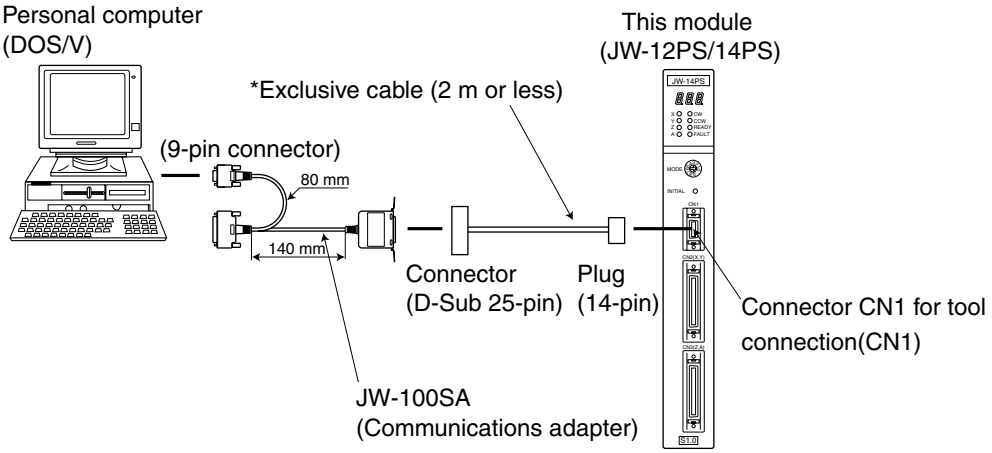
- Firmly tighten the module retention screws. Loose screws may result in malfunction.
- Do not block the ventilation holes on this module or block the flow of air into and out from these holes. Doing so might cause the temperature inside the module to heat up and cause malfunction.

4-2 Connecting connectors to this module

The following describes how to connect the CN1 connector for tool connection, CN2 connector for X-/Y-axes and CN3 for Z-/A-axes (JW-14PS only).

[1] Connecting the CN1 connector for tool connection

Connect this connector to the third-party personal computer (Windows 95/98). Use the dedicated cable and communications adapter (JW-100SA, sold separately) for connection.



(Above figure is for JW-14PS.)

*The customer must prepare the exclusive cable. (See wiring diagram on following page.)

(1) Exclusive cable wiring diagram

2 m or less (cable length)

Personal computer side (JW-100SA side)

Pin No.	Signal Name	Remarks
3	TXD	RS-422 send data (PS→personal computer)
4	NC	NC
5	NC	NC
6	NC	NC
8	GND	GND
9	NC	NC
10	NC	NC
11	NC	NC
13	Vcc	Vcc
14	NC	NC
15	/RXD	RS-422 receive data (personal computer→PS)
24	Vcc	Vcc
2	RXD	RS-422 receive data (personal computer→PS)
16	/TXD	RS-422 send data (PS→personal computer)
17	NC	NC
18	NC	NC
19	NC	NC
20	GND	GND
1	FG	FG
7	GND	GND
21	GND	GND
22	NC	NC
23	Vcc	Vcc
12	Vcc	Vcc
25	Vcc	Vcc

PS (JW-12PS/14PS) side

Pin No.	Signal Name	Remarks
1	TXD	RS-422 send data (PS→personal computer)
2	NC	
3	GND	PS side GND
4	NC	
5	NC	
6	/RXD	RS-422 receive data (personal computer→PS)
7	NC	
8	Vcc	PS side Vcc
9	RXD	RS-422 receive data (personal computer→PS)
10	/TXD	RS-422 send data (PS→personal computer)
11	GND	PS side GND
12	FG	FG
13	NC	
14	NC	

● Connector: D-Sub 25-pin female

Connector

=> JE-13250-02 (D1) made by Daiichi Denshi Corporation

Junction shell

=> DB-C3-J10 made by Japan Aviation Electronics Industry, Ltd.

● Connector: Centronics half-pitch 14-pin

① Soldered type

Plug ⇒ 10114-3000VE made by Sumitomo 3M Inc.

Non-shielded shell kit

⇒ 10314-52F0-008 made by Sumitomo 3M Inc.

[• Applicable cable ⇒ AWG#26 to #30
• O.D. of cable used ⇒ 8 mm dia. or less]

② Crimped type

1. Plug, shell optional type

Plug ⇒ 10114-6000EL made by Sumitomo 3M Inc.

Shell kit ⇒ 10314-3210-000 made by Sumitomo 3M Inc.

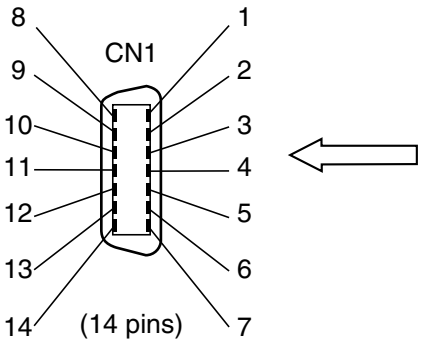
2. Plug, shell set type

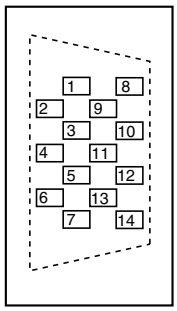
Plug w/hood

⇒ DHA-PC14-3G-HPD10 made by Daiichi Denshi Corporation

[• Applicable cable ⇒ AWG#28 flat cable]

(2) Signal assignments for connector CN1 for tool connection





(PS side connector of exclusive cable)

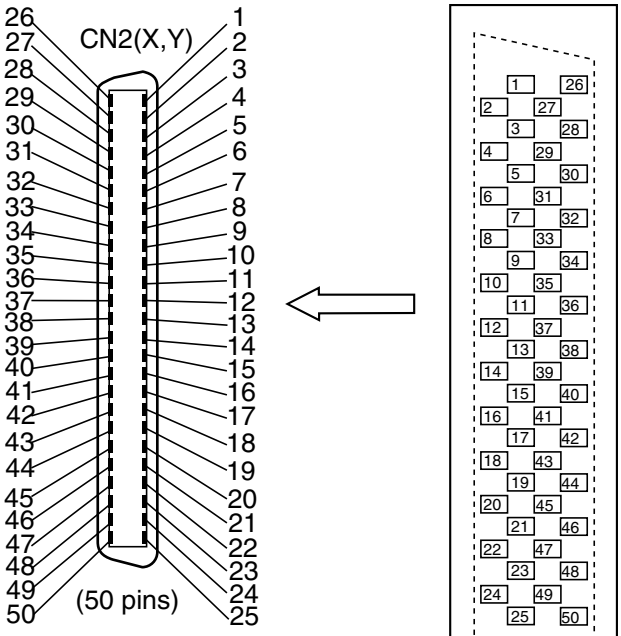
• Soldered type

: Signal assignments of 10114-3000VE made by Sumitomo 3M Inc.

[2] Connection of connectors CN2/CN3 for axes

The following shows the model names and signal arrangements of the X-/Y-axis connector CN2 and Z-/A-axis connector CN3 (JW-14PS only).

(1) Signal assignments of connectors CN2/CN3 for axes



• Signal names of CN3 (Z, A) are same as those for CN2 (X, Y).

*(Connector for axis connection)
• Soldered type
: Signal assignments of 10150-3000VE made by Sumitomo 3M Inc.

* Connector for axis connection

Connectors (cable side) to connect to the connectors CN2/CN3 for the axes are provided with this module.

Accessory	Model	Manufacturer
Connector	10150-3000VE (for 50-pin soldered plug)	Sumitomo 3M Inc.
Shell	10350-52F0-008 (50-pin plastic shell, one-touch lock)	Sumitomo 3M Inc.

[• Applicable cable => AWG#26 to #30
• O.D. of cable used => 16 mm dia. or less]

(Notes)

1. Use the soldered type connector provided with this module as the connector for axes must be shielded.
2. Do not attach or remove the cable side connector from the connector for axes with the 24 VDC power supply applied to connector CN2/CN3 for axes. Doing so might cause a malfunction.

(2) Signal arrangement of connectors CN2/CN3 for axes

NO.	Direction	Axis*	Signal Name	NO.	Direction	Axis*	Signal Name
1	IN	Common	24 V power input (+)	26	IN	Common	24 V power GND (-)
2	IN	Common	24 V power input (+)	27	IN	Common	24 V power GND (-)
3	OUT	X (Z)	CW pulse output: differential output + [line driver output]	28	OUT	X (Z)	CW pulse output: differential output - [line driver output]
4	OUT	X (Z)	CCW pulse output: differential output + [line driver output]	29	OUT	X (Z)	CCW pulse output: differential output - [line driver output]
5	OUT	X (Z)	CW pulse output [open collector output]	30	OUT	X (Z)	CCW pulse output [open collector output]
6	OUT	X (Z)	Clear deviation output [open collector]	31	OUT	X (Z)	General-purpose output (interrupt output, etc.) [open collector]
7	IN	X (Z)	Positioning completed input [24V]	32	IN	X (Z)	Emergency stop input [24V]
8	IN	X (Z)	General-purpose input (interrupt input, etc.) [24V]	33	IN	X (Z)	Driver error input [24V]
9	IN	X (Z)	Upper limit input [24V]	34	IN	X (Z)	Lower limit input [24V]
10	IN	X (Z)	Sensor input for origin [24V]	35	IN	X (Z)	Origin proximity input [24V]
11	IN	X (Z)	Encoder A phase input + [line driver or 5 V open collector signal input]	36	IN	X (Z)	Encoder A phase input - [line driver or 5 V open collector signal input]
12	IN	X (Z)	Encoder B phase input + [line driver or 5 V open collector signal input]	37	IN	X (Z)	Encoder B phase input - [line driver or 5 V open collector signal input]
13	IN	X (Z)	Encoder Z phase input + [line driver or 5 V open collector signal input]	38	IN	X (Z)	Encoder Z phase input - [line driver or 5 V open collector signal input]
14	IN	Common	Common for input (two-way)	39	IN	Common	Common for input (two-way)
15	OUT	Y (A)	CW pulse output: differential output + [line driver output]	40	OUT	Y (A)	CW pulse output: differential output - [line driver output]
16	OUT	Y (A)	CW pulse output: differential output + [line driver output]	41	OUT	Y (A)	CCW pulse output: differential output - [line driver output]
17	OUT	Y (A)	CW pulse output + [open collector output]	42	OUT	Y (A)	CCW pulse output [open collector output]
18	OUT	Y (A)	Clear deviation output [open collector]	43	OUT	Y (A)	General-purpose output (interrupt output, etc.) [open collector]
19	IN	Y (A)	Positioning completed input [24V]	44	IN	Y (A)	Emergency stop input [24V]
20	IN	Y (A)	General-purpose input (interrupt input, etc.) [24V]	45	IN	Y (A)	Driver error input [24V]
21	IN	Y (A)	Upper limit input [24V]	46	IN	Y (A)	Lower limit input [24V]
22	IN	Y (A)	Sensor input for origin [24V]	47	IN	Y (A)	Origin proximity input [24V]
23	IN	Y (A)	Encoder A phase input + [line driver or 5 V open collector signal input]	48	IN	Y (A)	Encoder A phase input - [line driver or 5 V open collector signal input]
24	IN	Y (A)	Encoder B phase input + [line driver or 5 V open collector signal input]	49	IN	Y (A)	Encoder B phase input - [line driver or 5 V open collector signal input]
25	IN	Y (A)	Encoder Z phase input + [line driver or 5 V open collector signal input]	50	IN	Y (A)	Encoder Z phase input - [line driver or 5 V open collector signal input]

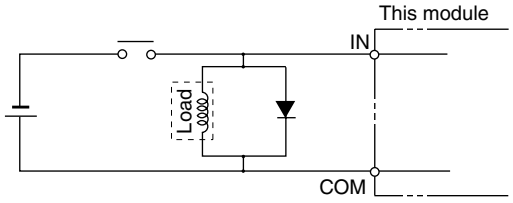
* Z or A in parentheses () in the axis column is for when connector CN3 is connected.

4-3 Connecting (wiring) to external devices

[1] to [8] show the wiring between this module and external equipment. Pay attention to the following points during wiring.

Noise from power lines in the periphery or external loads sometimes cause electronic control devices to malfunction (e.g. positional shift). Adopt the following countermeasures to eliminate malfunction caused by noise and improve system reliability.

1. Use power leads and cables specified in the instruction manual for the motor driver made of lead materials for use in wiring.
2. Wire with the power line (AC power supply, motor power leads) separated from the control line (pulse output line, external I/O signals leads).
3. Use a shielded lead with outer jacket for the control line.
4. Connect the shielded lead to the frame ground (FG) on the driver side.
5. Use a class III grounding, and use thick cable lead material of at least 1.25 mm^2 in cross-sectional area.
6. Use of twisted pair cable is recommended for the power line.
7. Be sure to install a surge absorber to inductive loads (relays, solenoids).
8. When an inductive load is connected to input signals, connect a diode as follows near to the load to absorb noise.

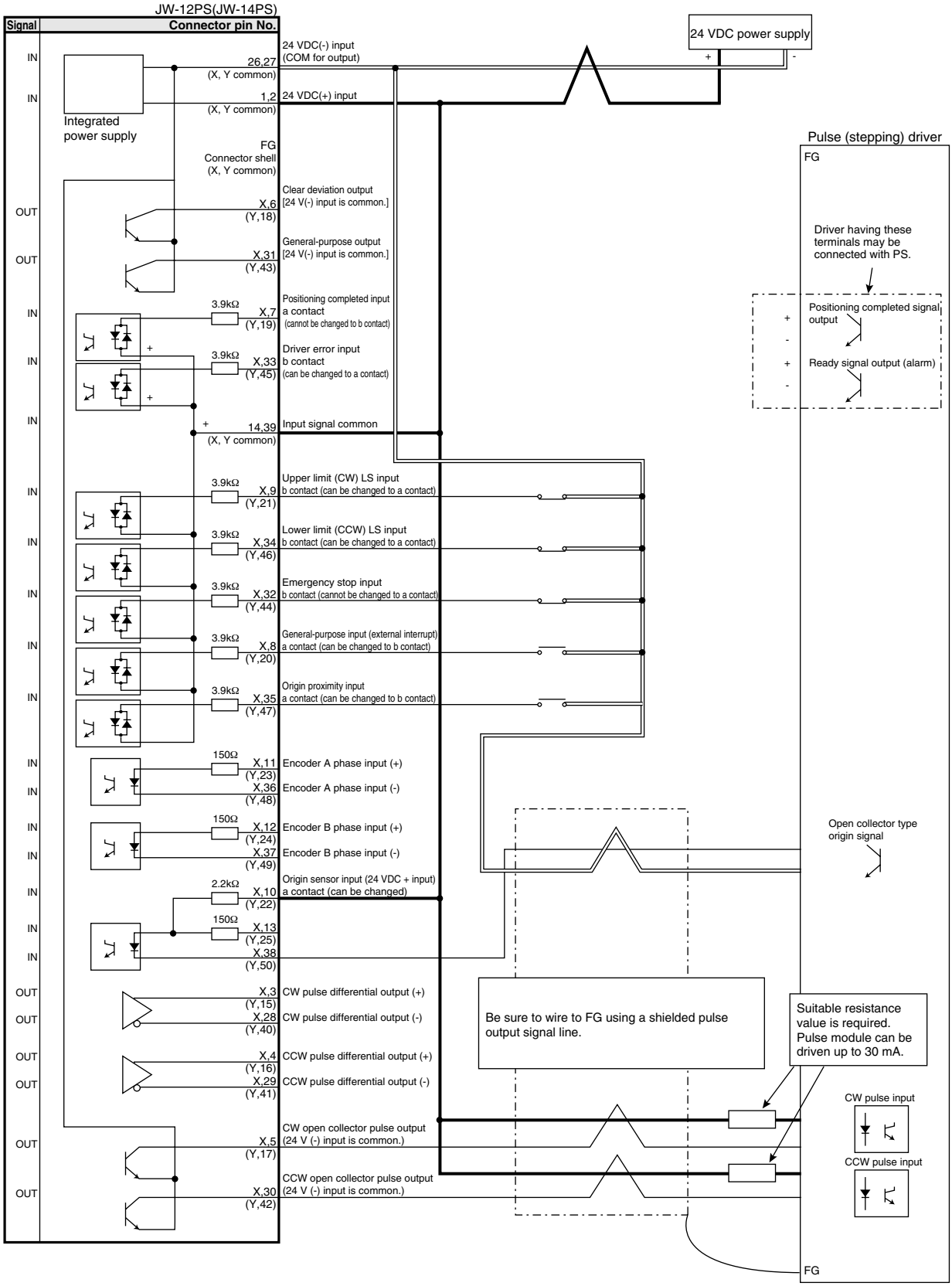


Diode : 

Use a diode having a peak total reverse voltage (VRM) of 3 times the load voltage or more, and a mean rectifying current of the load current or more.

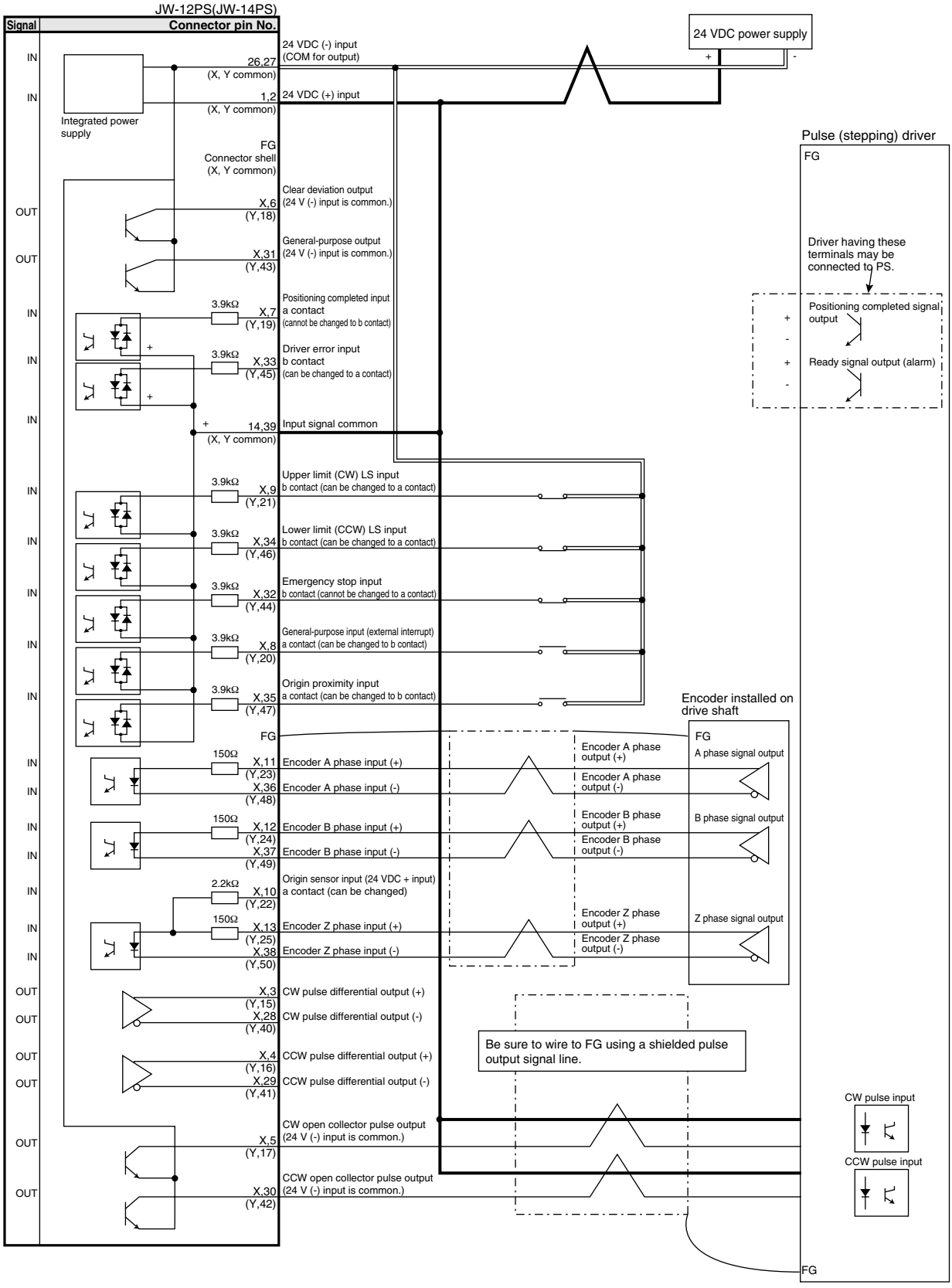
[1] Wiring in open loop control with a general pulse driver

The following example is for the X (Y) axis. Wire in the same way for the Z (A) axis.



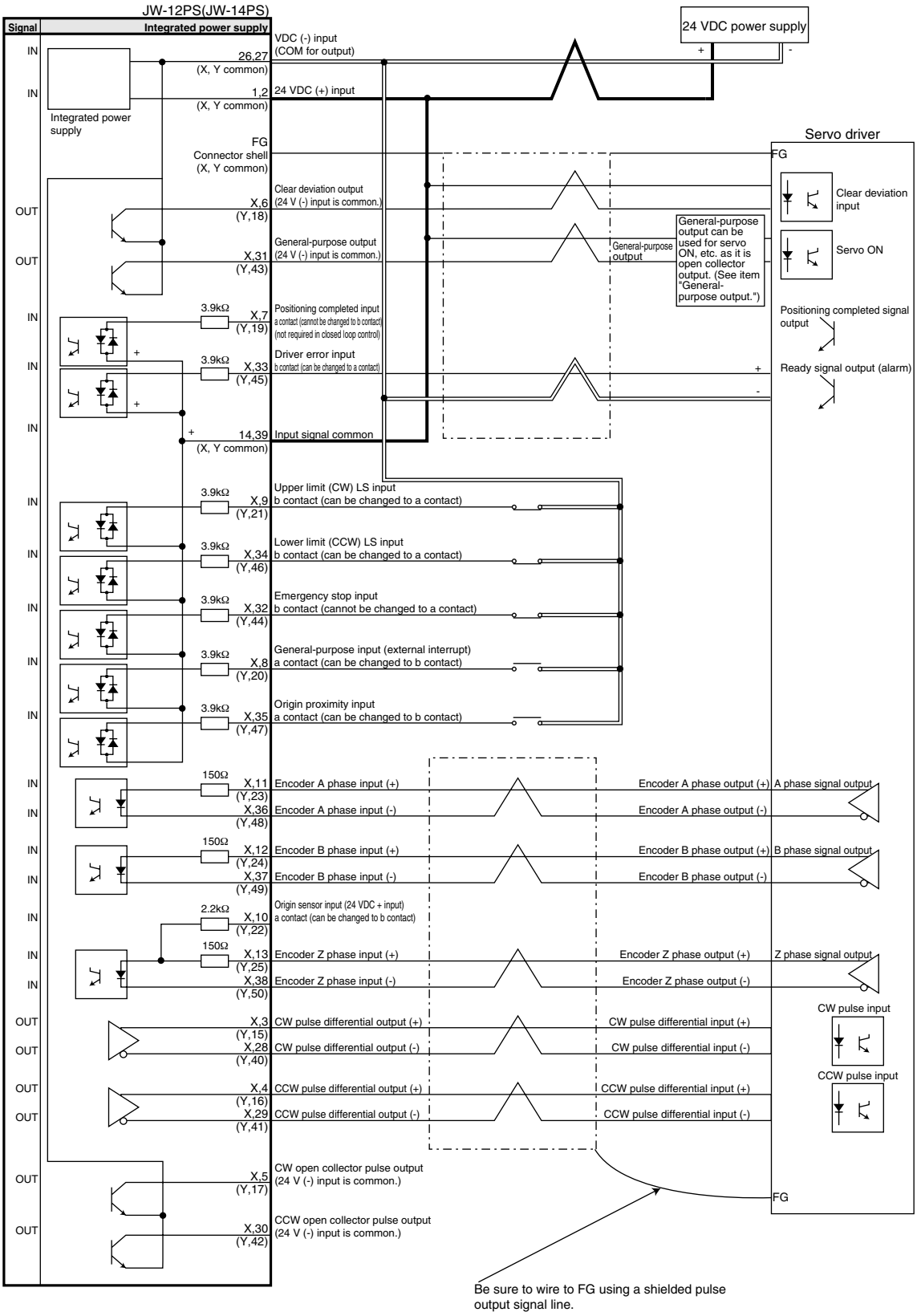
[2] Wiring in closed loop control with a general pulse driver

The following example is for the X (Y) axis. Wire in the same way for the Z (A) axis.



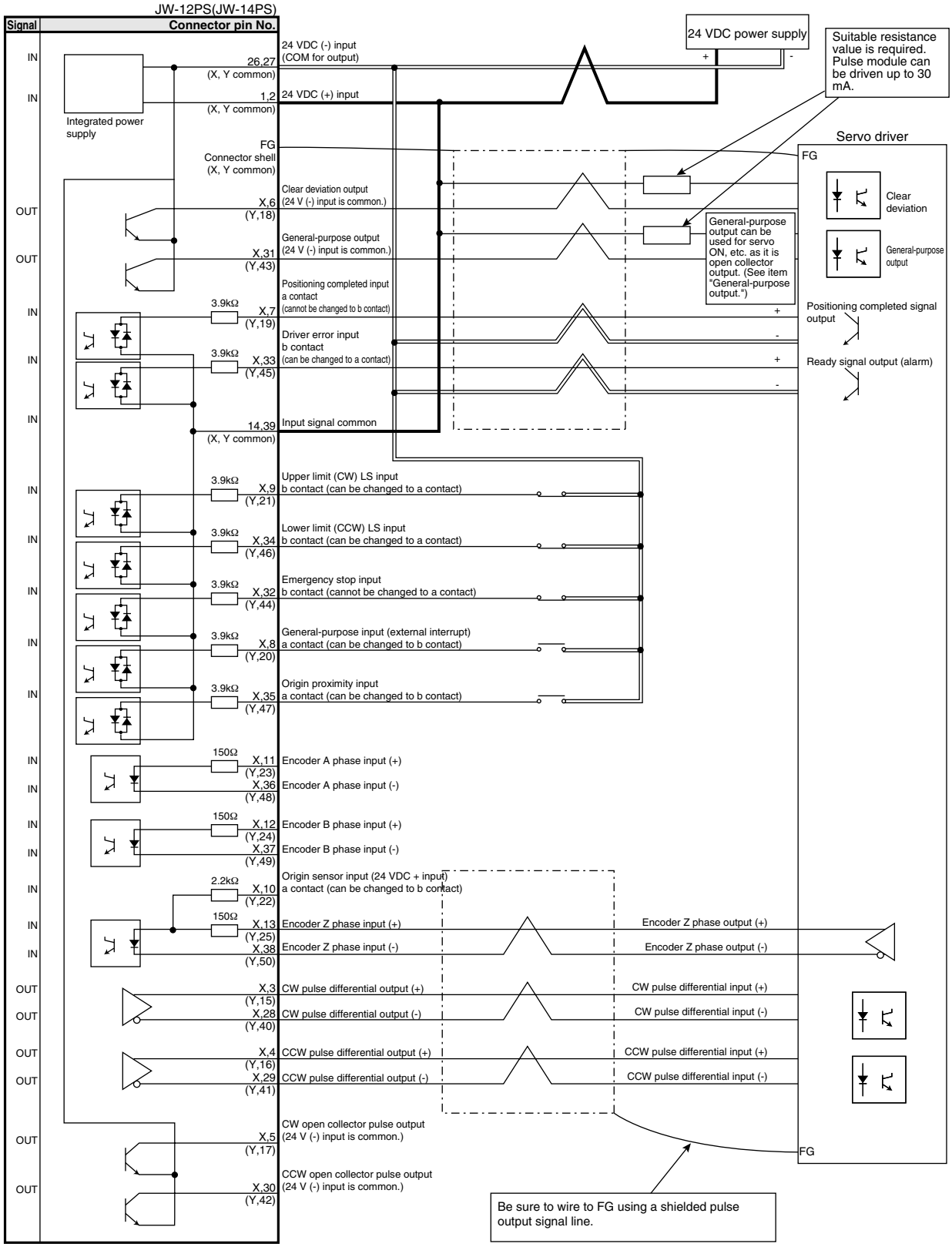
[3] Wiring in closed loop control with a general pulse driver

The following example is for the X (Y) axis. Wire in the same way for the Z (A) axis.



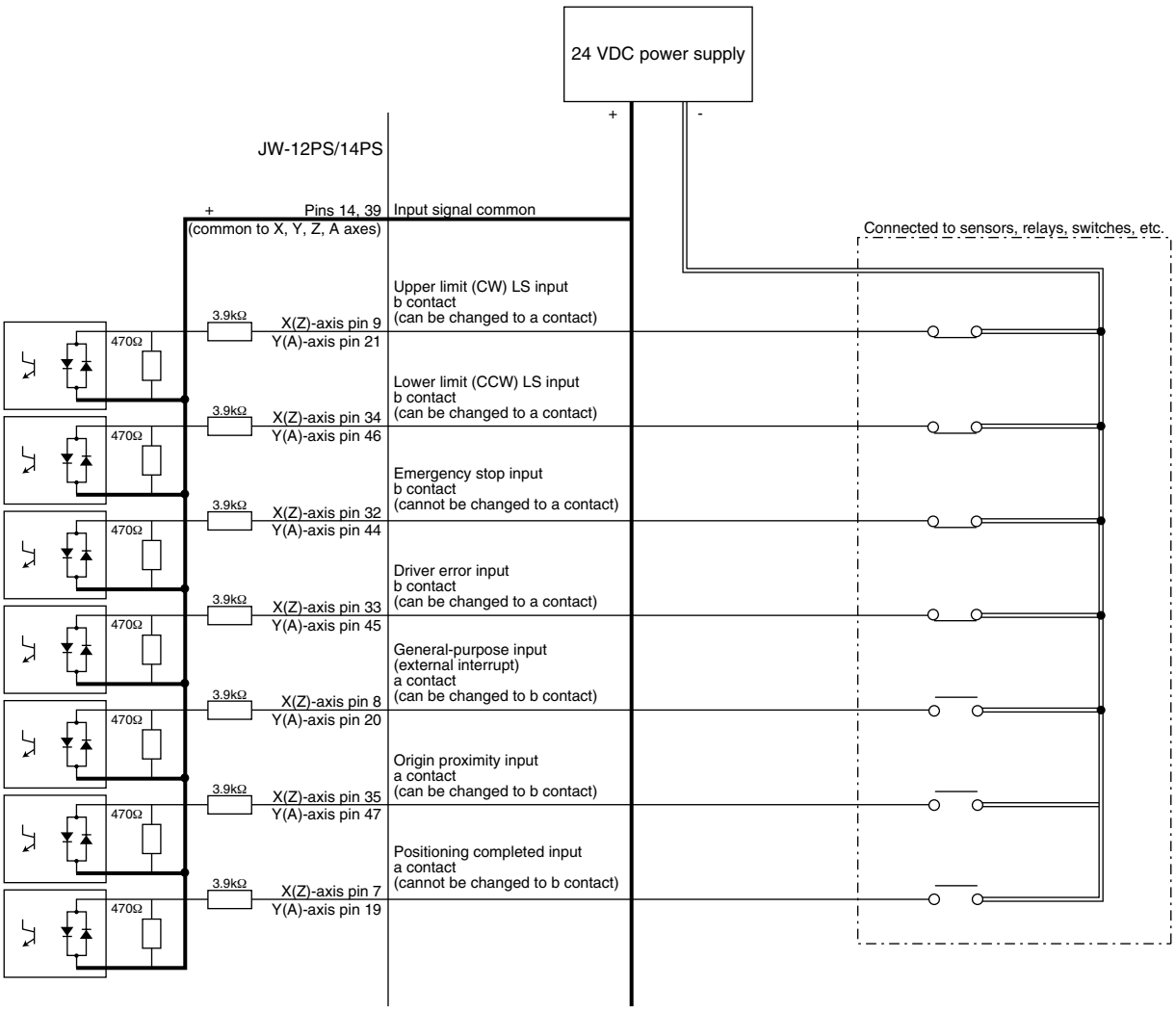
[4] Wiring in open loop control with a general servo driver

The following example is for the X (Y) axis. Wire in the same way for the Z (A) axis.



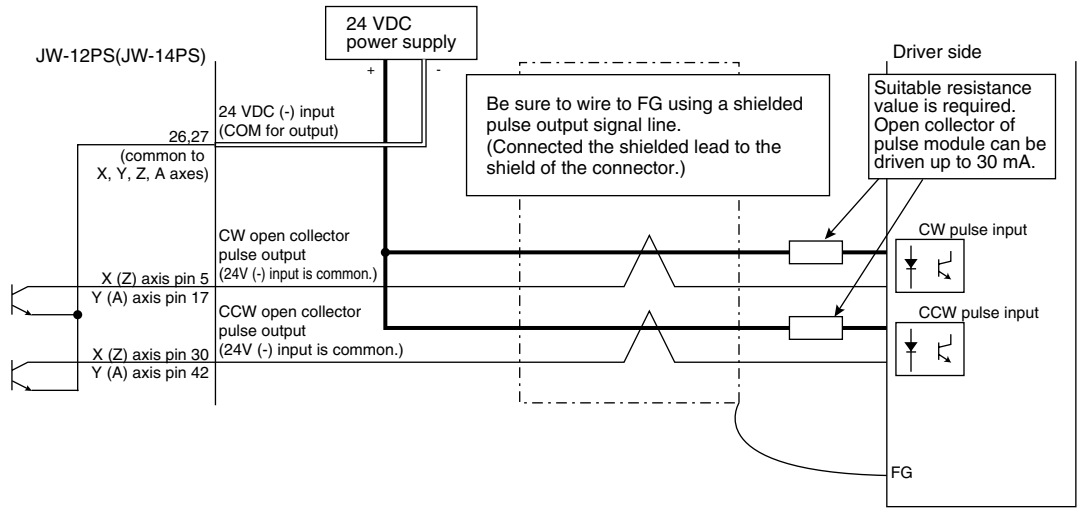
[5] Wiring of the input section

Use a switch, for example, having a switching capacity of 5 mA or more for each input. Connect a power supply to b contacts when not in use. (b contacts can also be changed to a contacts in parameters except for the emergency stop input.)

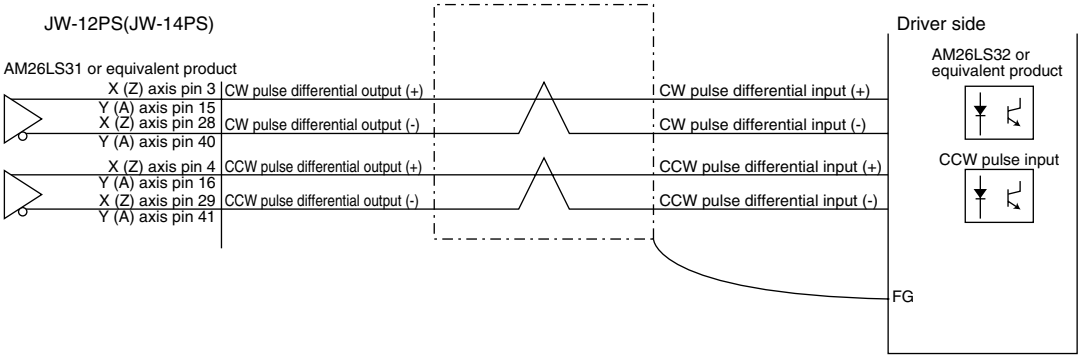


[6] Wiring of CW/CCW pulse output signals

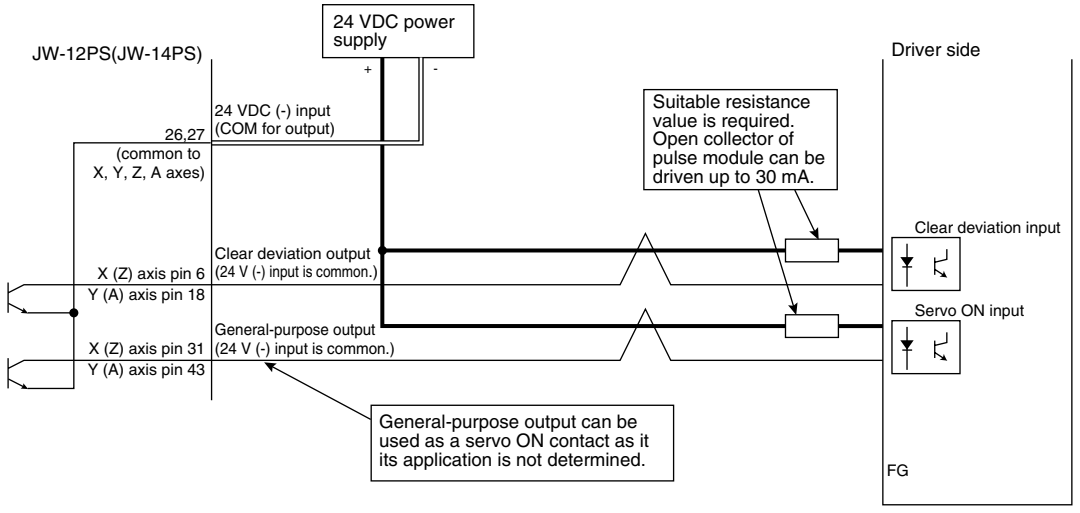
(1) Wiring in an open collector connection with a general pulse driver



(2) Wiring in connection with general differential reception-type driver



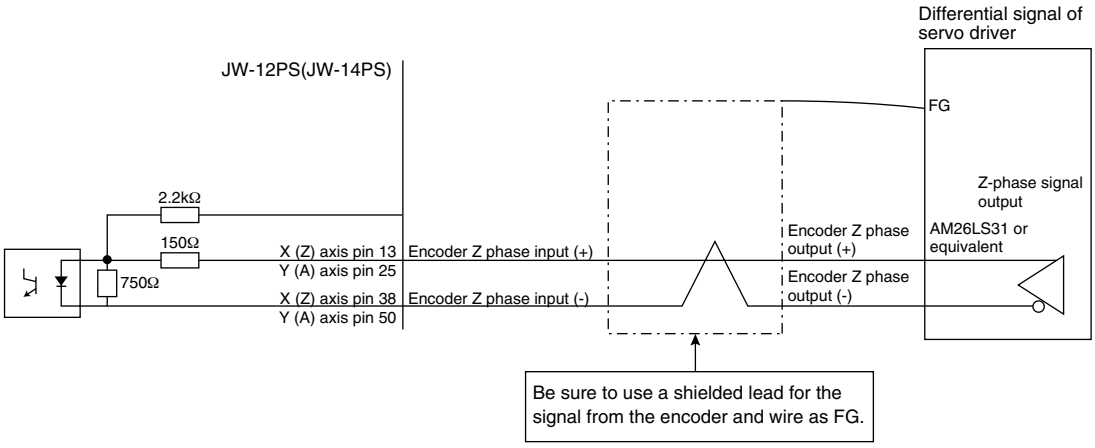
[7] Wiring of clear deviation output/general-purpose output signals



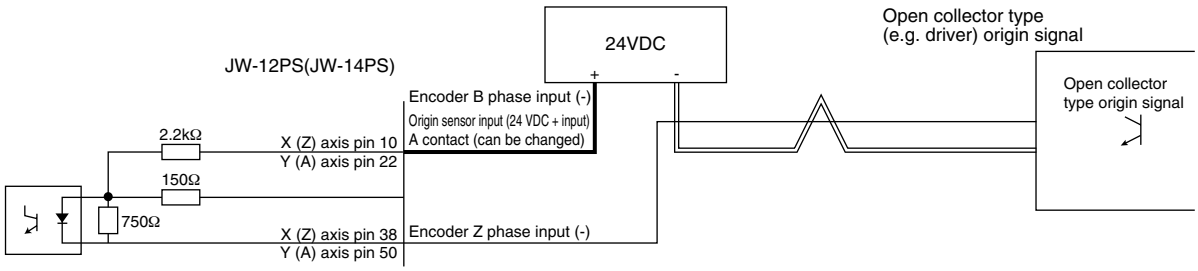
[8] Wiring of origin signal

(1) When this signal is used in an open loop

① When the differential signal origin (Z phase) signal is output from the driver



② When connecting an open collector type origin signal

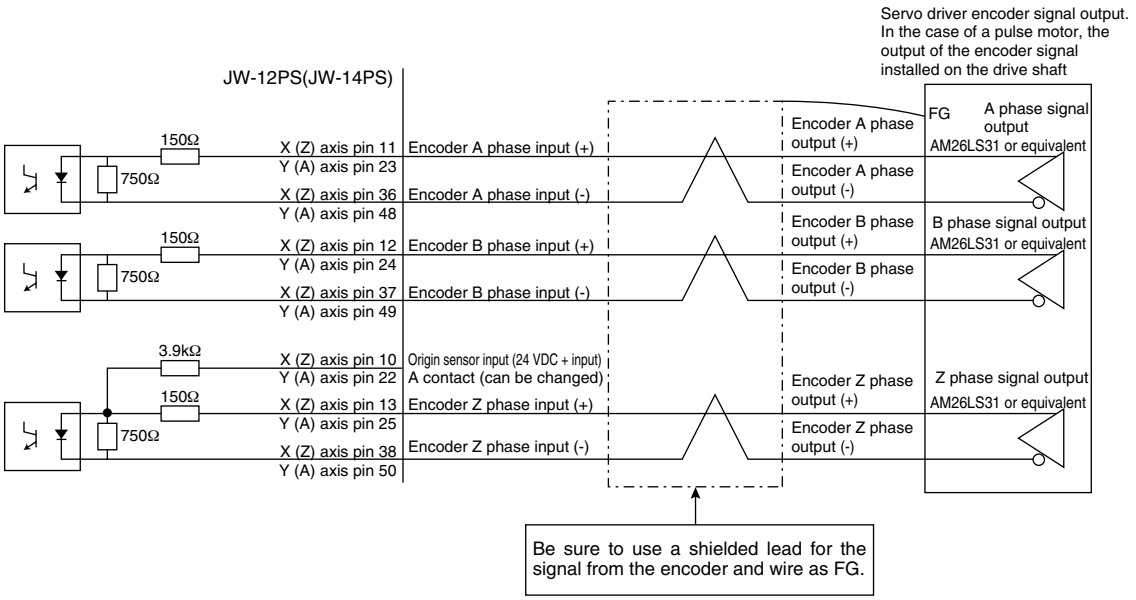


(2) When this signal is used in a closed loop

Wire the feedback signal (signal from the encoder) from the driver as shown below.

The driver (encoder) will not pose any problems if it can output a signal equivalent to AM26LS31.

• For details on the signal level on the driver side, check with the driver manufacturer.



Chapter 5 Data Transfer

5-1 Data transfer between this module and the JW50H/70H/100H control module

256-byte special I/O data area is used for transferring data between this module and the JW50H/70H/100H control module. I/O refresh area on which this module is mounted cannot be used for data transfer.

The following shows the data required for each program mode. Each of these data items must be transferred from the JW50H/70H/100H control module as block data, and are all exchanged on the 256-byte special I/O data area.

Actually, 64 bytes (block transfer read data and block transfer write data) each are assigned to the block data read area (PS→PC) and the block data write area (PS→PC), respectively.

(See the following page.)

① **Data required for direct operation (open loop connection)**
- Parameter 1 (block data No.00) data of each axis
- M output range data (block data No.02) only when M output is used
- Acceleration/deceleration time data (block data No.03) only when multiple acceleration/deceleration times are set

② **Data required for program operation and speed control operation (open loop connection)**
- Parameter 1 (block data No.00) data of each axis
- Various setting data required for program operation. M output, acceleration/deceleration time, dwell timer, speed, position, step data, etc. (block data No.02 to No.31)

③ **Data required for other basic operations (origin return, Move origin, jog operation, teaching, etc.)**
- Parameter 1 (block data No.00) data of each axis

④ **Data required for special control (closed loop control, absolute system)**
- Parameter 2 (block data No.01) data of each axis

When building a highly reliable closed loop system or an absolute system (comprising limited connectable servos) for holding current value data when a power interruption occurs, parameter 2 (block data No.01) must be set in all the startup methods of operation modes ① to ③ described above.

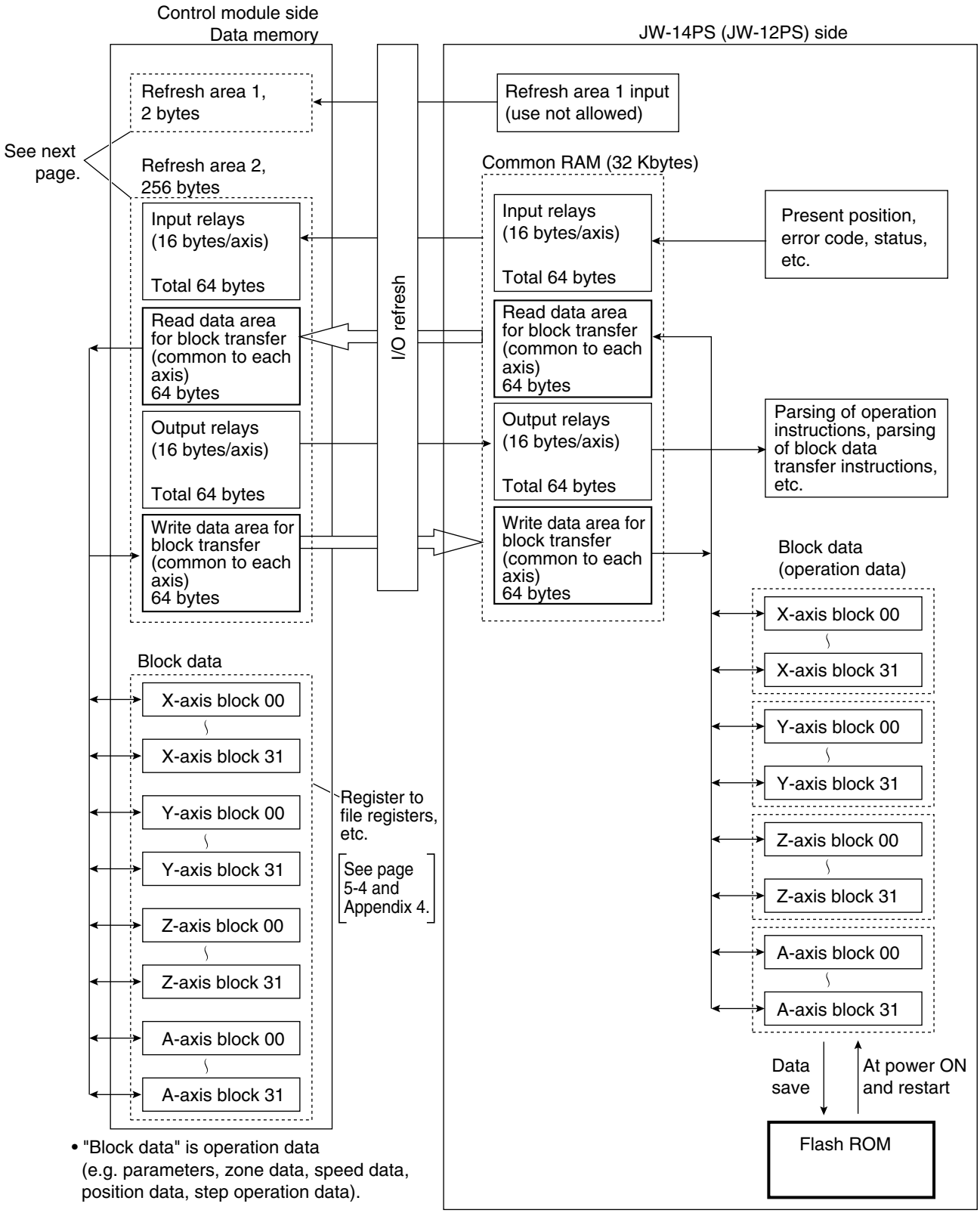
Caution (Address annotation)

- This chapter annotates addresses in special I/O data area on the JW50H/70H/100H control module that are used by this module as follows:

Address	Annotation
Byte addresses	N+*****
Relay addresses	n+*****

N and n are the top address of special I/O data when any given I/O has been registeared.

■ Outline of data exchange



(Note) The above figure is for the JW-14PS. The Z- and A-axes are not supported on the JW-12PS.

[1] Refresh area

(1) Refresh area 1: I/O relay area (2 bytes)

Address	Description
1st byte	Use not allowed
2nd byte	

• Addresses are assigned according to the position where this module is mounted and by optional I/O registration of the JW50H/70H/100H control module.

(2) Refresh area 2: Special I/O data area (256 bytes)

Address	Number of bytes		Direction*	Description		
N+0000 to 0017	16	256	PC←PS	Input relays	For X-axis	⇒See item 5-2.
N+0020 to 0037	16				For Y-axis	
N+0040 to 0057	16				For Z-axis (JW-14PS only)	
N+0060 to 0077	16				For A-axis (JW-14PS only)	
N+0100 to 0177	64			(Read) data storage area for block transfer		
N+0200 to 0217	16		PC→PS	Output relays	For X-axis	⇒See item 5-2.
N+0220 to 0237	16				For Y-axis	
N+0240 to 0257	16				For Z-axis (JW-14PS only)	
N+0260 to 0277	16				For A-axis (JW-14PS only)	
N+0300 to 0377	64			(Write) data storage area for block transfer		

* PC=JW50H/70H/100H control module, PS=JW-12PS/14PS

• N is the top address of special I/O data area (256 bytes) that is assigned to this module by optional I/O registration. The following table shows the addresses of refresh area 2 when N is set to ⊐1000 or 49000.

Address	Setting Example	
N+0000 to 0017	⊐ 1000 to ⊐1017	49000 to 49017
N+0020 to 0037	⊐ 1020 to ⊐1037	49020 to 49037
N+0040 to 0057	⊐ 1040 to ⊐1057	49040 to 49057
N+0060 to 0077	⊐ 1060 to ⊐1077	49060 to 49077
N+0100 to 0177	⊐ 1100 to ⊐1177	49100 to 49177
N+0200 to 0217	⊐ 1200 to ⊐1217	49200 to 49217
N+0220 to 0237	⊐ 1220 to ⊐1237	49220 to 49237
N+0240 to 0257	⊐ 1240 to ⊐1257	49240 to 49257
N+0260 to 0277	⊐ 1260 to ⊐1277	49260 to 49277
N+0300 to 0377	⊐ 1300 to ⊐1377	49300 to 49377

[2] Block data

The block data for each axis is comprised as shown in the following table in 64-byte units. (The block data must be set independently for each axis.)

Block No.	Description	PC side memory address*1	Remarks		
			Number of bytes	Direct operation/ program operation	Reference page
0	Parameter 1 (regular parameters)	0000 to 0077		*2	Item 5-3
1	Parameter 2 (special parameters)	0100 to 0177		*2	
2	M output range data (0 to 7)	0200 to 0277	4×2×8	*2	5-5 (1)
3	Acceleration time data (1 to 8)	0300 to 0337	4×8	*2	5-5 (2)
	Deceleration time data (1 to 8)	0340 to 0377	4×8	*2	
4	Dwell timer data (01 to 16)	0400 to 0437	2×16	For program operation	5-5 (3)
5	Speed data (No.1 to 16)	0500 to 0577	4×16	For program operation	5-6 (4)
6	Speed data (No.17 to 32)	0600 to 0677	4×16		
7	Speed data (No.33 to 48)	0700 to 0777	4×16		
8	Speed data (No.49 to 64)	1000 to 1077	4×16		
9	Position data (No.1 to 16)	1100 to 1177	4×16	For program operation	5-6 (5)
10	Position data (No.17 to 32)	1200 to 1277	4×16		
11	Position data (No.33 to 48)	1300 to 1377	4×16		
12	Position data (No.49 to 64)	1400 to 1477	4×16		
13	Position data (No.65 to 80)	1500 to 1577	4×16		
14	Position data (No.81 to 76)	1600 to 1677	4×16		
15	Position data (No.97 to 99)	1700 to 1713	4×3		
16	Step data (No.01 to 08)	2000 to 2077	8×8	For program operation	5-7 (6)
17	Step data (No.09 to 16)	2100 to 2177	8×8		
18	Step data (No.17 to 24)	2200 to 2277	8×8		
19	Step data (No.25 to 32)	2300 to 2377	8×8		
20	Step data (No.33 to 40)	2400 to 2477	8×8		
21	Step data (No.41 to 48)	2500 to 2577	8×8		
22	Step data (No.49 to 56)	2600 to 2677	8×8		
23	Step data (No.57 to 64)	2700 to 2777	8×8		
24	Step data (No.65 to 72)	3000 to 3077	8×8		
25	Step data (No.73 to 80)	3100 to 3177	8×8		
26	Step data (No.81 to 88)	3200 to 3277	8×8		
27	Step data (No.89 to 96)	3300 to 3377	8×8		
28	Step data (No.97 to 99)	3400 to 3427	8×3		
29	Reserved area	3500 to 3577	—	—	—
30	Reserved area	3600 to 3677	—	—	—
31	Reserved area	3700 to 3777	—	—	—

*2 Shared by both direct operation and program operation
Total 0000 to 3777 (2048 bytes/axis)

*1 In this example, the PC side memory address is the address where data is assigned continuously with 0000 set as the top address of the block data.

The following shows the formats for each of the data items. (Setting data is annotated entirely in BCD.)

(1) M output range data (0 to 7)

Setting range of upper limit value/lower limit value: -9999999 to +9999999 (-9999999 to +9999999 pulses) in 1-pulse increments

	Address	Bit							
		7	6	5	4	3	2	1	0
Lower limit value	C+0000	10^1				10^0			
	C+0001	10^3				10^2			
	C+0002	10^5				10^4			
	C+0003	—	—	A/I	Sign	10^6			
Upper limit value	C+0004	10^1				10^0			
	C+0005	10^3				10^2			
	C+0006	10^5				10^4			
	C+0007	—	—	A/I	Sign	10^6			

- "Sign": plus=0, minus=1, absolute values independent of the "A/I" bit setting
- C is the leading address of each M output 0 to 7.

(2) Acceleration time/deceleration time data

Setting range: 0 to 250000 (0 to 250000 ms) in 1-ms increments

① **Acceleration time data (1 to 8)**

Address	Bit							
	7	6	5	4	3	2	1	0
D+0000	10^1				10^0			
D+0001	10^3				10^2			
D+0002	10^5				10^4			
D+0003	—				—			

- D is the leading address of each acceleration time data 1 to 8.

② Deceleration time data (1 to 8)

Address	Bit							
	7	6	5	4	3	2	1	0
E+0000	10^1				10^0			
E+0001	10^3				10^2			
E+0002	10^5				10^4			
E+0003	—				—			

- E is the leading address of each deceleration time data 1 to 8.

(3) Dwell timer data (01 to 16)

Setting range: 0 to 9999 (0 to 99990 ms) in 10-ms increments

Address	Bit							
	7	6	5	4	3	2	1	0
F+0000	10^1				10^0			
F+0001	10^3				10^2			

- F is the leading address of each dwell timer data 01 to 16.

(4) Speed data (No.01 to 64)

Setting range: 0 to 500000 (0 to 500 kpps) in 1-pps increments

Address	Bit							
	7	6	5	4	3	2	1	0
G+0000	10^1				10^0			
G+0001	10^3				10^2			
G+0002	10^5				10^4			
G+0003	—				—			

• G is the top address of each speed data No.01 to 64.

(5) Position data (No.01 to 99)

Setting range: -9999999 to +9999999 (-9999999 to +9999999 pulses) in 1-pulse increments

Address	Bit							
	7	6	5	4	3	2	1	0
H+0000	10^1				10^0			
H+0001	10^3				10^2			
H+0002	10^5				10^4			
H+0003	—	—	A/I	Sign	10^6			

"A/I": 0=absolute value, 1=relative value, "Sign": Plus=0, Minus=1

• H is the top address of position data No.01 to 99.

• Position instructions at writing of interrupt output position data becomes an absolute value regardless of the setting of "A/I", and "A/I" becomes the bit for specifying interrupt output ON/OFF.
(When "A/I" is set to "1", interrupt output is ON, and when "A/I" is set to "0", interrupt output is OFF.)

• Position instructions at speed control startup become the travel distance after an interrupt, and the "Sign" and "A/I" bits are disabled.

(6) Program operation step data (No.01 to 99)

Address		Bit							
		7	6	5	4	3	2	1	0
J+0000		Axis designation (4=X-axis, 5=X-axis, 6=X-axis, 7=X-axis)				Operation pattern (0, 1, 2, 3) ⇒ See below.			
J+0001		Acceleration time No. (0 to 8) *0 is parameter value.				Deceleration time No. (0 to 8) *0 is parameter No.			
J+0002		Startup speed No. (00 to 64) *00 is parameter value.							
J+0003		Target speed No. (00 to 64) *00 is jog operation speed of parameter value.							
J+0004		Dwell timer No. (00 to 16) *00 is "dwell timer disabled."							
J+0005		Position data No. (01 to 99)							
J+0006		Output code (01 to 99)							
J+0007	When operation pattern is set to "Single step", "Automatic" and " Continuous"	Jump destination step No. (00 to 99) • When set to "00", the program advances to the next (incremented by "1") step.							
	When operation pattern is set to "Speed operation"	Speed No. after external interrupt (00 to 64) • When set to "00", the speed after parameter interrupt is enabled.							

• J is the top address of each step data No.01 to 99.

■ Operation patterns (above address J+0000 bits 0 to 3)

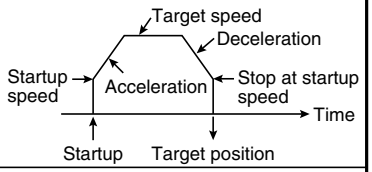
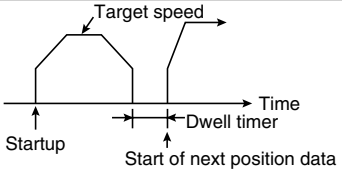
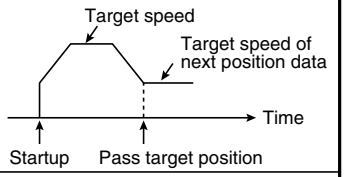
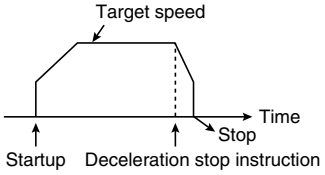
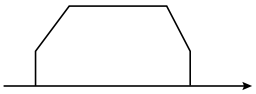
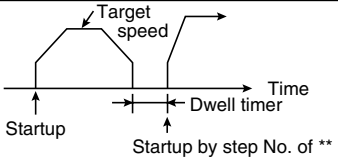
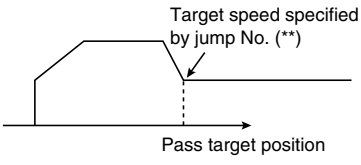
Operation pattern	Setting	Description
Single step	0	The program executes the current step data, and stands by for the next startup. • When the dwell timer is enabled, the positioning completed signal turns ON after the time preset to the dwell timer has elapsed.
Automatic	1	The program executes the current step data, stops operation for the time preset to the dwell timer, and automatically starts operation at the next (incremented by "1") step or the step at the jump destination step No.
Continuous	2	The program executes the current step data, and starts operation at the next (incremented by "1") step or the step at the jump destination step No. without stopping at the target position. • The dwell timer is disabled in this operation mode.
Speed control	3	The program operates at the speed preset in the current step data. The operation direction follows the direction (sign) of the step data position data, and the present position is also updated during operation. When the sign is "0" (forward), the program operates at the preset speed in the CW direction, and when the sign is "1" (reverse), the program operates at the preset speed in the CCW direction. • At startup, only the "Sign" bit of the step data position data is enabled. • Operation can be stopped by "External interrupt" and "Deceleration stop" during speed control operation. • When an external interrupt input is used to perform interrupt jog feed, the "Position data" preset in the step data becomes the travel distance after the interrupt, and the "Speed No. after external interrupt" preset in the step data becomes the speed after the interrupt. The travel direction after the interrupt is the same direction as the direction of operation. The "present value zero preset" at an external interrupt is set at "Present position at speed control operation" in parameter 1 (address A+0006).

* When parameter 1 (address A+0006) is set to "02", the present position remains "0".

⇒ See page 5-16.

■ Operation patterns and jump destinations in program operation

Four settings are provided for the operation patterns (described on the previous page). Combining jump ON/OFF conditions with these operation patterns results in the seven patterns shown in the table below.

Operation pattern	Jump destination	Name	Description	Operation
0	0 0 *	Single step	The program executes the current step data, stops operation, and stands by for startup by the next step data.	
1	0 0 *	Automatic	The program executes the current step data, stops operation for the time preset to the dwell timer, and automatically starts operation at the next (incremented by "1") step.	
2	0 0 *	Continuous	The program executes the current step data, and program execution is continued at the next (incremented by "1") step without stopping operation at the target position.	
3	0 0 *	Speed control	This is the conventional continuous output pattern. Pulse output is maintained at the speed preset in the current step data. The present position is also calculated during continuous output, and the direction of pulse output follows the sign of the position data. To stop this output, use either the deceleration stop instruction or external interrupt jog feed.	 **(Note)** Finally, the speed reaches the startup speed.
0	* *	Jump single step	The program executes the current step data, stops operation, and stands by for a startup at the step No. (**) entered as the jump step No.	
1	* *	Jump automatic	The program executes the current step data, stops operation for the time preset to the dwell timer, and automatically starts operation at the step No. (**).	
2	* *	Jump continuous	After the program executes the current step data, the program continues to execute the step data specified by the jump step No. without stopping operation at the target position.	

* Jump is not performed when "00" is set.

■ About startup axis in program operation, and interpolation operation

① Startup

This module can simultaneously start single-step operation of each of the four axes, and perform linear interpolation of two axes. It can also perform start interpolation of two axes with single-step operation of the other axes, and simultaneously start linear interpolation of two sets of two axes. On the JW-14PS, the combination of the two axes to interpolate can be selected as desired. However, a duplicate instruction error occurs when 2-axis linear interpolation is instructed while the axes programmed for 2-axis linear interpolation are already in operation.

② Interpolation data

When performing linear interpolation on two axes, linear interpolation is possible using the step data of any the axes (X, Y, Z, or A). The data used for linear interpolation follows the axis data of all step data with the exception of coordinate data. The data of the axis to be interpolated is used as the coordinate data.

For example, when performing linear interpolation on the X- and Y-axes using the step data of the Z-axis, all of the data of the Z-axis is used as the acceleration/deceleration time, startup speed, target speed, and dwell timer data. The data of the X- and Y-axes is used only for the coordinate data, and the target speed (speed data) becomes the interpolation speed.

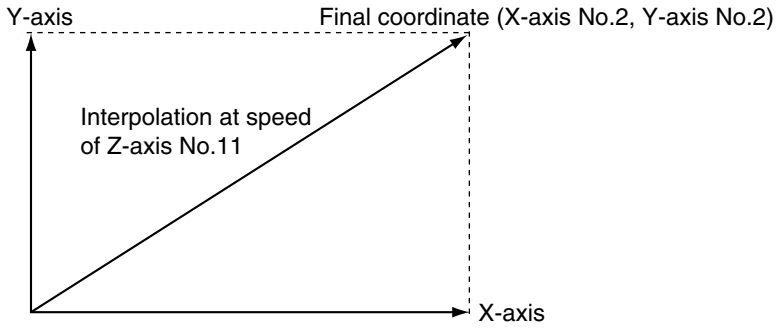
[Example] Step data when performing linear interpolation on the X- and Y-axes in program operation of Z-axis

Z-axis step data — Step No.1

■ ■ 0(BCD)	------- X/Y-axis designation ("3" in Hex) - Operation pattern 0 (single step)
4(BCD) 8(BCD)	------- Acceleration time No.4 (Z-axis data) - Deceleration time No.8 (Z-axis data)
15(BCD)	------- Startup speed No.15 (Z-axis data)
11(BCD)	------- Target speed No.11 (Z-axis data)
00(BCD)	------- Dwell timer disabled (Z-axis data)
02(BCD)	------- Position data No.02 (X/Y-axis data)
01(BCD)	------- Output code 01 (indicated in Z-axis relay area)
09(BCD)	------- Output code 9
15(BCD)	------- Jump destination 15

■ indicates ON.

The following shows the relationship between speed and coordinates during operation using the above data.



5-2 Operation data area

This section describes the assignments and functions of refresh area 2 (pages 5-2 and 5-3).

[1] Assignment of special I/O data area

Special I/O data area (256 bytes) is used as the refresh area.

(1) Input section (N+0000 to 0177) * JW-14PS only

I/O	Byte address of data memory (N+****)				Bit	Function			Details	
	X-axis	Y-axis	Z-axis*	A-axis*					No.	Page
Input (PC←PS)	0000	0020	0040	0060	0	Operation ready (U.R.)	0	Operation readying	①	5-12
							1	Operation ready		
					1	Positioning completed	↑	Completed	②	
							↓	At startup		
					2	Busy flag	0	Non-busy state	③	
							1	Busy state		
					3	Program operation startup standby	0	Non-startup standby	④	
							1	Startup standby state		
					4	No origin flag	0	Origin	⑤	
							1	No origin		
					5	Teaching completed	↑	Completed	⑥	
							↓	At start		
					6	BD.REQ (block data request) signal • Block transfer is possible only when this flag is ON.	0	Block transfer disabled	⑦	
							1	Block transfer enabled		
					7	Error flag	0	No error	⑧	
							1	Error		
	0001	0021	0041	0061	0	Present position display mode monitor	0	Instruction value display	⑨	
							1	Encoder input display		
					1	Interrupt output monitor	0	Interrupt output OFF	⑩	
							1	Interrupt output ON		
					2	Driver communications completed • Enabled only when absolute value control is enabled.	↑	Completed	⑪	
							↓	At start		
					3 to 7	Reserved function			—	
	0002	0022	0042	0062	0	CW limit input signal	State of input signals of each axis is monitored. 1: ON o: OFF		⑫	
					1	CCW limit input signal				
					2	Origin proximity input signal				
					3	Origin input signal				
					4	General-purpose input signal				
					5	Driver error input signal				
					6	Emergency stop input signal				
					7	Positioning completed signal				
	0003	0023	0043	0063	0	M output 0	State of each M output (zone) signal is monitored. 1: ON 0: OFF		⑬	5-13
					1	M output 1				
					2	M output 2				
					3	M output 3				
					4	M output 4				
					5	M output 5				
					6	M output 6				
					7	M output 7				
	0004	0024	0044	0064	0 to 7	Present position (10^1 10^0)			⑭	
	0005	0025	0045	0065	0 to 7	Present position (10^3 10^2)				
	0006	0026	0046	0066	0 to 7	Present position (10^5 10^4)				
	0007	0027	0047	0067	0 to 7	Present position (sign 10^6)				
	0010	0030	0050	0070	0 to 7	Output code (00 to 99) *Enabled at program operation			⑮	
	0011	0031	0051	0071	0 to 7	Step No. (00 to 99) *Enabled at program operation			⑯	
	0012	0032	0052	0072	0 to 7	Error code, lower (00 to 99)			⑰	
	0013	0033	0053	0073	0 to 7	Error code, upper (00 to 99)				
	0014	0034	0054	0074	0 to 7	Reserved function			—	

Input (PC←PS)	0015	0035	0055	0075	0 to 7	Reserved function	—	5-13
	0016	0036	0056	0076	0 to 7	Reserved function	—	
	0017	0037	0057	0077	0 to 7	Block data No. monitor (00 to 31) *Read block No. is indicated.	⑱	
	0100 to 0177				64 bytes	Data storage area at block data read (PC←this unit transfer buffer area) *Area common to each axis	⑲	

(2) Output section (N+0200 to 0377)

* JW-14PS only

I/O	Byte address of data memory (N+****)				Bit	Function			Details	
	X-axis	Y-axis	Z-axis*	A-axis*					No.	Page
Output (PC→PS)	0200	0220	0240	0260	0	At program operation	Start 1 [↑]		①	5-14
					1	At program operation	Continuous startup/ single-step startup setting	0 Continuous startup	②	
								1 Single-step startup		
					2	At program operation	Step No. enable	0 Set disabled	③	
								1 Set enabled		
					3	External input startup selection			③´	
					4	At direct operation	Start 2 [↑]		④	
					5	At direct operation	Position control/speed control setting	0 Position control startup	⑤	
								1 Speed control startup		
					6	At direct operation	Jog+ (CW jog operation instruction)	0 Stop	⑥	
								1 Operation		
					7	At direct operation	Jog- (CCW jog operation instruction)	0 Stop	⑦	
								1 Operation		
	0201	0221	0241	0261	0	Zero return [↑]			⑧	
					1	Move origin [↑]			⑨	
					2	Present position preset [↑]			⑩	
					3	Deceleration stop [↑]			⑪	5-15
					4	Forced intervention startup [↑]			⑫	
					5	Clear deviation		0 OFF	⑬	
								1 ON		
					6	Override enable		0 Disabled	⑭	
								1 Enabled		
					7	Clear error [↑] (pulse output inhibit cancel)			⑮	
	0202	0222	0242	0262	0	Teaching [↑]			⑯	
					1	Clear error [↑]			⑰	
					2	General-purpose output		0 OFF	⑱	
								1 ON		
					3	Block data write *Executed at each scan when ON			⑲	
					4	Block data read *Executed at each scan when ON			⑳	5-16
					5	Block data save (write to flash ROM) [↑] *Enabled on X-axis only (batch operation for 4 axes)			㉑	
					6	Switching of present position display mode	0	Instruction value	㉒	
							1	Encoder input (at closed loop control)		
					7	Read absolute present position [↑] *Enabled only when absolute value control is enabled			㉓	
	0203	0223	0243	0263	0 to 7	Step No. at program operation (00 to 99)			㉔	
	0204	0224	0244	0264	0 to 7	Position No. at teaching (00 to 99)			㉕	
	0205	0225	0245	0265	0 to 7	Designation of block data block No. (00 to 31)			㉖	
	0206	0226	0246	0266	0 to 7	Override coefficient, lower (00 to 99)	Set override coefficient within range 000 to 999%.		㉗	
	0207	0227	0247	0267	0 to 7	Override coefficient, upper (00 to 09)				
	0210	0230	0250	0270	0 to 7	Position instruction value (10^1 10^0)	Becomes the travel distance after an interrupt in the case of speed control operation. Sign indicates direction of operation.		㉘	
	0211	0231	0251	0271	0 to 7	Position instruction value (10^3 10^2)				
	0212	0232	0252	0272	0 to 7	Position instruction value (10^5 10^4)				
	0213	0233	0253	0273	0 to 7	Position instruction value (sign A/I 10^6)				
	0214	0234	0254	0274	0 to 7	Speed instruction value (10^1 10^0)	When 000000, the jog operation speed of the parameter becomes the speed instruction value.		㉙	
	0215	0235	0255	0275	0 to 7	Speed instruction value (10^3 10^2)				
	0216	0236	0256	0276	0 to 7	Speed instruction value (10^5 10^4)				
	0217	0237	0257	0277	0 to 3	Acceleration time No. (0 to 8) *When 0, setting value of parameter			㉚	5-17
					4 to 7	Deceleration time No. (0 to 8) *When 0, setting value of parameter			㉛	
	0300 to 0377				64 Byte	Data storage area at block data write (PC->this unit transfer buffer area) *Area common to each axis			㉜	

[2] Description of functions

(1) Input section (PC←PS)

① to ⑲ correspond to the numbers on pages 5-10 and 5-11.

① **Operation ready (U.R.)**

This input turns ON when normal parameters and block data are stored to this module, and this module is ready for operation.

② **Positioning completed**

This input targets the following operations: program operation startup, direct operation startup, jog operation, zero return, and move origin.

● When the external positioning completed signal is set to "Disabled" (dependent on setting at parameter 1- address A+0000 - bit 7)

This input turns OFF at various startups, and turns ON after pulse output from this module is completed.

This input turns OFF at power ON, initial start, and the next startup.

- This input immediately turns ON when "Positioning monitoring time" is set to "0000".
- When a time is preset to the dwell timer in program operation, this input turns ON after pulse output is completed, and the time preset to the dwell timer has elapsed.
- This input stays OFF when an emergency stop or deceleration stop is performed during operation.

● When the external positioning completed signal is set to "Enabled" (dependent on setting at parameter 1- address A+0000 - bit 7)

This input turns OFF at various startups, and turns ON when the positioning completed signal from the driver turns ON.

- When a time is preset to the dwell timer in program operation, this input turns ON after the position completed signal from the driver turns ON and the time preset to the dwell timer has elapsed.
- This input stays OFF when an emergency stop or deceleration stop is performed during operation.
- Set the positioning completed signal (INP) of the servo driver to turn OFF during operation and to turn ON while operation is stopped.
- An error occurs if the external positioning completed signal does not turn OFF within the "Positioning monitoring time" set at parameter 1 - address A+0066 and 0067 after pulse output from this module is completed.

③ **Busy flag**

This flag turns ON at start of processing, and OFF when processing is completed.

- The busy flag turns ON during execution of various positioning operations and speed control operation, jog operation, teaching, block data save, present value preset, and other processes.
- The busy flag turns OFF at power ON and initial start.
- When an axis is specified in program operation, the bit corresponding to the specified operational axis is enabled.

④ **Program operation startup standby**

This input turns ON while the program is standing by for the next startup after program operation startup (continuous startup or single-step startup), and turns OFF when program execution is next restarted.

- When the operation pattern is set to "Automatic" or "Continuous," this input does not turn ON after operation is completed.
- In the case of a single-step startup, this input turns ON after completion of operation programmed to each step independently of the operation pattern.
- This input turns OFF when a deceleration stop/emergency stop is executed or operation has stopped due to an error during program operation.

⑤ **No origin flag**

This flag turns OFF when the origin is confirmed, and ON when it is not confirmed.

⑥ **Teaching completed**

This input turns ON when teaching is completed.

- This input turns OFF at power ON, initial start and start of teaching.

⑦ **BD.REQ (block data request) signal**

This signal is ON when reading/writing of block data is possible, and OFF when it is not possible (busy state).

- This signal turns ON at power ON and initial start, and turns OFF during data read/write periods.

⑧ **Error flag**

This flag turns ON when an error occurs. At the same time, an error code is output to the "Error code" register and is indicated on the 7-segment display on the front of this module.

- This flag turns OFF when the error state is canceled by power ON, initial start or the "Clear error" relay.

Note, however, that the error reoccurs if the cause of the error still remains.

⑨ **Present position display mode monitor**

Indication of present position data is set to "Instruction value" or "Encoder input value" at the "Switching of present position display mode" relay. This relay monitors which of the two modes the display is in.

This relay is "0" when the mode is "Instruction value" and "1" when the mode is "Encoder input value."

- Present position data is not displayed even if this input is set to "1" when the closed loop control mode of parameter 2 (address B+0000) is set to "Disabled."

⑩ **Interrupt output monitor**

This indicates the state of interrupt outputs. 1: ON, 0: OFF

- This relay is enabled only when the general-purpose output of parameter 1 (address A+0076) is set to "Interrupt output."

⑪ **Driver communications completed**

This input turns OFF when reading of the present position from the driver is started by the "Read absolute present position" relay.

- This input turns OFF at power ON, initial start and start of the next read.
- This function is enabled only when "Absolute value control mode selection" at parameter 2: 020 is enabled.

⑫ **CW limit input signal/CCW limit input signal/Origin proximity input signal/Origin input signal/General-purpose input signal/Driver error input signal/Emergency stop input signal/ Positioning completed signal**

The states of external input signals for each axis are monitored and displayed as they are. 1: ON, 0: OFF

⑬ **M outputs 0 to 7**

The states of each M output are monitored and displayed. 1: ON, 0: OFF

M outputs are signals that are output when the present position is within the range set at "M output range data" in the block data (block No.2).

⑭ **Present position (10^1 10^0) to Present position (sign 10^6)**

The present position data is displayed.

- The present position data display mode can be selected as "Instruction value" or "Encoder input value" by the "Switching of present position display mode" relay.

⑮ **Output code (01 to 99)**

The output code set to the target step data (block data: block Nos.16 to 28) is output after execution of the target step is completed in program operation.

- Output is enabled only in the program mode.

⑯ **Step No. (01 to 99)**

The step No. currently being executed in program operation is displayed.

- Output is enabled only in the program mode.

⑰ **Error code (lower: 01 to 99), Error code (upper: 00 to 09)**

This indicates the error code of the currently occurring error.

- The error code is also displayed on the 7-segment display at the same time.
- The indication returns to "00" when the error start is canceled by the "Clear error" relay.

  Note, however, that the error reoccurs if the cause of the error still remains.

⑱ **Block data No. monitor (00 to 31)**

This indicates the block No. that was read during reading of the block data.

- The block No. is held until the next block data read.

⑲ **Read data area for block transfer (PC ← this module transfer buffer area)**

This is the data storage area common to each axis for when block data is read. When the block data of each axis is read from this module, it is read via this 64-byte area.

(2) Output section (PC→PS)

① to ㉜ correspond to the number on page 5-11.

① **Start 1**

Program operation is started by this relay changing state from OFF to ON.

- Either of external startup or this relay is enabled when the operation mode (parameter 1 - address A+0076) of general-purpose input is set to "External startup input." (To perform an external startup in program operation, the relay at ③' must be set to "0".)

② **Continuous startup/single-step startup setting**

Set either of "Continuous startup" or "Single-step startup" when starting up program operation.

0: Continuous startup, 1: Single-step startup

- When "Single-step startup" is selected, the entire program is executed one step at a time regardless of the setting of "Operation pattern" programmed in each step data. (Single-step operation is used, for example, in test runs.)

③ **Step No. enable**

To specify the step No. where program operation is to be started up, set this relay to "1" and set the startup step No. to the register for setting the "Step No. at program operation."

- When this relay is "0", the "Jump destination step No." set at the next (incremented by "1") step or at the target step data is enabled.
- The step No. is returned to 00 at power ON or initial start.

③′ **External input startup selection**

The external input startup becomes a program operation startup when this relay is set to "0" or a direct operation startup when this relay is set to "1".

④ **Start 2**

Direct operation is started up by this relay changing state from OFF to ON.

- Either of external startup or this relay is enabled when the operation mode (parameter 1 - address A+0076) of general-purpose input is set to "External startup input." (To perform an external startup in program operation, the relay at ③' must be set to "0".)

⑤ **Position control/speed control setting**

Set either "Position control" or "Speed control" when starting up direct operation.

0: Position control, 1: Speed control

⑥ **Jog+ (CW jog operation instruction)**

When this relay is set to "1", jog operation is performed in the CW direction.

- The "Speed instruction value," "Acceleration time No." and "Deceleration time No." set in respective registers are enabled as the speed, acceleration time and deceleration time in jog operation. (When a respective register is set to "00", the value in parameters is enabled.)

⑦ **Jog- (CCW jog operation instruction)**

When this relay is set to "1", jog operation is performed in the CCW direction.

- The "Speed instruction value," "Acceleration time No." and "Deceleration time No." set in respective registers are enabled as the speed, acceleration time and deceleration time in jog operation. (When a respective register is set to "00", the value in parameters is enabled.)

⑧ **Zero return**

Zero return operation is executed by this relay changing state from OFF to ON.

- The operation mode, speed, acceleration time, deceleration time, etc. during a zero return are all set in parameters.

⑨ **Move origin**

Move origin operation is executed by this relay changing state from OFF to ON.

- Move origin cannot be executed when the origin is not confirmed.
- The "Speed instruction value," "Acceleration time No." and "Deceleration time No." set in respective registers are enabled as the speed, acceleration time and deceleration time in move origin.

⑩ **Present position preset**

Present position preset operation is executed by this relay changing state from OFF to ON.

- The present position data to be preset is set in the "Position instruction value" register.

⑪ **Deceleration stop**

A deceleration stop is executed by this relay changing state from OFF to ON.

- In program operation, the "Deceleration time No." set in step data (block data: block No.16 to 28) is enabled as the deceleration time.
- In direct operation, the "Deceleration time No." set in the "Deceleration time No." register is enabled as the deceleration time.

⑫ **Forced intervention startup**

Forced intervention operation is executed by this relay changing state from OFF to ON.

- Forced intervention operation is enabled only in program operation.

⑬ **Clear deviation**

Clear deviation output is turned ON and OFF according to the ON/OFF setting of this relay.

- Clear deviation output is automatically output at the following conditions in addition to the ON/OFF state of this relay:
  1. Clear deviation output turns ON for about 20 ms when zero return is completed.
  2. Clear deviation output turns ON for about 20 ms together with suspension of pulse output when an emergency stop is executed.
     (according to setting of parameter 1: 000 - 5 "Emergency stop input function selection")

⑭ **Override enable**

The override function allows you to change the speed after a startup (during operation). When this relay is ON, the setting of the "Override coefficient" register is enabled, and the target speed is changed.

- Override is enabled only during program operation, direct operation or jog operation, and the speed becomes the speed obtained by multiplying the target speed specified at operation startup (taken to be 100%) by the override coefficient (%).
- When this relay changes state to OFF, override is disabled and the target speed specified at operation startup is returned to.

⑮ **Clear error (pulse output inhibit cancel)**

The error state and the pulse output inhibit state are canceled by this relay changing state from OFF to ON.

- After an error has occurred, the next instruction is executed after the error is canceled by this relay changing state from OFF to ON.

⑯ **Teaching**

The registration No. is displayed blinking on the 7-segment display by this relay changing state from OFF to ON, and the present value is registered as the position No. set in the "Position No. at teaching" register by this relay changing state from ON to OFF.

- Teaching is possible only when the origin is confirmed.

⑰ **Write interrupt output position data**

This relay is for setting the position data where an interrupt output is to be generated when the interrupt output function is in use.

The value set in the "Position instruction value" register is written to this unit as the "interrupt output position data" by this relay changing state from OFF to ON.

- At this time, the "A/I" bit of the value set in the "Position instruction value" register becomes the "Interrupt output ON/OFF" setting.
- The interrupt output function is enabled only when the operation mode (parameter 1 - address A+0076) of general-purpose output is set to "Interrupt output."

⑱ **General-purpose output**

General-purpose output is turned ON and OFF according to the ON/OFF setting of this relay.

This relay is enabled only when the operation mode (parameter 1 - address A+0076) of general-purpose output is set to "General-purpose output."

⑲ **Block data write**

When this relay is ON, 64 bytes of data in the "Data storage area at block data write" register are written to this unit.

- Set the write destination block No. in the "Block data block No." register.
- The BD.REQ signal relay turns OFF during writing of block data.
- If this relay turns ON when this unit is not busy (i.e. "Busy flag" is OFF), writing of block data is executed once every two scans for the duration that this flag is ON.

⑳ **Block data read**

When this relay is ON, the 64-byte block data in this module is read to the "Data storage area at block data read" register.

- The block No. of the read destination is set at the "Block data block No." register.
- The BD.REQ signal relay turns OFF during reading of block data.
- If this relay turns ON when this module is not busy (i.e. "Busy flag" is OFF), reading of block data is executed once every two scans for the duration that this flag is ON.

㉑ **Block data save**

When this relay changes state from OFF to ON, all block data in RAM on this unit is saved to flash ROM (called "FROM" in some places in this manual) that is used for backing up block data.

- After writing the block data, be sure to save the data by this relay. If the power is turned ON and the initial start is performed without saving newly written block data, flash ROM->RAM transfer is performed, and the new block data that was written to this module (RAM) is overwritten with old data in flash ROM. So, this relay must be turned ON when parameter data has been rewritten.
- This relay is enabled only for the X-axis, and the block data of all axes is batch-saved (data of X-/Y-/-Z-/A-axes on the JW-14PS, and X-/Y-axes on the JW-12PS).

㉒ **Switching of present position display mode**

This relay sets the present position data display mode to either "Instruction value" or "Encoder input value."

When this relay is set to "0", the display mode is "Instruction value," and when this relay is set to "1", the display mode is "Instruction value."

- When the closed loop control mode (parameter 2 - address B+0000) is set to "Disabled," the present position data (encoder input value) is not displayed even if this relay is set to "1".

㉓ **Read absolute present position**

When this relay changes state from OFF to ON, the present position read instruction is output from the tool port to an absolute value-compatible driver, the present position is read from the driver, and is preset as the present position on this unit.

- When reading is completed, the "Driver communications completed" relay turns ON.
- This function is enabled only when "Absolute value control mode selection" (parameter 2 - address B+0020) is set to "Enabled."

㉔ **Step No. at program operation (00 to 99)**

This register sets the "Step No." to start program operation at.

- When the "Step No. enable" relay is ON, the "Step No." set at this register is enabled.

㉕ **Position No. at teaching (00 to 99)**

The "Position data No." to be registered during teaching is set at this register.

㉖ **Designation of block data block No. (00 to 31)**

The "Block No." for reading and writing block data is set at this register.

㉗ **Override value (lower), Override value (upper)**

When the "Override enable" relay is ON, the "Override value" set at this register is enabled.

㉘ **Position instruction value (10^0 10^1) to position instruction value (sign A/I 10^6) →See position data (page 5-6).**

Set the various position data to these registers during "Direct operation," "Present position preset" and "Write interrupt output position data" operations.

- The setting range is -9999999 to +9999999.
- In the case of speed control in direct operation, position data is disabled, and the "Sign" bit becomes the bit for specifying the direction of speed control operation.
- When the "Write interrupt output position data" relay changes state from OFF to ON, these registers are for setting "position data of where interrupt output is generated" and "interrupt output ON/OFF," and the "A/I" bit is for specifying "interrupt output ON/OFF."

㉙ **Speed instruction value (10^0 10^1) to Speed instruction value (10^4 10^5)**

Set the target speed to these registers during "Direct operation," "Jog operation" and "Move origin" operations.

- The setting range is 0 to +500000 KPS (when the differential driver is used), and the resolution is 4.
- When "000000" is set, the jog operation speed set at parameter 1 (address A+0070 to 0073) is enabled.

㉚ **Acceleration time No. (0 to 8)**

Set the acceleration time No. to these registers during "Direct operation," "Jog operation" and "Move origin" operations.

- Eight acceleration times (01 to 8) can be set to block data (first half of block No.3).
- When acceleration time No.0 is set, the acceleration time set at parameter 1 (address A+0024 to 0027) is enabled.

㉛ **Deceleration time No. (0 to 8)**

Set the deceleration time No. to these registers during "Direct operation," "Jog operation" and "Move origin" operations.

- Eight deceleration times (01 to 8) can be set to block data (last half of block No.3).
- When deceleration time No.0 is set, the deceleration time set at parameter 1 (address A+0030 to 0033) is enabled.

㉜ **(Write) data storage area at block transfer (PC→ this module transfer buffer area)**

This is the data storage area common to each axis for when block data is written. When the block data of each axis is written to this module, it is written via this 64-byte area.

5-3 Parameters

[1] Parameter assignments

(1) Parameter 1 (regular parameters: must be set independently on each axis)

This parameter must be set to operate this module. The following table shows the settings of parameter 1. The settings be transferred to block No.00 of the PS block data.

"****" in "A+****" (where A is the top address of parameter 1) is indicated as the numerical value of the following addresses.

Address	Byte	Default	Function		Details No.	Details Page
0000	Bit 0	0	Selection of output pulse signal system	0: CCW/CW, 1: Pulse/direction	①	5-21
	1	0	Selection of limit input signal logic	0: b contact (minus logic), 1: a contact (plus logic)	②	
	2	0	Selection of origin proximity input signal logic	0: a contact (plus logic), 1: b contact (minus logic)	③	
	3	0	Selection of origin input signal logic	0: a contact (plus logic), 1: b contact (minus logic)	④	
	4	0	Selection of general-purpose input signal logic	0: a contact (plus logic), 1: b contact (minus logic)	⑤	
	5	0	Selection of emergency stop input function	0: Only pulse output stopped, 1: Pulse output stopped and deviation counter reset output	⑥	
	6	0	Selection of emergency stop enabled axis * X-axis parameter only enabled	0: Each axis common (all axes stopped when an error occurs on 1 axis) 1: Each axis independent	⑦	
	7	0	Enabling of external positioning completed signal	0: External positioning completed signal disabled, 1: Enabled	⑧	
0001	Bit 0	0	Designation of origin unconfirmed at hardware error	0: Previous state held at emergency stop, limit input or driver error 1: State forcibly set to origin unconfirmed state	⑨	
	1	0	Designation of origin unconfirmed at software limit error	0: Present value held at error, 1: State forcibly set to origin unconfirmed state	⑩	
	2	0	Selection of driver error input logic	0: b contact (minus logic), 1: a contact (plus logic)	⑪	
	3 to 7	0	Reserved area	-	⑫	
0002	Bits 0 to 3	0	Zero return operation mode setting	0: No-inversion mode, 1: Inversion mode 1, 2: Inversion mode 2	⑬	
	4 to 7	0	Zero return direction setting	0: CW direction, 1: CCW direction	⑭	
0003	1	00	Zero return direction setting	00: Stop at origin after escape from proximity 01: Proximity edge detection 1 (count method 1) 02: Proximity edge detection 2 (count method 2) 03: Origin proximity signal unused 04: Inversion at limit end, zero return operation at low speed, and stop at origin 05: Origin proximity signal and origin signal both unused	⑮	5-22
0004 to 0005	2	0001	Origin count	0000 to 9999 Origin count by origin count system	⑯	
0006	1	00	Present position at speed control operation *	00: Present position data updated as it is (also updated at an interrupt detection) 01: Present position data updated as it is (zero preset at an interrupt detection) 02: Present position data set to "0" at speed control startup, and present position data not updated (Present position data is also not updated after an interrupt has occurred, and remains at "0" until startup of the next position control.)	⑰	
0007	1	0F	Operating axis selection (Selected axis is judged as not existing when relay is OFF.)	0 0 0 0 A-axis Z-axis Y-axis X-axis	⑱	
0010 to 0013	4	00000001	Reference speed	000001 to 500000pps *Remaining 1 byte is not used.	⑲	
0014 to 0017	4	00500000	Maximum speed	000001 to 500000pps *Remaining 1 byte is not used.	⑳	
0020 to 0023	4	00000000	Startup speed	000000 to 500000pps *Remaining 1 byte is not used.	㉑	
0024 to 0027	4	00000000	Acceleration time	000000 to 250000ms *Remaining 1 byte is not used.	㉒	
0030 to 0033	4	00000000	Deceleration time	000000 to 250000ms *Remaining 1 byte is not used.	㉓	
0034 to 0037	4	00000000	Zero return (high speed)	000000 to 500000pps *Remaining 1 byte is not used.	㉔	
0040 to 0043	4	00000000	Zero return (low speed)	000000 to 500000pps *Remaining 1 byte is not used.	㉕	
0044 to 0047	4	-9999999	CCW side software limit value	- 9999999 to 9999999	㉖	
0050 to 0053	4	9999999	CW side software limit value	- 9999999 to 9999999	㉗	
0054 to 0057	4	00000000	Speed after interrupt	000000 to 500000 pps (enabled only at direct operation) • In the case of 000000, they are continuation and remaining 1 byte is not used about the speed before interruption.	㉘	
0060 to 0063	4	00000000	Origin compensation data	- 9999999 to 9999999	㉙	5-23
0064 to 0065	2	0000	Backlash compensation data	0000 to 9999	㉚	
0066 to 0067	2	0000	Positioning monitoring time	0000 to 9999 ms (in 1-ms increments)	㉛	
0070 to 0073	4	00000000	Jog (initial) opeation speed	000000 to 500000 pps *Remaining 1 byte is not used.	㉜	

*The value cannot be set to "01" or "02"when closed loop control 1/2 is selected.

Address	Byte	Default	Function		Details No.	Details Page
0074	1	00	Acceleration/deceleration curve (00 to 99%)	Sets the S-curve coefficient within range 00 to 99%. (ramp when "00" is set)	㉝	5-23
0075	Bits 0 to 3	0	Jog operation mode	0: No 1-second wait, 1: 1-second wait	㉞	
	4 to 7	0	Operation at software limit error	0: Deceleration stop 1: Immediate stop 2: Software limit disabled (used when coordinate management in speed control is endless)	㉟	
0076	Bits 0 to 3	0	General-purpose input operation mode setting	0: Regular input (Operation state of general-purpose input relays is monitored.) 1: Interrupt input (Speed control is switched to position control at ↑.) 2: External startup input (Both external startup and startup by the internal startup relay are enabled.)	㊱	
	4 to 7	0	General-purpose output operation mode setting	0: Regular output (State of general-purpose output relays is output.) 1: Interrupt output(ON or OFF when present value matches the interrupt output position data) • Interrupt output ON/OFF setting follows the setting of the "A/I" bit.	㊲	
0077	1	00	Parameter common setting (X-axis parameter only enabled)	0: Axis independent parameters 1: X-/Y-axis common parameters 2: X-/Y-/Z-axis common parameters (14PS) 3: X-/Y-/Z-/A-axis common parameters (14PS)	㊳	

(2) Parameter 2 (special parameters: must be set independently on each axis)

This parameter must be set when special control such as an electronic gear or absolute control (*) using an absolute value encoder is performed. The following table shows the settings of parameter 2. These settings must be transferred to block No.01 of the PS block data. Do not set this parameter 2 when special control is not performed. "****" in "B+****" (where B is the leading address of parameter 2) is indicated as the numerical value of the following addresses.

* Only connectors made by specified manufacturers can be used for connecting the absolute value encoder and absolute value control driver. (See absolute value control.)

Address	Byte	Default	Function			Details No.	Details Page
0000	1	00	Closed loop control mode selection		00: Closed loop control "Disabled" • If wired, the number of pulses from the encoder can be counted. 01: Operation stops due to an error when the number of pulses from the encoder exceeds the closed loop control allowable range. Compensation by closed loop control is not performed. 02: Operation stops due to an error when the number of pulses from the encoder exceeds the closed loop control allowable range. Compensation by closed loop control is performed.	㊴	5-25
0001	1	99	Compensation time		Setting range = 01 to 99 (0.1 to 9.9 secs, in 0.1-sec increments)	㊵	
0002	1	00	Encoder count direction		00: Count incremented by CW rotation, 01: Count incremented by CCW rotation	㊶	
0003	1	00	Reserved area		—	㊷	
0004 to 0007	4	00000000	Closed loop control allowable range (unsigned)		Sets the allowable range for the difference (deviation) between the instruction value and the encoder pulse. • Setting range = 0000001 to 9999999 • Default is no comparative judgment OFF (no error).	㊸	
0010 to 0013	4	00000000	Completion pulse allowable range (unsigned)		This is used in closed loop control mode 1 or 2. Set the allowable range in which the feedback pulse is input at the final coordinate. An error occurs if the feedback pulse does not fall in this range within the positioning monitoring time after pulse output. • Setting range = 0000001 to 9999999	㊹	
0014 to 0017	4	00	Reserved area		—	㊺	
0020	1	00	Absolute value control mode selection		00: Absolute value control "Disabled" 01: Operation mode 1 The present value is rewritten at power ON or when the absolute present value read relay turns ON.	㊻	
0021	1	00	Absolute value control driver model selection		00: Model 1 (made by Wako Giken)	㊼	
0022 to 0027	6	00	Reserved area		—	㊽	
0030 to 0033	4	00000001	Electronic gear 1	Instruction value M coefficient	1 to 9999999	㊾	
0034 to 0037	4	00000001		Instruction value D coefficient	1 to 9999999	㊿	
0040 to 0043	4	00000001	Electronic gear 2	Encoder M coefficient	1 to 9999999	(51)	
0044 to 0047	4	00000001		Encoder D coefficient	1 to 9999999	(52)	
0050 to 0077	24	00	Reserved area		—	(53)	

[2] Parameter setup procedure

(1) Setup procedure for regular control parameters (when module is used in an open loop)

① Set all functions to be used to parameter 1.

② When direct operation is performed, only parameters are transferred in blocks. When program operation is performed, block transfer is performed after parameters and data (position, speed, step data, etc.) for various program operation is set. (See item "Block transfer".)

③ Write the various data to PS internal flash ROM.
If data is not written to flash ROM, all data including parameters is erased when the power is turned ON again, and data is overwritten with the data that was previously registered to flash ROM.

- As this module parses the content of parameters during writing to flash ROM, operation sometimes malfunctions if parameters are not written to flash ROM.

5

(2) Setup procedure 1 for special control parameters (when module is used in a closed loop)

① Set electronic gears 1 and 2 in parameter 2.*1

② Set items relating to the closed loop control in parameter 2. (See item "Closed loop control".)

③ Set all functions to be used to parameter 1.

④ When direct operation is performed, only parameters are transferred in blocks. When program operation is performed, block transfer is performed after parameters and data (position, speed, step data, etc.) for various program operation is set. (See item "Block transfer".)

⑤ Write the various data to PS internal flash ROM.
If data is not written to flash ROM, all data including parameters is erased when the power is turned ON again, and data is overwritten with the data that was previously registered to flash ROM.

- As this module parses the content of parameters during writing to flash ROM, operation sometimes malfunctions if parameters are not written to flash ROM.

*1 Be sure to set the electronic gear first as this setting affects all other parameters.

(3) Setup procedure 2 for special control parameters (when module is used in absolute value control)

① Set electronic gears 1 and 2 in parameter 2.*2

② Set items relating to absolute value control and closed loop control in parameter 2. (See item "Absolute value control".)

③ Set all functions to be used to parameter 1.

④ When direct operation is performed, only parameters are transferred in blocks. When program operation is performed, block transfer is performed after parameters and data (position, speed, step data, etc.) for various program operation is set. (See item "Block transfer".)

⑤ Write the various data to PS internal flash ROM.
If data is not written to flash ROM, all data including parameters is erased when the power is turned ON again, and data is overwritten with the data that was previously registered to flash ROM.

- As this module parses the content of parameters during writing to flash ROM, operation sometimes malfunctions if parameters are not written to flash ROM.

*2 Be sure to set the electronic gear first as this setting affects all other parameters.

[3] Details of parameters 1/2

(1) Details of parameter 1

① to ㊳ correspond to numbers on pages 5-18 and 5-19.

① **Parameter 1 - address 0000 - bit 0 (default 0 (OFF))**
Selects the output pulse signal system. When "0" is set, the 2-pulse system is selected, and when "1" is set, the signed pulse system is selected. (See page 5-24.)

② **Parameter 1 - address 0000 - bit 1 (default 0 (OFF), b contact)**
Selects the logic of the limit input signal (9, 34, 21 and 46 of CN2/3) that is input by external sensors, for example. When "0" is set, the b contact (minus logic) is selected, and when "1" is set, the a contact (plus logic) is selected.

③ **Parameter 1 - address 0000 - bit 2 (default 0 (OFF), a contact)**
Selects the logic of the origin proximity input signal (35 and 57 of CN2/3) that is input by external sensors, for example. When "0" is set, the a contact (plus logic) is selected, and when "1" is set, the b contact (minus logic) is selected.

④ **Parameter 1 - address 0000 - bit 3 (default 0 (OFF), a contact)**
Selects the logic of the origin input signal (10(13-38) and 22(25-50) of CN2/3) that is input by external sensors, for example. When "0" is set, the a contact (plus logic) is selected, and when "1" is set, the b contact (minus logic) is selected.

⑤ **Parameter 1 - address 0000 - bit 4 (default 0 (OFF), a contact)**
Selects the logic of the general-purpose input signal (8 and 20 of CN2/3) that is input by external sensors, for example. When "0" is set, the a contact (plus logic) is selected, and when "1" is set, the b contact (minus logic) is selected.

⑥ **Parameter 1 - address 0000 - bit 5 (default 0 (OFF))**
Selects the function of emergency stop input (32 and 44 of CN2/3) that is input by external sensors, for example. When "0" is set, only pulse output stops, and the clear deviation output (6 and 18 of CN2/3) remains OFF. When "1" is set, pulse output stops, and then the clear deviation output (6 and 18 of CN2/3) turns ON for about 20 ms.

⑦ **Parameter 1 - address 0000 - bit 6 (default 0 (OFF))**
Selects the effective axis for the emergency stop. When "0" is set, pulse output of all axes is stopped when an error occurs on one axis. When "1" is set, pulse output of only the axis on which the emergency stop was applied is stopped, and operation of the remaining axes is not stopped. (Note, however, that error code 10 is generated.)

⑧ **Parameter 1 - address 0000 - bit 7 (default 0 (OFF)<disabled>)**
Selects external positioning completed signal enable/disable that is input by external sensors, for example. When "0" is set, the signal is disabled (the signal turns OFF at the various startups, and turns ON after pulse output from this unit is completed.) When "1" is set, the signal is enabled (the signal turns OFF at the various startups, and this relay turns ON when the positioning completed signal from the driver turns ON. (See item "Special I/O data positioning completed".)

⑨ **Parameter 1 - address 0001 - bit 0 (default 0 (OFF))**
Selects the state of the present value when a hardware error (emergency stop, limit input, driver error) is input from the outside. When "0" is set, the previous state is held as the present value. When "1" is set, the state is forcibly set to an origin unconfirmed state. (Zero return is required to perform positioning again.)

⑩ **Parameter 1 - address 0001 - bit 1 (default 0 (OFF))**
Selects the state of the present value when a software limit error occurs. When "0" is set, the previous state is held as the present value. When "1" is set, the state is forcibly set to an origin unconfirmed state. (Zero return is required to perform positioning again.)

⑪ **Parameter 1 - address 0001 - bit 2 (default 0 (OFF), b contact)**
Selects the logic of the driver error input signal (33 and 45 of CN2/3) that is input by external sensors, for example. When "0" is set, the b contact (minus logic) is selected, and when "1" is set, the a contact (plus logic) is selected.

⑫ **Parameter 1 - address 0001 - bits 3 to 7 (default 0 (OFF))**
Do not set these bits as this area is not set.

⑬ **Parameter 1 - address 0002 - bits 0 to 3 (default 0 (BCD))**
Sets the zero return operation mode ins BCD. "0" indicates the no-inversion mode, "1" indicates the inversion mode 1, and "2" indicates the inversion mode 2. (See item "Zero return".)

⑭ **Parameter 1 - address 0002 - bits 4 to 7 (default 0 (BCD))**
Sets the zero return direction in BCD. "0" indicates CW and "1" indicates "CCW".

⑮ **Parameter 1 - address 0003 (default 00 (BCD))**

Sets the origin detection method in BCD. When "00" is set, an immediate stop at the origin after escape from proximity is selected. When "01" is set, the origin count method 1 is selected. When "02" is set, the origin count method 2 is selected. When "03" is set, the origin proximity signal is used, operation is started by low-speed zero return, and stops immediately by the origin signal. When "04" is set, operation is inverted at the limit end, after which operation is performed by low-speed zero return, and stops immediately by the origin signal. When "05" is set, both the origin proximity and origin signals are unused, and the zero return operation start point is taken as the origin. (See item "Zero return".)

⑯ **Parameter 1 - addresses 0004 and 0005 (default 0000 (BCD))**

Indicates the origin count by origin count methods 1 and 2. The setting range is 0000 to 9999. When "0000" is set, this value is recognized as "0001". (See item "Zero return".)

⑰ **Parameter 1 - address 0006 (default 00 (BCD))**

Sets the present position (present value) management method at speed control operation. When "00" is set, the present value is managed to perform operation, and the present value data is updated as it is also at an interrupt detection. When "01" is set, the present value is managed to perform operation, the present value is preset to zero at an interrupt detection, and a new present value is taken from then on. (The stop position becomes the travel distance of the interrupt.) When "02" is set, the present value at speed control startup is set to "0" and the present value is not managed. Even after an interrupt occurs, the present value is not updated, and remains "0" until the next position control startup.

• "01" and "02" cannot be set when closed loop control is used.

⑱ **Parameter 1 - address 0007 (default 0F (Hex), all axes enabled)**

Selects the operational axis. As axis assignments, the X-axis is enabled when bit 0 is ON, the Y-axis is enabled when bit 1 is ON, the Z-axis is enabled when bit 2 is ON, and the A-axis is enabled when bit 3 is ON. Startup cannot be performed on disabled axes. Also, even if a 24 VDC power supply is not wired to or other wiring has not been connected to a disabled axis, an error code is not output, and operation can be performed only on enabled axes.

Example:Only X-axis enabled = 01 (Hex), only Y-axis enabled = 02 (Hex), only Z-axis enabled = 04 (Hex), only A-axis enabled = 08 (Hex), only X-/Y-axes enabled = 03 (Hex), only Z-/A-axes enabled = 0C (Hex),

• This parameter is set on the X-axis. (Only X-axis parameters are enabled.)

⑲ **Parameter 1 - addresses 0010 to 0013 (default 00000000 (BCD))**

This is the reference speed setup data in acceleration/deceleration operation. The setting range is 0 to 500000. (See Appendix "Way of thinking behind acceleration/deceleration time.")

⑳ **Parameter 1 - addresses 0014 to 0017 (default 00500000 (BCD))**

This is the area for setting the speed that must not be exceeded on individual axes. This is used to prevent the mechanical limit speed from being specified by mistake in 2-axis interpolation control. The setting range is 0 to 500000. (See cautions in 2-axis interpolation.)

㉑ **Parameter 1 - addresses 0020 to 0023 (default 00000000 (BCD))**

This is the startup speed when performing positioning on each axis. The setting range is 0 to 500000. (See page 5-24.)

㉒ **Parameter 1 - addresses 0024 to 0027 (default 0 (BCD))**

This is the area for setting the acceleration time in positioning. The setting range is 0 to 500000. (See Appendix "Way of thinking behind acceleration/deceleration time.")

㉓ **Parameter 1 - addresses 0030 to 0033 (default 00000000 (BCD))**

This is the area for setting the deceleration time in positioning. The setting range is 0 to 500000. (See Appendix "Way of thinking behind acceleration/deceleration time.")

㉔ **Parameter 1 - addresses 0034 to 0037 (default 00000000 (BCD))**

This is the speed at high-speed zero return. The setting range is 0 to 500000. (See item "Zero return".)

㉕ **Parameter 1 - addresses 0040 to 0043 (default 00000000 (BCD))**

This is the speed at low-speed zero return. The setting range is 0 to 500000. (See item "Zero return".)

㉖ **Parameter 1 - addresses 0044 to 0047 (default -9999999 (BCD))**

This is the software limit value on the CCW side. The setting range is -9999999 to +9999999.

(Note) The software limit setting range changes when the electronic gear is used.
(See item "Electronic gear".)

㉗ **Parameter 1 - addresses 0054 to 0057 (default 99999999 (BCD))**

This is the software limit value on the CW side. The setting range is -9999999 to +9999999.

(Note) The software limit setting range changes when the electronic gear is used.
(See item "Electronic gear".)

㉘ **Parameter 1 - addresses 0054 to 0057 (default 00000000 (BCD))**

This is the area for setting the speed after an interrupt in direct operation. The setting range is 0 to 500000. (See item "Direct operation and external interrupt".)

㉙**Parameter 1 - addresses 0060 to 0063 (default 00000000 (BCD))**

This is the area for setting compensation data after a zero return. The setting range is -9999999 to +9999999. (See item "Zero return".)

㉚**Parameter 1 - addresses 0064 and 0065 (default 0000 (BCD))**

This is the area for setting backlash compensation data. The setting range is 0000 to 9999. (See item "Backlash compensation".)

㉛ **Parameter 1 - addresses 0066 and 0067 (default 0000 (BCD))**

This is the area for setting the positioning monitoring time in closed loop control. The setting range is 0000 to 9999 in 1-ms increments. (See item "Closed loop control".)

㉜**Parameter 1 - addresses 0070 to 0073 (default 00 (BCD))**

This is the area for setting the jog initial speed. When the speed data is set to "0" at jog operation, operation is performed according to this speed. This setting is handy when performing jog operation at a fixed speed. The setting range is 0 to 500000 (pps). (See item "Jog operation".)

㉜**Parameter 1 - address 0074 (default 00 (BCD))**

Sets the acceleration/deceleration curve during sinusoid drive. When "00" is set, drive is ramp drive. The larger the numerical value set here, the gentler the curve becomes. The setting range is 00 to 99. Sinusoid drive does not function in jog and speed control operation.
(See item "sinusoid drive".)

㉞**Parameter 1 - address 0075 - bits 0 to 3 (default 0 (BCD))**

This area is for setting the jog operation mode. "0" sets "No 1-second wait," and "1" sets a "1-second wait." To perform inching, set "01". (See 11-2.)

㉟**Parameter 1 - address 0075 - bits 4 to 7 (default 0 (BCD))**

This area is for setting the operation mode when a software limit occurs. "0" sets deceleration operation, "1" sets immediate stop, and "2" sets software limit disabled (used when coordinate management in speed control is endless).

• Software limit disabled cannot be used in closed loop control.

㊱**Parameter 1 - address 0076 - bits 0 to 3 (default 0 (BCD))**

This is the area for setting the operation mode of general-purpose input. "0" is regular input (the state of the general-purpose output relay is monitored), "1" is interrupt input (speed control is switched to position control at ↑), and "2" is external startup input.
(See item "General-purpose input".)

㊲**Parameter 1 - address 0076 bits 4 to 7 (default 0 (BCD))**

This is the area for setting the operation mode of general-purpose output. "0" is regular output (the state of the general-purpose output relay is output), and "1" is interrupt output. (Output turns ON or OFF when the present value matches the interrupt output position data. The interrupt output ON/OFF setting follows the setting of the "A/I" bit. See item "General-purpose output".)

㊳**Parameter 1 - address 0077 (default 00 (BCD))**

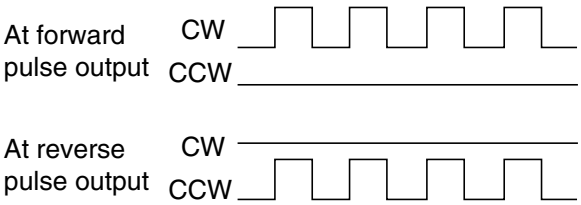
This is set when X-axis parameters are to be used on other axes as well. When X-axis parameters are to be used in common on other axes, the parameters of those axes need not be set as they become the same as the parameters for the X-axis. When "00" is set, parameters are set independently for each axis. When "01" is set, parameters are common to the X-/Y-axes and to the Z-/A-axes (JW-14PS). When "02" is set, parameters are common to the X-/Y-/Z-axes and independent to the A-axis. When "03" is set, parameters are common to the X-/Y-/Z-/A-axes (JW-14PS).

• This parameter is set on the X-axis. (Only X-axis parameters can be set.)

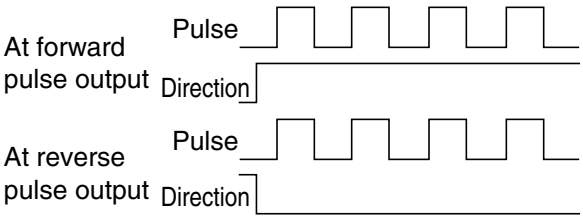
■ Setting details of parameter 1 - address 0000 - bit 0

Sets the pulse output type according to the driver specifications.

• When set to "0", the 2-pulse system is adopted.

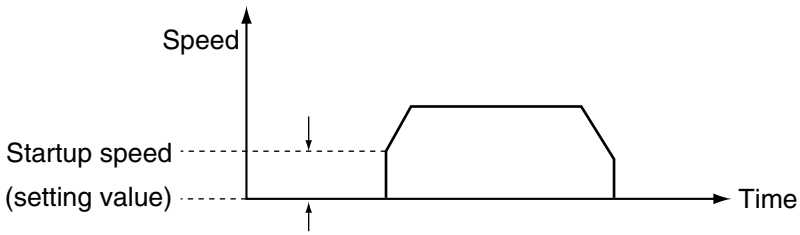


• When set to "1", the signed pulse system is adopted.



■ Setting details of parameter 1 - addresses 0020 to 0023

Sets the speed (pps) for starting positioning (including zero return and jog operation) smoothly.



Address A+0020 of parameter 1	10^1	10^0
Address A+0021 of parameter 1	10^3	10^2
Address A+0022 of parameter 1	10^5	10^4

When a value other than 500000 maximum (BCD code) is set, a parameter setup error is output.

(2) Details of parameter 2

㊴ to ㊸ correspond to numbers on page 5-18.

㊴ **Parameter 2 - address 0000 (default 0 (OFF))**

Selects the closed loop control mode. When "00" is set, closed loop control is not used. When "01" is set, operation stops in error and compensation is not performed when the number of pulses from the encoder exceeds the closed loop control allowable range. When "02" is set, operation stops in error and compensation is performed at all times by closed loop control when the number of pulses from the encoder exceeds the closed loop control allowable range.
(See item "Closed loop control".)

㊵ **Parameter 2 - address 0001 (default 99 (OFF))**

Selects the compensation time in closed loop control. The setting range is 01 to 99 in 0.1-second increments. (See item "Closed loop control".)

㊶ **Parameter 2 - address 0002 (default 0 (OFF))**

Selects the direction of signals received from the encoder in closed loop control. "00" sets count incremented by CW rotation, and "01" sets count incremented by CCW rotation.
(See item "Closed loop control".)

㊷**Parameter 2 - address 0003 (default 0 (BCD))**

This is unset area. Do not set.

㊸ **Parameter 2 - addresses 0004 to 0007 (default 00000000 (BCD))**

This area is for setting the allowable range (called the "closed loop allowable range") for the error between the instruction value and number of encoder feedback pulses during closed loop control operation. The setting range is 0000001 to 9999999. When "0000000" is set, comparative judgment is not performed. (See item "Closed loop control".)

㊹**Parameter 2 - addresses 0010 to 0013 (default 00000000 (BCD))**

This area is for setting the allowable range (called the "completed pulse allowable range") for the error between the instruction value and number of encoder feedback pulses when closed loop control is completed. The setting range is 0000001 to 9999999. When "0000000" is set, comparative judgment is not performed. (See item "Closed loop control".)

㊺ **Parameter 2 - addresses 0014 to 0017 (default 00 (BCD))**

This is unset area. Do not set.

㊻**Parameter 2 - address 0020 (default 00 (BCD))**

Selects the absolute value control mode. When "00" is set, absolute value control is set to "Disabled." When "01" is set, operation mode 1 is set. In this mode, the present value is preset at power ON or when the absolute present value read relay turns ON.
(See item "Absolute value control".)

㊼**Parameter 2 - address 0021 (default 00 (BCD))**

Selects the driver in absolute value control. Set "00" when absolute value control is performed using the GPP Series made by Wako Giken. Currently, only this mode is supported.
(See item "Absolute value control".)

㊽ **Parameter 2 - addresses 0022 to 0027 (default 00 (BCD))**

This is unset area. Do not set.

㊾**Parameter 2 - addresses 0030 to 0033 (default 00 (BCD))**

Set the M coefficient value of electronic gear 1. Normally, this section is used only in closed loop control. The setting range is 0000001 to 9999999. (See item "Closed loop control".)

㊿**Parameter 2 - addresses 0034 to 0037 (default 00 (BCD))**

Set the D coefficient value of electronic gear 1. Normally, this section is used only in closed loop control. The setting range is 0000001 to 9999999. (See item "Closed loop control".)

(51) **Parameter 2 - addresses 0040 to 0043 (default 00 (BCD))**

Sets the M coefficient value of electronic gear 2 (feedback value from the encoder). This section is used only in closed loop control. The setting range is 0000001 to 9999999.
(See item "Closed loop control".)

(52)**Parameter 2 - addresses 0044 to 0047 (default 00 (BCD))**

Sets the D coefficient value of electronic gear 2 (feedback value from the encoder). This section is used only in closed loop control. The setting range is 0000001 to 9999999.
(See item "Closed loop control".)

(53)**Parameter 2 - addresses 0050 to 0077 (default 00 (BCD))**

This is unset area. Do not set.

5-4 How to transfer to the relay area

This module is a special I/O module. However, it differs from regular special I/O modules in that automatic I/O registration cannot be used as 256 bytes of special I/O data registers area is occupied. So, on systems mounted with this module, be sure to perform optional I/O registration.

• For details on how to perform optional I/O registration, refer to the user's manual for the dedicated tool (JW-14PG, JW-50SP, etc.).

Optional I/O registration is handy when performing actual operation if you transfer data, that needs to be handled by relays (in 1-bit increments) in the data exchange area, to relay area on JW50H/70H/100H. The following example explains how to transfer data to relay area using two modules, JW-14PS(1) and JW-14PS(2). This example is explained using the ladder program that is actually used and a list of I/O assignments used at this time.

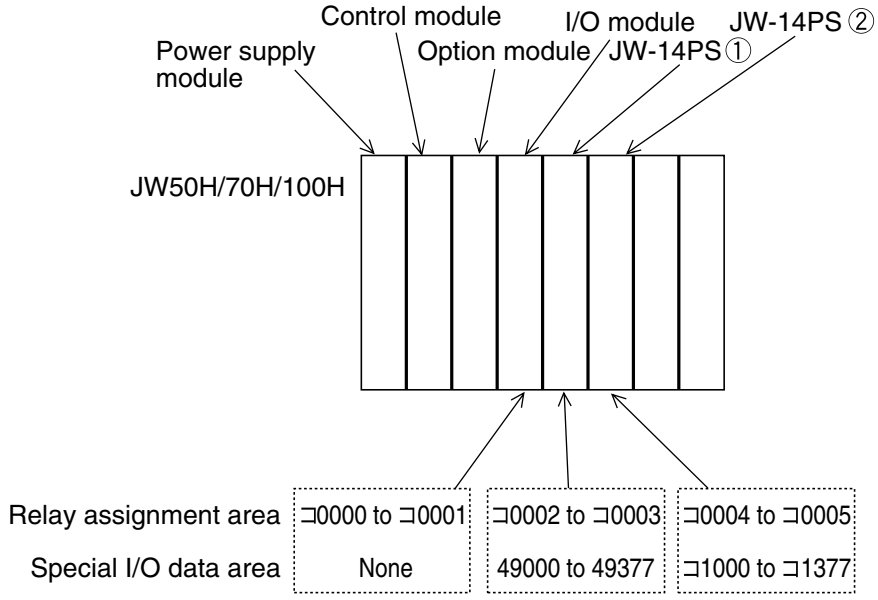
5

[Example]

As shown below, when JW-14PS① and JW-14PS② are mounted on the rack panel, the I/O relays used on JW-14PS① are ⊐0002 and ⊐0003, and the I/O relays used on JW-14PS② are ⊐0004 and ⊐0004. These relay areas cannot be used as they are fixed for input.

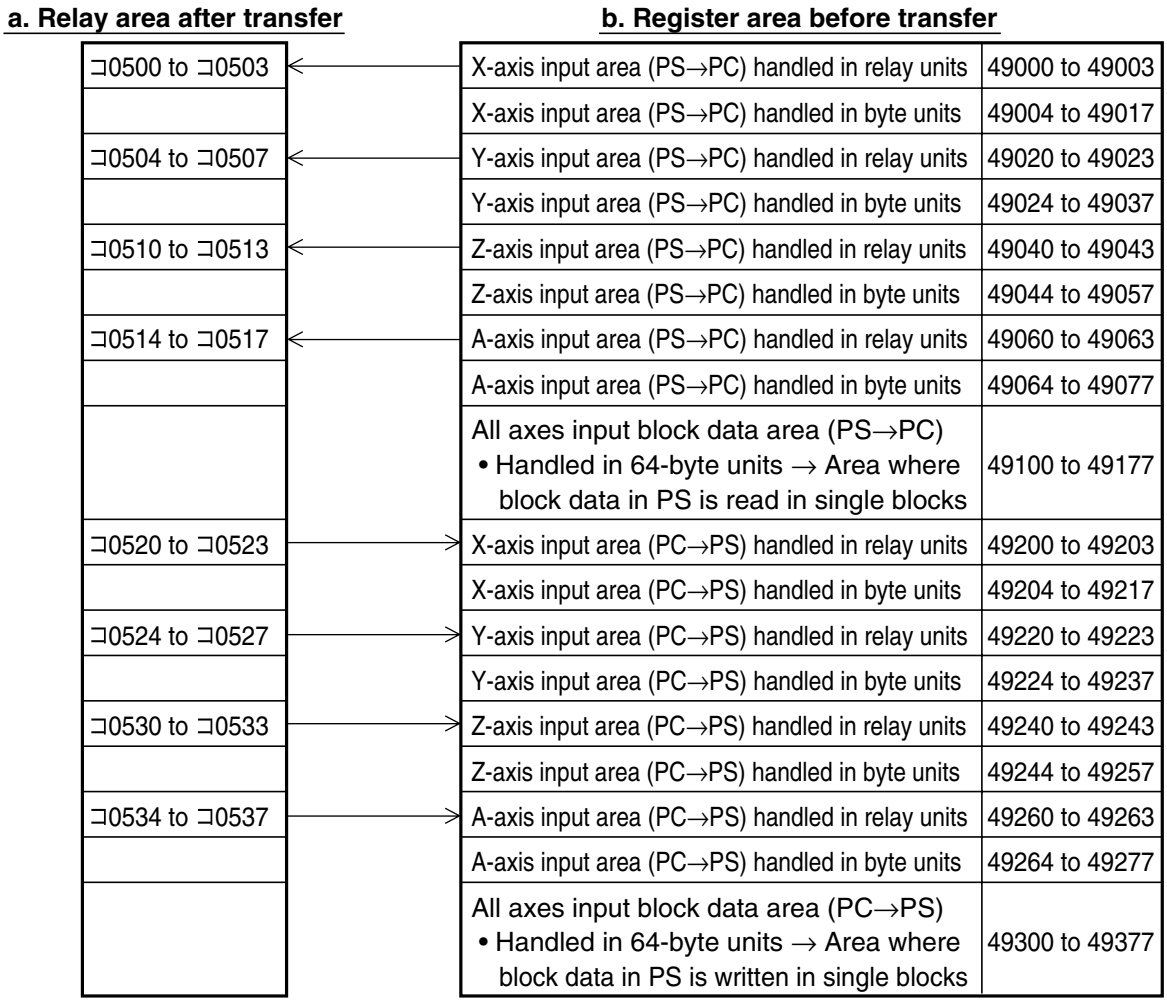
The following describes transfer of various data when the special I/O data area in which data is actually exchanged is set to 49000 to 49377 on JW-14PS① and to ⊐1000 to ⊐1377 on JW-14PS② by optional I/O registration. It is more convenient in terms of data handling to transfer the top address of JW-14PS to all relay areas by optional I/O registration as in JW-14PS②. However, the relay area of JW50H/70H/100H is restricted to ⊐1000 to ⊐1577. Accordingly, when there are many units, the method of setting the leading address to data register area as in JW-14PS① and transferring only the section required in handling by the relays by a ladder program is used.

Sample ladder program 1 (on page 5-32) shows a program for transferring part of the register area (in byte units) starting from top address 49000 to the relay area. The tables on pages 5-30 and 5-31 show the I/O assignments at that time.



■ Brief outline of data transfer

The following shows a brief outline of data transfer that must be handled in relay units in the special I/O data area of JW-14PS① (top address of special I/O is 49000) on the previous page.



[1] Special I/O data area assignments

(1) Assignment of special I/O data area when top address is set to 49000 by optional I/O registration

(I/O assignments before transfer on previous page b)

• Input section (N+0000 to 0177)

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis	A-axis				
Input (PC←PS)	49000	49020	49040	49060	0	Operation ready (U.R.)	0	Operation readying
							1	Operation ready
					1	Positioning completed	↑	Completed
							↓	At start
					2	Busy flag	0	Non-busy state
							1	Busy state
					3	Program operation startup standby	0	Non-startup standby
							1	Startup standby state
					4	No origin flag	0	Origin
							1	No origin
					5	Teaching completed	↑	Completed
							↓	At start
					6	BD.REQ (block data request) signal • Block transfer is possible only when this flag is ON.	0	Block transfer disabled
							1	Block transfer enabled
					7	Error flag	0	No error
							1	Error
	49001	49021	49041	49061	0	Present position display mode monitor	0	Instruction value display
							1	Encoder input display
					1	Interrupt output monitor	0	Interrupt output OFF
							1	Interrupt output ON
					2	Driver communications completed * Enabled only when absolute value control is enabled.	↑	Completed
							↓	At start
					3 to 7	Reserved function		
	49002	49022	49042	49062	0	CW limit input signal	State of input signals of each axis is monitored. 1: ON 0: OFF	
					1	CCW limit input signal		
					2	Origin proximity input signal		
					3	Origin input signal		
					4	General-purpose input signal		
					5	Driver error input signal		
					6	Emergency stop input signal		
					7	Positioning completed signal		
	49003	49023	49043	49063	0	M output 0	State of each M output (zone) signal is monitored. 1: ON 0: OFF	
					1	M output 1		
					2	M output 2		
					3	M output 3		
					4	M output 4		
					5	M output 5		
					6	M output 6		
					7	M output 7		
	49004	49024	49044	49064	0 to 7	Present position (10^0 10^1)		
	49005	49025	49045	49065	0 to 7	Present position (10^5 10^6)		
	49006	49026	49046	49066	0 to 7	Present position (10^4 10^5)		
	49007	49027	49047	49067	0 to 7	Present position (sign 10^6)		
	49010	49030	49050	49070	0 to 7	Output code (00 to 99) *Enabled at program operation		
	49011	49031	49051	49071	0 to 7	Step No. (00 to 99) *Enabled at program operation		
	49012	49032	49052	49072	0 to 7	Error code, lower (00 to 99)		
	49013	49033	49053	49073	0 to 7	Error code, upper (00 to 99)		
	49014	49034	49054	49074	0 to 7	Reserved function		
	49015	49035	49055	49075	0 to 7	Reserved function		
	49016	49036	49056	49076	0 to 7	Reserved function		
	49017	49037	49057	49077	0 to 7	Block data No. monitor (00 to 31) *Read block No. is indicated.		
	49100 to 49177				0 to 7	Data storage area at block data read (PC←this module transfer buffer area) *Area common to each axis		

• Output section (N+0200 to 0377)

I/O	Byte address of data memory				Bit	Function			
	X-axis	Y-axis	Z-axis	A-axis					
Output (PC→PS)	49200	49220	49240	49260	0	At program operation	Start 1 [↑]		
					1		Continuous startup/ single-step startup setting	0	Continuous startup
								1	Single-step startup
					2		Step No. enable	0	Set disabled
								1	Set enabled
					3	External input startup selection			
					4	At direct operation	Start 2 [↑]		
					5		Position control/speed control setting	0	Position control startup
								1	Speed control startup
					6		Jog+ (CW jog operation instruction)	0	Stop
								1	Operation
					7		Jog- (CCW jog operation instruction)	0	Stop
								1	Operation
	49201	49221	49241	49261	0	Zero return [↑]			
					1	Move origin [↑]			
					2	Present position preset [↑]			
					3	Deceleration stop [↑]			
					4	Forced intervention startup [↑]			
					5	Clear deviation		0	OFF
								1	ON
					6	Override enable		0	Disabled
								1	Enabled
					7	Clear error [↑] (pulse output inhibit canceled)			
	49202	49222	49242	49262	0	Teaching [↑]			
					1	Writing of interrupt output position data [↑]			
					2	General-purpose output		0	OFF
								1	ON
					3	Block data write *Executed at each scan when ON			
					4	Block data read *Executed at each scan when ON			
					5	Block data save (write to flash ROM) [↑] *Enabled on X-axis only (batch operation for 4 axes)			
					6	Switching of present position display mode		0	Instruction value
								1	Encoder input (at closed loop control)
					7	Read absolute present position [↑] *Enabled only when absolute value control is enabled			
	49203	49223	49243	49263	0 to 7	Step No. at program operation (00 to 99)			
	49204	49224	49244	49264	0 to 7	Position No. at teaching (00 to 99)			
	49205	49225	49245	49265	0 to 7	Designation of block data block No. (00 to 31)			
	49206	49226	49246	49266	0 to 7	Override coefficient, lower (00 to 99)	Set override coefficient within range 000 to 999%.		
	49207	49227	49247	49267	0 to 7	Override coefficient, upper (00 to 99)			
	49210	49230	49250	49270	0 to 7	Position instruction value (10^1 10^0)	Becomes the travel distance after an interrupt in the case of speed control operation. Sign indicates direction of operation.		
	49211	49231	49251	49271	0 to 7	Position instruction value (10^3 10^2)			
	49212	49232	49252	49272	0 to 7	Position instruction value (10^5 10^4)			
	49213	49233	49253	49273	0 to 7	Position instruction value (sign A/I 10^6)			
	49214	49234	49254	49274	0 to 7	Speed instruction value (10^1 10^0)	When 000000, the jog operation speed of parameters becomes the speed instruction value.		
	49215	49235	49255	49275	0 to 7	Speed instruction value (10^3 10^2)			
	49216	49236	49256	49276	0 to 7	Speed instruction value (10^5 10^4)			
	49217	49273	49257	49277	0 to 3	Acceleration time No. (0 to 8) *Setting value of parameter when 0			
					4 to 7	Deceleration time No. (0 to 8) *Setting value of parameter when 0			
	49300 to 49377				64 bytes	Data storage area at block data write (PC→ this module transfer buffer area) *Area common to each axis			

(2) Assignment of special I/O data area after transfer by sample ladder 1 (page 5 - 32) (I/O assignment after transfer of a on page 5 - 27)

• Input section (N+0000 to 0177)

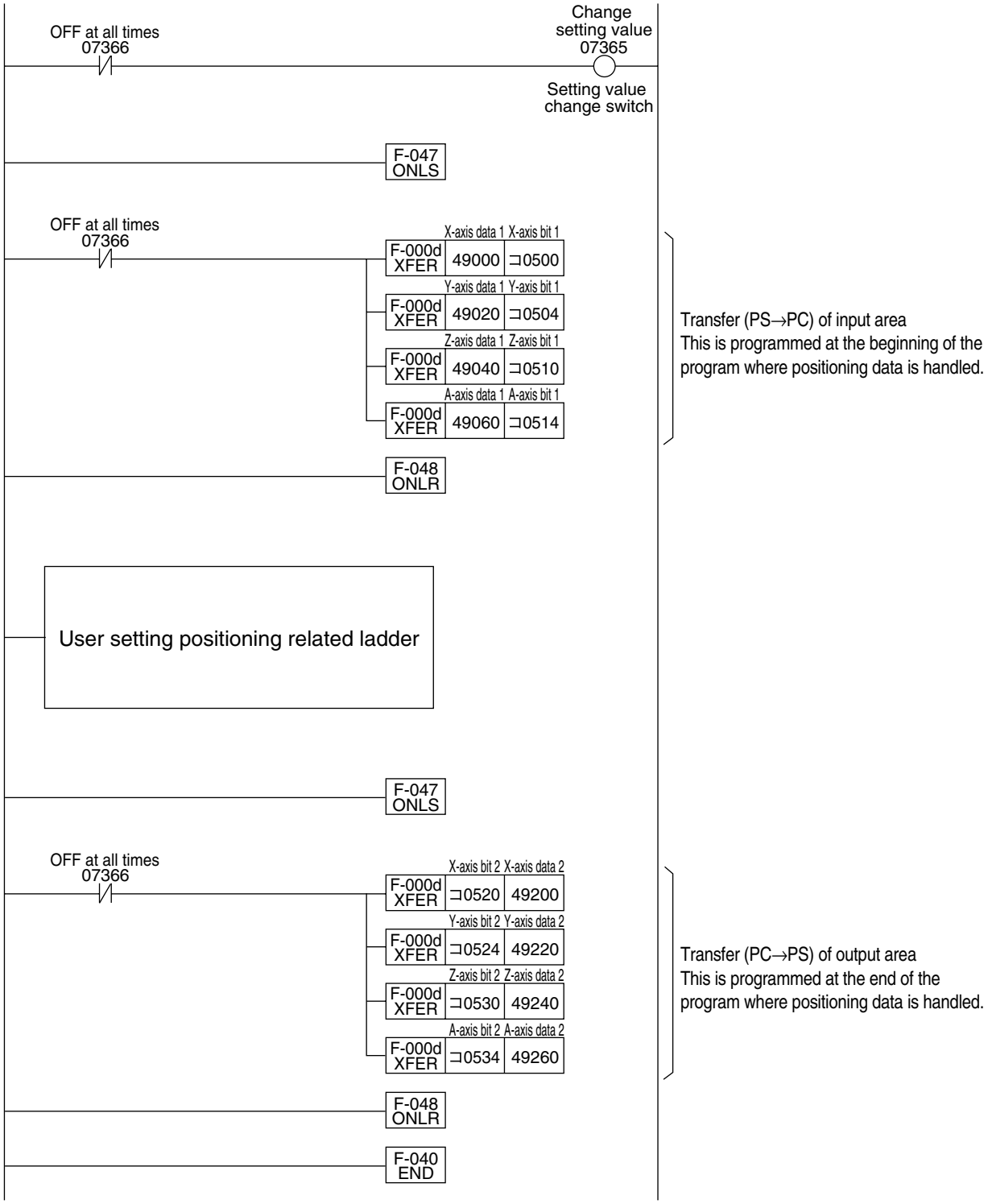
I/O	Byte address of data memory				Bit	Function		
	X-axis	X-axis	Z-axis	A-axis				
Input (PC←PS)	⊐0500	⊐0504	⊐0510	⊐0514	0	Operation ready (U.R.)	0	Operation readying
							1	Operation ready
					1	Positioning completed	↑	Completed
							↓	At start
					2	Busy flag	0	Non-busy state
							1	Busy state
					3	Program operation startup standby	0	Non-startup standby
							1	Startup standby state
					4	No origin flag	0	Origin
							1	No origin
					5	Teaching completed	↑	Completed
							↓	At start
					6	BD.REQ (block data request) signal • Block transfer is possible only when this flag is ON.	0	Block transfer disabled
							1	Block transfer enabled
					7	Error flag	0	No error
							1	Error
	⊐0501	⊐0505	⊐0511	⊐0515	0	Present position display mode monitor	0	Instruction value display
							1	Encoder input display
					1	Interrupt output monitor	0	Interrupt output OFF
							1	Interrupt output ON
					2	Driver communications completed * Enabled only when absolute value control is enabled.	↑	Completed
							↓	At start
					3 to 7	Reserved function		
	⊐0502	⊐0506	⊐0512	⊐0516	0	CW limit input signal	State of input signals of each axis is monitored. 1: ON 0: OFF	
					1	CCW limit input signal		
					2	Origin proximity input signal		
					3	Origin input signal		
					4	General-purpose input signal		
					5	Driver error input signal		
					6	Emergency stop input signal		
					7	Positioning completed signal		
	⊐0503	⊐0507	⊐0513	⊐0517	0	M output 0	State of each M output (zone) signal is monitored. 1: ON 0: OFF	
					1	M output 1		
					2	M output 2		
					3	M output 3		
					4	M output 4		
					5	M output 5		
					6	M output 6		
					7	M output 7		
	49004	49024	49044	49064	0 to 7	Present position (10^0 10^1)		
	49005	49025	49045	49065	0 to 7	Present position (10^5 10^6)		
	49006	49026	49046	49066	0 to 7	Present position (10^4 10^5)		
	49007	49027	49047	49067	0 to 7	Present position (sign 10^6)		
	49010	49030	49050	49070	0 to 7	Output code (00 to 99) *Enabled at program operation		
	49011	49031	49051	49071	0 to 7	Step No. (00 to 99) *Enabled at program operation		
	49012	49032	49052	49072	0 to 7	Error code, lower (00 to 99)		
	49013	49033	49053	49073	0 to 7	Error code, upper (00 to 99)		
	49014	49034	49054	49074	0 to 7	Reserved function		
	49015	49035	49055	49075	0 to 7	Reserved function		
	49016	49036	49056	49076	0 to 7	Reserved function		
	49017	49037	49057	49077	0 to 7	Block data No. monitor (00 to 31) *Read block No. is indicated.		
	49100 to 49177				0 to 7	Data storage area at block data read (PC←this module transfer buffer area) *Area common to each axis		

• Output section (N+0200 to 0377)

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis	A-axis				
Output (PC→PS)	⊐0520	⊐0524	⊐0530	⊐0534	0	At program operation	Start 1 [↑]	
					1		Continuous startup/single-step startup setting	0: Continuous startup; 1: Single-step startup
					2		Step No. enable	0: Set disabled; 1: Set enabled
					3	External input startup selection		
					4	At direct operation	Start 2 [↑]	
					5		Position control/speed control setting	0: Position control startup; 1: Speed control startup
					6		Jog+ (CW jog operation instruction)	0: Stop; 1: Operation
					7		Jog- (CCW jog operation instruction)	0: Stop; 1: Operation
	⊐0521	⊐0525	⊐0531	⊐0535	0	Zero return [↑]		
					1	Move origin [↑]		
					2	Present position preset [↑]		
					3	Deceleration stop [↑]		
					4	Forced intervention startup [↑]		
					5	Clear deviation		0: OFF; 1: ON
					6	Override enable		0: Disabled; 1: Enabled
					7	Clear error [↑] (pulse output inhibit canceled)		
	⊐0522	⊐0526	⊐0532	⊐0536	0	Teaching [↑]		
					1	Writing of interrupt output position data [↑]		
					2	General-purpose output		0: OFF; 1: ON
					3	Block data write *Executed at each scan when ON		
					4	Block data read *Executed at each scan when ON		
					5	Block data save (write to flash ROM) [↑] *Enabled on X-axis only (batch operation for 4 axes)		
					6	Switching of present position display mode		0: Instruction value; 1: Encoder input (at closed loop control)
					7	Read absolute present position [↑] *Enabled only when absolute value control is enabled		
	⊐0523	⊐0527	⊐0533	⊐0537	0 to 7	Step No. at program operation (00 to 99)		
	49204	49224	49244	49264	0 to 7	Position No. at teaching (00 to 99)		
	49205	49225	49245	49265	0 to 7	Designation of block data block No. (00 to 31)		
	49206	49226	49246	49266	0 to 7	Override coefficient, lower (00 to 99)		Set override coefficient within range 000 to 999%.
	49207	49227	49247	49267	0 to 7	Override coefficient, upper (00 to 99)		
	49210	49230	49250	49270	0 to 7	Position instruction value (10^1 10^0)		Becomes the travel distance after an interrupt in the case of speed control operation. Sign indicates direction of operation.
	49211	49231	49251	49271	0 to 7	Position instruction value (10^3 10^2)		
	49212	49232	49252	49272	0 to 7	Position instruction value (10^5 10^4)		
	49213	49233	49253	49273	0 to 7	Position instruction value (sign A/I 10^6)		
	49214	49234	49254	49274	0 to 7	Speed instruction value (10^1 10^0)		When 000000, the jog operation speed of parameters becomes the speed instruction value.
	49215	49235	49255	49275	0 to 7	Speed instruction value (10^3 10^2)		
	49216	49236	49256	49276	0 to 7	Speed instruction value (10^5 10^4)		
	49217	49273	49257	49277	0 to 3	Acceleration time No. (0 to 8) * When 0, setting value of parameter		
					4 to 7	Deceleration time No. (0 to 8) *When 0, setting value of parameter		
	49300 to 49377				64 bytes	Data storage area at block data write (PC→transfer buffer area of this module) *Area common to each axis		

■ Sample ladder program 1

This ladder program transfers part of special I/O data area to relay area.

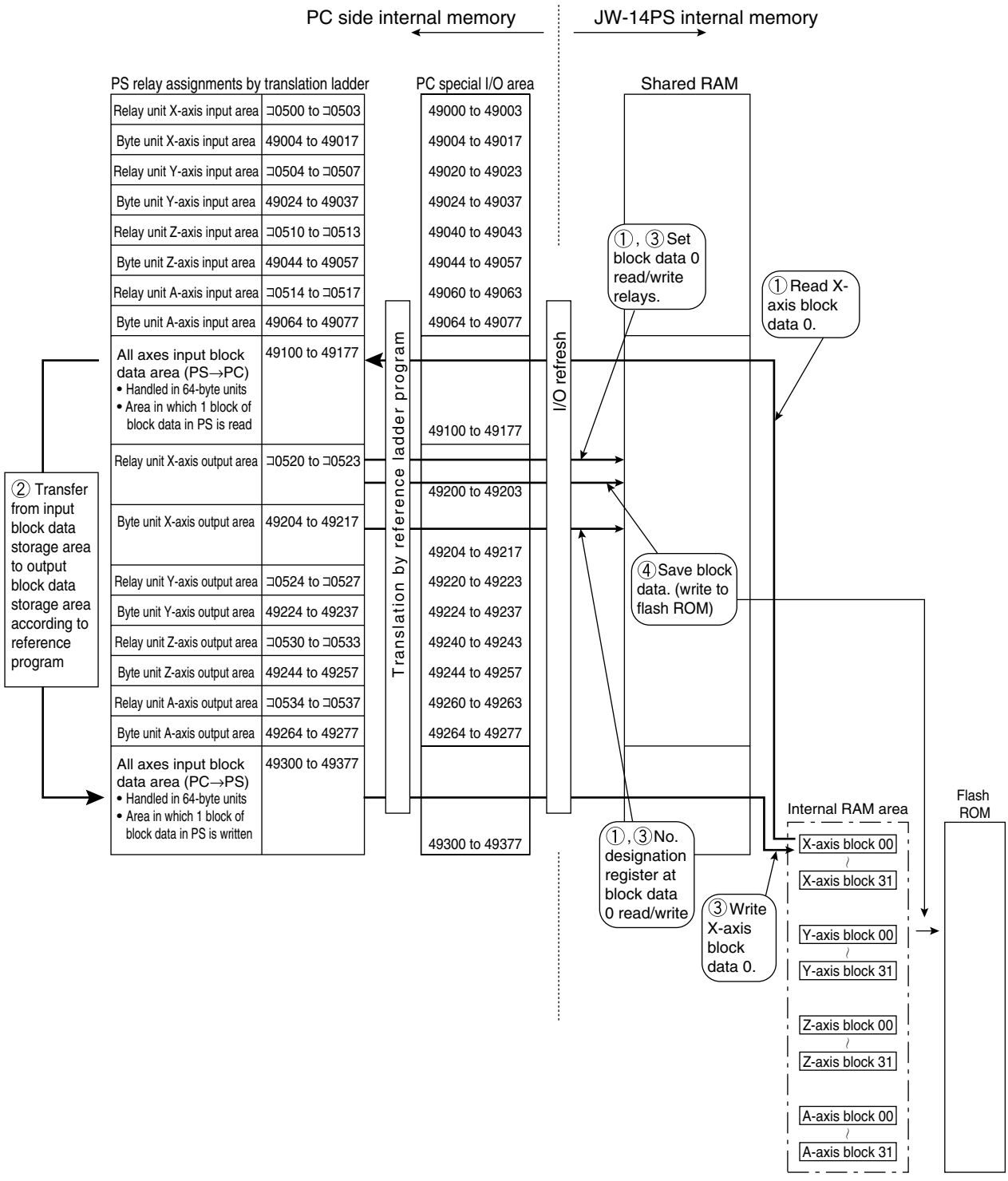


5-5 How to block-transfer any single block of data

The following describes a method of reading any single block of data to block data storage area on the JW50H/70H/100H control module input section from shared RAM on JW-12PS/14PS, and transferring that block data to block data storage area on the JW50H/70H/100H control module output section. In this example, the read/write section of the block data is added to the "transfer to relay area" sample ladder program on the previous page.

[Example]The content of X-axis parameter 1 is read to the JW50H/70H/100H control module from JW-14PS on JW-14PS① (top address 49000) on page 5-26, and that data is transferred to the write area to write the data.

● Data flow for reading/writing X-axis parameter 1 (block data 0) from the PS side



[Details of data flow]

① Read X-axis parameter 1 (block data No.00) from PS side.

② Transfer read data to write storage area.

③ Write write data to PS.

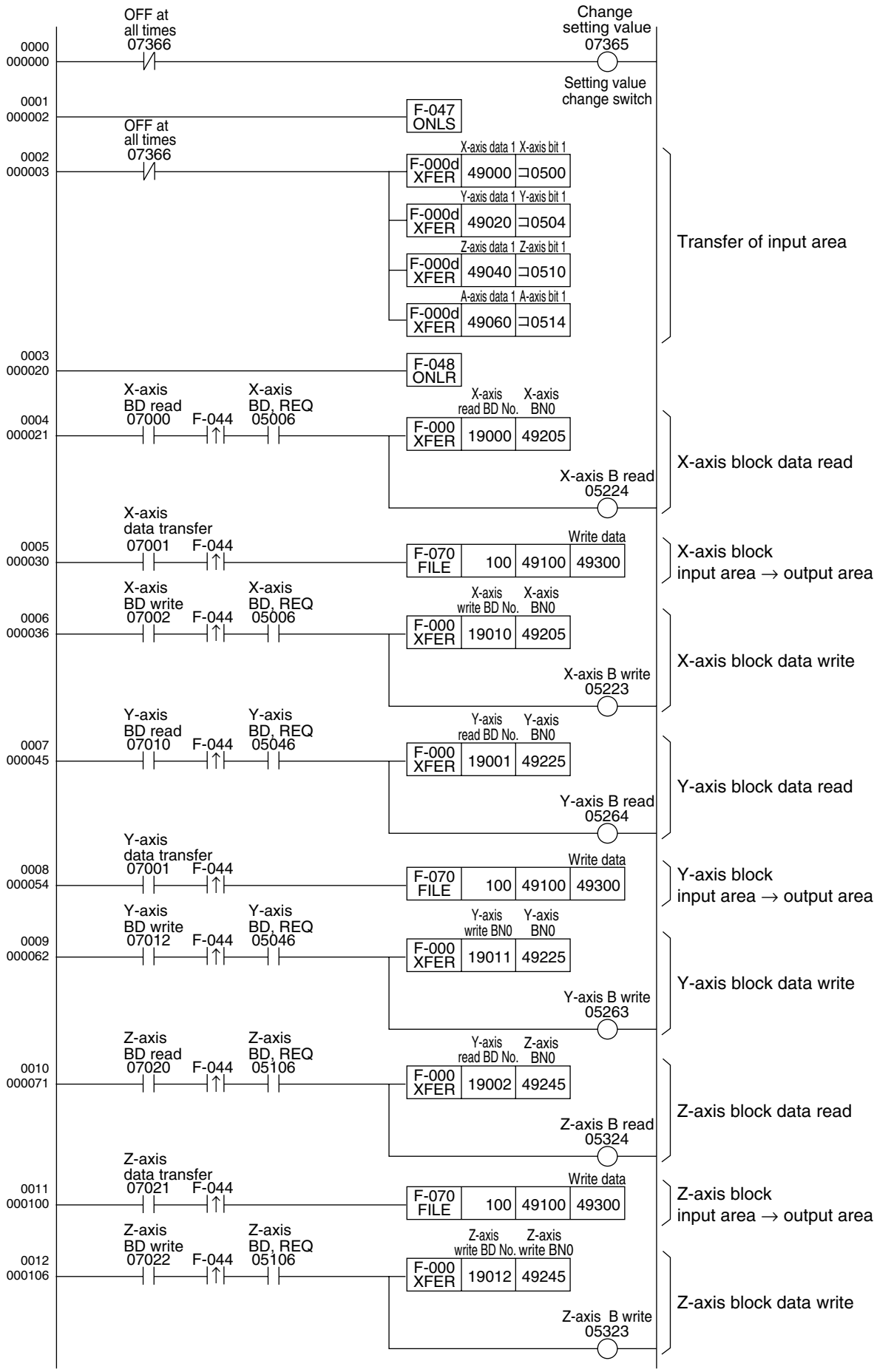
④ Save block data.

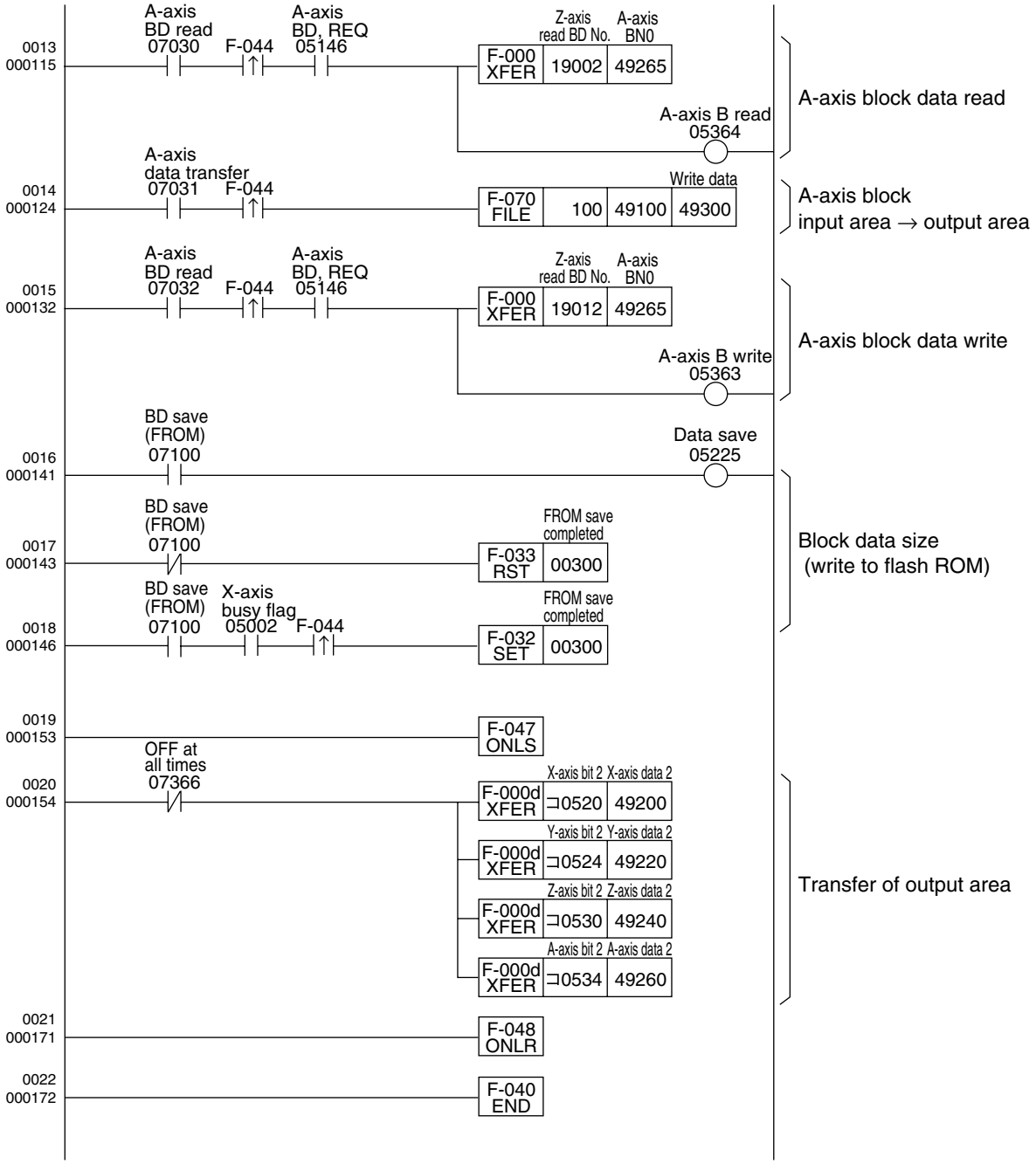
The following table shows the procedure for the above flow and the setup method when the ladder program on the following page is used.

		General method, result	Setup method/result of ladder program on following page
①	Setting	• Block data No. (No.0) to read is set to 49205, and the block data read relay 05224 is turned ON.	• The content of 19000 is set to 00(Hex) to turn 07000 ON.
	Result	• The data of block data 0 (parameter 1) is entered to input block data storage area 49100 to 49177.	• The data of X-axis parameter 1 is read to 49100 to 49177.
②	Setting	• The data in input block data storage area 49100 is transferred to output block data storage area 49300.	• 07001 is turned ON.
	Result	• The data is transferred to 49300. As 49300 is output area, the content of the 49300 is edited here if parameter 1 must be modified.	• The content of 49100 to 49177 is transferred to user-rewriteable output area 49300 to 49377.
③	Setting	• Block data transfer No. (No.0) to write is set to 49205, and the block data write relay 05223 is turned ON.	• The content of 19010 is set to 00(Hex) to turn 07002 ON.
	Result	• The content of block data 0 is written to the PS side.	• The content of X-axis block data 0 (parameter 1) is written to the PS side.
④	Setting	• The block data save (shared RAM→flash ROM) relay 05225 is turned ON.	• Block data save relay 07010 is turned ON.
	Result	• Saving of data to flash ROM is completed. After writing of all block data has ended, be sure to write the block data to flash ROM to prevent the block data in the PS from being lost due to a power interruption, etc.	• Saving of data to flash ROM is completed.

(Note)

Though block data can be written in single blocks at a time when it is written to internal RAM area, all data can only be batch-transferred when saving block data (writing data to flash ROM).


OFF at all times 07366
Change setting value 07365
Setting value change switch
F-047 ONLS
X-axis data 1
X-axis bit 1
F-000d XFER 49000 ⊐0500
Y-axis data 1
Y-axis bit 1
F-000d XFER 49020 ⊐0504
Z-axis data 1
Z-axis bit 1
F-000d XFER 49040 ⊐0510
A-axis data 1
A-axis bit 1
F-000d XFER 49060 ⊐0514
Transfer of input area
F-048 ONLR
X-axis BD read 07000
F-044
X-axis BD, REQ 05006
X-axis read BD No.
X-axis BN0
F-000 XFER 19000 49205
X-axis B read 05224
X-axis block data read
X-axis data transfer 07001
Write data
F-070 FILE 100 49100 49300
X-axis block input area → output area
X-axis BD write 07002
X-axis write BD No.
F-000 XFER 19010 49205
X-axis B write 05223
X-axis block data write
Y-axis BD read 07010
Y-axis BD, REQ 05046
Y-axis read BD No.
Y-axis BN0
F-000 XFER 19001 49225
Y-axis B read 05264
Y-axis block data read
Y-axis data transfer 07001
Y-axis block input area → output area
Y-axis BD write 07012
Y-axis write BN0
F-000 XFER 19011 49225
Y-axis B write 05263
Y-axis block data write
Z-axis BD read 07020
Z-axis BD, REQ 05106
Z-axis read BD No.
Z-axis BN0
F-000 XFER 19002 49245
Z-axis B read 05324
Z-axis block data read
Z-axis data transfer 07021
Z-axis block input area → output area
Z-axis BD write 07022
Z-axis write BD No.
write BN0
F-000 XFER 19012 49245
Z-axis B write 05323
Z-axis block data write


0013
000115
A-axis
BD read
07030
F-044
A-axis
BD, REQ
05146
Z-axis
read BD No.
A-axis
BN0
F-000
XFER
19002
49265
A-axis B read
05364
A-axis block data read
0014
000124
A-axis
data transfer
07031
F-044
Write data
F-070
FILE
100
49100
49300
A-axis block
input area → output area
0015
000132
A-axis
BD read
07032
F-044
A-axis
BD, REQ
05146
Z-axis
read BD No.
A-axis
BN0
F-000
XFER
19012
49265
A-axis B write
05363
A-axis block data write
0016
000141
BD save
(FROM)
07100
Data save
05225
0017
000143
BD save
(FROM)
07100
FROM save
completed
F-033
RST
00300
0018
000146
BD save
(FROM)
07100
X-axis
busy flag
05002
F-044
FROM save
completed
F-032
SET
00300
Block data size
(write to flash ROM)
0019
000153
F-047
ONLS
0020
000154
OFF at
all times
07366
X-axis bit 2
X-axis data 2
F-000d
XFER
⊐0520
49200
Y-axis bit 2
Y-axis data 2
F-000d
XFER
⊐0524
49220
Z-axis bit 2
Z-axis data 2
F-000d
XFER
⊐0530
49240
A-axis bit 2
A-axis data 2
F-000d
XFER
⊐0534
49260
Transfer of output area
0021
000171
F-048
ONLR
0022
000172
F-040
END

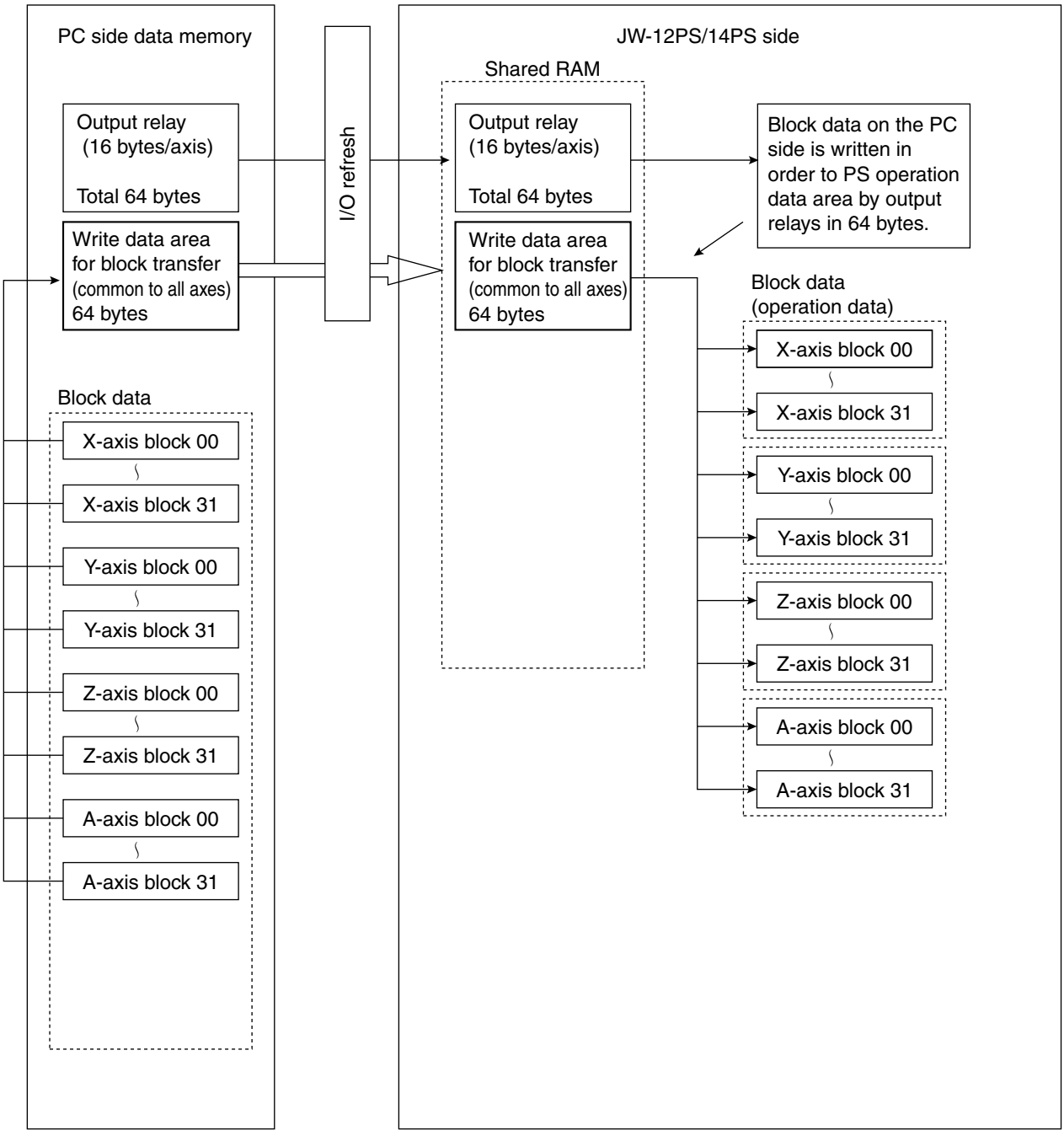
5-6 Data read/write ladders in block transfer

[1] Outline

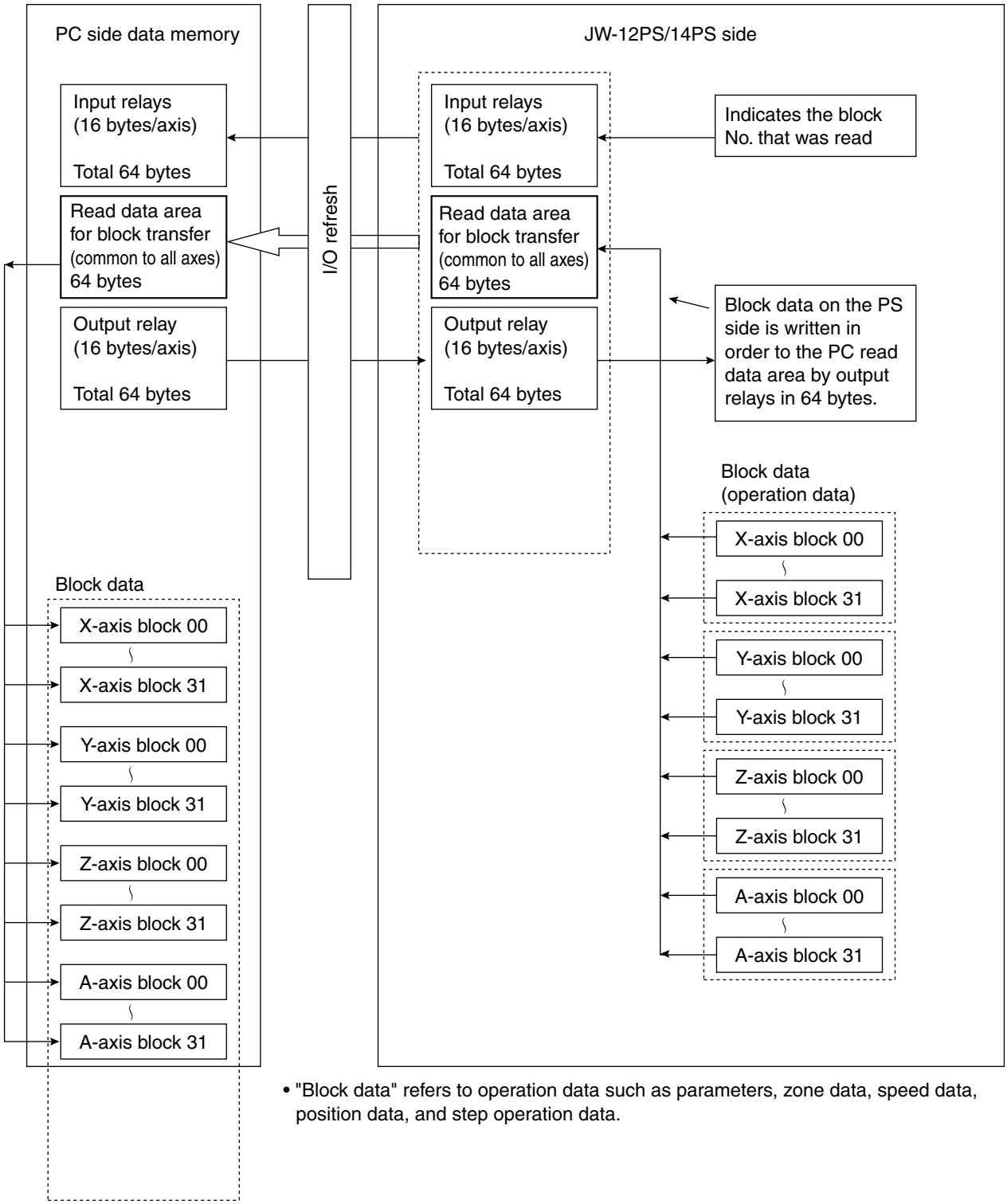
Various data is transferred in 64-byte size blocks to transfer (read/write) data to the JW-12PS/14PS side from the JW50H/70H/100H control module. For example, to transfer all the block data of the X- and Y-axes (or, Z- and A-axes), transfer must be performed 128 times (64 times). The total block data per axis is 2048 bytes. As there is not enough space in the regular registers of file 0, separate file memory must be registered. Pages 5-40 to 5-45 show an example of a ladder program for transferring (reading/writing) block data for four axes to file 1. Appendix 5 shows a table of the positioning data that is assigned to file 1 at this time.

Only block data for the required blocks can be transferred, so there is no need to always use this example ladder program. Also, when using only direct operation, repeated block transfer is not needed as only the values of regular parameter 1 (block data 0) are transferred. With direct operation, using the ladder program (page 5-33) for transferring the data of individual desired blocks comes in handy.

■ **Brief description of writing by the sample ladder program**



■ Brief description of reading by the sample ladder program



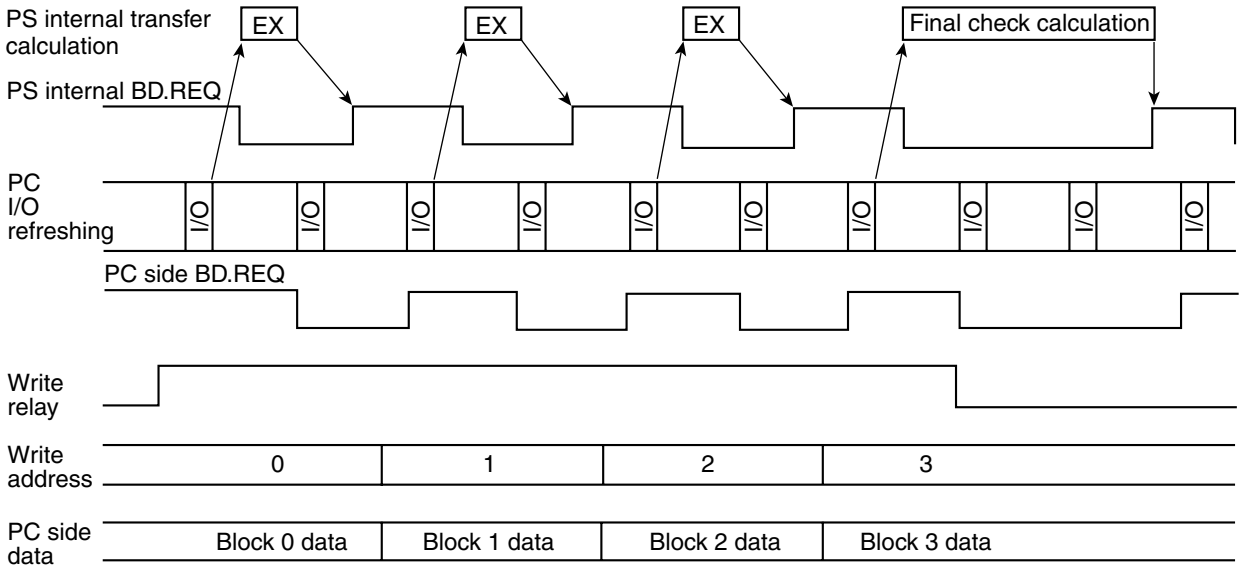
• "Block data" refers to operation data such as parameters, zone data, speed data, position data, and step operation data.

[2] BD.REQ signal

The following explains operation of the BD.REQ signal which is handy when used for reading/writing of block data.

Normally, the BD.REQ signal is ON when block data transfer is possible. The BD.REQ signal turns OFF during transfer when the block data read/write relays turn ON. The following shows the timing of data transfer using the BD.REQ signal.

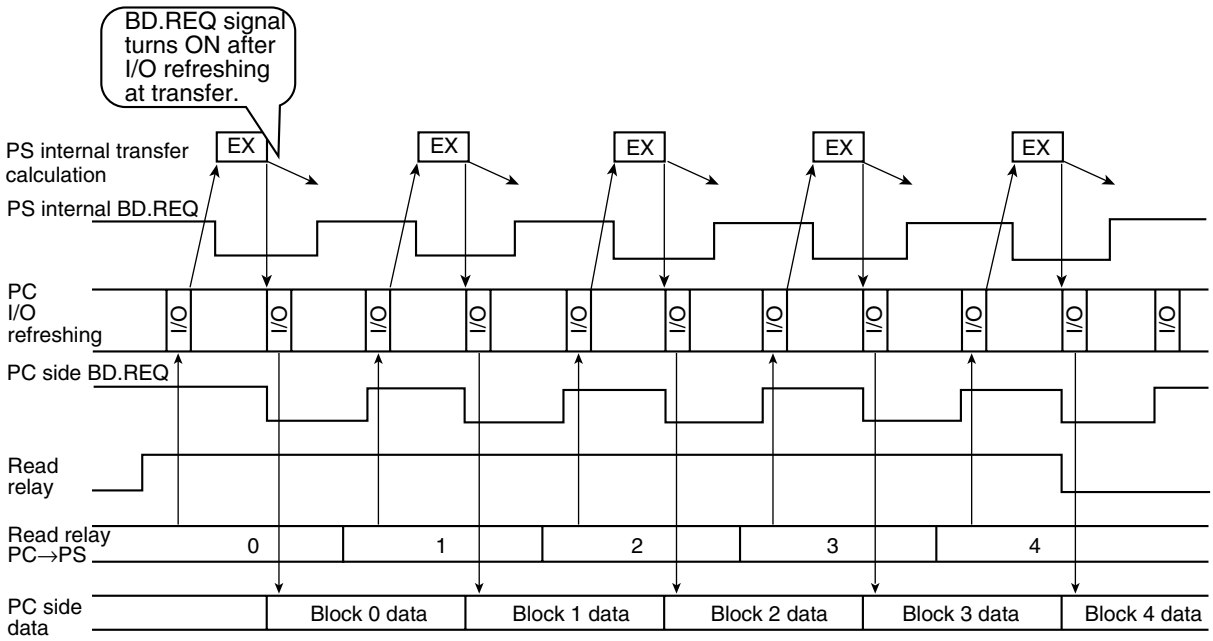
■ Write timing



■ Read timing

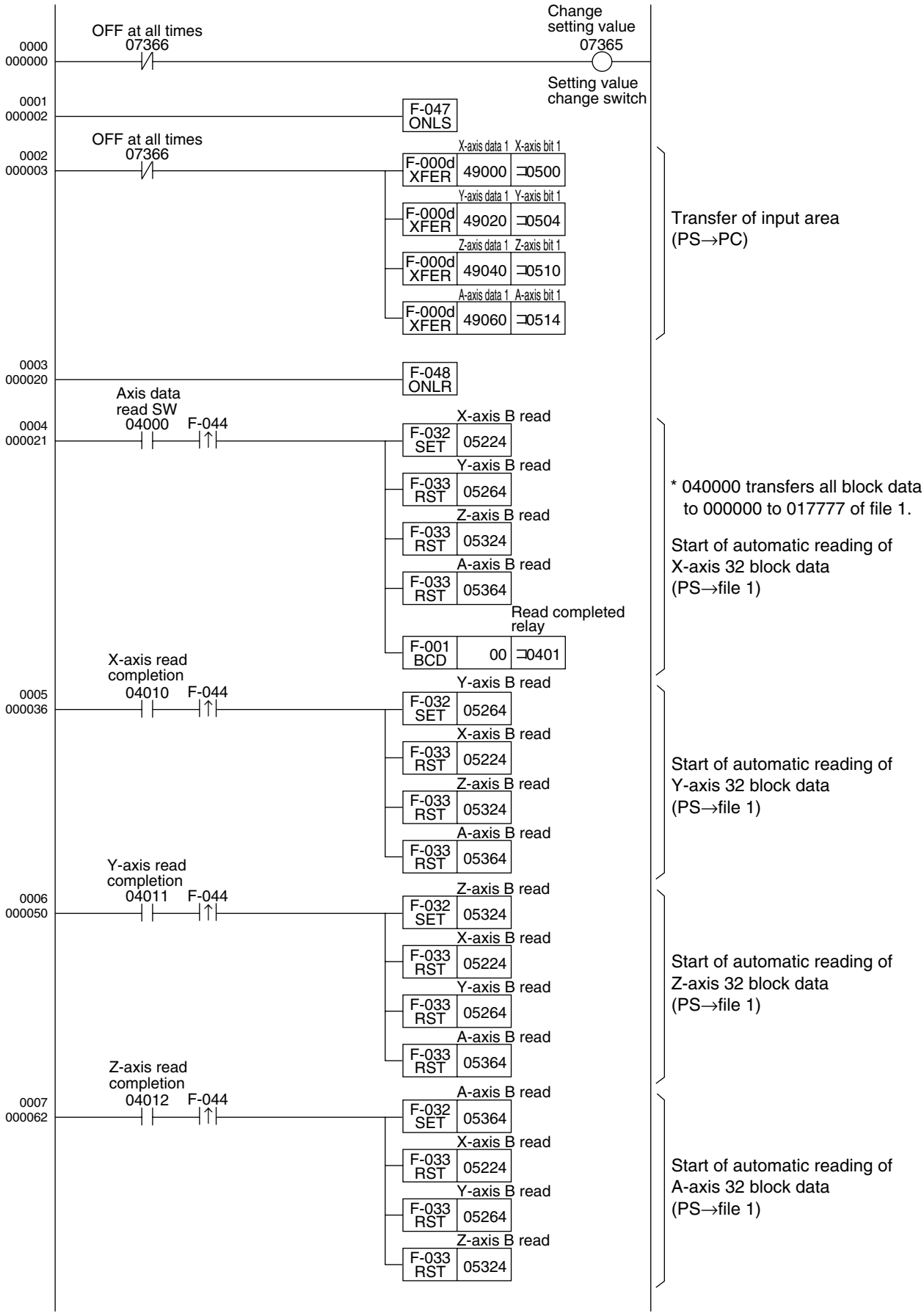
When the read relay is ON at I/O refreshing on the 1st scan, the BD.REQ signal is turned OFF, and calculation for data transfer is started.

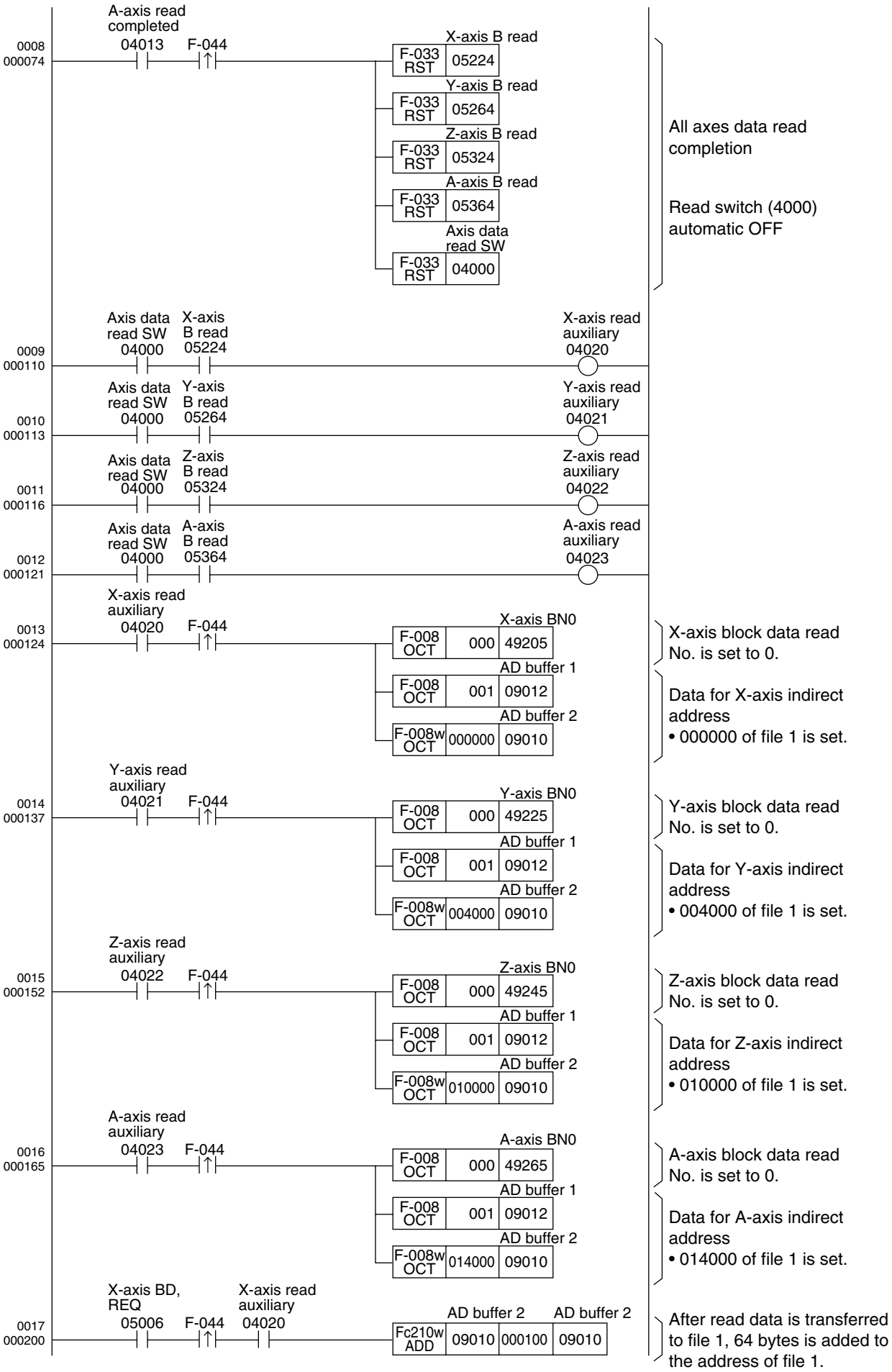
The block data is transferred at I/O refreshing on the 2nd scan. After this I/O refreshing ends, the BD.REQ signal is turned ON.

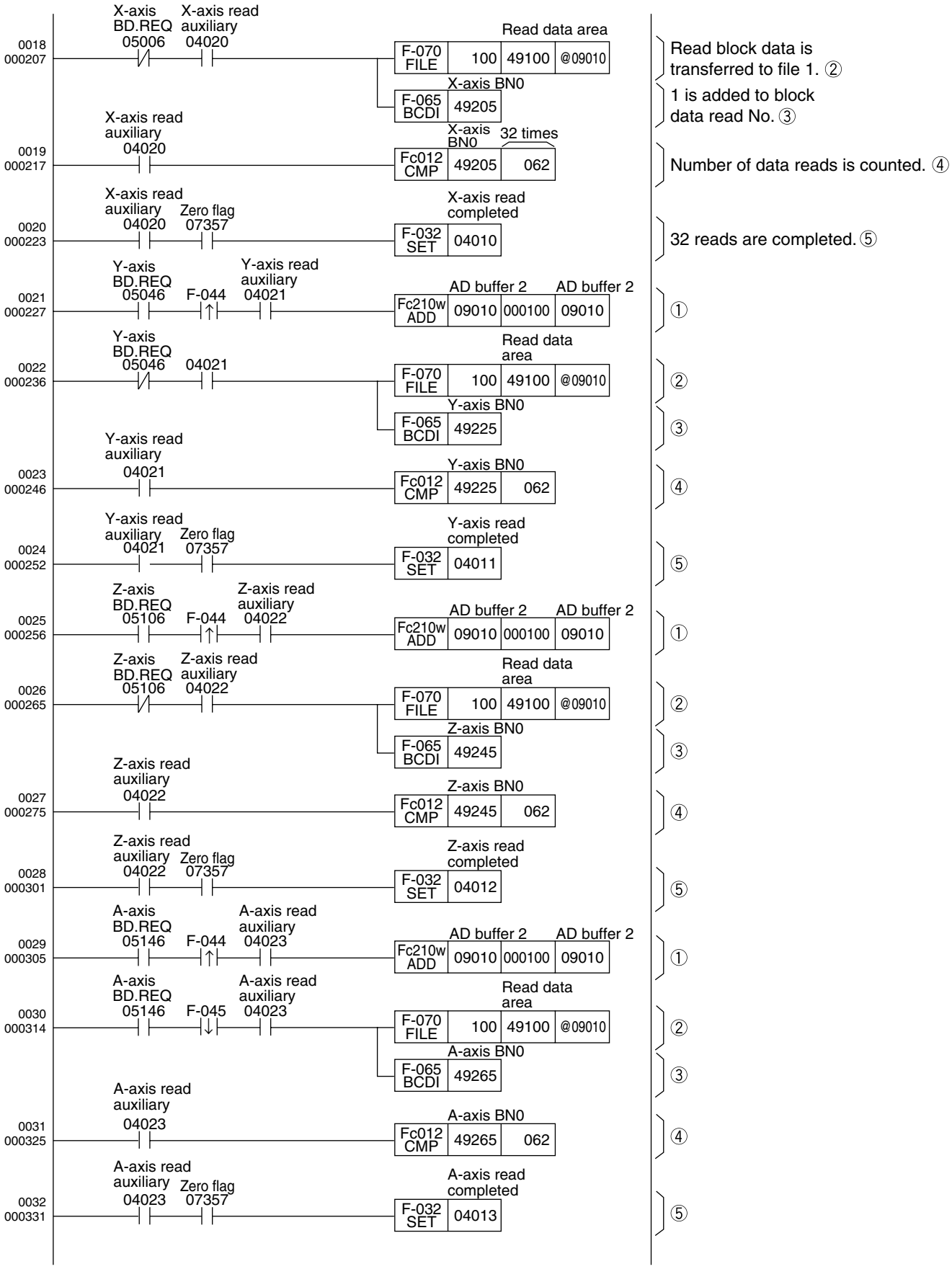


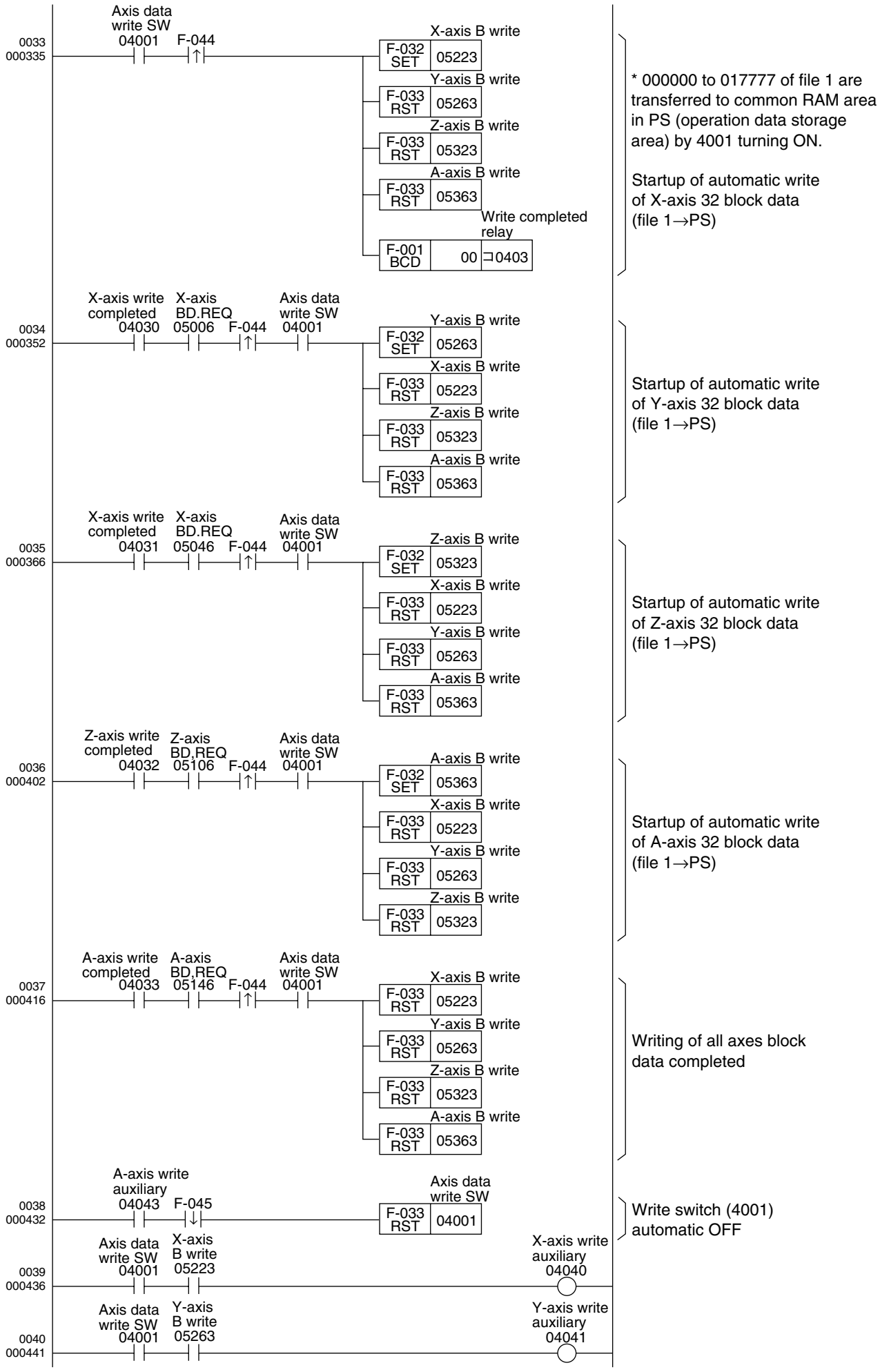
5-7 Sample ladder program for batch transfer of all axes and all block data

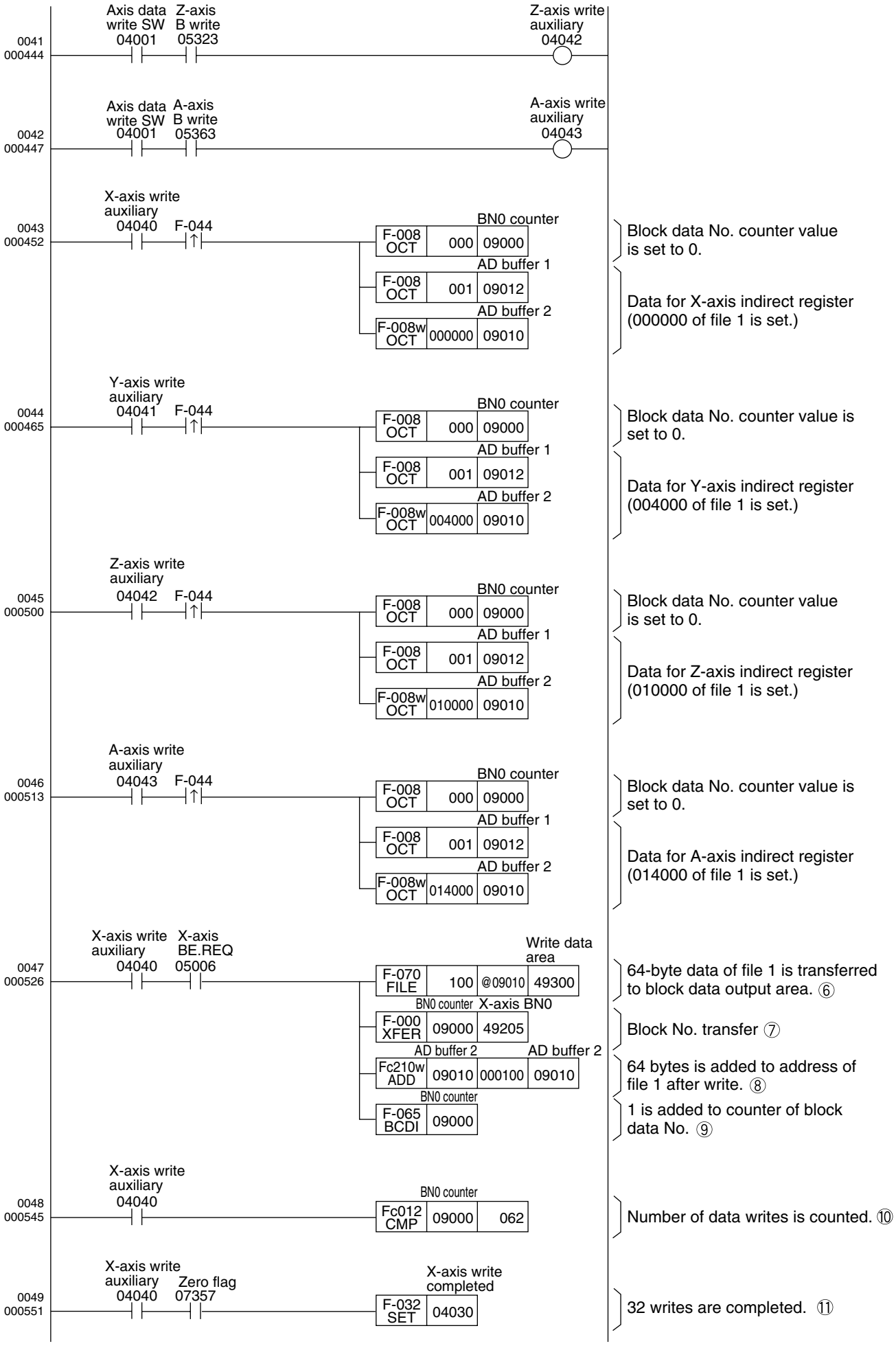
- Data is read (PS→PC) when 04000 turns ON.
- Data is written (PC→PS) when 04001 turns ON.
- Block data is saved to flash ROM when 04002 turns ON.

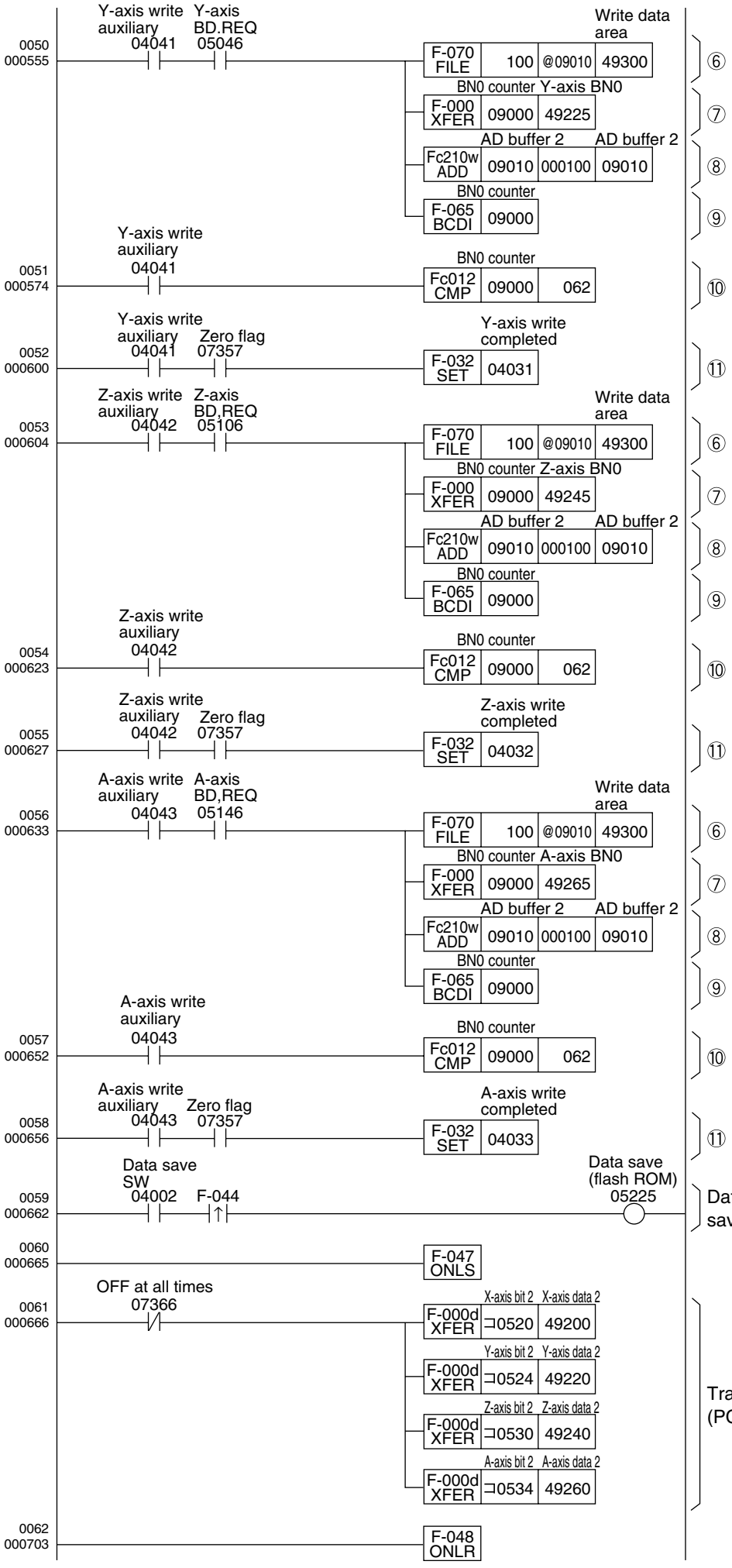



A-axis read completed
04013
F-044
0008
000074
X-axis B read
F-033 RST
05224
Y-axis B read
F-033 RST
05264
Z-axis B read
F-033 RST
05324
A-axis B read
F-033 RST
05364
Axis data read SW
F-033 RST
04000
All axes data read completion
Read switch (4000) automatic OFF
Axis data read SW
04000
X-axis B read
05224
0009
000110
X-axis read auxiliary
04020
Axis data read SW
04000
Y-axis B read
05264
0010
000113
Y-axis read auxiliary
04021
Axis data read SW
04000
Z-axis B read
05324
0011
000116
Z-axis read auxiliary
04022
Axis data read SW
04000
A-axis B read
05364
0012
000121
A-axis read auxiliary
04023
X-axis read auxiliary
04020
F-044
0013
000124
X-axis BN0
F-008 OCT
000
49205
AD buffer 1
F-008 OCT
001
09012
AD buffer 2
F-008w OCT
000000
09010
X-axis block data read No. is set to 0.
Data for X-axis indirect address
• 000000 of file 1 is set.
Y-axis read auxiliary
04021
F-044
0014
000137
Y-axis BN0
F-008 OCT
000
49225
AD buffer 1
F-008 OCT
001
09012
AD buffer 2
F-008w OCT
004000
09010
Y-axis block data read No. is set to 0.
Data for Y-axis indirect address
• 004000 of file 1 is set.
Z-axis read auxiliary
04022
F-044
0015
000152
Z-axis BN0
F-008 OCT
000
49245
AD buffer 1
F-008 OCT
001
09012
AD buffer 2
F-008w OCT
010000
09010
Z-axis block data read No. is set to 0.
Data for Z-axis indirect address
• 010000 of file 1 is set.
A-axis read auxiliary
04023
F-044
0016
000165
A-axis BN0
F-008 OCT
000
49265
AD buffer 1
F-008 OCT
001
09012
AD buffer 2
F-008w OCT
014000
09010
A-axis block data read No. is set to 0.
Data for A-axis indirect address
• 014000 of file 1 is set.
X-axis BD, REQ
05006
F-044
X-axis read auxiliary
04020
0017
000200
AD buffer 2
AD buffer 2
Fc210w ADD
09010
000100
09010
After read data is transferred to file 1, 64 bytes is added to the address of file 1.


X-axis BD.REQ 05006
X-axis read auxiliary 04020
Read data area
0018 000207
F-070 FILE 100 49100 @09010
X-axis BN0
F-065 BCDI 49205
Read block data is transferred to file 1. ②
1 is added to block data read No. ③
X-axis read auxiliary 04020
X-axis BN0
32 times
0019 000217
Fc012 CMP 49205 062
Number of data reads is counted. ④
X-axis read auxiliary 04020
Zero flag 07357
X-axis read completed
0020 000223
F-032 SET 04010
32 reads are completed. ⑤
Y-axis BD.REQ 05046
F-044
Y-axis read auxiliary 04021
AD buffer 2
AD buffer 2
0021 000227
Fc210w ADD 09010 000100 09010
①
Y-axis BD.REQ 05046
04021
Read data area
0022 000236
F-070 FILE 100 49100 @09010
②
Y-axis BN0
F-065 BCDI 49225
③
Y-axis read auxiliary 04021
Y-axis BN0
0023 000246
Fc012 CMP 49225 062
④
Y-axis read auxiliary 04021
Zero flag 07357
Y-axis read completed
0024 000252
F-032 SET 04011
⑤
Z-axis BD.REQ 05106
F-044
Z-axis read auxiliary 04022
AD buffer 2
AD buffer 2
0025 000256
Fc210w ADD 09010 000100 09010
①
Z-axis BD.REQ 05106
Z-axis read auxiliary 04022
Read data area
0026 000265
F-070 FILE 100 49100 @09010
②
Z-axis BN0
F-065 BCDI 49245
③
Z-axis read auxiliary 04022
Z-axis BN0
0027 000275
Fc012 CMP 49245 062
④
Z-axis read auxiliary 04022
Zero flag 07357
Z-axis read completed
0028 000301
F-032 SET 04012
⑤
A-axis BD.REQ 05146
F-044
A-axis read auxiliary 04023
AD buffer 2
AD buffer 2
0029 000305
Fc210w ADD 09010 000100 09010
①
A-axis BD.REQ 05146
F-045
A-axis read auxiliary 04023
Read data area
0030 000314
F-070 FILE 100 49100 @09010
②
A-axis BN0
F-065 BCDI 49265
③
A-axis read auxiliary 04023
A-axis BN0
0031 000325
Fc012 CMP 49265 062
④
A-axis read auxiliary 04023
Zero flag 07357
A-axis read completed
0032 000331
F-032 SET 04013
⑤


Axis data write SW 04001
F-044
0033
000335
X-axis B write
F-032 SET 05223
Y-axis B write
F-033 RST 05263
Z-axis B write
F-033 RST 05323
A-axis B write
F-033 RST 05363
Write completed relay
F-001 BCD 00 ⊐0403
* 000000 to 017777 of file 1 are transferred to common RAM area in PS (operation data storage area) by 4001 turning ON.
Startup of automatic write of X-axis 32 block data (file 1→PS)
X-axis write completed 04030
X-axis BD.REQ 05006
F-044
Axis data write SW 04001
0034
000352
Y-axis B write
F-032 SET 05263
X-axis B write
F-033 RST 05223
Z-axis B write
F-033 RST 05323
A-axis B write
F-033 RST 05363
Startup of automatic write of Y-axis 32 block data (file 1→PS)
X-axis write completed 04031
X-axis BD.REQ 05046
F-044
Axis data write SW 04001
0035
000366
Z-axis B write
F-032 SET 05323
X-axis B write
F-033 RST 05223
Y-axis B write
F-033 RST 05263
A-axis B write
F-033 RST 05363
Startup of automatic write of Z-axis 32 block data (file 1→PS)
Z-axis write completed 04032
Z-axis BD,REQ 05106
F-044
Axis data write SW 04001
0036
000402
A-axis B write
F-032 SET 05363
X-axis B write
F-033 RST 05223
Y-axis B write
F-033 RST 05263
Z-axis B write
F-033 RST 05323
Startup of automatic write of A-axis 32 block data (file 1→PS)
A-axis write completed 04033
A-axis BD,REQ 05146
F-044
Axis data write SW 04001
0037
000416
X-axis B write
F-033 RST 05223
Y-axis B write
F-033 RST 05263
Z-axis B write
F-033 RST 05323
A-axis B write
F-033 RST 05363
Writing of all axes block data completed
A-axis write auxiliary 04043
F-045
0038
000432
Axis data write SW
F-033 RST 04001
Write switch (4001) automatic OFF
Axis data write SW 04001
X-axis B write 05223
0039
000436
X-axis write auxiliary 04040
Axis data write SW 04001
Y-axis B write 05263
0040
000441
Y-axis write auxiliary 04041


0041
000444
Axis data write SW 04001
Z-axis B write 05323
Z-axis write auxiliary 04042
0042
000447
Axis data write SW 04001
A-axis B write 05363
A-axis write auxiliary 04043
0043
000452
X-axis write auxiliary 04040
F-044
BN0 counter
F-008 OCT 000 09000
AD buffer 1
F-008 OCT 001 09012
AD buffer 2
F-008w OCT 000000 09010
Block data No. counter value is set to 0.
Data for X-axis indirect register (000000 of file 1 is set.)
0044
000465
Y-axis write auxiliary 04041
F-044
BN0 counter
F-008 OCT 000 09000
AD buffer 1
F-008 OCT 001 09012
AD buffer 2
F-008w OCT 004000 09010
Block data No. counter value is set to 0.
Data for Y-axis indirect register (004000 of file 1 is set.)
0045
000500
Z-axis write auxiliary 04042
F-044
BN0 counter
F-008 OCT 000 09000
AD buffer 1
F-008 OCT 001 09012
AD buffer 2
F-008w OCT 010000 09010
Block data No. counter value is set to 0.
Data for Z-axis indirect register (010000 of file 1 is set.)
0046
000513
A-axis write auxiliary 04043
F-044
BN0 counter
F-008 OCT 000 09000
AD buffer 1
F-008 OCT 001 09012
AD buffer 2
F-008w OCT 014000 09010
Block data No. counter value is set to 0.
Data for A-axis indirect register (014000 of file 1 is set.)
0047
000526
X-axis write auxiliary 04040
X-axis BE.REQ 05006
Write data area
F-070 FILE 100 @09010 49300
BN0 counter
X-axis BN0
F-000 XFER 09000 49205
AD buffer 2
AD buffer 2
Fc210w ADD 09010 000100 09010
BN0 counter
F-065 BCDI 09000
64-byte data of file 1 is transferred to block data output area. ⑥
Block No. transfer ⑦
64 bytes is added to address of file 1 after write. ⑧
1 is added to counter of block data No. ⑨
0048
000545
X-axis write auxiliary 04040
BN0 counter
Fc012 CMP 09000 062
Number of data writes is counted. ⑩
0049
000551
X-axis write auxiliary 04040
Zero flag 07357
X-axis write completed
F-032 SET 04030
32 writes are completed. ⑪

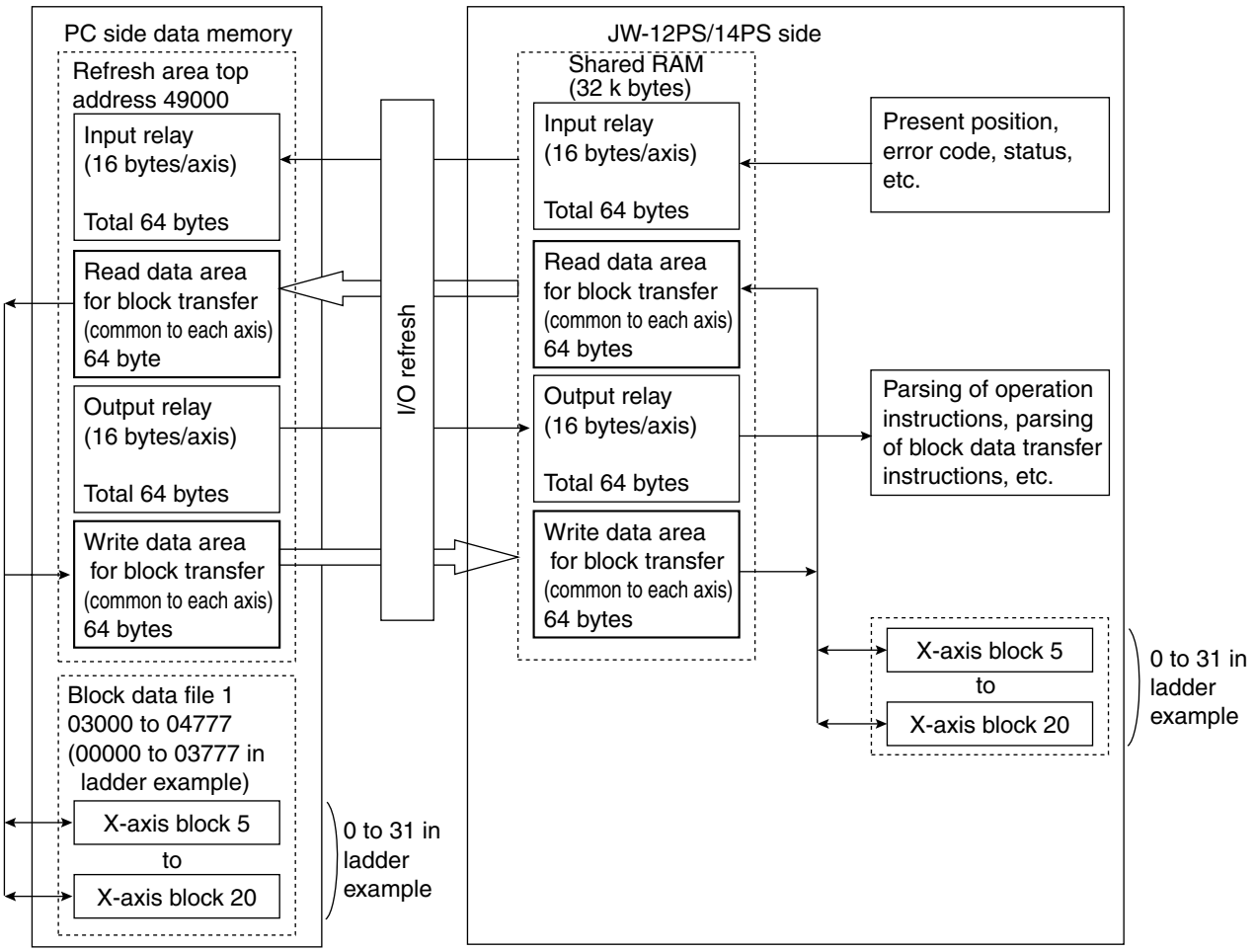

Y-axis write auxiliary 04041
Y-axis BD.REQ 05046
Write data area
0050 000555
F-070 FILE 100 @09010 49300
⑥
BN0 counter
Y-axis BN0
F-000 XFER 09000 49225
⑦
AD buffer 2
AD buffer 2
Fc210w ADD 09010 000100 09010
⑧
BN0 counter
F-065 BCDI 09000
⑨
Y-axis write auxiliary 04041
0051 000574
BN0 counter
Fc012 CMP 09000 062
⑩
Y-axis write auxiliary 04041
Zero flag 07357
0052 000600
Y-axis write completed
F-032 SET 04031
⑪
Z-axis write auxiliary 04042
Z-axis BD,REQ 05106
Write data area
0053 000604
F-070 FILE 100 @09010 49300
⑥
BN0 counter
Z-axis BN0
F-000 XFER 09000 49245
⑦
AD buffer 2
AD buffer 2
Fc210w ADD 09010 000100 09010
⑧
BN0 counter
F-065 BCDI 09000
⑨
Z-axis write auxiliary 04042
0054 000623
BN0 counter
Fc012 CMP 09000 062
⑩
Z-axis write auxiliary 04042
Zero flag 07357
0055 000627
Z-axis write completed
F-032 SET 04032
⑪
A-axis write auxiliary 04043
A-axis BD,REQ 05146
Write data area
0056 000633
F-070 FILE 100 @09010 49300
⑥
BN0 counter
A-axis BN0
F-000 XFER 09000 49265
⑦
AD buffer 2
AD buffer 2
Fc210w ADD 09010 000100 09010
⑧
BN0 counter
F-065 BCDI 09000
⑨
A-axis write auxiliary 04043
0057 000652
BN0 counter
Fc012 CMP 09000 062
⑩
A-axis write auxiliary 04043
Zero flag 07357
0058 000656
A-axis write completed
F-032 SET 04033
⑪
Data save SW 04002
F-044
0059 000662
Data save (flash ROM) 05225
Data written to common RAM is saved to flash ROM.
0060 000665
F-047 ONLS
OFF at all times 07366
0061 000666
X-axis bit 2
X-axis data 2
F-000d XFER ⊐0520 49200
Y-axis bit 2
Y-axis data 2
F-000d XFER ⊐0524 49220
Z-axis bit 2
Z-axis data 2
F-000d XFER ⊐0530 49240
A-axis bit 2
A-axis data 2
F-000d XFER ⊐0534 49260
Transfer of output area (PC→PS)
0062 000703
F-048 ONLR

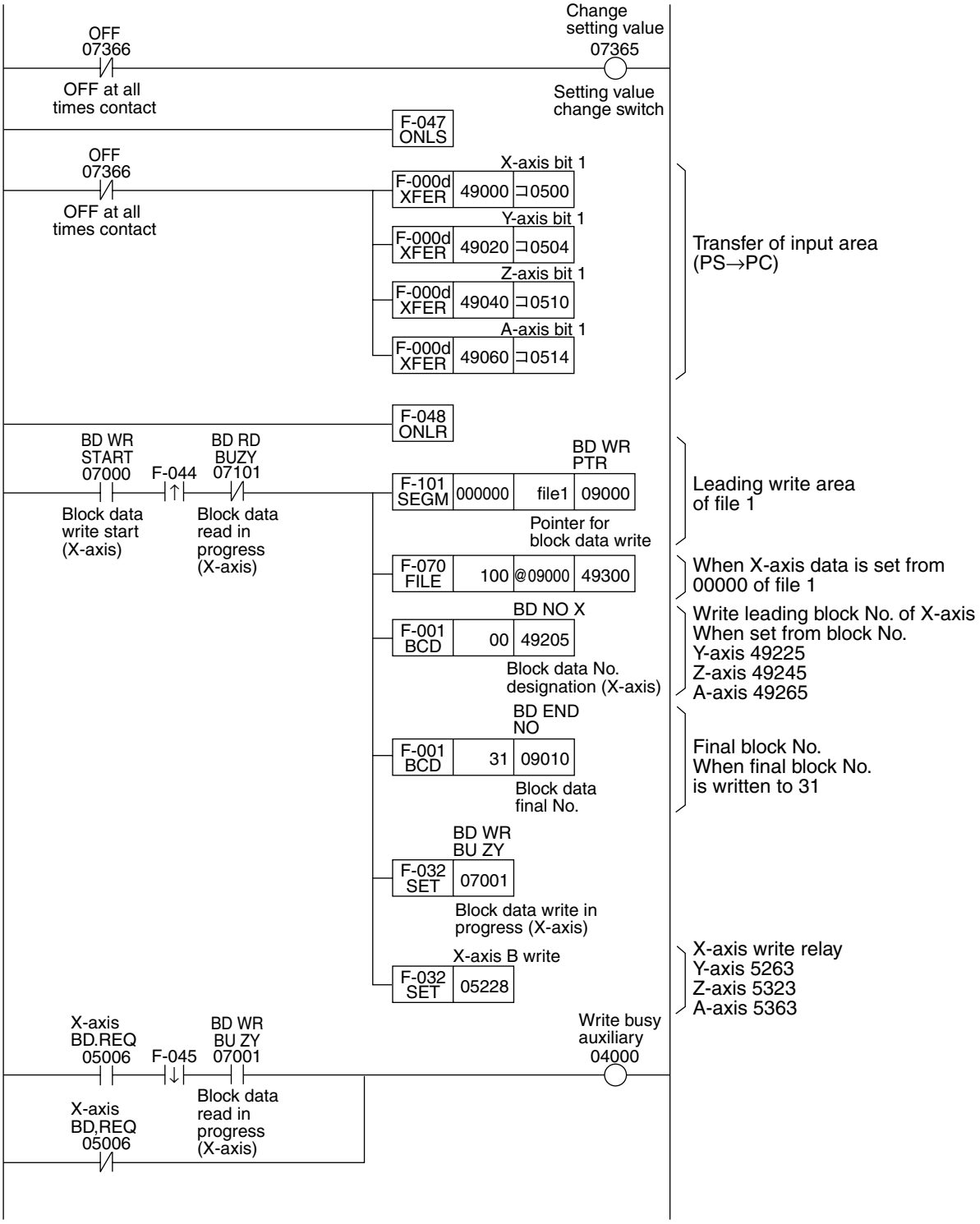
5-8 Transfer of any X-axis block when top address of special I/O area is set to 49000

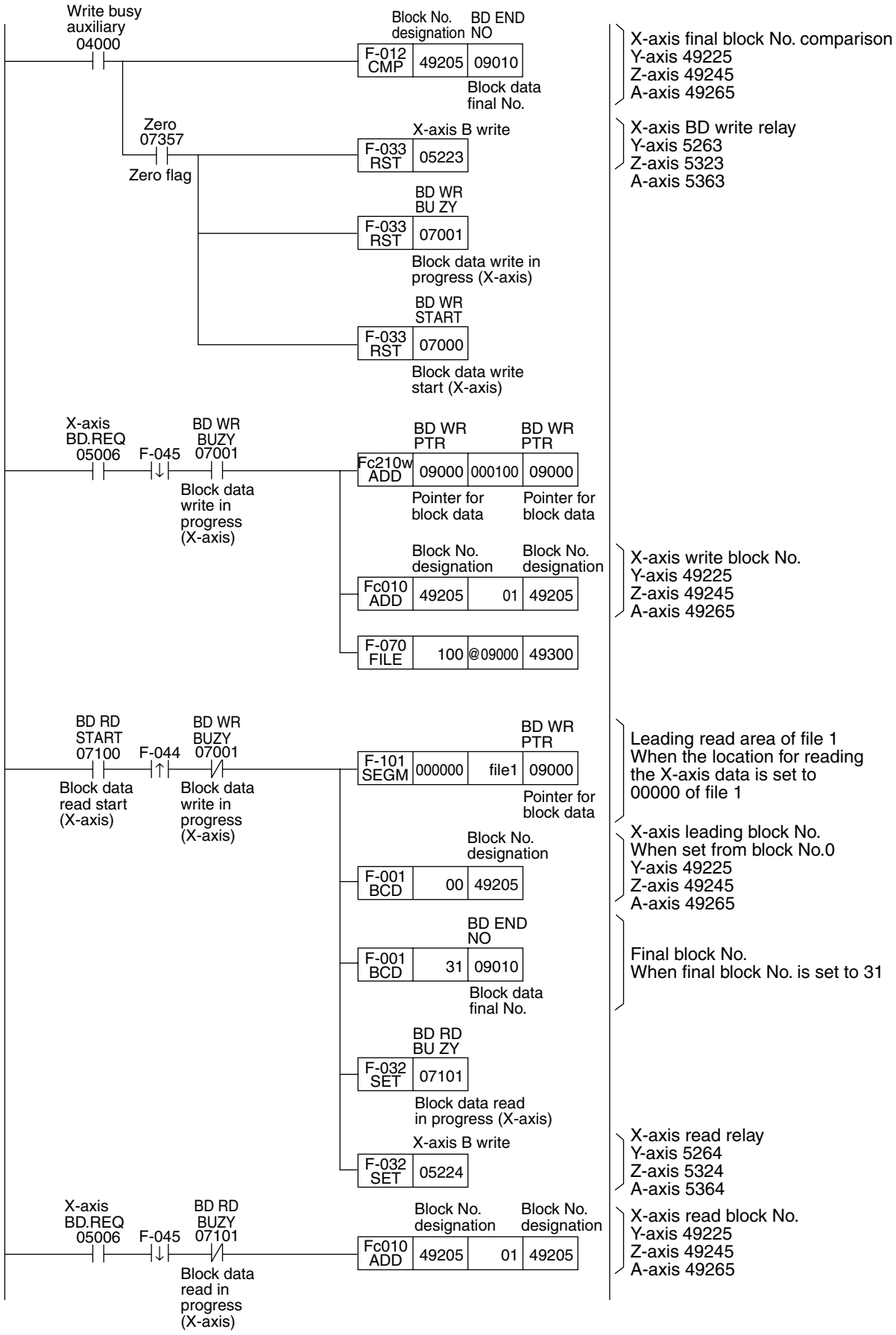
The ladder program shown on pages 5-47 to 5-49 shows a method for reading and writing any block data on the X-axis from any address in file 1, and writing to any block data. (On the example ladder program on the following page, 32 items of X-axis block data written from 000000 to 003777 of file 1 are written to PS, and 32 items of X-axis block data are read from 000000 to 003777 of file 1.)
To read/write from any registers in file 1 to any block data, the ladder program must be changed. (The read/write areas and the read/write block Nos., etc. of file 1 must be changed.)
The Y-, Z- and A-axes can also be read/written in the same way by changing the ladder program. (The read/write areas, read/write block Nos., read/write relays, monitor block Nos., etc. of file 1 must be changed.

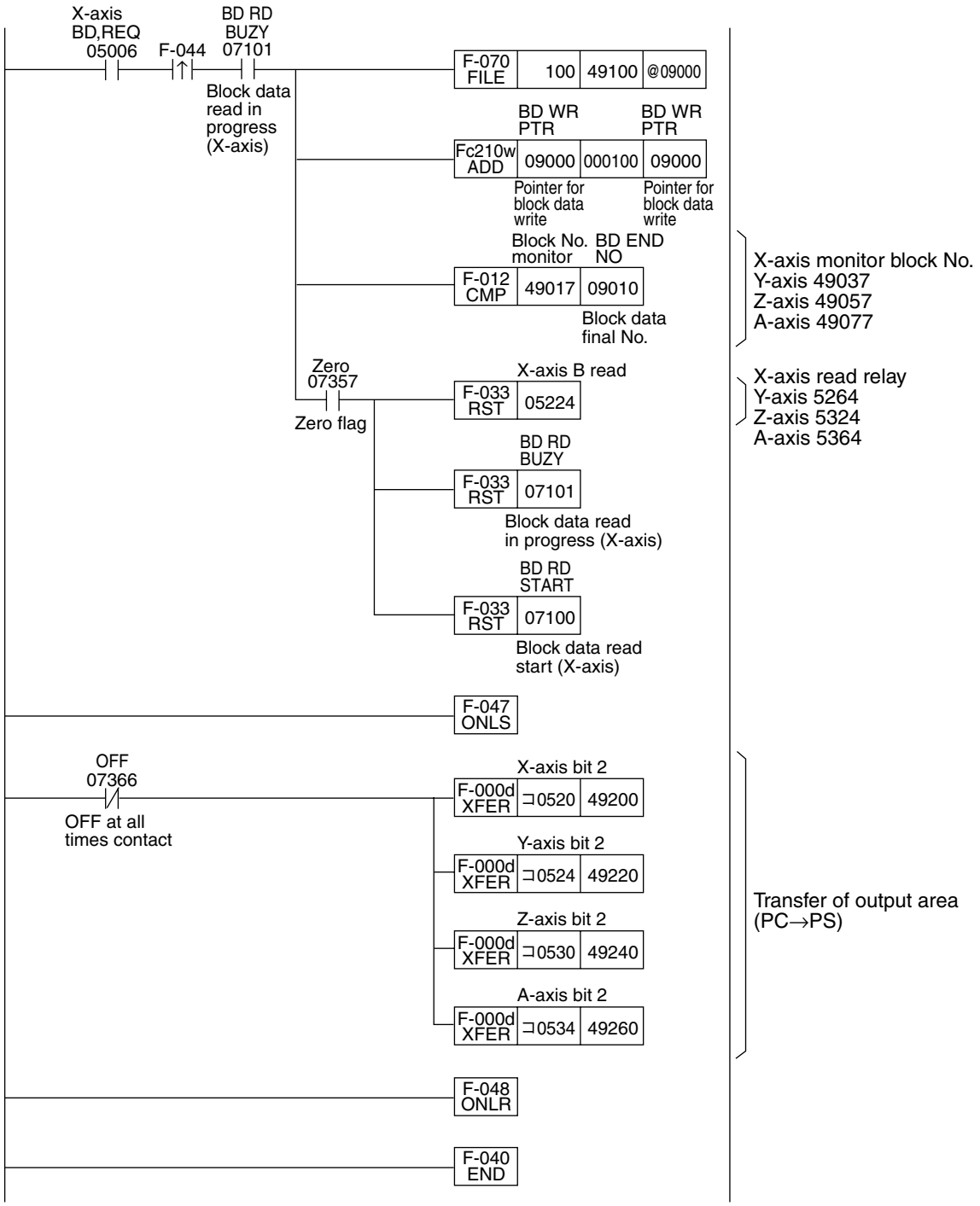
5

The conceptual diagram below shows an instance where block data is read/written with 003000 to 004777 of file 1 as the area of block Nos.5 to 20. Transfer such as this is possible by re-reprogramming the ladder program shown on the next page.




OFF
07366
OFF at all
times contact
Change
setting value
07365
Setting value
change switch
F-047
ONLS
OFF
07366
OFF at all
times contact
X-axis bit 1
F-000d
XFER
49000
⊐0500
Y-axis bit 1
F-000d
XFER
49020
⊐0504
Z-axis bit 1
F-000d
XFER
49040
⊐0510
A-axis bit 1
F-000d
XFER
49060
⊐0514
Transfer of input area
(PS→PC)
F-048
ONLR
BD WR
START
07000
F-044
BD RD
BUZY
07101
Block data
write start
(X-axis)
Block data
read in
progress
(X-axis)
BD WR
PTR
F-101
SEGM
000000
file1
09000
Pointer for
block data write
Leading write area
of file 1
F-070
FILE
100
@09000
49300
When X-axis data is set from
00000 of file 1
BD NO X
F-001
BCD
00
49205
Block data No.
designation (X-axis)
Write leading block No. of X-axis
When set from block No.
Y-axis 49225
Z-axis 49245
A-axis 49265
BD END
NO
F-001
BCD
31
09010
Block data
final No.
Final block No.
When final block No.
is written to 31
BD WR
BU ZY
F-032
SET
07001
Block data write in
progress (X-axis)
X-axis B write
F-032
SET
05228
X-axis write relay
Y-axis 5263
Z-axis 5323
A-axis 5363
X-axis
BD.REQ
05006
F-045
BD WR
BU ZY
07001
Block data
read in
progress
(X-axis)
Write busy
auxiliary
04000
X-axis
BD,REQ
05006


Write busy auxiliary 04000
Block No. designation
BD END NO
F-012 CMP
49205
09010
Block data final No.
X-axis final block No. comparison
Y-axis 49225
Z-axis 49245
A-axis 49265
Zero 07357
Zero flag
X-axis B write
F-033 RST
05223
X-axis BD write relay
Y-axis 5263
Z-axis 5323
A-axis 5363
BD WR BU ZY
F-033 RST
07001
Block data write in progress (X-axis)
BD WR START
F-033 RST
07000
Block data write start (X-axis)
X-axis BD.REQ 05006
F-045
BD WR BUZY 07001
Block data write in progress (X-axis)
BD WR PTR
BD WR PTR
Fc210w ADD
09000
000100
09000
Pointer for block data
Pointer for block data
Block No. designation
Block No. designation
Fc010 ADD
49205
01
49205
X-axis write block No.
Y-axis 49225
Z-axis 49245
A-axis 49265
F-070 FILE
100
@09000
49300
BD RD START 07100
F-044
BD WR BUZY 07001
Block data read start (X-axis)
Block data write in progress (X-axis)
BD WR PTR
F-101 SEGM
000000
file1
09000
Pointer for block data
Leading read area of file 1
When the location for reading the X-axis data is set to 00000 of file 1
Block No. designation
F-001 BCD
00
49205
X-axis leading block No.
When set from block No.0
Y-axis 49225
Z-axis 49245
A-axis 49265
BD END NO
F-001 BCD
31
09010
Block data final No.
Final block No.
When final block No. is set to 31
BD RD BU ZY
F-032 SET
07101
Block data read in progress (X-axis)
X-axis B write
F-032 SET
05224
X-axis read relay
Y-axis 5264
Z-axis 5324
A-axis 5364
X-axis BD.REQ 05006
F-045
BD RD BUZY 07101
Block data read in progress (X-axis)
Block No. designation
Block No. designation
Fc010 ADD
49205
01
49205
X-axis read block No.
Y-axis 49225
Z-axis 49245
A-axis 49265


X-axis BD,REQ 05006
F-044
BD RD BUZY 07101
Block data read in progress (X-axis)
F-070 FILE 100 49100 @09000
BD WR PTR
BD WR PTR
Fc210w ADD 09000 000100 09000
Pointer for block data write
Pointer for block data write
Block No. monitor
BD END NO
F-012 CMP 49017 09010
Block data final No.
X-axis monitor block No.
Y-axis 49037
Z-axis 49057
A-axis 49077
Zero 07357
Zero flag
X-axis B read
F-033 RST 05224
X-axis read relay
Y-axis 5264
Z-axis 5324
A-axis 5364
BD RD BUZY
F-033 RST 07101
Block data read in progress (X-axis)
BD RD START
F-033 RST 07100
Block data read start (X-axis)
F-047 ONLS
OFF 07366
OFF at all times contact
X-axis bit 2
F-000d XFER ⊐0520 49200
Y-axis bit 2
F-000d XFER ⊐0524 49220
Z-axis bit 2
F-000d XFER ⊐0530 49240
A-axis bit 2
F-000d XFER ⊐0534 49260
Transfer of output area (PC→PS)
F-048 ONLR
F-040 END

5-9 Ladder programs for block transfer of any block of data and transfer of all block data

Pages 5-53 to 5-59 show the following ladder programs:

- Ladder program for transferring any single block of data on JW-14PS② (top address ㅋ1000) on page 5-26.
  (This, in fact, involves reading to read data area for block transfer on the JW50H/70H/100H control module from shared RAM on JW-14PS, and transferring that block data to write data area for block transfer on the JW50H/70H/100H control module.)
- Ladder program for (reading/writing) block data for four axes to file 1.

These ladder programs were made for JW-14PS② by merging the sample ladder program on pages 5-35 and 5-36 and the sample ladder on pages 5-40 to 5-45 for JW-14PS①.

[1] Assignment of special I/O data area when top address is set to ⊐1000 by optional I/O registration on JW-14PS②

• Input section (N+0000 to 0177)

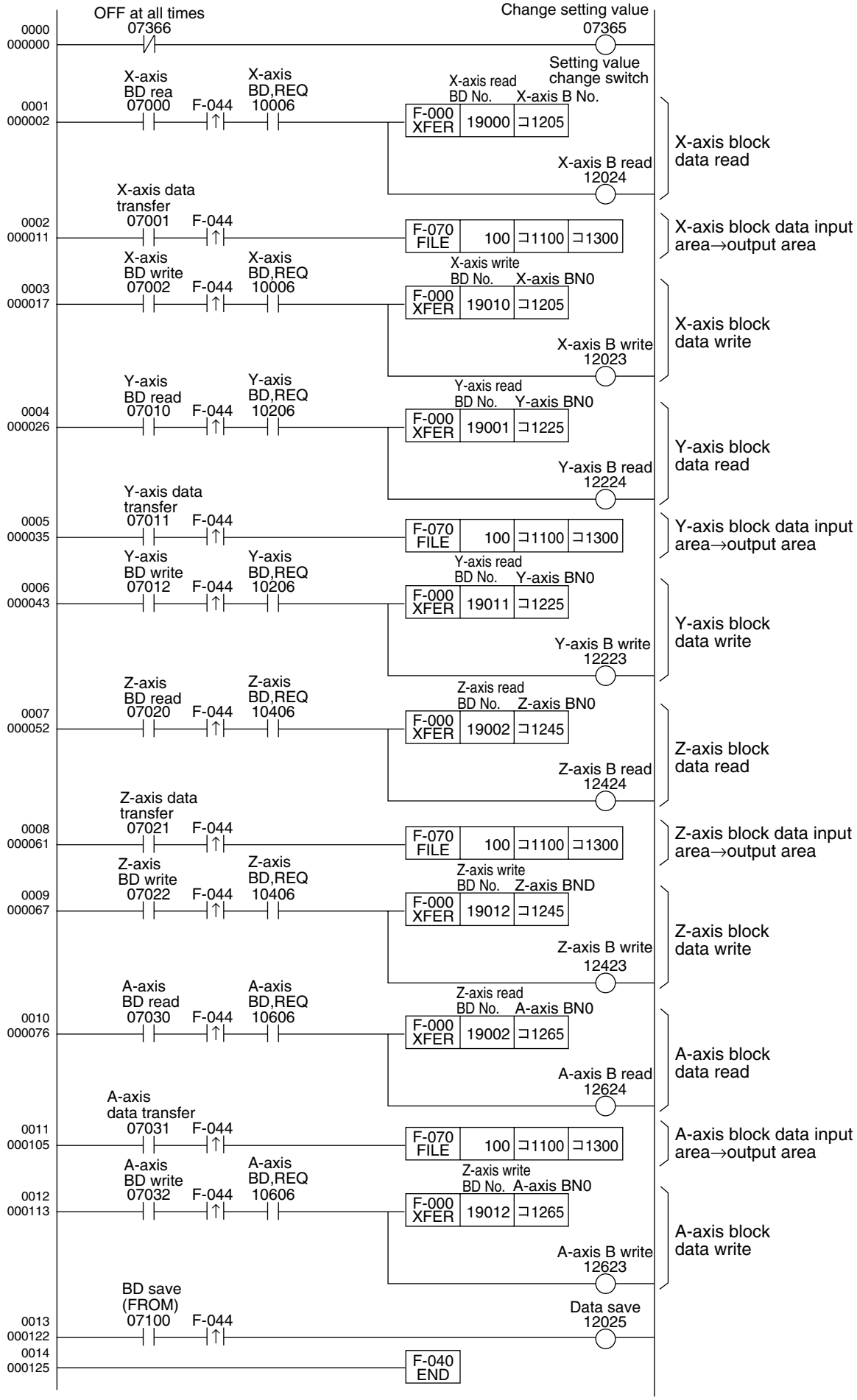
I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis	A-axis				
Input (PC←PS)	⊐1000	⊐1020	⊐1040	⊐1060	0	Operation ready (U.R.)	0	Operation readying
							1	Operation ready
					1	Positioning completed	↑	Completed
							↓	At start
					2	Busy flag	0	Non-busy state
							1	Busy state
					3	Program operation startup standby	0	Non-startup standby
							1	Startup standby state
					4	No origin flag	0	Origin
							1	No origin
					5	Teaching completed	↑	Completed
							↓	At start
					6	BD.REQ (block data request) signal	0	Block transfer disabled
						• Block transfer is possible only when this flag is ON.	1	Block transfer enabled
					7	Error flag	0	No error
							1	Error
	⊐1001	⊐1021	⊐1041	⊐1061	0	Present position display mode monitor	0	Instruction value display
							1	Encoder input display
					1	Interrupt output monitor	0	Interrupt output OFF
							1	Interrupt output ON
					2	Driver communications completed	↑	Completed
						• Enabled only when absolute value control is enabled.	↓	At start
					3 to 7	Reserved function		
	⊐1002	⊐1022	⊐1042	⊐1062	0	CW limit input signal	State of input signals of each axis is monitored. 1: ON 0: OFF	
					1	CCW limit input signal		
					2	Origin proximity input signal		
					3	Origin input signal		
					4	General-purpose input signal		
					5	Driver error input signal		
					6	Emergency stop input signal		
					7	Positioning completed signal		
	⊐1003	⊐1023	⊐1043	⊐1063	0	M output 0	State of each M output (zone) signal is monitored. 1: ON 0: OFF	
					1	M output 1		
					2	M output 2		
					3	M output 3		
					4	M output 4		
					5	M output 5		
					6	M output 6		
					7	M output 7		
	⊐1004	⊐1024	⊐1044	⊐1064	0 to 7	Present position (10^0 10^1)		
	⊐1005	⊐1025	⊐1045	⊐1065	0 to 7	Present position (10^5 10^6)		
	⊐1006	⊐1026	⊐1046	⊐1066	0 to 7	Present position (10^4 10^5)		
	⊐1007	⊐1027	⊐1047	⊐1067	0 to 7	Present position (sign 10^6)		
	⊐1010	⊐1030	⊐1050	⊐1070	0 to 7	Output code (00 to 99) *Enabled at program operation		
	⊐1011	⊐1031	⊐1051	⊐1071	0 to 7	Step No. (00 to 99) *Enabled at program operation		
	⊐1012	⊐1032	⊐1052	⊐1072	0 to 7	Error code, lower (00 to 99)		
	⊐1013	⊐1033	⊐1053	⊐1073	0 to 7	Error code, upper (00 to 99)		
	⊐1014	⊐1034	⊐1054	⊐1074	0 to 7	Reserved function		
	⊐1015	⊐1035	⊐1055	⊐1075	0 to 7	Reserved function		
	⊐1016	⊐1036	⊐1056	⊐1076	0 to 7	Reserved function		
	⊐1017	⊐1037	⊐1057	⊐1077	0 to 7	Block data No. monitor (00 to 31) *Read block No. is indicated.		
	⊐1100 to ⊐1177				0 to 7	Data storage area at block data read (PC←this module transfer buffer area) *Area common to each axis		

• Output section (N+0200 to 0377)

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis	A-axis				
Output (PC→PS)	⊐1200	⊐1220	⊐1240	⊐1260	0	At program operation	Start 1 [↑]	
					1		Continuous startup/single-step startup setting	0: Continuous startup; 1: Single-step startup
					2		Step No. enable	0: Set disabled; 1: Set enabled
					3	External input startup selection		
					4	At direct operation	Start 2 [↑]	
					5		Position control/ speed control setting	0: Position control startup; 1: Speed control startup
					6		Jog+ (CW jog operation instruction)	0: Stop; 1: Operation
					7		Jog- (CCW jog operation instruction)	0: Stop; 1: Operation
	⊐1201	⊐1221	⊐1241	⊐1261	0	Zero return [↑]		
					1	Move origin [↑]		
					2	Present position preset[↑]		
					3	Deceleration stop [↑]		
					4	Forced intervention startup [↑]		
					5	Clear deviation		0: OFF; 1: ON
					6	Override enable		0: Disabled; 1: Enabled
					7	Clear error [↑] (pulse output inhibit canceled)		
	⊐1202	⊐1222	⊐1242	⊐1262	0	Teaching [↑]		
					1	Writing of interrupt output position data [↑]		
					2	General-purpose output		0: OFF; 1: ON
					3	Block data write *Executed at each scan when ON		
					4	Block data read *Executed at each scan when ON		
					5	Block data save (write to flash ROM) [↑] *Enabled on X-axis only (batch operation for 4 axes)		
					6	Switching of present position display mode		0: Instruction value; 1: Encoder input (at closed loop control)
					7	Read absolute present position [↑] *Enabled only when absolute value control is enabled		
	⊐1203	⊐1223	⊐1243	⊐1263	0 to 7	Step No. at program operation (00 to 99)		
	⊐1204	⊐1224	⊐1244	⊐1264	0 to 7	Position No. at teaching (00 to 99)		
	⊐1205	⊐1225	⊐1245	⊐1265	0 to 7	Designation of block data block No. (00 to 31)		
	⊐1206	⊐1226	⊐1246	⊐1266	0 to 7	Override coefficient, lower (00 to 99)		Set override coefficient within range 000 to 999%.
	⊐1207	⊐1227	⊐1247	⊐1267	0 to 7	Override coefficient, upper (00 to 99)		
	⊐1210	⊐1230	⊐1250	⊐1270	0 to 7	56 Position instruction value (10^0 10^1)		
	⊐1211	⊐1231	⊐1251	⊐1271	0 to 7	57 Position instruction value (10^2 10^3)		
	⊐1212	⊐1232	⊐1252	⊐1272	0 to 7	58 Position instruction value (10^4 10^5)		
	⊐1213	⊐1233	⊐1253	⊐1273	0 to 7	59 Position instruction value (sign A/I 10^6)		
	⊐1214	⊐1234	⊐1254	⊐1274	0 to 7	60 Speed instruction value (10^0 10^1)		When 000000, the jog operation speed of parameters becomes the speed instruction value.
	⊐1215	⊐1235	⊐1255	⊐1275	0 to 7	61 Speed instruction value (10^2 10^3)		
	⊐1216	⊐1236	⊐1256	⊐1276	0 to 7	62 Speed instruction value (10^4 10^5)		
	⊐1217	⊐1237	⊐1257	⊐1277	0 to 3	64 Acceleration time No. (0 to 8) *Setting value of parameter when 0		
					4 to 7	65 Deceleration time No. (0 to 8) *Setting value of parameter when 0		
	⊐1300 to ⊐1377				64 bytes	Data storage area at block data write (PC→this module transfer buffer area) *Area common to each axis		

[2] Sample ladder program 4

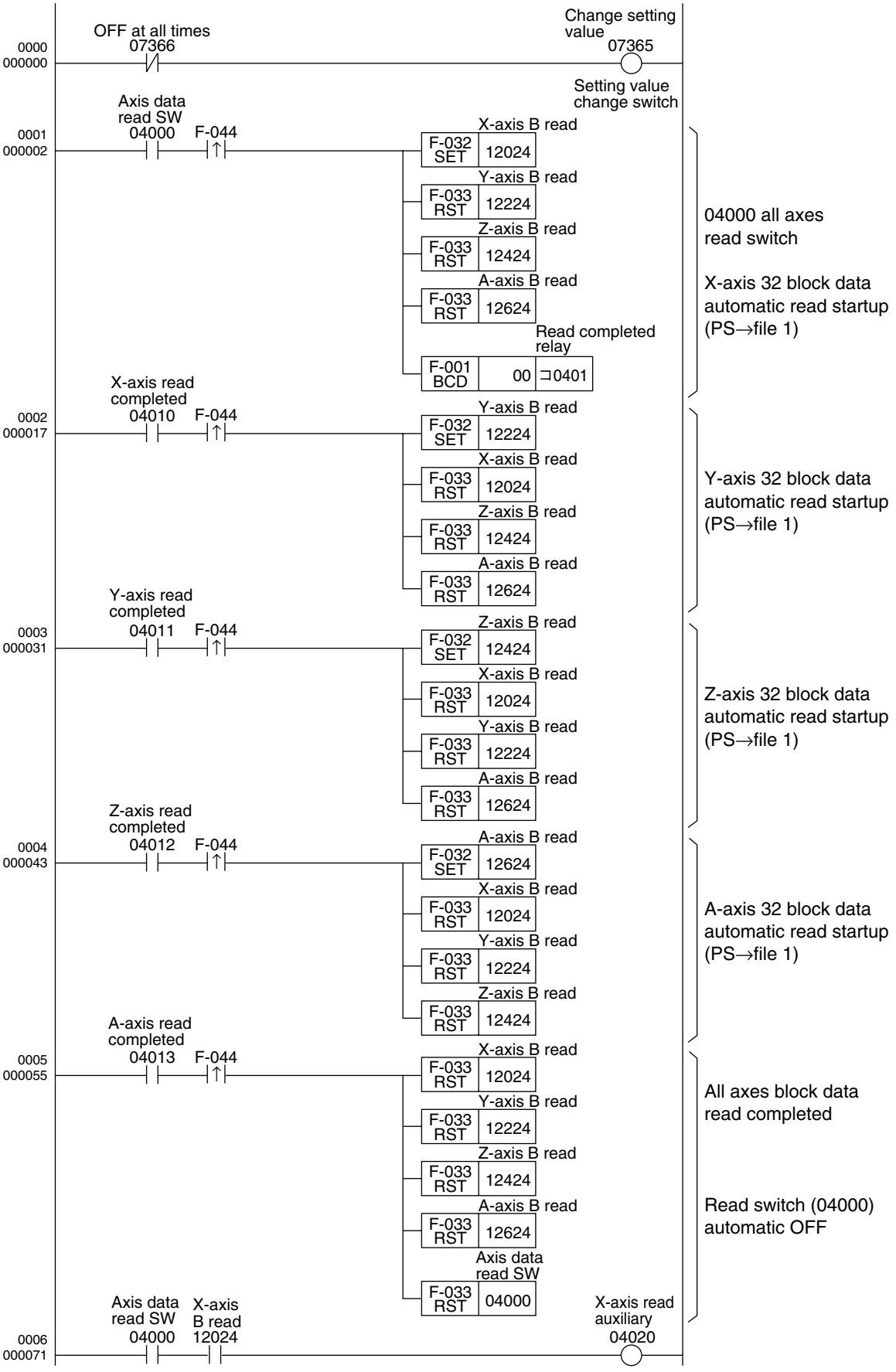
Ladder for transferring any block of data on JW-14PS②

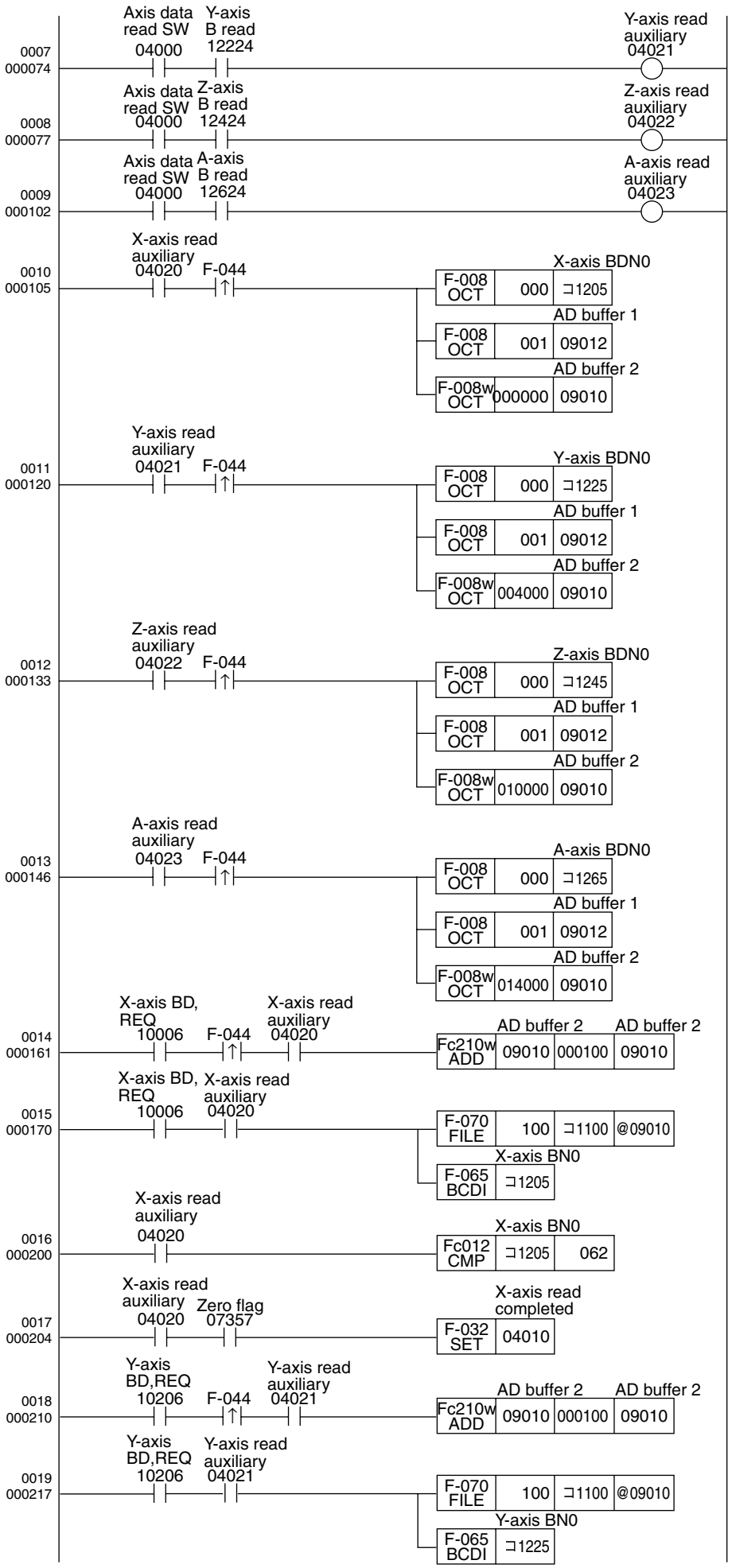


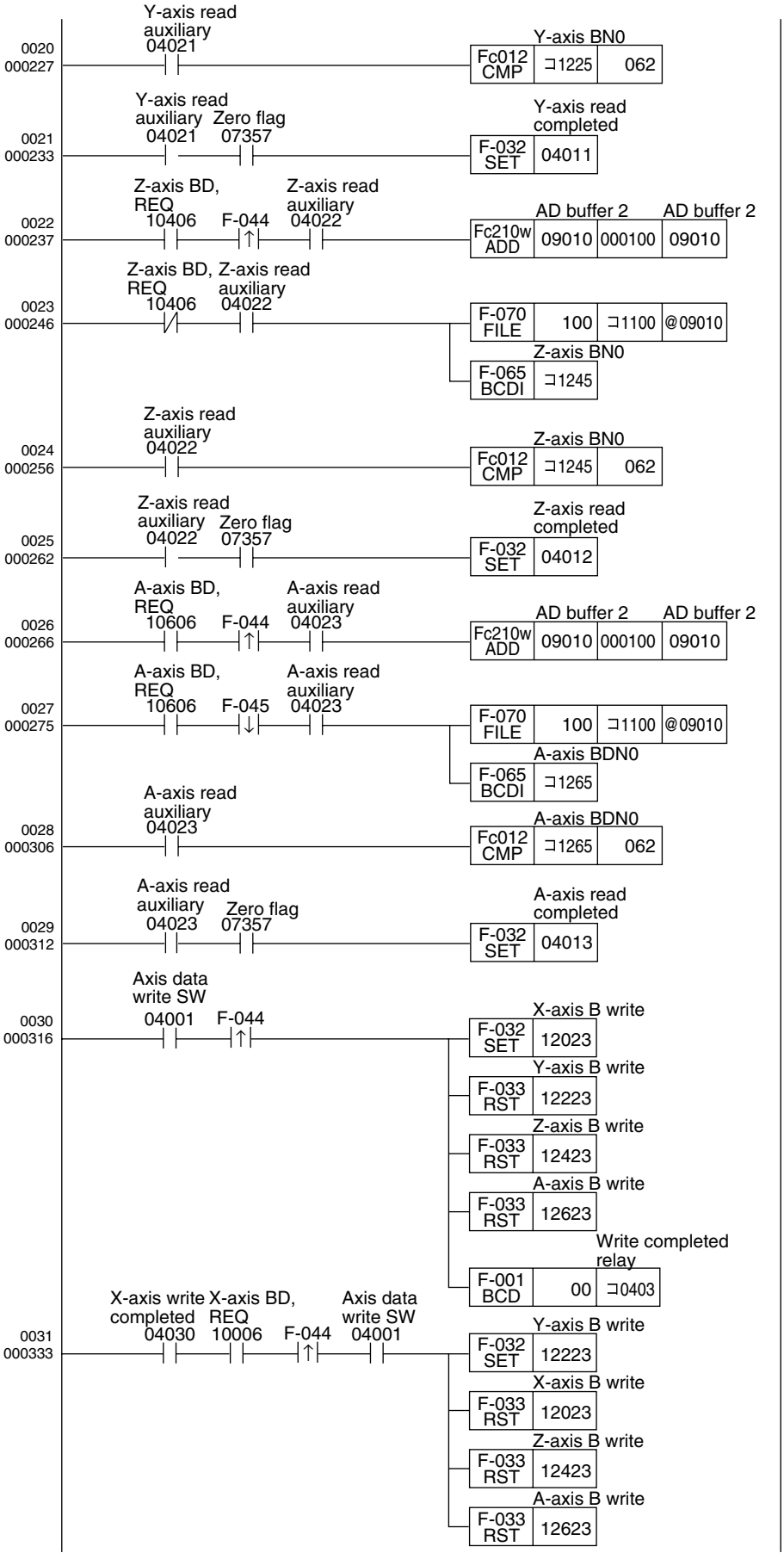
[3] Sample ladder program 5

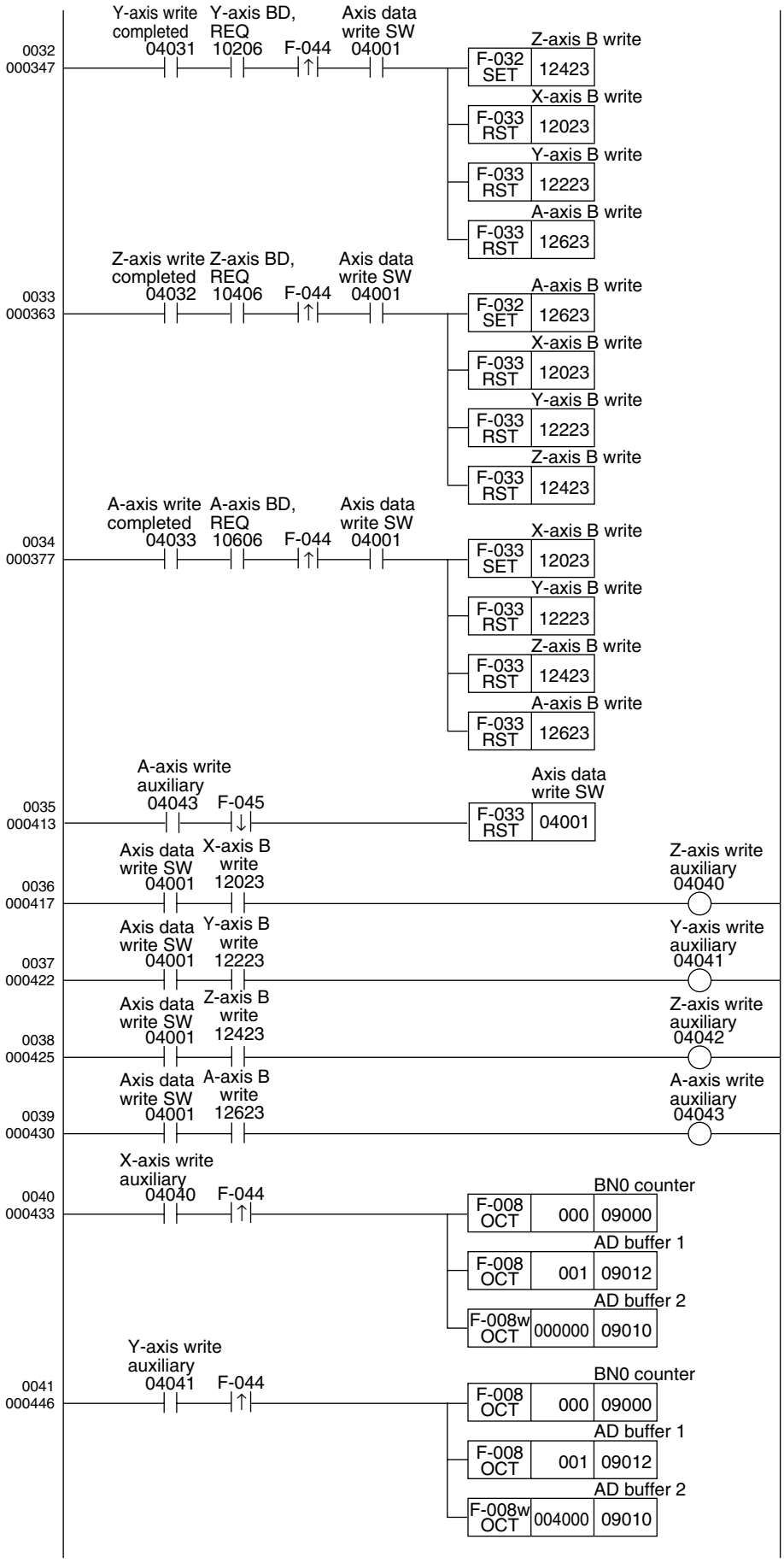
Sample ladder for batch-transferring all axes, all block data on JW-14PS②

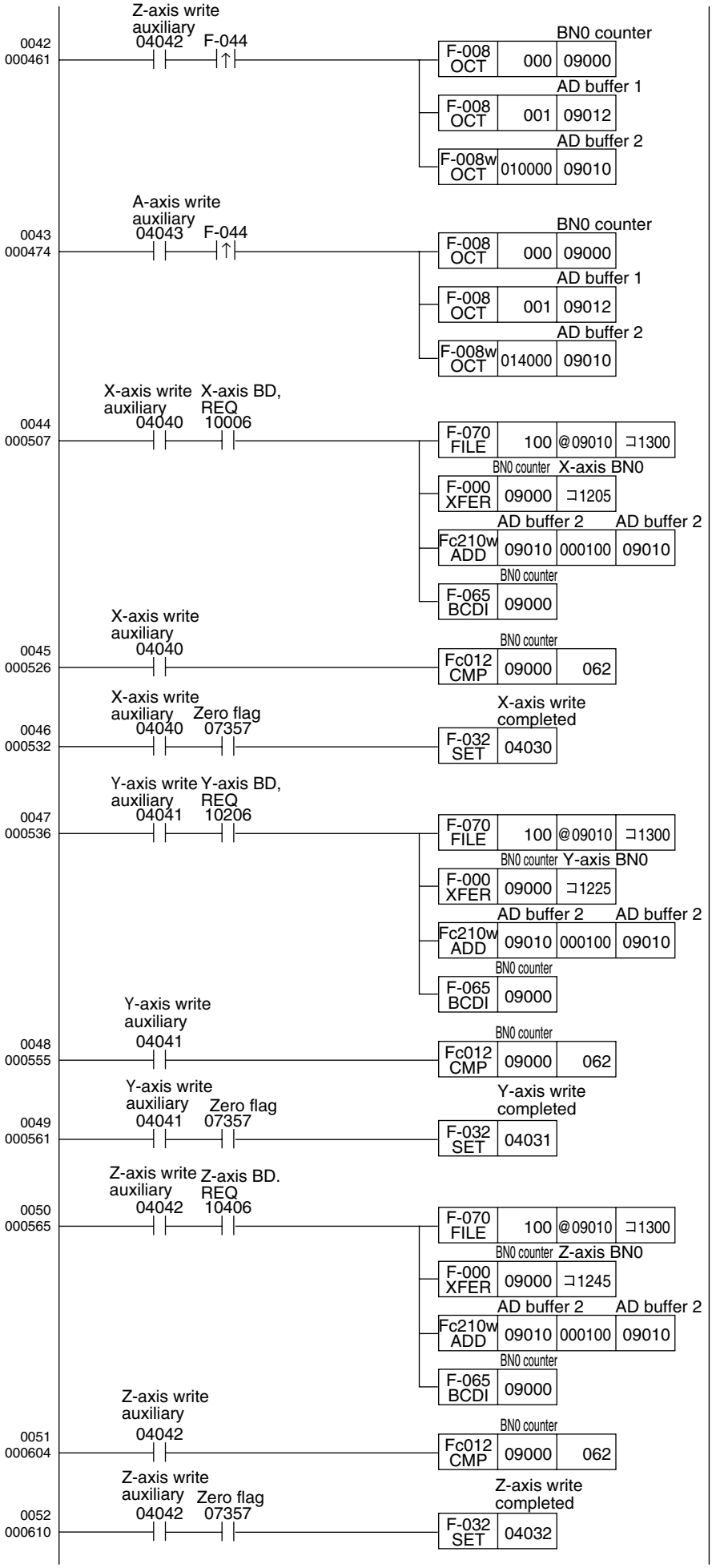
- Data is read (PS→PC) when 04000 turns ON.
- Data is written (PC→PS) when 04001 turns ON.
- Block data is saved to flash ROM when 04002 turns ON.

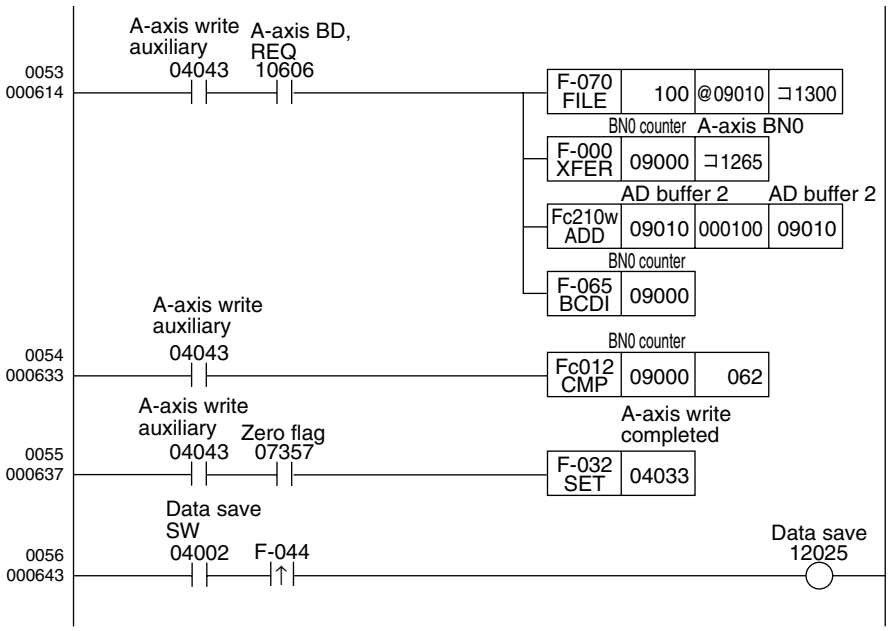



0007
000074
Axis data read SW 04000
Y-axis B read 12224
Y-axis read auxiliary 04021
0008
000077
Axis data read SW 04000
Z-axis B read 12424
Z-axis read auxiliary 04022
0009
000102
Axis data read SW 04000
A-axis B read 12624
A-axis read auxiliary 04023
0010
000105
X-axis read auxiliary 04020
F-044
X-axis BDN0
F-008 OCT 000 ⊐1205
AD buffer 1
F-008 OCT 001 09012
AD buffer 2
F-008w OCT 000000 09010
0011
000120
Y-axis read auxiliary 04021
F-044
Y-axis BDN0
F-008 OCT 000 ⊐1225
AD buffer 1
F-008 OCT 001 09012
AD buffer 2
F-008w OCT 004000 09010
0012
000133
Z-axis read auxiliary 04022
F-044
Z-axis BDN0
F-008 OCT 000 ⊐1245
AD buffer 1
F-008 OCT 001 09012
AD buffer 2
F-008w OCT 010000 09010
0013
000146
A-axis read auxiliary 04023
F-044
A-axis BDN0
F-008 OCT 000 ⊐1265
AD buffer 1
F-008 OCT 001 09012
AD buffer 2
F-008w OCT 014000 09010
0014
000161
X-axis BD, REQ 10006
F-044
X-axis read auxiliary 04020
AD buffer 2
AD buffer 2
Fc210w ADD 09010 000100 09010
0015
000170
X-axis BD, REQ 10006
X-axis read auxiliary 04020
F-070 FILE 100 ⊐1100 @09010
X-axis BN0
F-065 BCDI ⊐1205
0016
000200
X-axis read auxiliary 04020
X-axis BN0
Fc012 CMP ⊐1205 062
0017
000204
X-axis read auxiliary 04020
Zero flag 07357
X-axis read completed
F-032 SET 04010
0018
000210
Y-axis BD,REQ 10206
F-044
Y-axis read auxiliary 04021
AD buffer 2
AD buffer 2
Fc210w ADD 09010 000100 09010
0019
000217
Y-axis BD,REQ 10206
Y-axis read auxiliary 04021
F-070 FILE 100 ⊐1100 @09010
Y-axis BN0
F-065 BCDI ⊐1225


0020
000227
Y-axis read auxiliary 04021
Y-axis BN0
Fc012 CMP
⊐1225
062
0021
000233
Y-axis read auxiliary 04021
Zero flag 07357
Y-axis read completed
F-032 SET
04011
0022
000237
Z-axis BD, REQ 10406
F-044
Z-axis read auxiliary 04022
AD buffer 2
AD buffer 2
Fc210w ADD
09010
000100
09010
0023
000246
Z-axis BD, REQ 10406
Z-axis read auxiliary 04022
F-070 FILE
100
⊐1100
@09010
Z-axis BN0
F-065 BCDI
⊐1245
0024
000256
Z-axis read auxiliary 04022
Z-axis BN0
Fc012 CMP
⊐1245
062
0025
000262
Z-axis read auxiliary 04022
Zero flag 07357
Z-axis read completed
F-032 SET
04012
0026
000266
A-axis BD, REQ 10606
F-044
A-axis read auxiliary 04023
AD buffer 2
AD buffer 2
Fc210w ADD
09010
000100
09010
0027
000275
A-axis BD, REQ 10606
F-045
A-axis read auxiliary 04023
F-070 FILE
100
⊐1100
@09010
A-axis BDN0
F-065 BCDI
⊐1265
0028
000306
A-axis read auxiliary 04023
A-axis BDN0
Fc012 CMP
⊐1265
062
0029
000312
A-axis read auxiliary 04023
Zero flag 07357
A-axis read completed
F-032 SET
04013
0030
000316
Axis data write SW 04001
F-044
X-axis B write
F-032 SET
12023
Y-axis B write
F-033 RST
12223
Z-axis B write
F-033 RST
12423
A-axis B write
F-033 RST
12623
Write completed relay
F-001 BCD
00
⊐0403
0031
000333
X-axis write completed 04030
X-axis BD, REQ 10006
F-044
Axis data write SW 04001
Y-axis B write
F-032 SET
12223
X-axis B write
F-033 RST
12023
Z-axis B write
F-033 RST
12423
A-axis B write
F-033 RST
12623


0032
000347
Y-axis write completed 04031
Y-axis BD, REQ 10206
F-044 ↑
Axis data write SW 04001
F-032 SET 12423
Z-axis B write
F-033 RST 12023
X-axis B write
F-033 RST 12223
Y-axis B write
F-033 RST 12623
A-axis B write
0033
000363
Z-axis write completed 04032
Z-axis BD, REQ 10406
F-044 ↑
Axis data write SW 04001
F-032 SET 12623
A-axis B write
F-033 RST 12023
X-axis B write
F-033 RST 12223
Y-axis B write
F-033 RST 12423
Z-axis B write
0034
000377
A-axis write completed 04033
A-axis BD, REQ 10606
F-044 ↑
Axis data write SW 04001
F-033 SET 12023
X-axis B write
F-033 RST 12223
Y-axis B write
F-033 RST 12423
Z-axis B write
F-033 RST 12623
A-axis B write
0035
000413
A-axis write auxiliary 04043
F-045 ↓
Axis data write SW
F-033 RST 04001
0036
000417
Axis data write SW 04001
X-axis B write 12023
Z-axis write auxiliary 04040
0037
000422
Axis data write SW 04001
Y-axis B write 12223
Y-axis write auxiliary 04041
0038
000425
Axis data write SW 04001
Z-axis B write 12423
Z-axis write auxiliary 04042
0039
000430
Axis data write SW 04001
A-axis B write 12623
A-axis write auxiliary 04043
0040
000433
X-axis write auxiliary 04040
F-044 ↑
BN0 counter
F-008 OCT 000 09000
AD buffer 1
F-008 OCT 001 09012
AD buffer 2
F-008w OCT 000000 09010
0041
000446
Y-axis write auxiliary 04041
F-044 ↑
BN0 counter
F-008 OCT 000 09000
AD buffer 1
F-008 OCT 001 09012
AD buffer 2
F-008w OCT 004000 09010


0042
000461
Z-axis write auxiliary 04042
F-044
F-008 OCT 000 09000
BN0 counter
F-008 OCT 001 09012
AD buffer 1
F-008w OCT 010000 09010
AD buffer 2
0043
000474
A-axis write auxiliary 04043
F-044
F-008 OCT 000 09000
BN0 counter
F-008 OCT 001 09012
AD buffer 1
F-008w OCT 014000 09010
AD buffer 2
0044
000507
X-axis write auxiliary 04040
X-axis BD, REQ 10006
F-070 FILE 100 @09010 ⊐1300
F-000 XFER 09000 ⊐1205
BN0 counter
X-axis BN0
Fc210w ADD 09010 000100 09010
AD buffer 2
AD buffer 2
F-065 BCDI 09000
BN0 counter
0045
000526
X-axis write auxiliary 04040
Fc012 CMP 09000 062
BN0 counter
0046
000532
X-axis write auxiliary 04040
Zero flag 07357
F-032 SET 04030
X-axis write completed
0047
000536
Y-axis write auxiliary 04041
Y-axis BD, REQ 10206
F-070 FILE 100 @09010 ⊐1300
F-000 XFER 09000 ⊐1225
BN0 counter
Y-axis BN0
Fc210w ADD 09010 000100 09010
AD buffer 2
AD buffer 2
F-065 BCDI 09000
BN0 counter
0048
000555
Y-axis write auxiliary 04041
Fc012 CMP 09000 062
BN0 counter
0049
000561
Y-axis write auxiliary 04041
Zero flag 07357
F-032 SET 04031
Y-axis write completed
0050
000565
Z-axis write auxiliary 04042
Z-axis BD. REQ 10406
F-070 FILE 100 @09010 ⊐1300
F-000 XFER 09000 ⊐1245
BN0 counter
Z-axis BN0
Fc210w ADD 09010 000100 09010
AD buffer 2
AD buffer 2
F-065 BCDI 09000
BN0 counter
0051
000604
Z-axis write auxiliary 04042
Fc012 CMP 09000 062
BN0 counter
0052
000610
Z-axis write auxiliary 04042
Zero flag 07357
F-032 SET 04032
Z-axis write completed


A-axis write auxiliary
04043
A-axis BD, REQ
10606
0053
000614
F-070 FILE
100
@09010
⊐1300
BN0 counter
A-axis BN0
F-000 XFER
09000
⊐1265
AD buffer 2
AD buffer 2
Fc210w ADD
09010
000100
09010
BN0 counter
F-065 BCDI
09000
A-axis write auxiliary
04043
0054
000633
BN0 counter
Fc012 CMP
09000
062
A-axis write auxiliary
04043
Zero flag
07357
0055
000637
A-axis write completed
F-032 SET
04033
Data save SW
04002
F-044
0056
000643
Data save
12025

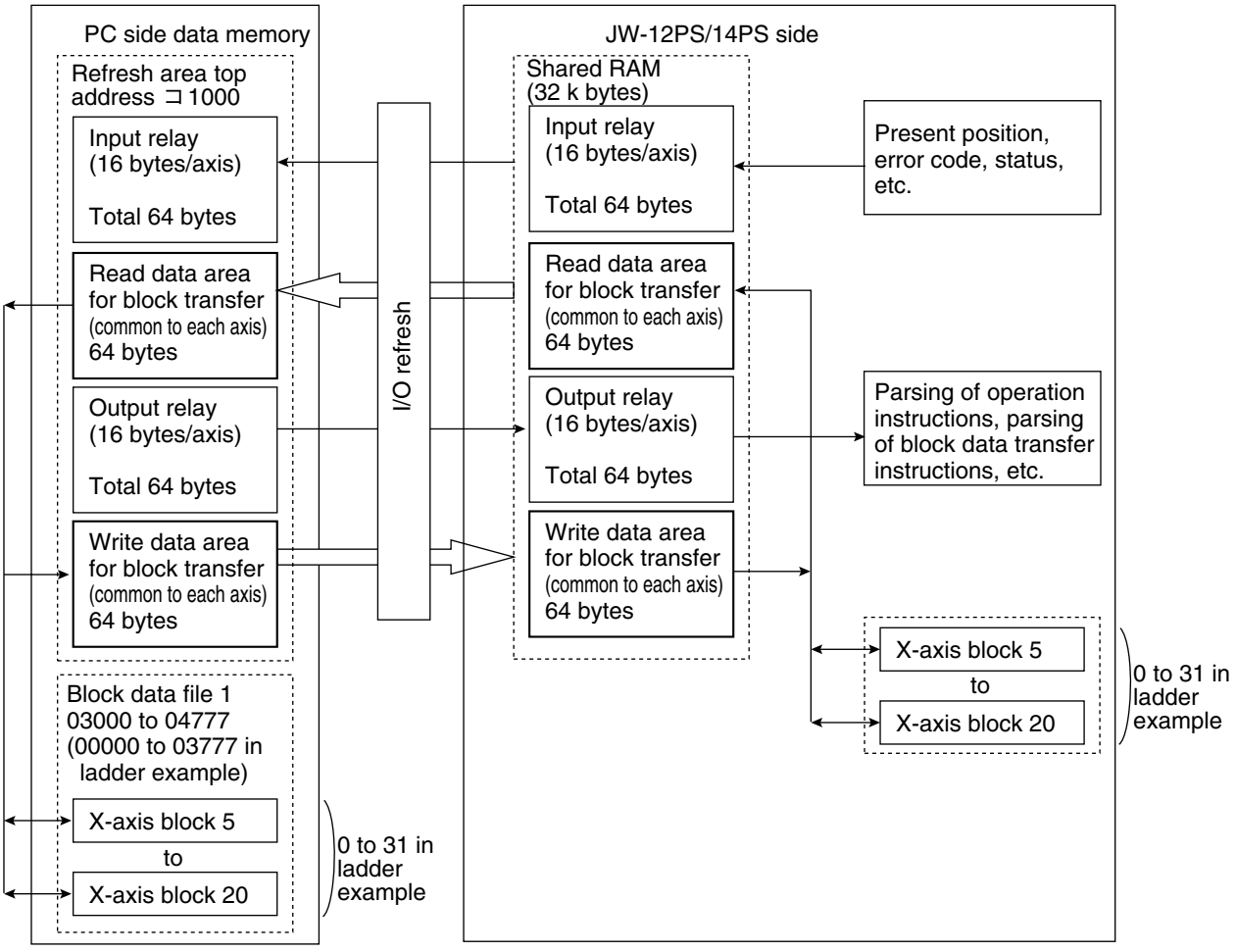
5

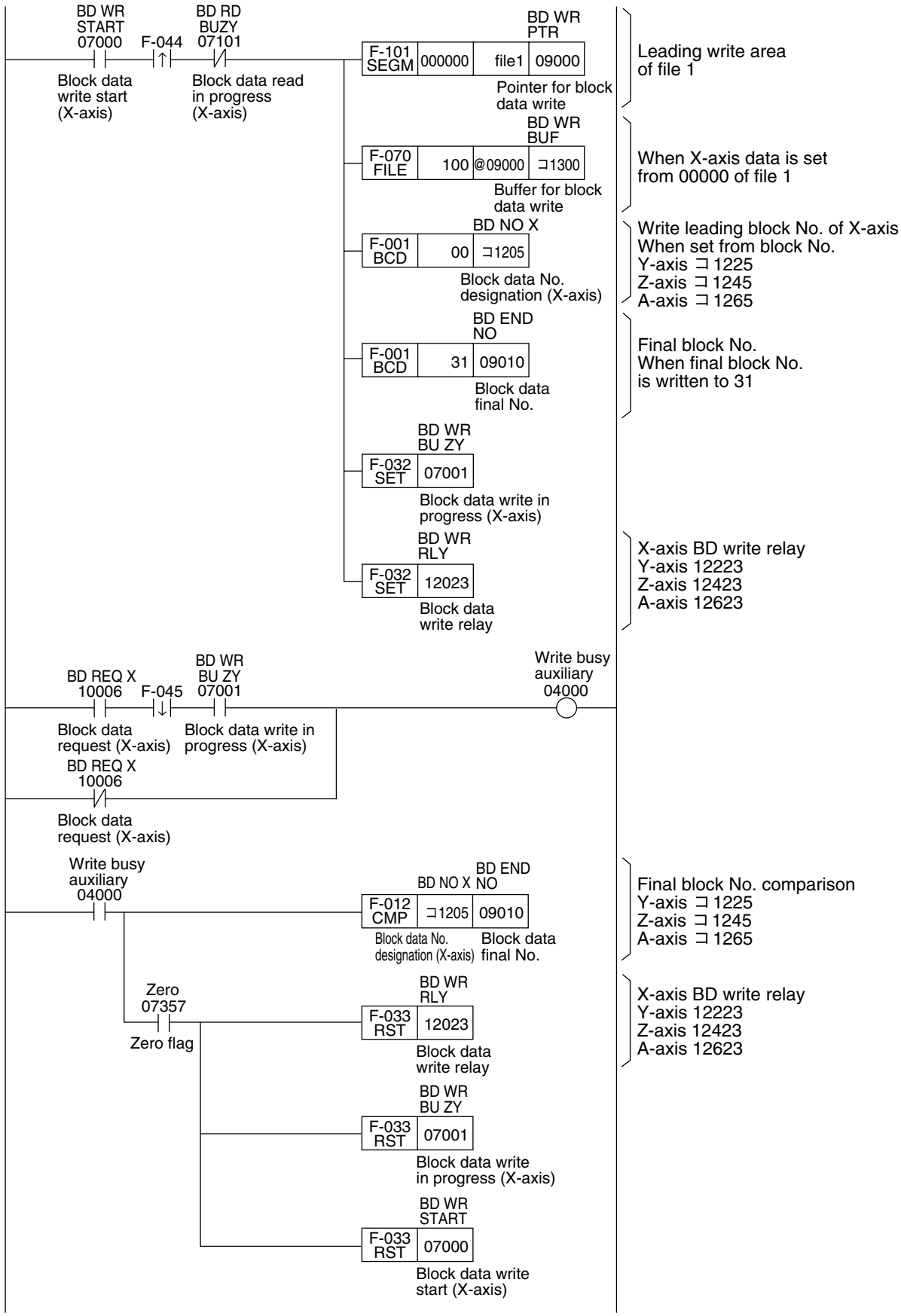
5-10 Transfer of any X-axis block when top address of special I/O area is set to ⊐1000

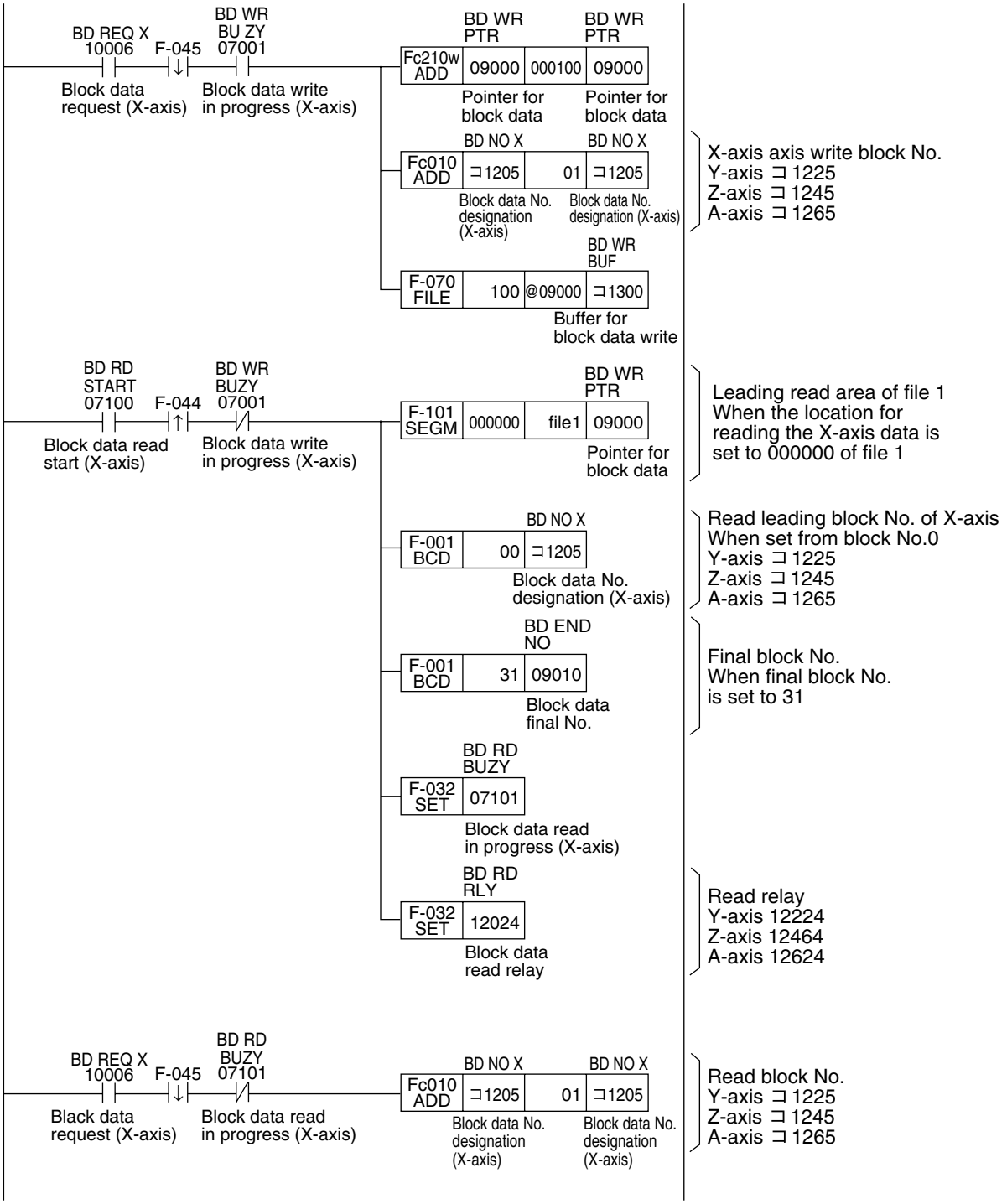
The ladder program shown on pages 5-61 to 5-63 shows a method of reading and writing any block data on the X-axis from any address in file 1, and a method of writing any block data. (On the example ladder program on the following page, 32 items of X-axis block data written from 000000 to 003777 of file 1 are written to PS, and 32 items of X-axis block data are read from 000000 to 003777 of file 1.)
To read/write from any registers in file 1 to any block data, the ladder program must be changed. (The read/write areas and the read/write block Nos., etc. of file 1 must be changed.)
The Y-, Z- and A-axes can also be read/written in the same way by changing the ladder program. (The read/write areas, read/write block Nos., read/write relays, monitor block Nos., etc. of file 1 must be changed.

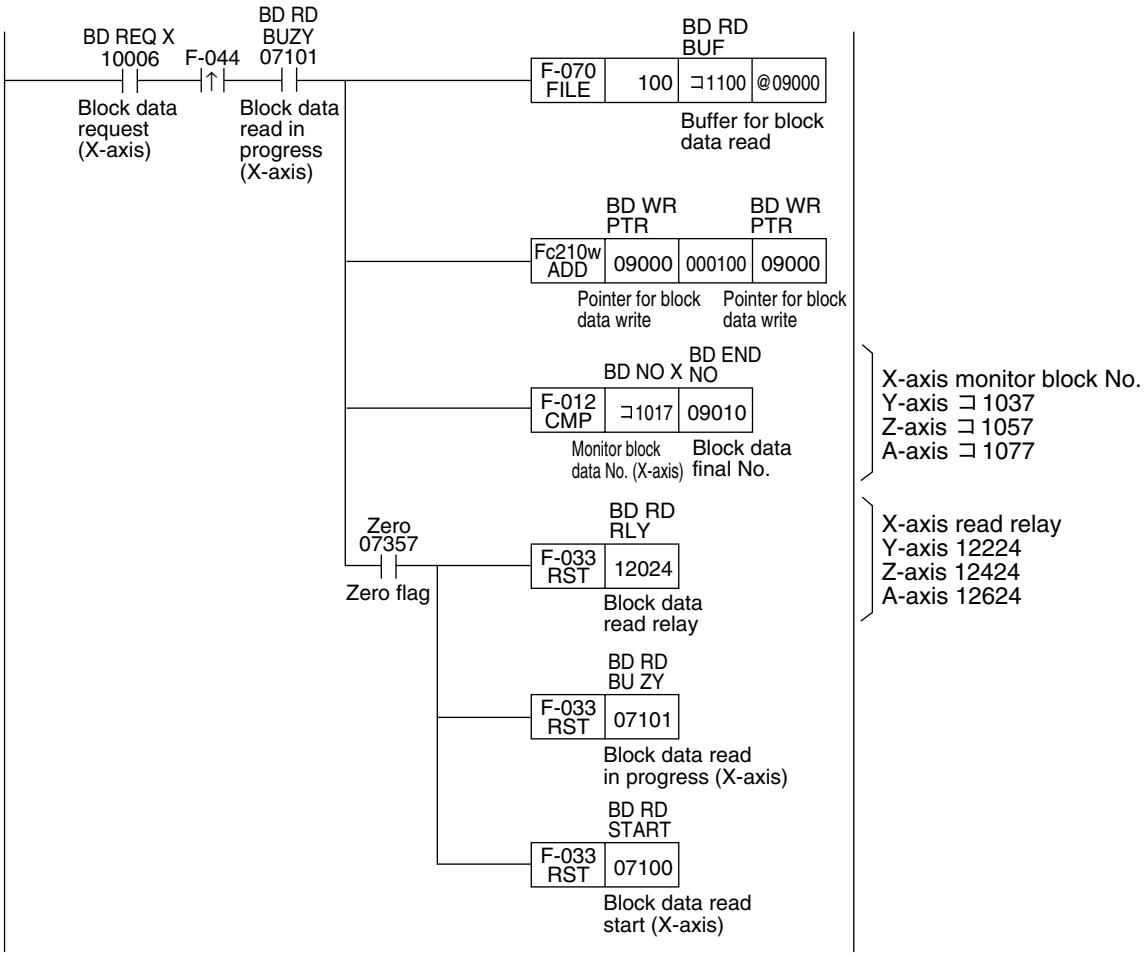
5

The conceptual diagram below shows an instance where block data is read/written with 003000 to 004777 of file 1 as the area of block Nos.5 to 20. Transfer such as this is possible by re-reprogramming the ladder program shown on the next page.




BD WR START 07000
F-044
BD RD BUZY 07101
Block data write start (X-axis)
Block data read in progress (X-axis)
BD WR PTR
F-101 SEGM
000000
file1
09000
Pointer for block data write
Leading write area of file 1
BD WR BUF
F-070 FILE
100
@09000
⊐1300
Buffer for block data write
When X-axis data is set from 00000 of file 1
BD NO X
F-001 BCD
00
⊐1205
Block data No. designation (X-axis)
Write leading block No. of X-axis
When set from block No.
Y-axis ⊐ 1225
Z-axis ⊐ 1245
A-axis ⊐ 1265
BD END NO
F-001 BCD
31
09010
Block data final No.
Final block No.
When final block No. is written to 31
BD WR BU ZY
F-032 SET
07001
Block data write in progress (X-axis)
BD WR RLY
F-032 SET
12023
Block data write relay
X-axis BD write relay
Y-axis 12223
Z-axis 12423
A-axis 12623
BD REQ X 10006
F-045
BD WR BU ZY 07001
Block data request (X-axis)
Block data write in progress (X-axis)
Write busy auxiliary 04000
BD REQ X 10006
Block data request (X-axis)
Write busy auxiliary 04000
BD NO X
BD END NO
F-012 CMP
⊐1205
09010
Block data No. designation (X-axis)
Block data final No.
Final block No. comparison
Y-axis ⊐ 1225
Z-axis ⊐ 1245
A-axis ⊐ 1265
Zero 07357
Zero flag
BD WR RLY
F-033 RST
12023
Block data write relay
X-axis BD write relay
Y-axis 12223
Z-axis 12423
A-axis 12623
BD WR BU ZY
F-033 RST
07001
Block data write in progress (X-axis)
BD WR START
F-033 RST
07000
Block data write start (X-axis)


BD REQ X
10006
F-045
BD WR
BU ZY
07001
Block data request (X-axis)
Block data write in progress (X-axis)
BD WR PTR
BD WR PTR
Fc210w ADD
09000
000100
09000
Pointer for block data
Pointer for block data
BD NO X
BD NO X
Fc010 ADD
⊐1205
01
⊐1205
Block data No. designation (X-axis)
Block data No. designation (X-axis)
X-axis axis write block No.
Y-axis ⊐ 1225
Z-axis ⊐ 1245
A-axis ⊐ 1265
BD WR BUF
F-070 FILE
100
@09000
⊐1300
Buffer for block data write
BD RD START
07100
F-044
BD WR BUZY
07001
Block data read start (X-axis)
Block data write in progress (X-axis)
BD WR PTR
F-101 SEGM
000000
file1
09000
Pointer for block data
Leading read area of file 1
When the location for reading the X-axis data is set to 000000 of file 1
BD NO X
F-001 BCD
00
⊐1205
Block data No. designation (X-axis)
Read leading block No. of X-axis
When set from block No.0
Y-axis ⊐ 1225
Z-axis ⊐ 1245
A-axis ⊐ 1265
BD END NO
F-001 BCD
31
09010
Block data final No.
Final block No.
When final block No. is set to 31
BD RD BUZY
F-032 SET
07101
Block data read in progress (X-axis)
BD RD RLY
F-032 SET
12024
Block data read relay
Read relay
Y-axis 12224
Z-axis 12464
A-axis 12624
BD REQ X
10006
F-045
BD RD BUZY
07101
Black data request (X-axis)
Block data read in progress (X-axis)
BD NO X
BD NO X
Fc010 ADD
⊐1205
01
⊐1205
Block data No. designation (X-axis)
Block data No. designation (X-axis)
Read block No.
Y-axis ⊐ 1225
Z-axis ⊐ 1245
A-axis ⊐ 1265


BD REQ X
10006
F-044
BD RD
BUZY
07101
Block data
request
(X-axis)
Block data
read in
progress
(X-axis)
BD RD
BUF
F-070
FILE
100
⊐1100
@09000
Buffer for block
data read
BD WR
PTR
BD WR
PTR
Fc210w
ADD
09000
000100
09000
Pointer for block
data write
Pointer for block
data write
BD NO X
BD END
NO
F-012
CMP
⊐1017
09010
Monitor block
data No. (X-axis)
Block data
final No.
X-axis monitor block No.
Y-axis ⊐ 1037
Z-axis ⊐ 1057
A-axis ⊐ 1077
Zero
07357
Zero flag
BD RD
RLY
F-033
RST
12024
Block data
read relay
X-axis read relay
Y-axis 12224
Z-axis 12424
A-axis 12624
BD RD
BU ZY
F-033
RST
07101
Block data read
in progress (X-axis)
BD RD
START
F-033
RST
07100
Block data read
start (X-axis)

5

Chapter 6 Zero Return

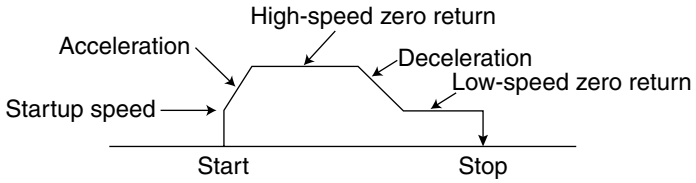
This chapter describes zero return instructions and operation patterns during zero return by individual settings.

6-1 Zero return operation

When a zero return is executed, operation differs as follows according to whether or not (*) there is an origin proximity input signal. *This is set by address A +0003 (origin detection method) in parameter 1.

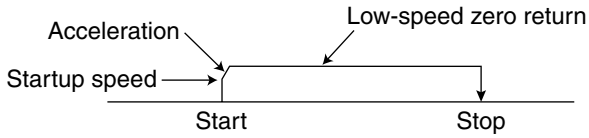
• W**hen there is an origin proximity input signal**

Zero return starts at high-speed zero return, and deceleration is performed by origin proximity input. Operation stops immediately by the origin input signal.



• **When there is no origin proximity input signal**

Zero return is performed at low-speed zero return, and operation stops immediately by the origin input signal.



Acceleration is not performed when the zero return low speed is equal to or less than the startup speed.

When instructing positioning using absolute values, you must perform a zero return first of all to confirm the origin.

(Note) When the present position preset is used, the origin after the preset differs from the initially determined origin.

(⇒ See item "Present value preset.")

■ **Relay area for operation relating to zero return (assignment of special I/O data area)**

I/O	Byte address of data memory (N+****)				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	1	Positioning completed	↑	Completed
							↓	At start
					2	Busy flag	0	Non-busy state
							1	Busy state
					4	No origin flag	0	Origin
							1	No origin
	0002	0022	0042	0062	0	CW limit input signal	State of input signals of each axis is monitored. 1: ON 0: OFF	
					1	CCW limit input signal		
					2	Origin proximity input signal		
					2	Origin input signal		
					7	Positioning completed signal		
Output (PC→PS)	0201	0221	0241	0261	0	Zero return [↑]		
					1	Move origin [↑]		

* JW-14PS only

■ **Parameter 1 relating to zero return (regular parameters: must be set independently on each axis)**

Address (A+****)	Bit	Default	Function	
0002	0 to 3	00	Zero return operation mode setting	0: No-inversion mode, 1: Inversion mode 1, 2: Inversion mode 2
	4 to 7	00	Zero return direction setting	0: CW direction, 1: CCW direction

Address (A+****)	Byte	Default	Function	
0003	1	00	Origin detection method setting	00: Stop at origin after escape from proximity 01: Proximity edge detection 1 (count method 1) 02: Proximity edge detection 2 (count method 2) 03: Origin proximity signal unused 04: Inversion at limit end, zero return operation at low speed, and stop at origin 05: Origin proximity signal and origin signal both unused
0004 to 0005	2	0001	Origin count	0000 to 9999 Origin count by origin count system
0024 to 0027	4	00000000	Acceleration time	000000 to 250000ms *Remaining 1 byte is not used.
0030 to 0033	4	00000000	Deceleration time	000000 to 250000ms *Remaining 1 byte is not used.
0034 to 0037	4	00000000	High-speed zero return	000000 to 500000pps *Remaining 1 byte is not used.
0040 to 0043	4	00000000	Low-speed zero return	000000 to 500000pps *Remaining 1 byte is not used.
0060 to 0063	4	00000000	Origin compensation data	-9999999 to 9999999

The acceleration/deceleration data of zero return is the parameter value.

(Note) When the origin input signal is open collector, be sure to limit the low-speed zero return to 1 kpps.

6-2 Example of operation by origin detection method

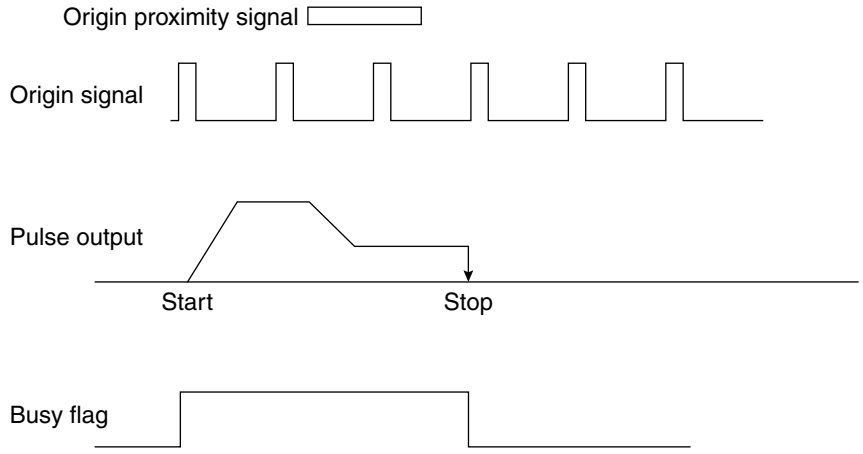
(1) Stop by origin signal after origin proximity detection (value of parameter 1 address A+0003 set to "00")

With this mode, the origin proximity signal and origin signal are captured from the external input connector and zero return is performed.

When origin signal input is input by an open collector output signal, connect the signal to the sensor input (pins 10 and 22) for the origin. The response time is 1 ms or less. (a or b contacts can be switched in parameters.)

When the differential driver output signal is input, connect the signal to the sensor input (pins 13-38, 25-50) for the origin. The response time is 250 kpps (0.04 ms) or less. (a or b contacts can be switched in parameters.)

In this mode, operation is started at high-speed zero return as shown below, and deceleration operation is performed at the edge of the origin proximity signal. After the low-speed zero return speed is reached after escape from origin proximity, operation is stopped immediately by the initial origin signal to confirm the origin.

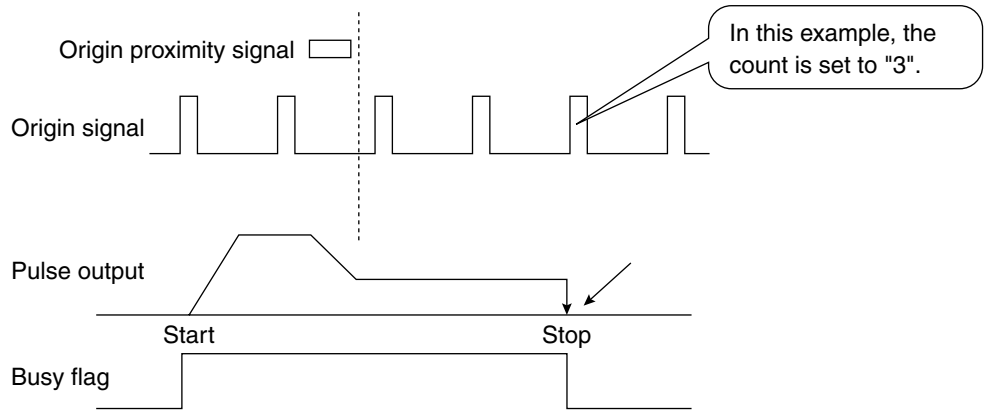


(2) Origin count method 1 (value of parameter 1 address A+0003 set to "01")

With this mode, the origin proximity signal and origin signal are captured from the external input connector and zero return is performed.

Both open collector and differential driver output origin input signals can be input.

In this mode, operation is started at high-speed zero return as shown below, and deceleration operation is performed at the edge of the origin proximity signal. After escape from origin proximity, the origin signal is counted, and operation is stopped immediately by the origin signal when the preset count (address A+0004, 0005 of parameter 1) is reached to confirm the origin.

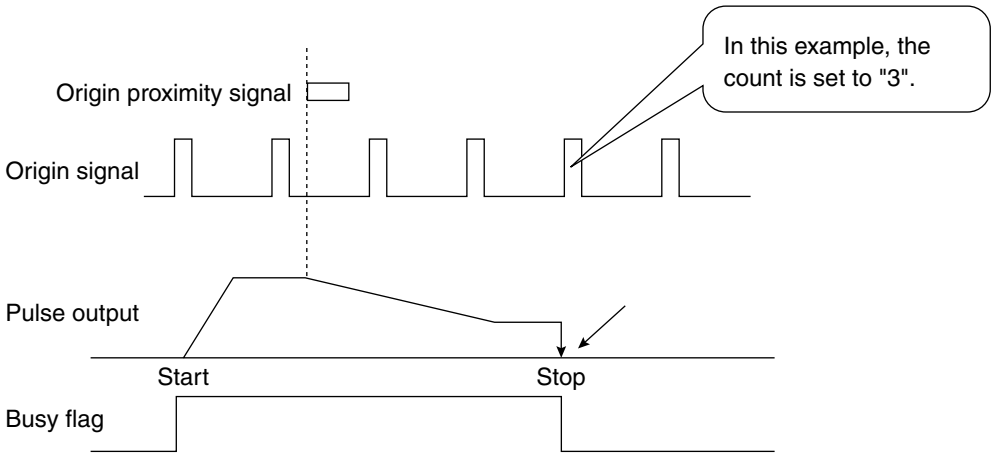


(3) Origin count method 2 (value of parameter 1 address A+0003 set to "02")

With this mode, the origin proximity signal and origin signal are captured from the external input connector and zero return is performed.

Only differential driver output signals can be input for origin signal input in this mode.

In this mode, operation is started at high-speed zero return as shown below, and deceleration operation is performed at the edge of the origin proximity signal. After start of deceleration operation, the origin signal is counted, and operation is stopped immediately by the origin signal when the preset count (address A+0004, 0005 of parameter 1) is reached to confirm the origin. At this time, operation stops even during deceleration operation.

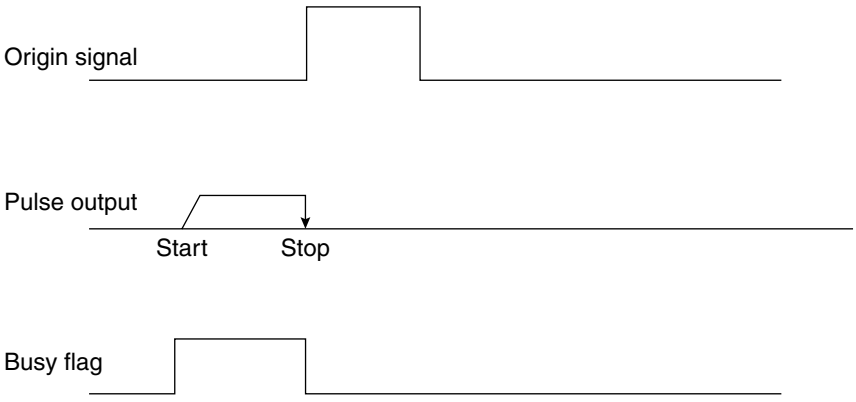


(4) Origin proximity signal not used (value of parameter 1 address A+0003 set to "03")

With this mode, only the origin signal is captured from the external input connector and zero return is performed.

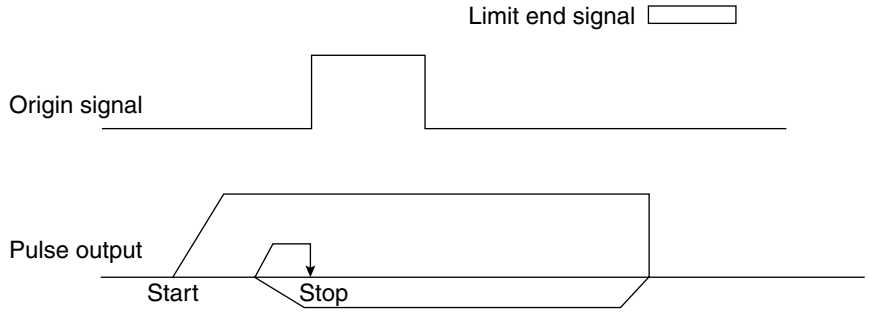
Both open collector and differential driver output origin input signals can be input.

In this mode, operation is started at low-speed zero return speed as shown below, and operation is stopped immediately by the initial origin signal to confirm the origin.



(5) Inversion at limit end, zero return operation at low speed, and stop at origin (value of parameter 1 address A+0003 set to "04")

With this mode, only the origin signal is captured from the external input connector and zero return is performed. The limit end signal is used instead of the origin proximity signal.
Both open collector and differential driver output origin input signals can be input.
In this mode, operation is started at high-speed zero return as shown below, operation is immediately inverted by the limit end signal after which operation is continued at low-speed zero return, and operation is stopped immediately by the initial origin signal to confirm the origin.



(Note) When inversion operation is performed at the limit end, perform zero return at a speed that will not apply stress on the mechanical system as inversion is instantaneous.

(6) Origin proximity signal and origin signal both unused (value of parameter 1 address A+0003 set to "05")

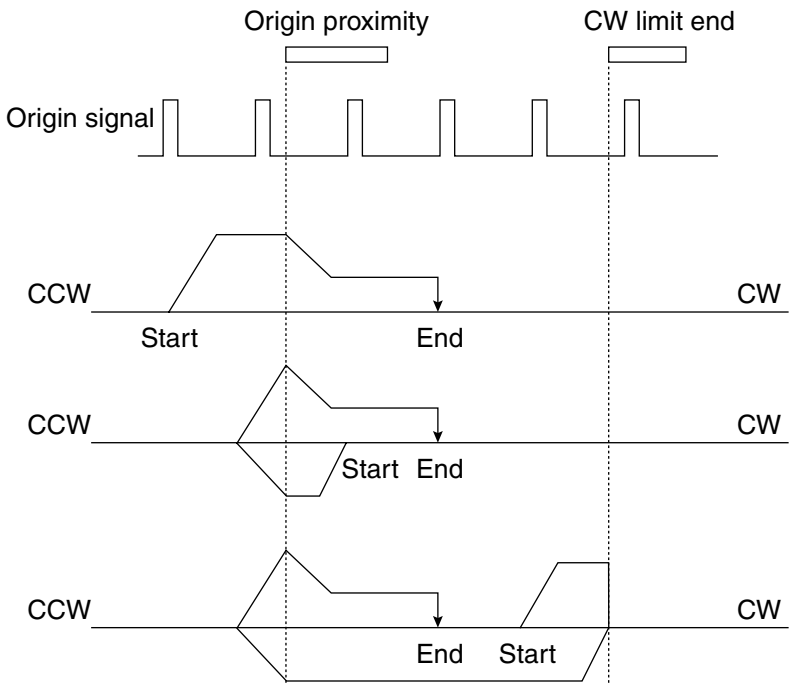
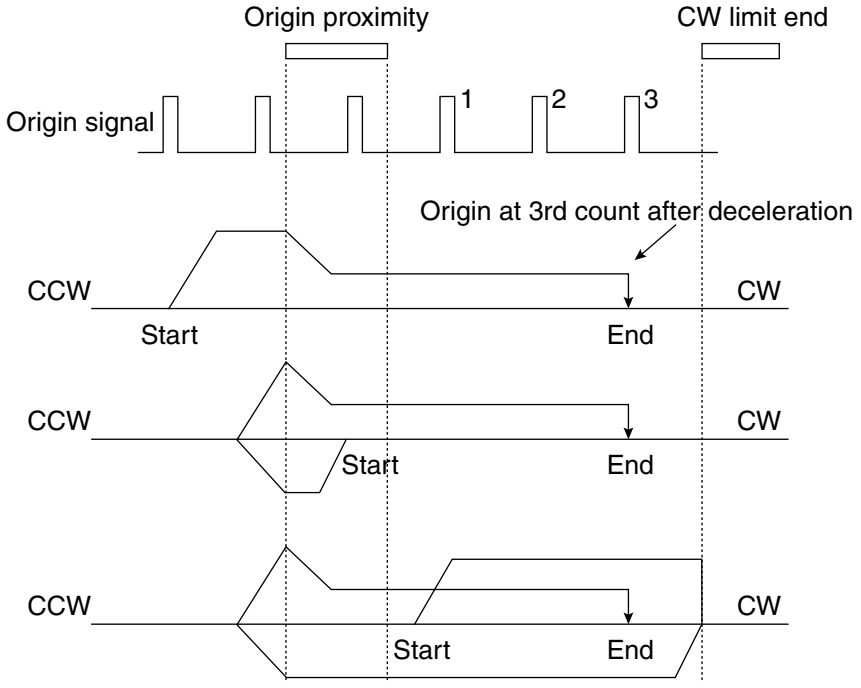
Neither the origin proximity signal nor origin signals are used. The point where zero return is started up is taken as the origin. This mode is mainly used for speed control on rotation systems or for initial testing.

6-3 Operation patterns by origin detection method

The following describes the operation patterns according to origin detection method and zero return operation.

CW is taken as the zero return direction. When the zero return direction is taken to be CCW, the direction of operation and direction of the limit input signal changes.

[1] Limit end inversion ON (inversion mode 1)

Zero return operation *1 / Origin detection method *2	1: Limit end inversion ON (inversion mode 1)
00 • Stop by origin signal after origin proximity escape	
01 • Origin count method 1 [Deceleration operation starts by the edge of the origin proximity signal, and stops at the determined origin count after escape from origin proximity. In the example on the right, the count is set to "3".]	

*1 Zero return operation: value of address A+0002 of parameter 1 (BCD: lower digit)

*2 Origin detection method: value of address A+0003 of parameter 1 (BCD: 2 digits)

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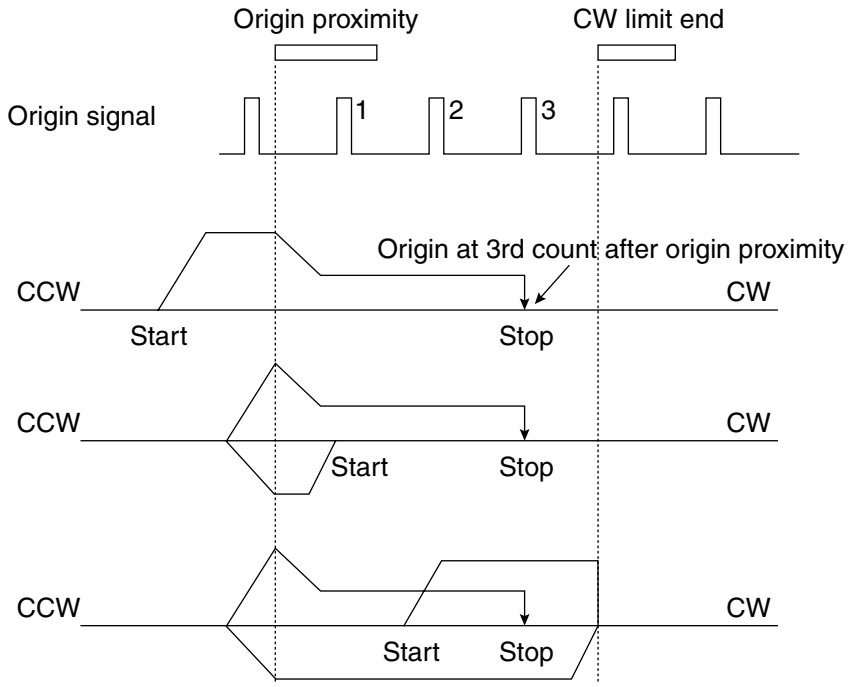
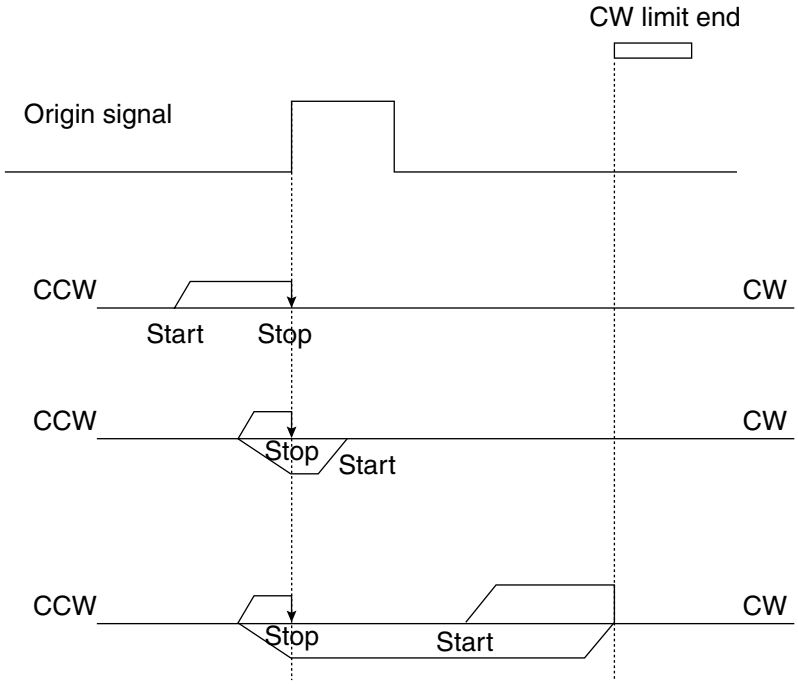
From previous page

02
• Origin count method 2

Deceleration operation starts by the edge of the origin proximity signal, and stops at the determined origin count after escape from origin proximity. In this case, operation stops and an error does not occur when the determined count is reached even during deceleration operation. In the example on the right, the count is set to "3". (Note) This mode cannot be used in connections where the origin signal is open collector as the origin signal is captured at high speed.



03
• Origin proximity not used



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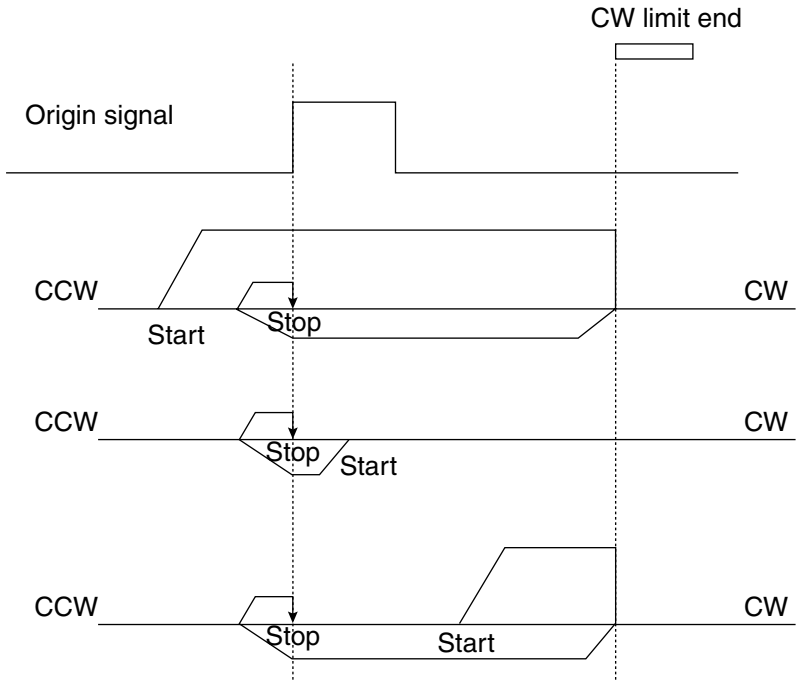
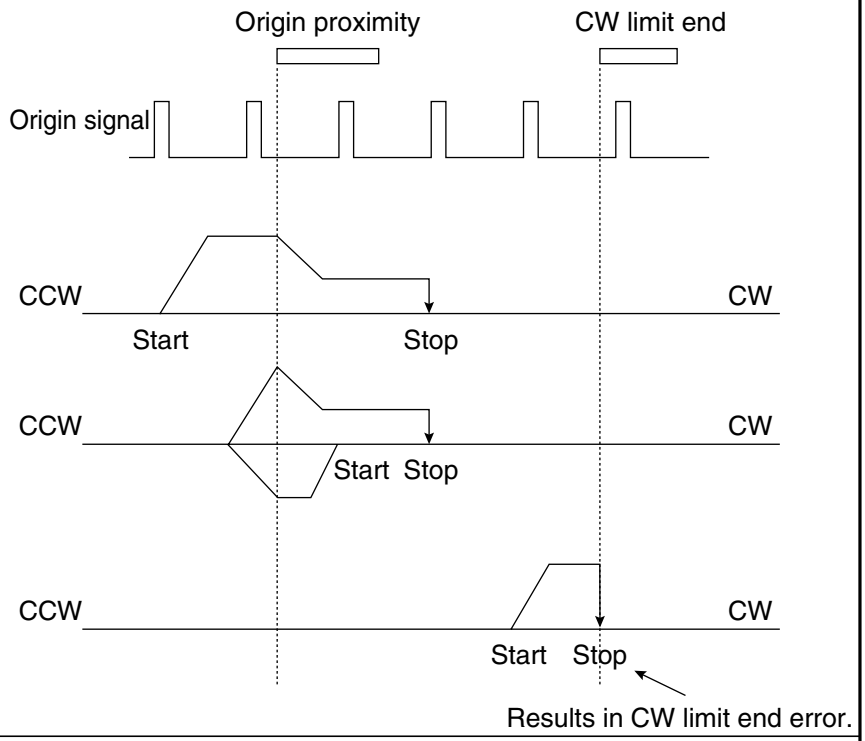
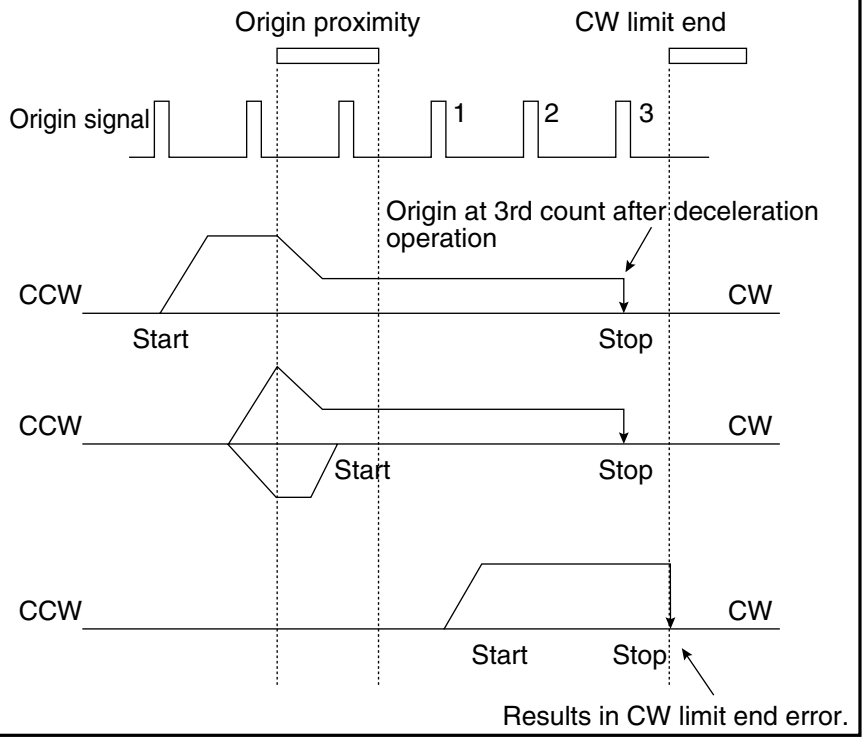
04 • Limit end signal is used instead of origin proximity signal. [No deceleration operation at limit end]	
05 • Origin proximity signal and origin signal not used	The point where zero return is started up is taken as the origin. Zero return is not performed. (This is for speed control operation on rotation system and for confirming initial operation.)

[2] Limit end inversion OFF (Inversion mode 2)

Origin return operation *1 / Origin detection method *2	2 : Limit end inversion OFF (inversion mode 2)
00 • Stop by origin signal after origin proximity escape	
01 • Origin count method 1 Deceleration operation starts by the edge of the origin proximity signal, and stops at the determined origin count after escape from origin proximity. In the example on the right, the count is set to "3". In the example on the right, the count is set to "3".	

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*1 Zero return operation: value of address A+0002 of parameter 1 (BCD: lower digit)

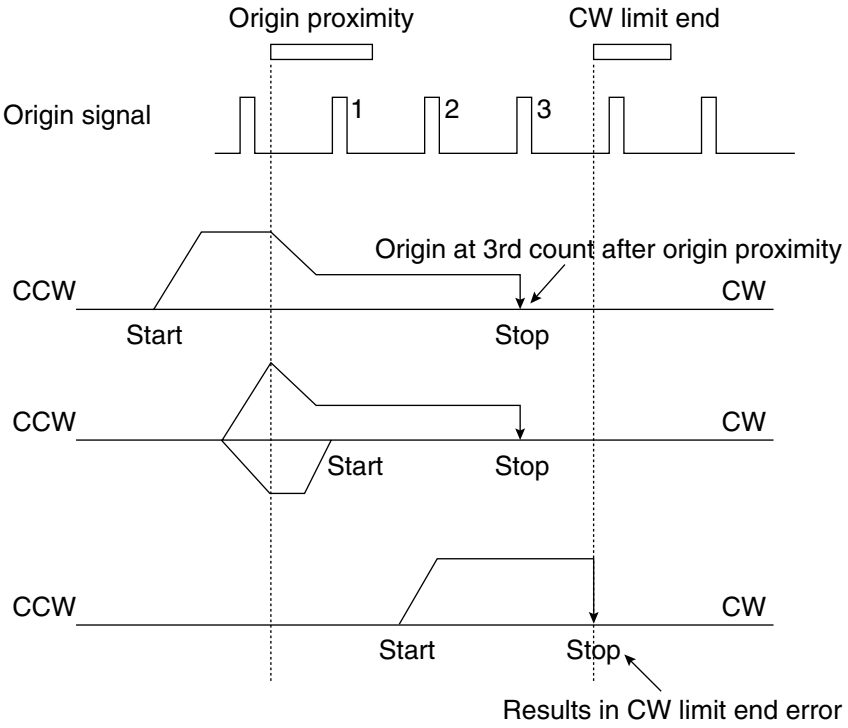
*2 Origin detection method: value of address A+0003 of parameter 1 (BCD: 2 digits)

From previous page

02

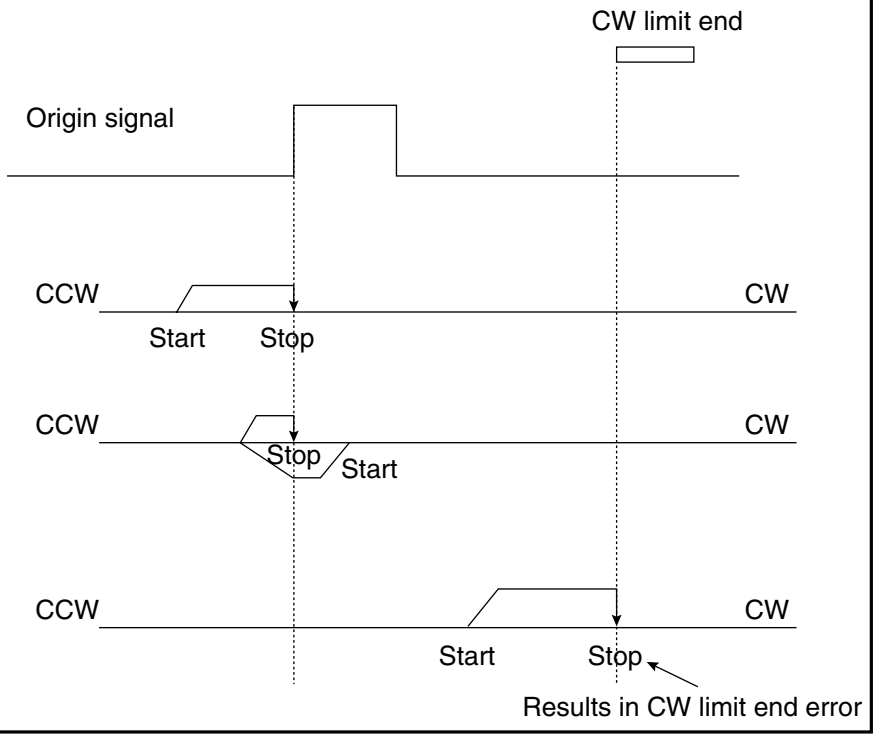
• Origin count method 2

Deceleration operation starts by the edge of the origin proximity signal, and stops at the determined origin count after escape from origin proximity. In this case, operation stops and an error does not occur when the determined count is reached even during deceleration operation. In the example on the right, the count is set to "3". (Note) This mode cannot be used in connections where the origin signal is open collector as the origin signal is captured at high speed.



03

• Origin proximity not used



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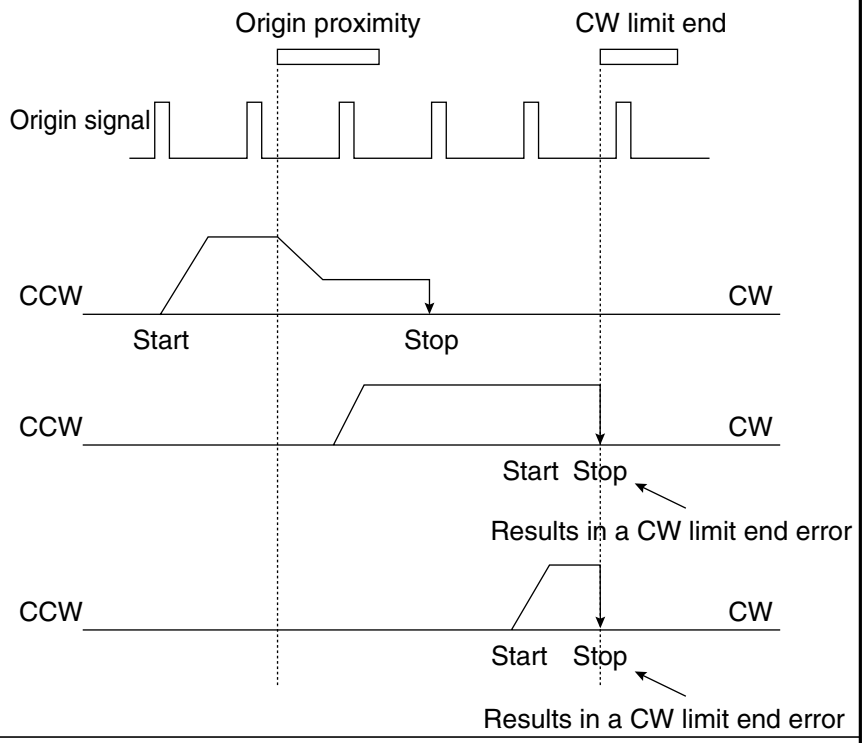
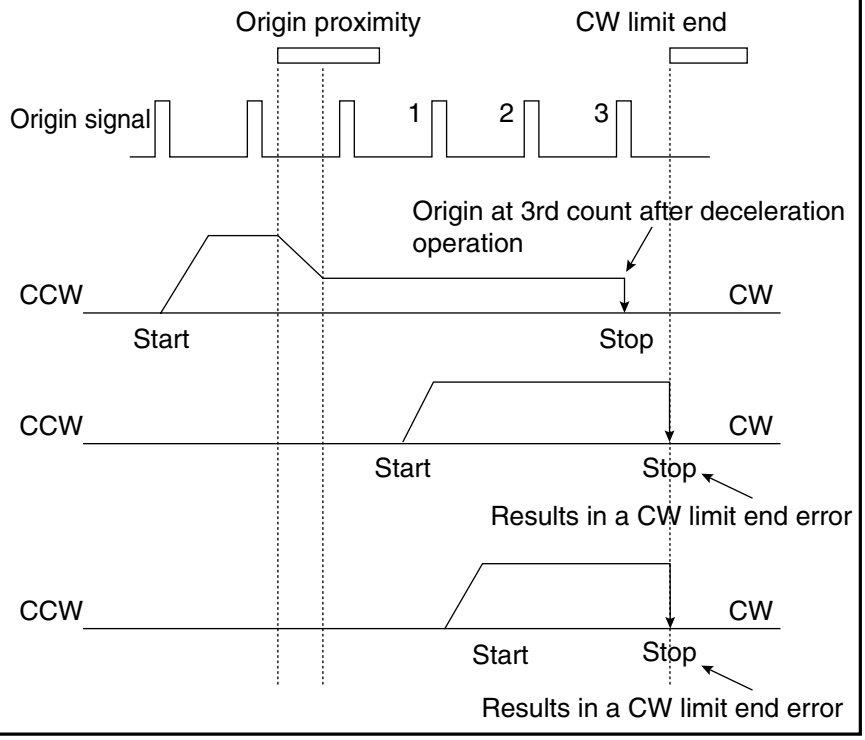
04 • The limit end signal is used instead of the origin proximity signal. (No deceleration operation at limit end)	This cannot be set as this results in an error at all limit ends.
05 • Origin proximity signal and origin signal not used	The point where zero return is started up is taken as the origin. Zero return is not performed. (This is for speed control operation on rotation system and for confirming initial operation.)

[3] All inversion OFF

Zero return operation *1 / Origin detection method *2	0: All inversion OFF
00 • Stop by origin signal after origin proximity escape	
01 • Origin count method 1 Deceleration operation starts by the edge of the origin proximity signal, and stops at the determined origin count after escape from origin proximity. In the example on the right, the count is set to "3".	

*1 Zero return operation: value of address A+0002 of parameter 1 (BCD: lower digit)

*2 Origin detection method: value of address A+0003 of parameter 1 (BCD: 2 digits)

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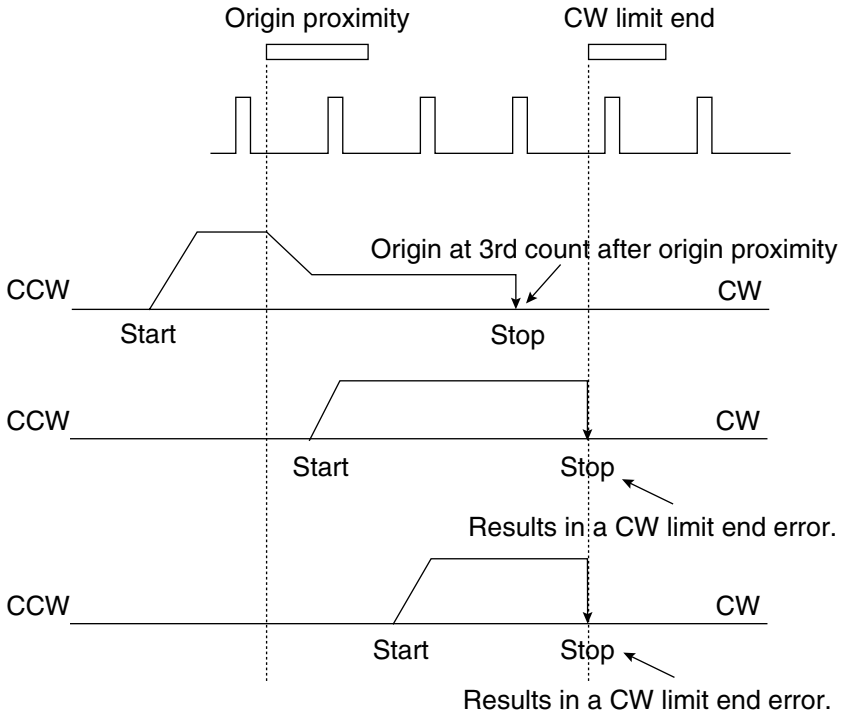
From previous page

02

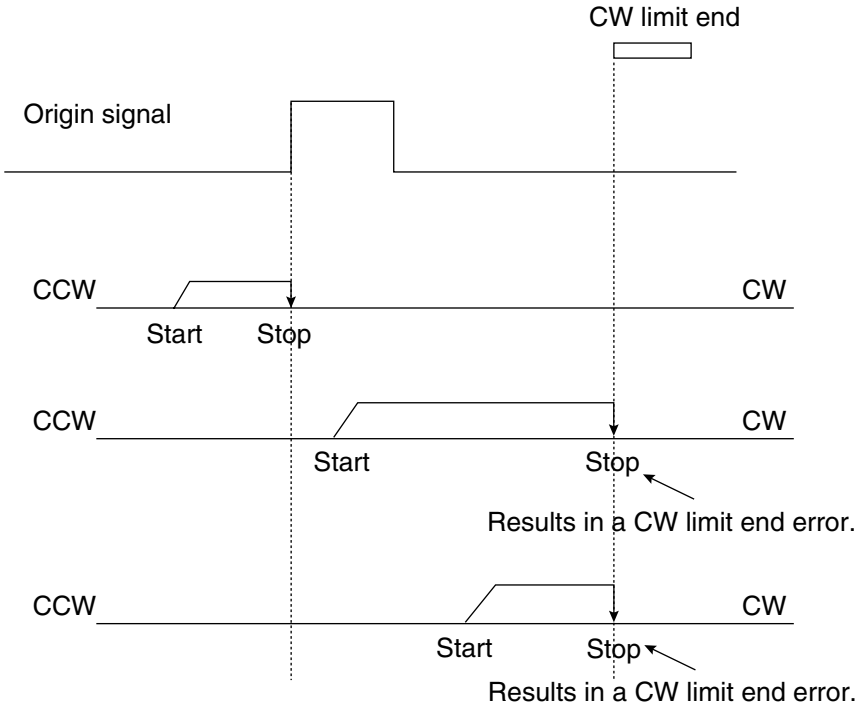
• Origin count method 2

Deceleration operation starts by the edge of the origin proximity signal, and stops at the determined origin count after escape from origin proximity. In this case, operation stops and an error does not occur when the determined count is reached even during deceleration operation. In the example on the right, the count is set to "3".



03

• Origin proximity not used



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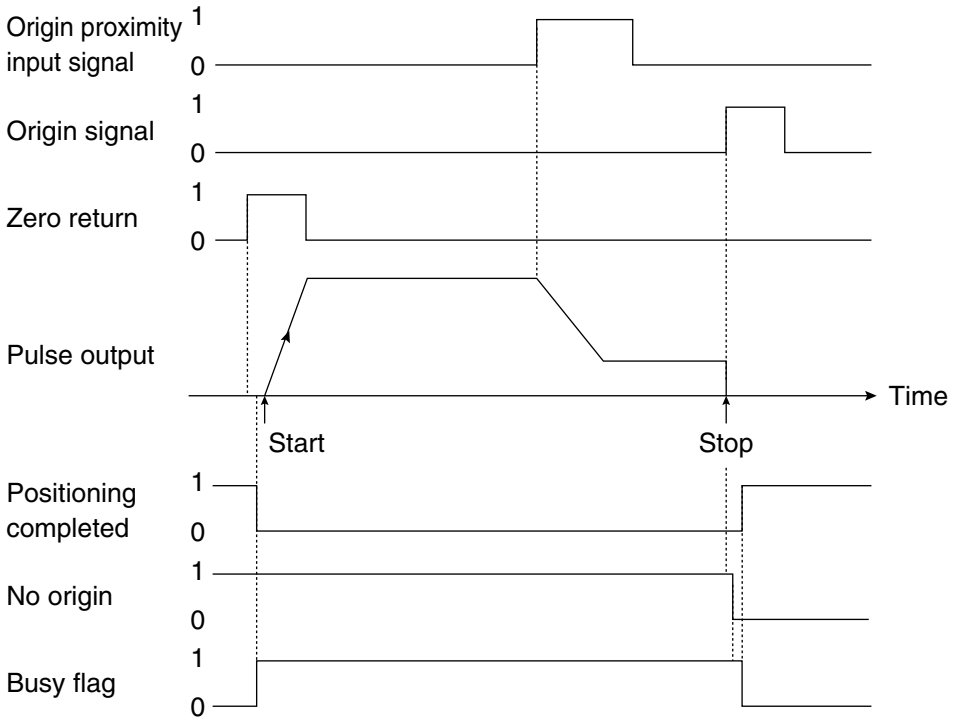
04 • The limit end signal is used instead of the origin proximity signal. (No deceleration operation at limit end)	This cannot be set as this results in an error at all limit ends.
05 • Origin proximity signal and origin signal not used	The point where zero return is started up is taken as the origin. Zero return is not performed. (This is for speed control operation on rotation system and for confirming initial operation.)

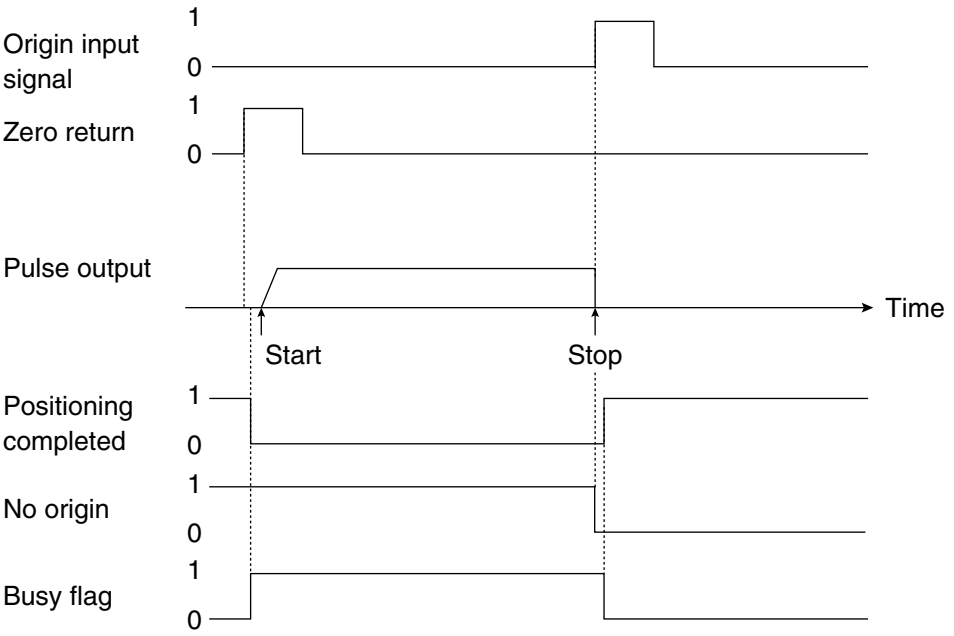
6-4 Zero return timing chart

[1] When there is no origin compensation data

● **When the origin proximity input signal is used**

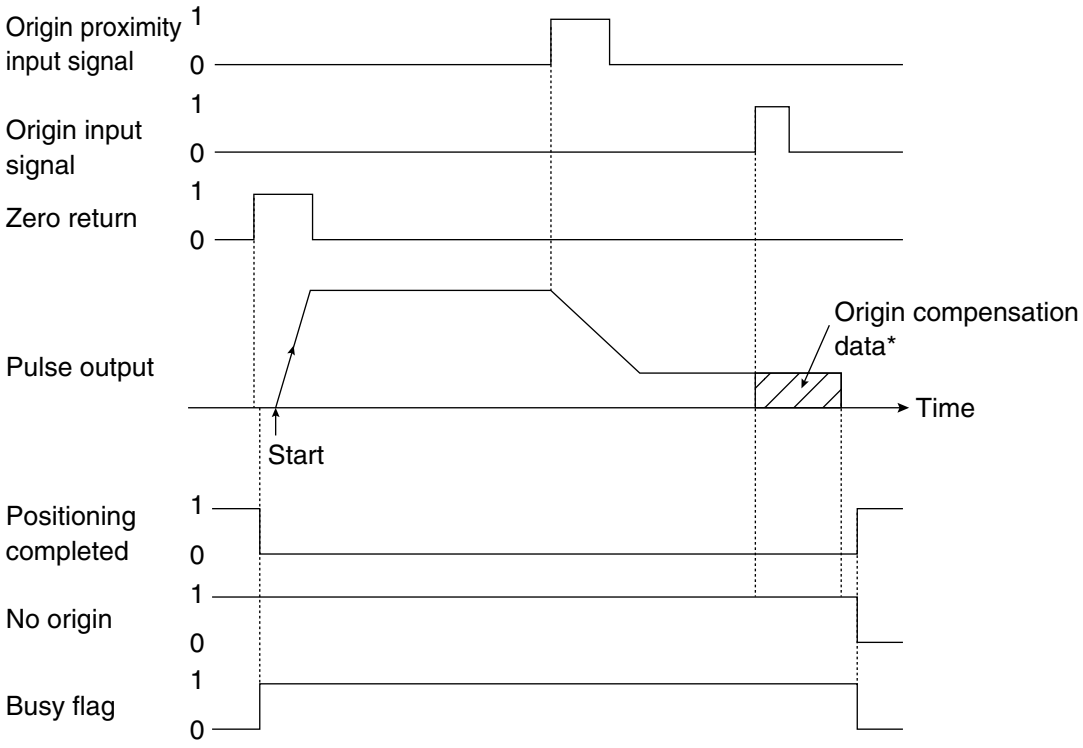


● **When the origin proximity input signal is not used**



[2] When there is origin compensation data

● When the origin proximity input signal is used

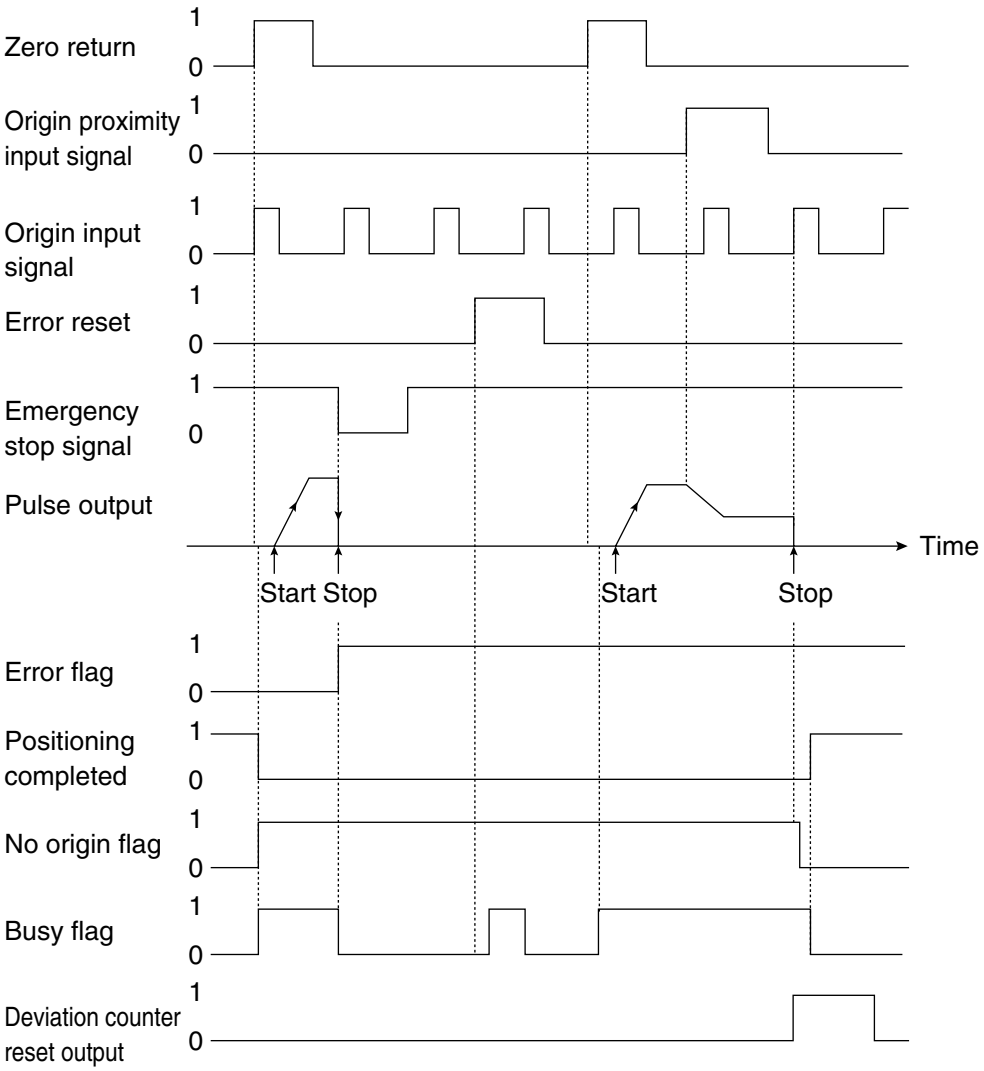


* The travel speed according to the origin compensation data is low-speed zero return.

• When a deviation occurs between the encoder feedback value and the instruction value with closed loop control OFF, adjust the deviation using the origin compensation data.

[3] Immediate stop of zero return

Zero return is canceled when the emergency stop signal (external input signal) is input during execution of zero return. Before executing a zero return again, reset the error.



6-5 Move origin

Move origin is used to return the axes to the origin position from any position. This is executed at the ON rising edge of move origin.

(Note) Execute move origin with the origin confirmed. The present position unconfirmed error (error code 039) occurs if the origin is not confirmed.

[1] Assignment of operation relay area and setting of operation data area

■ **Operation relay area (assignment of special I/O data) relating to move origin**

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	2	Busy flag	0	Non-busy state
							1	Busy state
Output (PC→PS)	0201	0221	0241	0261	1	Move origin [⇑]		
	0214	0234	0254	0274	0 to 7	Speed instruction value (10^1 10^0)	When 000000, the jog operation speed of parameters becomes the speed instruction value.	
	0215	0235	0255	0275	0 to 7	Speed instruction value (10^3 10^2)		
	0216	0236	0256	0276	0 to 7	Speed instruction value (10^5 10^4)		
	0217	0237	0257	0277	0 to 3	Acceleration time No. (0 to 8) *Setting value of parameter when 0		
					4 to 7	Deceleration time No. (0 to 8) *Setting value of parameter when 0		

*JW-14PS only

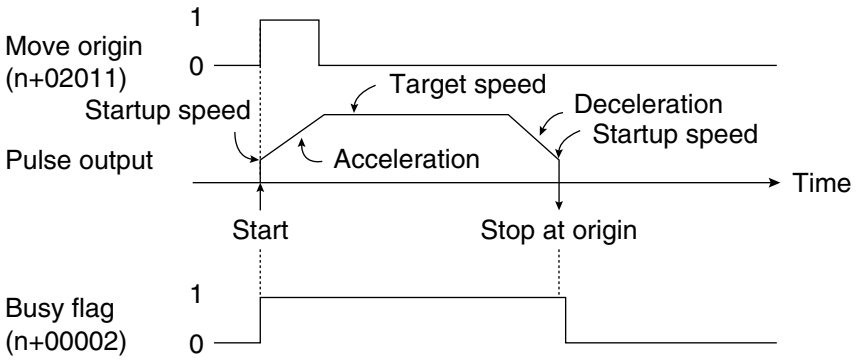
• "*****" in N+**** indicates the numerical value of the address.

• When the software limit has been set to be disabled (CW limit is smaller than or equal to CCW limit) on axis each parameter, move origin is not performed. (The present position is set to "0" when instructed.)

• The instruction speed of the operation data is used for the move origin speed, and the acceleration No. is used for the acceleration/deceleration data.

[2] Timing chart

The following shows the timing chart when move origin on the X-axis is executed.

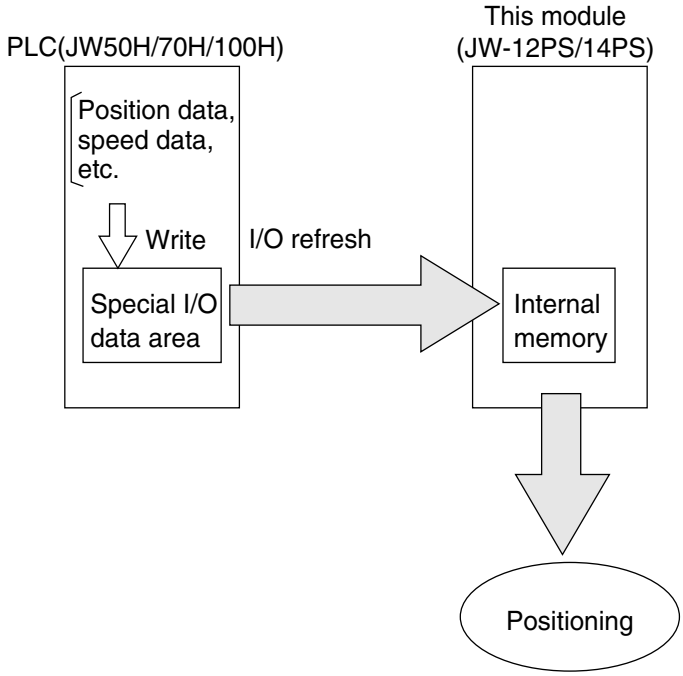


Chapter 7 Direct Operation

7-1 Explanation of direct operation

[1] Outline

In program operation, the step data programmed with the operation patterns must be transferred to internal memory on this module. However, in direct operation, positioning is performed merely by writing the position/speed data whenever necessary to the specified area (special I/O data area) on the PLC. Accordingly, this position/speed data can be input externally, and the present position from this module can be calculated and further processed to enable positioning, which allows more flexible and simpler position control.



(Note) In direct operation, linear interpolation is not performed.

[2] Startup of direct operation

There are two ways of starting up direct operation, and there are two direct operation modes.

(1) Startup method

① Change of state of the direct operation startup relay from OFF to ON (⌐↑)

② Change of state from OFF to ON (⌐↑) by an external startup signal (general-purpose input) (Parameter setting is required.)

(2) Operation mode

① Position control (PTP) operation

② Speed control operation

[3] Data setup procedure in direct operation

The following shows the procedure for performing direct operation on the X-axis.

① Set the display mode using switches.

↓

② Block-transfer parameter 1.
- When the acceleration/deceleration values are changed, this data only is block-transferred.
- Also set parameter 2 when an electronic gear, closed loop control and absolute value control is used.

(Note) When absolute value control operation is performed, connectable servo drivers are limited. ⇒See item "About absolute value control."

↓

③ Save the block data of each axis to flash ROM.

↓

④ Reset the error.

↓

⑤ Perform a zero return.

↓

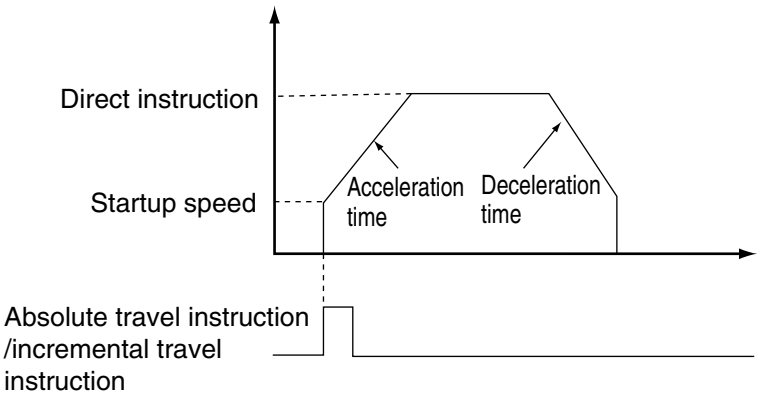
⑥ Set the position data, speed data, and acceleration/deceleration No. to be executed.
- When the acceleration/deceleration data is always the same, set the No. to 00 to use the parameter value.

↓

⑦ Turn the direct operation startup relay (n+02004) ON.
- In the case of an external startup, input the external startup signal with the external startup relay ON.

[4] Operation by direct operation matched to operation data area

Positioning by direct operation is determined according to the data set to the operation data area.



7-2 Setting data to be used for direct operation

The following describes the various axis data and special I/O data area used when executing direct operation. For details on how to set data and other details, see "5-3 Parameters" and "5-2 Operation data area."

[1] Axis parameters

● **Parameter 1 (regular parameter)**

Set as follows as block No.00. (must be set independently on each axis)

Address	Byte	Default	Function	
0006	1	00	Present position at speed control operation	00: Present position data updated as it is (also updated at an interrupt detection) 01: Present position data updated as it is (zero preset at an interrupt detection) 02: Present position data set to "0" at speed control startup, and present position data not updated(Present position data is also not updated after an interrupt has occurred, and remains at "0" until startup of the next position control.)
0010 to 0013	4	00000000	Reference speed	000000 to 500000pps *Remaining 1 byte is not used.
0014 to 0017	4	00000000	Maximum speed	000000 to 500000pps *Remaining 1 byte is not used.
0020 to 0023	4	00000000	Startup speed	000000 to 500000pps *Remaining 1 byte is not used.
0024 to 0027	4	00000000	Acceleration time	000000 to 250000pps *Remaining 1 byte is not used.
0030 to 0033	4	00000000	Deceleration time	000000 to 250000pps *Remaining 1 byte is not used.
0054 to 0057	4	00000000	Speed after interrupt	000000 to 500000 pps (enabled only at direct operation) • When 000000, the speed before the interrupt is continued. • 1 byte is unused

• "****" in A+**** indicates the numerical value of the address.

[2] Operation relay

● **Assignment of special I/O data area**

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	1	Positioning completed	↑	Completed
							↓	At startup
					2	Busy flag	0	Non-busy state
							1	Busy state
Output (PC←PS)	0200	0220	0240	0260	3	0: External input startup is program operation startup 1: External input startup is direct operation startup		
					4	At direct operation	Startup 2 [↑]	
					5		Position control/speed control setting	0: Position control setting 1: Speed control setting
	0201	0221	0241	0261	4	Forced intervention startup [↑]		
	0210	0230	0250	0270	0 to 7	Position instruction value(10^1 10^0)	Becomes the travel distance after an interrupt in the case of speed control operation. Sign indicates direction of operation.	
	0211	0231	0251	0271	0 to 7	Position instruction value(10^3 10^2)		
	0212	0232	0252	0272	0 to 7	Position instruction value(10^5 10^4)		
	0213	0233	0253	0273	0 to 7	Position instruction value(signA/I 10^6)		
	0214	0234	0254	0274	0 to 7	Speed instruction value(10^1 10^0)	When 000000, the jog operation speed of parameters becomes the speed instruction value.	
	0215	0235	0255	0275	0 to 7	Speed instruction value(10^3 10^2)		
	0216	0236	0256	0276	0 to 7	Speed instruction value(10^5 10^4)		
	0217	0237	0257	0277	0 to 3	Acceleration time No. (0 to 8) *Setting value of parameter when 0		
					4 to 7	Deceleration time No. (0 to 8) *Setting value of parameter when 0		

*JW-14PS only

• "****" in N+**** indicates the numerical value of the address.

7-3 Basic operation of direct operation

Whenever there is a startup, the required operation data is set to special I/O data area to execute position control operation or speed control operation.

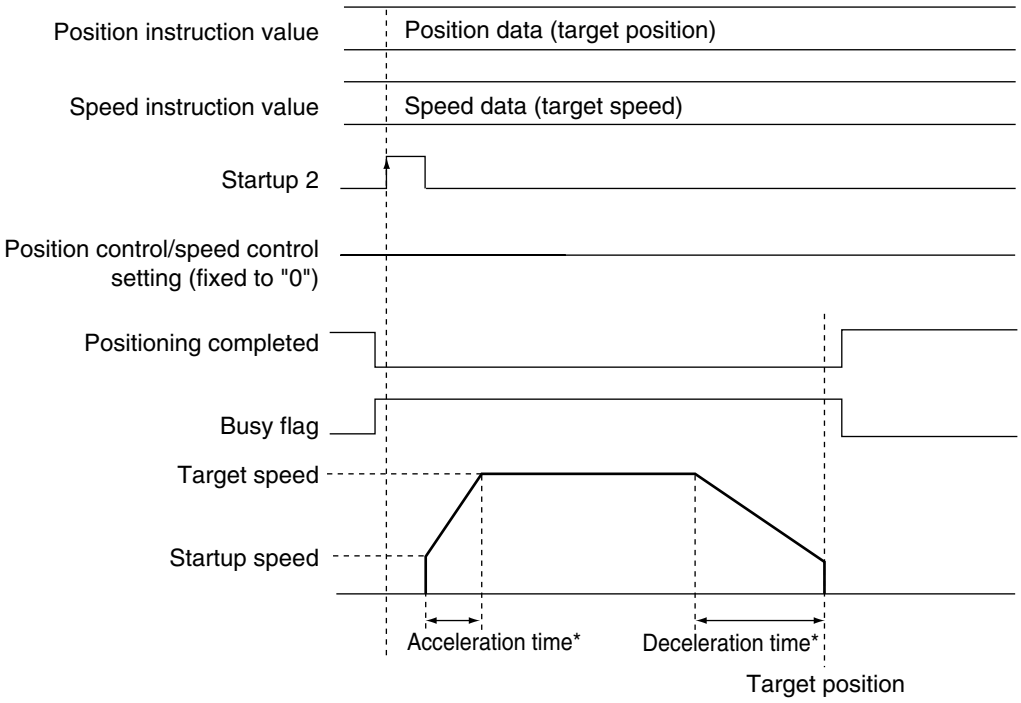
[1] Position control operation

Point-to-point position control operation is executed when direct operation is started up with the "Position control/speed control setting" relay set to "0".

(1) Required operation data and setting memory

Operation data name	Setting memory name	Description
Position data	Position data	Special I/O data area • "A/I" bit specifies absolute values or incremental values. (0: absolute value, 1: incremental value) • "Sign" bit specifies the direction when incremental value is selected. (0: CW, 1: CCW)
Speed data	Speed instruction value	Special I/O data area • When "0" is set, the parameter setting value is taken.
Acceleration time	Acceleration time No.	Special I/O data area • The acceleration time must be set to the block data (first half of block No.3) • When "0" is set, the parameter setting value is taken.
Deceleration time	Deceleration time No.	Special I/O data area • The deceleration time must be set to the block data (last half of block No.3) • When "0" is set, the parameter setting value is taken.
Startup time	Startup time	Parameter 1

(2) Basic timing chart



* The acceleration time and deceleration time are not the times up to when the speed arrives at the target speed, but the time up to when the speed arrives at the reference speed of the parameter. (⇒For details, see item "Parameter.")

[2] Speed control operation

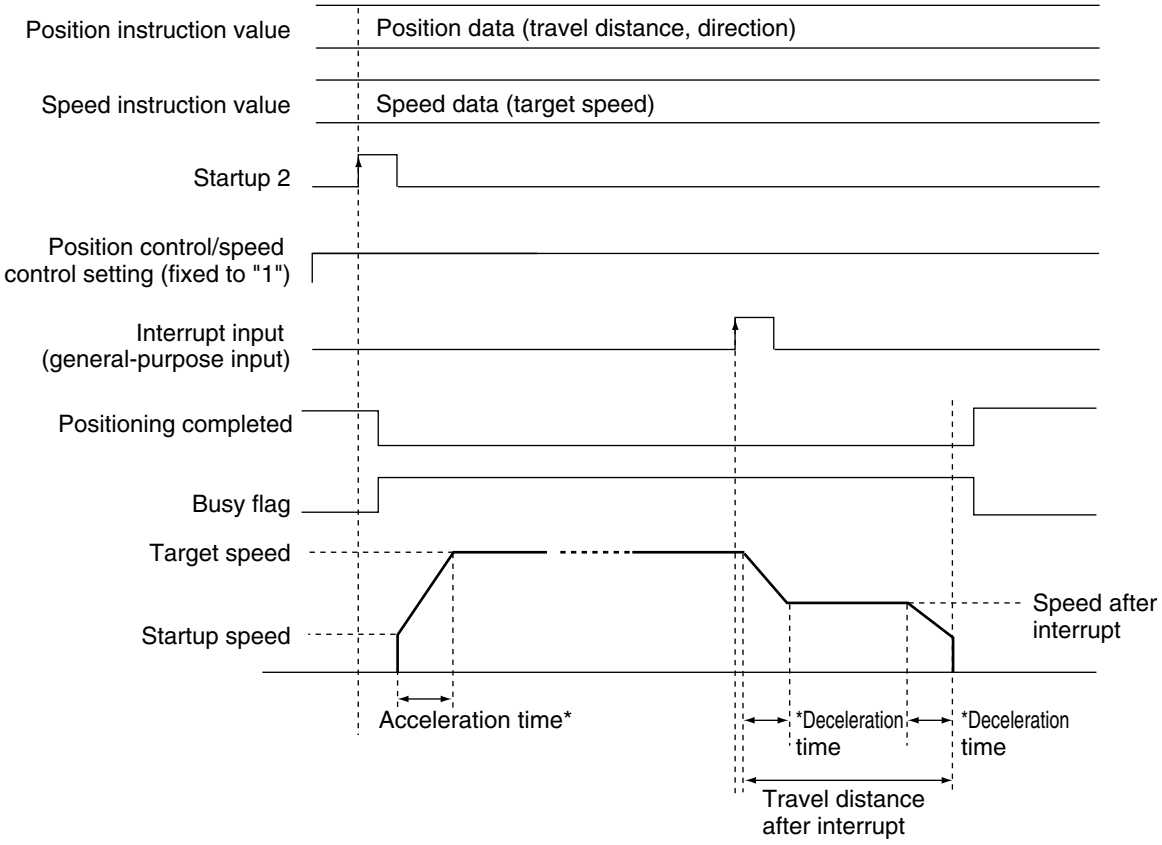
Speed control operation is executed when direct operation is started up with the "Position control/speed control setting" relay is set to "1".

Speed control operation can be stopped only by "external interrupt" and "deceleration stop."

(1) Required operation data and setting memory

Operation data name	Setting memory name	Description
Position data	Position instruction value	Special I/O data area • "Position data" is the travel distance after an interrupt. • "Sign" bit specifies the direction when incremental value is selected.(0: CW, 1: CCW) • "A/I" bit is disabled.
Speed data	Speed instruction value	Special I/O data area • When "0" is set, the parameter setting value is taken.
Acceleration time	Acceleration time No.	Special I/O data area • The acceleration time must be set to the block data (first half of block No.3) • When "0" is set, the parameter setting value is taken.
Deceleration time	Deceleration time No.	Special I/O data area • The deceleration time must be set to the block data (last half of block No.3) • When "0" is set, the parameter setting value is taken.
Startup time	Startup time	Parameter 1
Speed after interrupt	Speed after interrupt	Parameter 1

(2) Basic timing chart



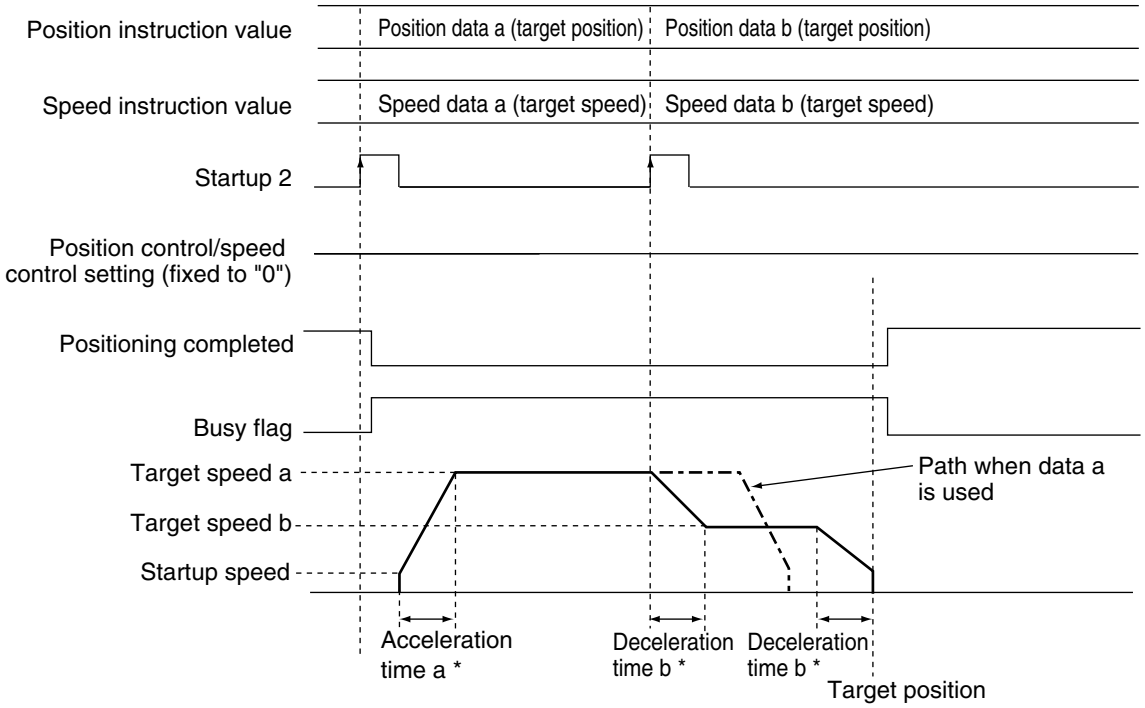
* The acceleration time and deceleration time are not the times up to when the speed arrives at the target speed, but the time up to when the speed arrives at the reference speed of the parameter. (⇒For details, see item "Parameter.")

7-4 Nested startups in direct operation

When new operation data is set to special I/O data area and position control operation is executed with operation at fixed speed during direct position control operation, new control is executed midway. Nested startups are not possible during acceleration/deceleration operation, and are not possible from speed control operation and program operation.

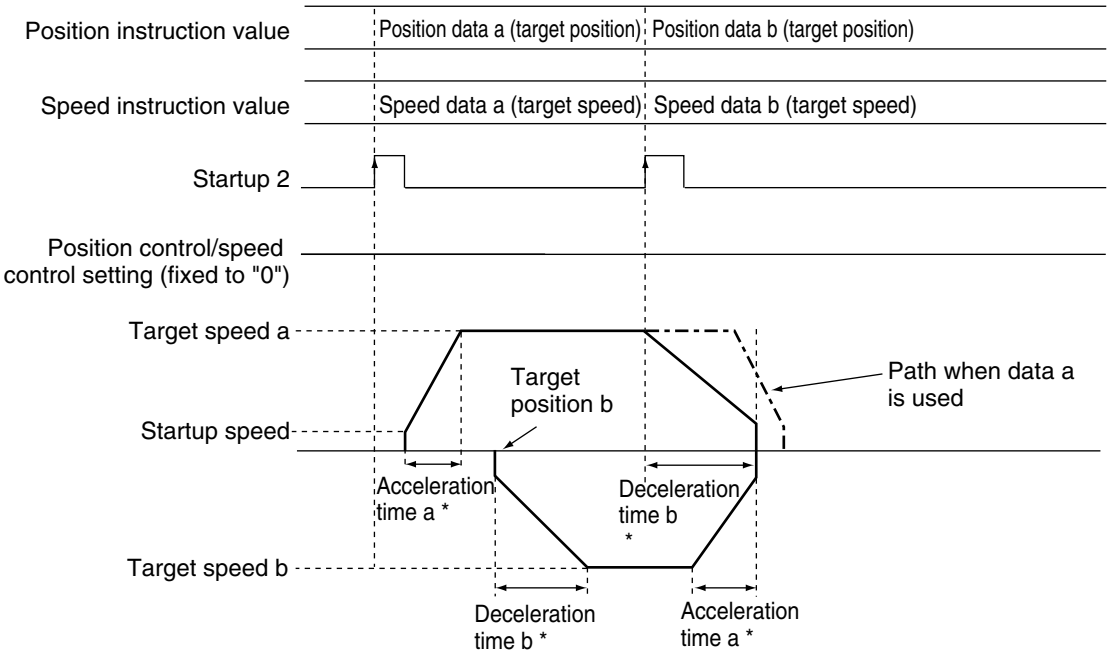
(1) Basic timing chart (in case of nested startups in same direction with absolute values)

In the following operation, the final position becomes position data b.



(2) Basic timing chart 2 (in the case of nested startups in opposite direction with absolute values)

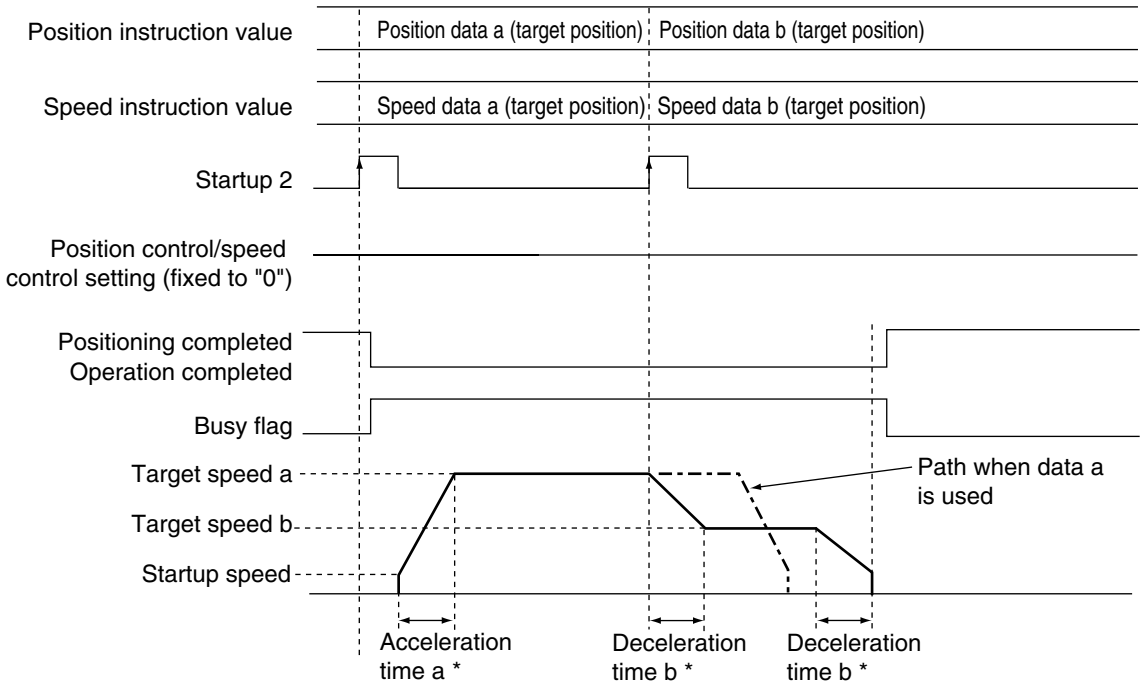
In the following operation, the final position becomes position data b.



* The acceleration time and deceleration time are not the times up to when the speed arrives at the target speed, but the time up to when the speed arrives at the reference speed of the parameter. (For details, see item "Parameter".)

(3) Basic timing chart 3 (in case of nested startups in the same direction with incremental values)

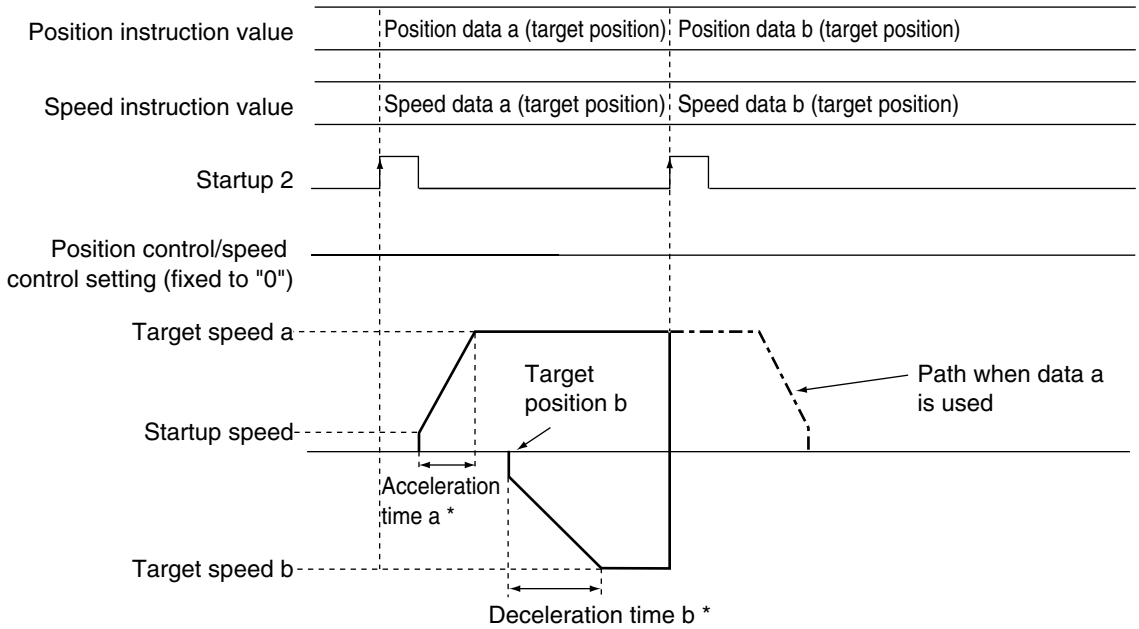
In the following operation, the final position becomes the position after travel by position data b from the 2nd startup signal.



(4) Basic timing chart 4 (in case of nested startups in opposite direction with incremental values)

In the following operation, the final position becomes the position after travel by position data b in the opposite direction from the 2nd startup signal.

With incremental values, there is no deceleration in opposite operation.



* The acceleration time and deceleration time are not the times up to when the speed arrives at the target speed, but the time up to when the speed arrives at the reference speed of the parameter. (For details, see item "Parameter".)

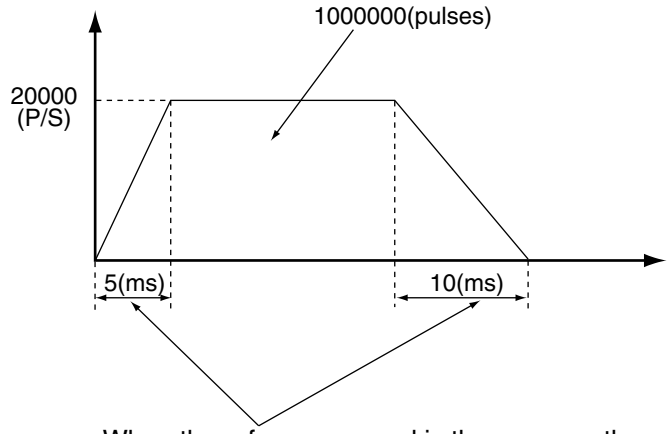
7-5 Direct operation sample program

The following shows an example of direct operation on the X-axis using the settings below.
These parameters must be set before this ladder program is executed.

(1) Operation settings

X-axis target coordinate data: 100000 (pulses)
X-axis target speed data: 200000 (p/s)
X-axis acceleration speed No.: 00 (parameter 1 data)
X-axis deceleration speed No.: 00 (parameter 1 data)

Address A+0010 to 0013 of parameter 1: 20000 (reference speed)
Address A+0024 to 0027 of parameter 1: 5 (acceleration time)
Address A+0030 to 0033 of parameter 1: 10 (deceleration time)

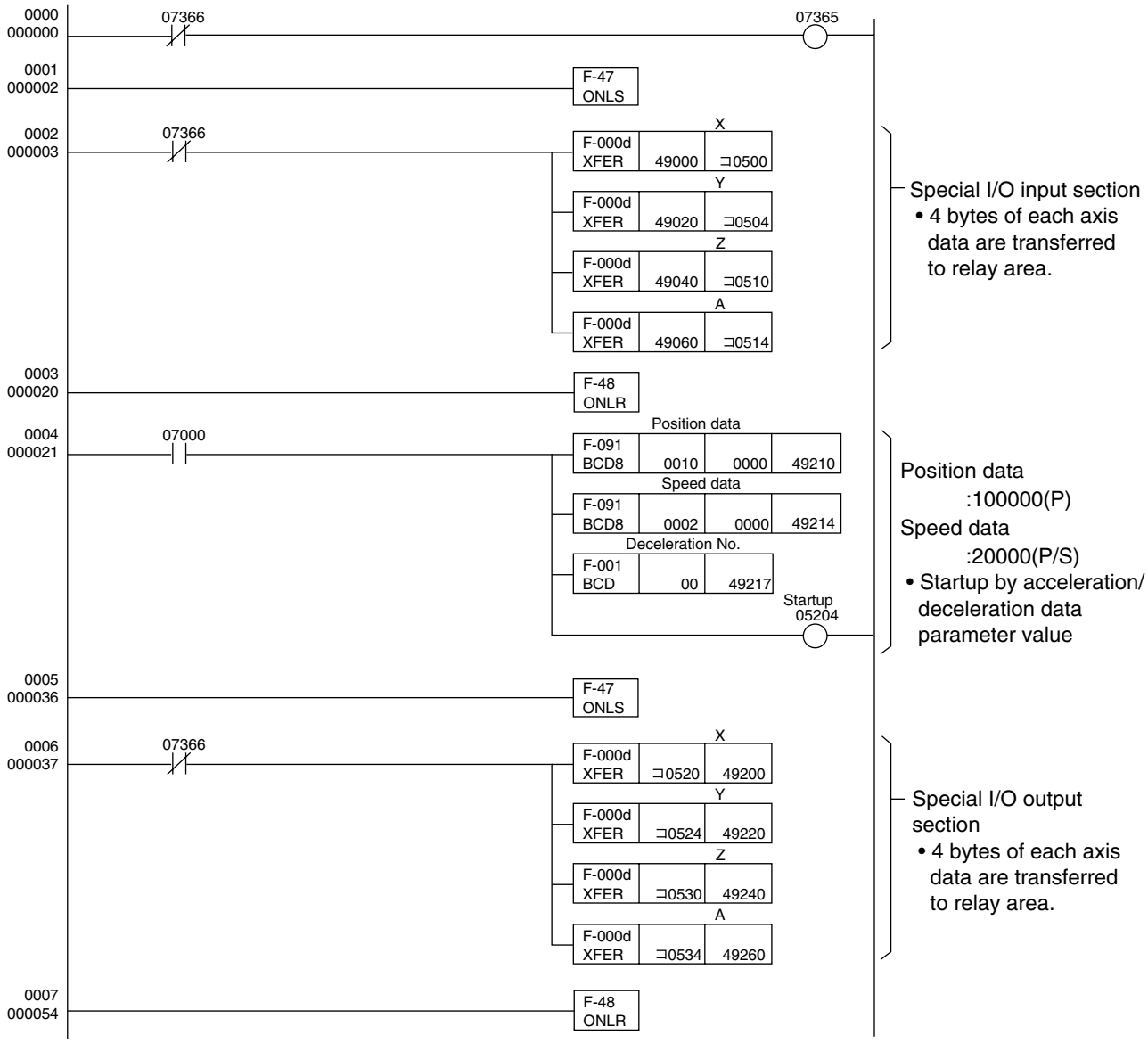


When the reference speed is the same as the target speed, the acceleration time and deceleration time become the actual acceleration or deceleration durations as they are.

Normally, at automatic I/O registration, the top address of the special I/O data area is 49000 and this area is not handled as a relay.
For this reason, only the data that must be handled as a relay is transferred in advance to relay area by a ladder program. (⇒See item "Ladder.")

When numbers in the relay No. 7000 range are turned ON by this ladder program, direct operation is executed.

(2) Ladder program



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(3) Assignment of special I/O data area

• Input section (N+0000 to 0177) * JW-14PS only

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	⊐0500	⊐0504	⊐0510	⊐0514	0	Operation ready (U.R.)	0	Operation readying
							1	Operation ready
					1	Positioning completed	↑	Completed
							↓	At startup
					2	Busy flag	0	Non-busy state
							1	Busy state
					3	Program operation startup standby	0	Non-startup standby
							1	Startup standby state
					4	No origin flag	0	Origin
							1	No origin
					5	Teaching completed	↑	Completed
							↓	At start
					6	BD.REQ (block data request) signal • Block transfer is possible only when this flag is ON.	0	Block transfer disabled
							1	Block transfer enabled
					7	Error flag	0	No error
							1	Error
	⊐0501	⊐0505	⊐0511	⊐0515	0	Present position display mode monitor	0	Instruction value display
							1	Encoder input display
					1	Interrupt output monitor	0	Interrupt output OFF
							1	Interrupt output ON
					2	Driver communications completed	↑	Completed
						• Enabled only when absolute value control is enabled.	↓	At start
					3 to 7	Reserved function		
	⊐0502	⊐0506	⊐0512	⊐0516	0	CW limit input signal	State of input signals of each axis is monitored. 1: ON 0: OFF	
					1	CCW limit input signal		
					2	Origin proximity input signal		
					3	Origin input signal		
					4	General-purpose input signal		
					5	Driver error input signal		
					6	Emergency stop input signal		
					7	Positioning completed signal		
	⊐0503	⊐0507	⊐0513	⊐0517	0	M output 0	State of each M output (zone) signal is monitored. 1: ON 0: OFF	
					1	M output 1		
					2	M output 2		
					3	M output 3		
					4	M output 4		
					5	M output 5		
					6	M output 6		
					7	M output 7		
	49004	49024	49044	49064	0 to 7	Present position (10^0 10^1)		
	49005	49025	49045	49065	0 to 7	Present position (10^5 10^6)		
	49006	49026	49046	49066	0 to 7	Present position (10^4 10^5)		
	49007	49027	49047	49067	0 to 7	Present position (10^6 sign)		
	49010	49030	49050	49070	0 to 7	Output code (00 to 99) *Enabled at program operation		
	49011	49031	49051	49071	0 to 7	Step No. (00 to 99) *Enabled at program operation		
	49012	49032	49052	49072	0 to 7	Error code, lower (00 to 99)		
	49013	49033	49053	49073	0 to 7	Error code, upper (00 to 99)		
	49014	49034	49054	49074	0 to 7	Reserved function		
	49015	49035	49055	49075	0 to 7	Reserved function		
	49016	49036	49056	49076	0 to 7	Reserved function		
	49017	49037	49057	49077	0 to 7	Block data No. monitor (00 to 31) *Read block No. is indicated.		
	49100 to 49177				0 to 7	Data storage area at block data read (PC←this module transfer buffer area) *Area common to each axis		

• Output section (N+0200 to 0377)

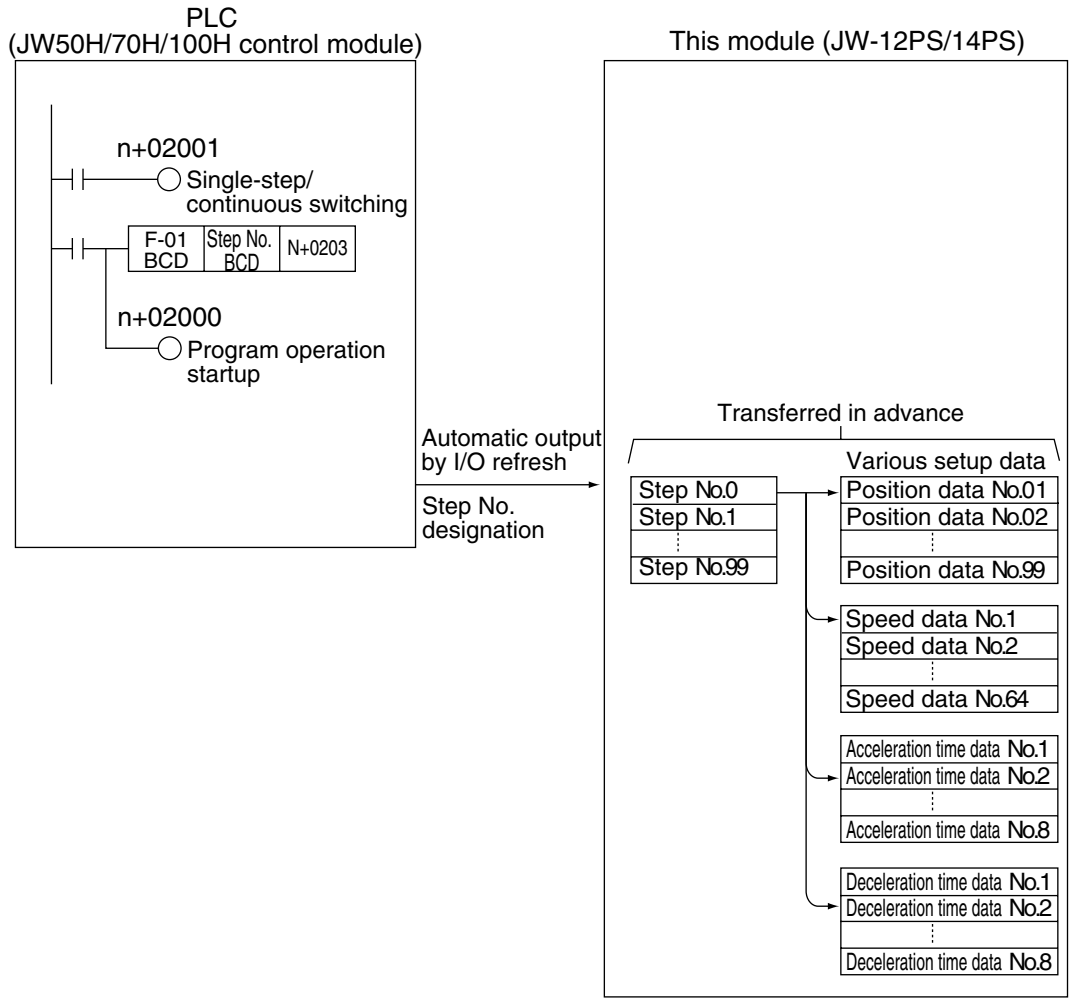
***JW-14PS only**

I/O	Byte address of data memory				Bit	Description		
	X-axis	Y-axis	Z-axis*	A-axis*				
Output (PC→PS)	⊐0520	⊐0524	⊐0530	⊐0534	0	At program operation	Start 1 [↑]	
					1		Continuous startup/single-step startup setting	0: Continuous startup; 1: Single-step startup
					2		Step No. enable	0: Set disabled; 1: Set enabled
					3	External input startup selection		
					4	At direct operation	Start 2 [↑]	
					5		Position control/speed control setting	0: Position control startup; 1: Speed control startup
					6		Jog+ (CW jog operation instruction)	0: Stop; 1: Operation
					7		Jog- (CCW jog operation instruction)	0: Stop; 1: Operation
	⊐0521	⊐0525	⊐0531	⊐0535	0	Zero return [↑]		
					1	Move origin [↑]		
					2	Present position preset [↑]		
					3	Deceleration stop [↑]		
					4	Forced intervention startup [↑]		
					5	Clear deviation		0: OFF; 1: ON
					6	Override enable		0: Disabled; 1: Enabled
					7	Clear error [↑] (pulse output inhibit cancel)		
	⊐0522	⊐0526	⊐0532	⊐0536	0	Teaching [↑]		
					1	Position data interrupt of interrupt output [↑]		
					2	General-purpose output		0: OFF; 1: ON
					3	Block data write *Executed at each scan when ON		
					4	Block data read *Executed at each scan when ON		
					5	Block data save (write to flash ROM) [↑] *Enabled on X-axis only (batch operation for 4 axes)		
					6	Switching of present position display mode		0: Instruction value; 1: Encoder input (at closed loop control)
					7	Read absolute present position [↑] *Enabled only when absolute value control is enabled		
	⊐0523	⊐0527	⊐0533	⊐0537	0 to 7	Step No. at program operation (00 to 99)		
	49204	49224	49244	49264	0 to 7	Position No. at teaching (00 to 99)		
	49205	49225	49245	49265	0 to 7	Designation of block data block No. (00 to 31)		
	49206	49226	49246	49266	0 to 7	Override value, lower (00 to 99)		Set override value within range 000 to 999%.
	49207	49227	49247	49267	0 to 7	Override value, upper (00 to 09)		
	49210	49230	49250	49270	0 to 7	Position instruction value (10^1 10^0)		Becomes the travel distance after an interrupt in the case of speed control operation. Sign indicates direction of operation.
	49211	49231	49251	49271	0 to 7	Position instruction value (10^3 10^2)		
	49212	49232	49252	49272	0 to 7	Position instruction value (10^5 10^4)		
	49213	49233	49253	49273	0 to 7	Position instruction value (sign A/I 10^6)		
	49214	49234	49254	49274	0 to 7	Speed instruction value (10^1 10^0)		When 000000, the jog operation speed of the parameter becomes the speed instruction value.
	49215	49235	49255	49275	0 to 7	Speed instruction value (10^3 10^2)		
	49216	49236	49256	49276	0 to 7	Speed instruction value (10^5 10^4)		
	49217	49273	49257	49277	0 to 3	Acceleration time No. (0 to 8) *When 0, setting value of parameter		
					4 to 7	Deceleration time No. (0 to 8) *When 0, setting value of parameter		
	49300 to 49377				64 bytes	Data storage area at block data write (PC→this module transfer buffer area) *Area common to each axis		

Chapter 8 Program Operation

8-1 Outline

In program operation, step data (position data, speed data, etc.) is transferred in advance to this module, and positioning is performed based on this step data according to instructions from the PLC.



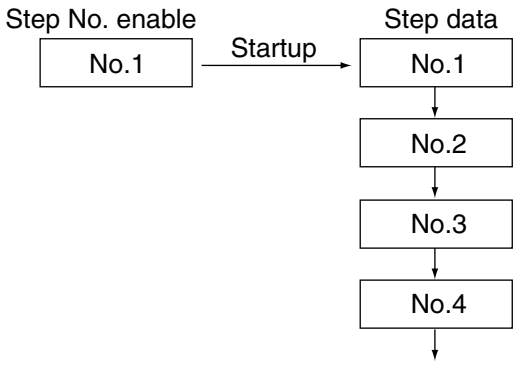
Transfer various setup data and step data to this module by block data transfer. Step No. enable is turned ON after the step No. to be operated is set to the operation relay area.

Startup is executed by ON rising edge of startup assigned to the operation relay area (internal auxiliary area) or general-purpose input (*) from outside.

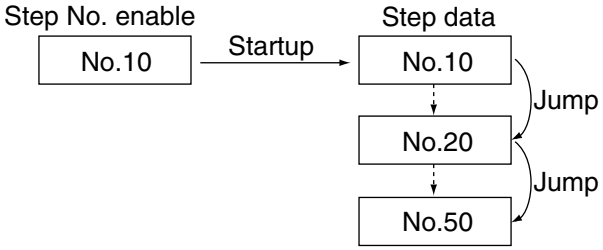
* Parameter 1 (address A+0076) must be set to general-purpose input.

This module performs positioning by step data (speed data No., acceleration time data No., deceleration time data No., dwell timer data No.) that is set to the specified step No.

●When a jump is not programmed
Positioning is performed in order.



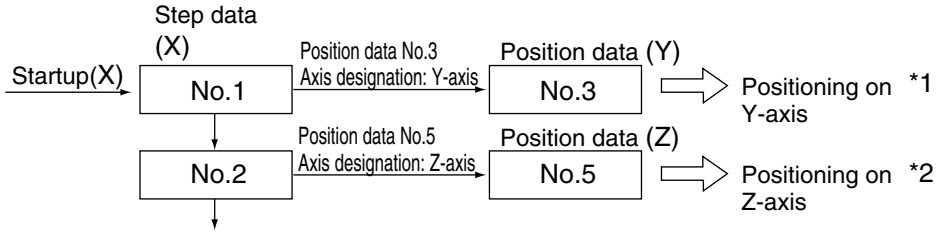
●When a jump is programmed
Program execution moves to the step No. at the jump destination and positioning is continued from that step No.



• This module stores executed step Nos. to memory, so subsequent steps can be executed after program execution is stopped, for example, by a deceleration stop.
Note, however, that when an origin search, zero return or present position preset is executed, this step No. is lost and must be started up again with the sequence No. enabled.

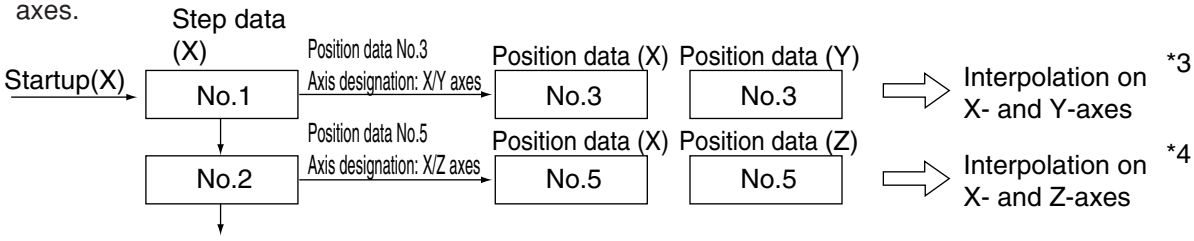
[1] Axis designation

Which axis is used to perform positioning from the step data is specified by axis designation in the step data.
At this time, the position data that is used is the position data of the axis specified by axis designation.
The data of the axis on which startup was performed is used as all data (speed, acceleration/deceleration data, etc.) other than position data that is specified in step data.



*1 X-axis data is used for the acceleration/deceleration time, startup speed, target speed, dwell time, and other settings. The Y-axis data is used only for the coordinate data.
*2 X-axis data is used for the acceleration/deceleration time, startup speed, target speed, dwell time, and other settings. The Z-axis data is used only for the coordinate data.

When multiple axes are specified by axis designation, interpolation is performed on the specified axes.



*3 The data of the X-/Y-axes is used only for the coordinate data. For all other data, the data of the X-axis is used.
*4 The data of the X-/Z-axes is used only for the coordinate data. For all other data, the data of the X-axis is used.

(Note) Interpolation can be performed only on two axes at maximum.

[2] Axis designation and flags

There are two types of status and present position that are assigned to input relays: those that are input to the axis (axis in the step data) on which startup was executed, and those that are input to the actual operating axis specified by axis designation.
Also, the data of the startup execution axis is used at all times for the output relay.

● **Output relay for startup execution axis** (assignment of special I/O data area)

I/O	Byte address of data memory				Bit	Function			
	X-axis	Y-axis	Z-axis*	A-axis*					
Output (PC→PS)	0200	0220	0240	0260	0	At program startup	Startup 1 [↑]		
					1		Continuous startup/ single-step startup setting	0	Continuous startup
								1	Single-step startup
					2		Step No. set	0	Set disabled
								1	Set enabled
	0202	0222	0242	0262	2	Switching of present position display mode	0	Instruction value	
							1	Encoder input (at closed loop control)	
	0203	0223	0243	0263	0 to 7	Step No. at program operation (00 to 99)			

*JW-14PS only

● **Input to startup execution axis** (assignment of special I/O data area)

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	0	Operation ready (U.R.)	0	Operation readying
							1	Operation ready
					1	Positioning completed	↑	Completed
							↓	At startup
					3	Program operation startup standby	0	Non-busy state
							1	Busy state
	0010	0030	0050	0070	0 to 7	Output code (00 to 99) *Enabled at program operation		

*JW-14PS only

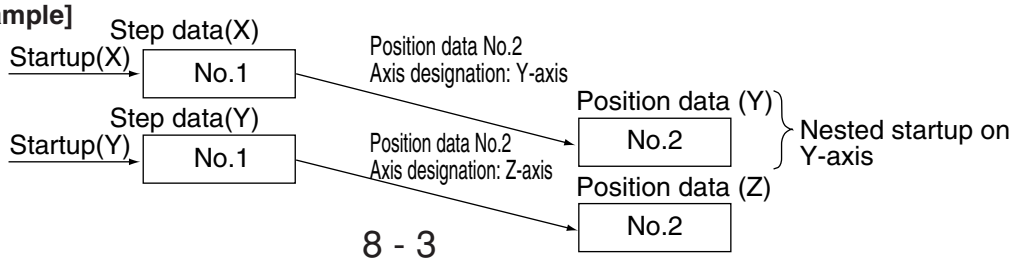
● **Input to operating axis** (assignment of special I/O data area)

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	2	Busy flag	0	Non-busy state
							1	Busy state
	0001	0021	0041	0061	0	Present position display mode monitor	0	Instruction value display
							1	Encoder input display
					1	Interrupt output monitor	0	Interrupt output OFF
							1	Interrupt output ON

*JW-14PS only

- "*****" in N+**** indicates the numerical value of the address.
- When the same operating axis is specified in other step data by axis designation in the step data, the nested startup error (error code 034) occurs.
- When the startup execution axis is the same as the operating axis, the nested startup error (error code 034) occurs even if the axis designation of each step data is different.

[Example]



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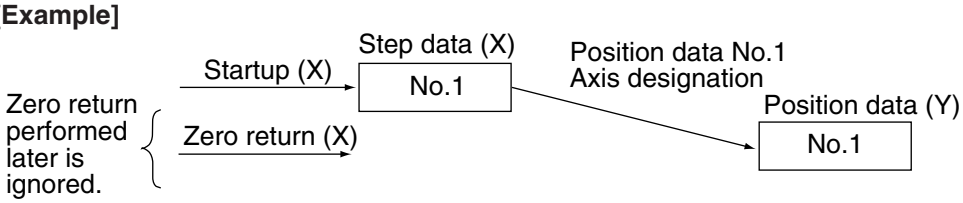
• When the instruction (e.g. zero return) other than program operation is the same axis as the startup execution axis in program operation, the nested startup error does not occur, and the instruction performed later is ignored.

[Example]



In other words, in program operation, instructions on the operating axis are handled as a nested startup.

8-2 Setting the data to be used in program operation

The following describes the various axis parameters and operation relays that are used when program operation is executed.

For details on how to set data and other details, see "5-3 Parameters" and "5-2 Operation data area."

[1] Axis parameters

■ Parameter 1 (regular parameter)

Set as follows as block No.00. (must be set independently on each axis)

Address	Byte	Default	Function	
0000	Bit 0	0	Selection of output pulse signal system	0 : CCW/CW 1 : pulse/direction
0006	1	00	Present position at speed control operation	00: Present position data updated as it is (also updated at an interrupt detection) 01: Present position data updated as it is (zero preset at an interrupt detection) 02: Present position data set to "0" at speed control startup, and present position data not updated (Present position data is also not updated after an interrupt has occurred, and remains at "0" until startup of the next position control.)
0010 to 0013	4	00000000	Reference speed	000000 to 500000pps *Remaining 1 byte is not used.
0014 to 0017	4	00000000	Maximum speed	000000 to 500000pps *Remaining 1 byte is not used.
0020 to 0023	4	00000000	Startup speed	000000 to 500000pps *Remaining 1 byte is not used.
0024 to 0027	4	00000000	Acceleration time	000000 to 250000ms *Remaining 1 byte is not used.
0030 to 0033	4	00000000	Deceleration time	000000 to 250000ms *Remaining 1 byte is not used.
0044 to 0047	4	-9999999	CCW side software limit value	-9999999 to 9999999
0050 to 0053	4	9999999	CW side software limit value	-9999999 to 9999999
0074	1	00	Acceleration/deceleration curve (00 to 99%)	Sets the sinusoidal coefficient within range 00 to 99%. (ramp when "00" is set)
0076	Bit 0 to 3	00	General-purpose input operation mode setting	2: External startup input (Both external startup and startup by the internal startup relay are enabled.)
0077	1	00	Parameter common setting (X-axis parameter only enabled)	0: Axis independent parameters 1: X-/Y-axis common parameters 2: X-/Y-/Z-axis common parameters (JW-14PS only) 3: X-/Y-/Z-/A-axis common parameters (JW-14PS only)

• "*****" in A+**** indicates the numerical value of the address.

[2] Operation relay

■ Assignment of special I/O data area

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	2	Busy flag	0	Non-busy state
							1	Busy state
					3	Program operation startup standby	0	Non-startup standby
							1	Startup standby state
	0010	0030	0050	0070	0 to 7	Output code (00 to 99) *Enabled at program operation		
	0011	0031	0051	0071	0 to 7	Step No. (00 to 99) *Enabled at program operation		
Output (PC←PS)	0200	0220	0240	0260	0	At program startup	Startup 1 [↑]	
					1		Continuous startup/ single-step startup setting	0 Continuous startup
								1 Single-step startup
					2		Step No. set	0 Set disabled
								1 Set enabled
	0203	0223	0243	0263	0 to 7	Step No. at program operation (00 to 99)		

*JW-14PS only

- "****" in N+**** indicates the numerical value of the address.
- When positioning is performed by absolute value position data, the present position unconfirmed error (error code 039) occurs if the origin is not confirmed.

8

8-3 Operation in program operation

Positioning can be performed as follows according to step data settings.

[1] Startup of program operation

There are two ways of starting up program operation, and there are two operation modes after a startup.

(1) Startup method

① Change of state of the program operation startup relay from OFF to ON (↑)

② Change of state from OFF to ON (↑) by an external startup signal (general-purpose input) (Selection of external startup input and parameter setting are required.)

(2) Operation mode after a startup

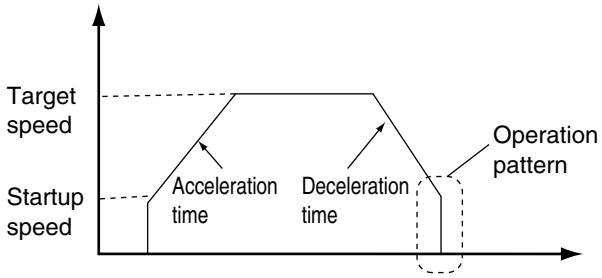
① Continuous startup: When the continuous/single-step startup relay is OFF, continuous program operation is executed when program execution is started up by the above method. Select this operation mode when performing actual program operation.

② Single-step startup: When the continuous/single-step startup relay is ON, and program execution is started up by the above method, program operation is executed one step at a time even by the data programmed in the continuous program. (Program execution is performed entirely in single steps.) This operation mode is used, for example, when debugging program operation.

[2] Operation in program operation according to step data

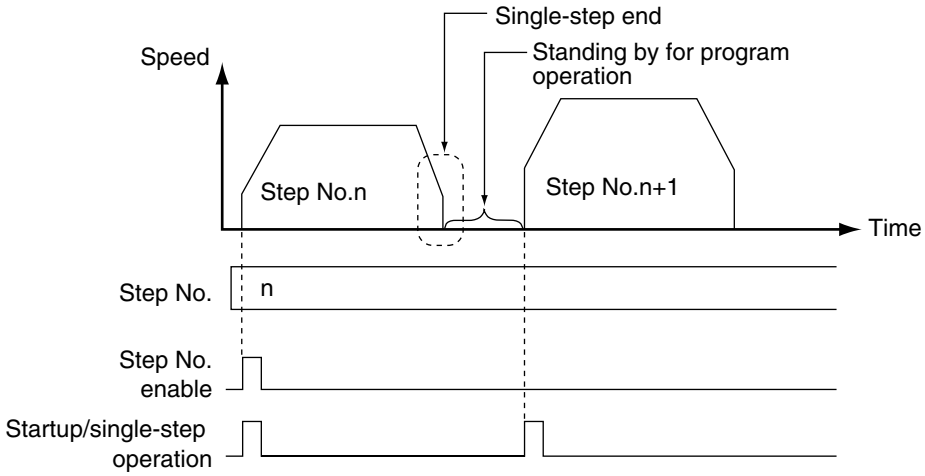
Positioning in program operation is determined by the data preset to step data.

⇒ See items "Format of data in program data" and "Operation patterns."



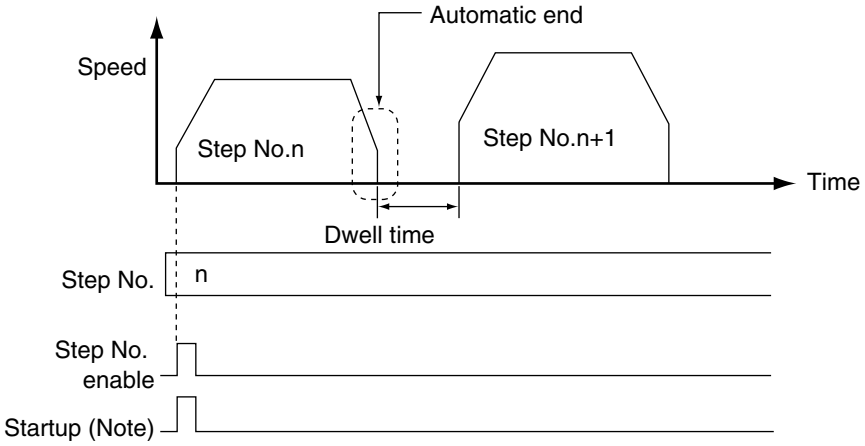
(1) In single-step operation (operation pattern 0, jump destination 00)

After positioning is executed by the settings of this step data, program execution stands by for program operation. Then, the next step No. (incremented by "1") is executed when the startup or single-step startup instruction is received.



(2) In continuous operation (operation pattern 1, jump destination 00)

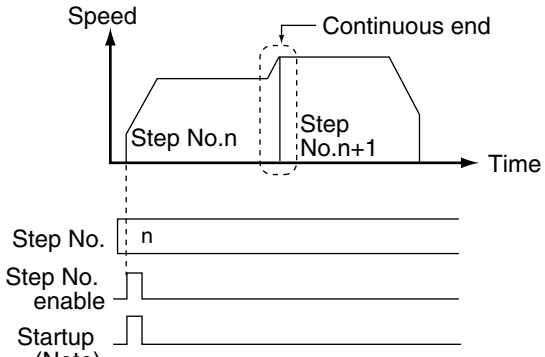
Position is executed by the settings of this step data, program execution stops for the time preset to the dwell timer, and position is executed by the settings of the next (incremented by "1") step data.



(Note) When single-step startup is executed, the automatic end does not result; single-step end results.
At this time, the dwell timer does not operate.

(3) In continuous operation (operation pattern 2, jump destination 00)

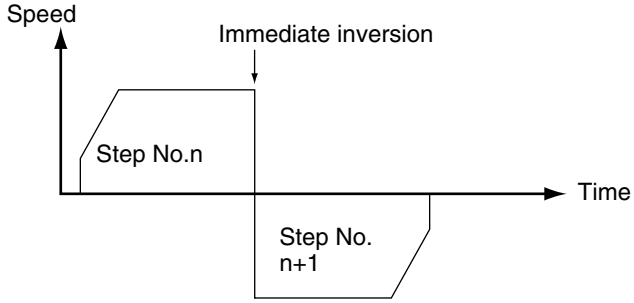
Though positioning is performed by the setting of this step data, the speed reaches the target speed of the next (incremented by "1") step data at the target position, and positioning of that position is performed.



(Note) When single-step startup is executed, the automatic end does not result; single-step end results.

Even when "continuous" is selected as the operation pattern, operation in which the positioning direction is inverted can be executed. At this time, operation is as follows regardless of the target speed or absolute/incremental position in each step.

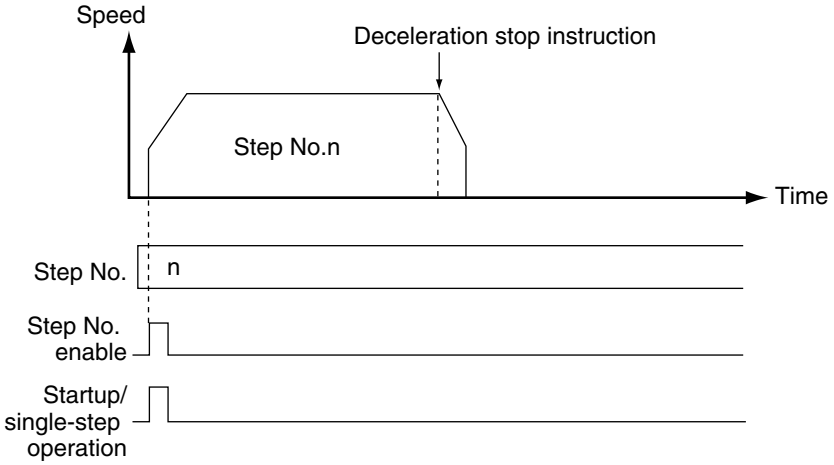
[Example] When step No.n is set to "continuous" and step No.n+1 is set to "single-step end," operation is inverted immediately without acceleration/deceleration when operation is inverted at step No.n+1 from step No.n. (When acceleration/deceleration is required at inversion, set the operation pattern of No.n to "automatic".)



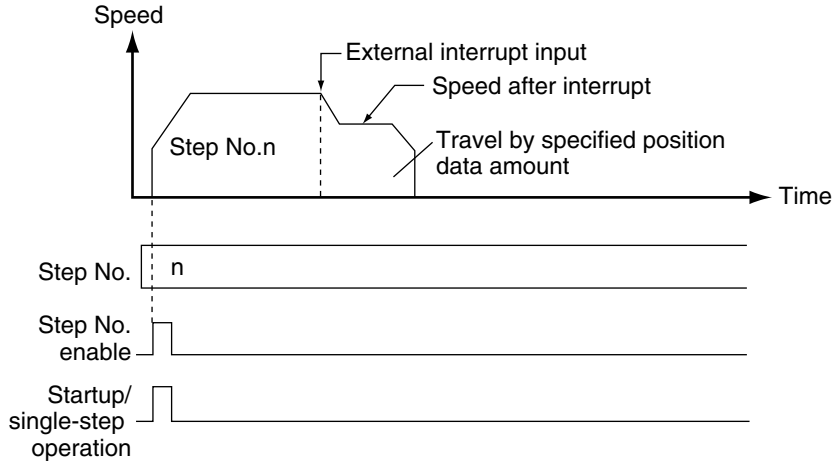
(4) Speed control (operation pattern 3)

Pulse output is maintained at the target speed in this step data. The present position is also calculated during continued output. The direction of pulse output follows the sign in the position data of the same No. To stop this output, either execute the deceleration stop instruction, or input the external interrupt signal from general-purpose input.

● **Deceleration stop**



● **External interrupt stop**

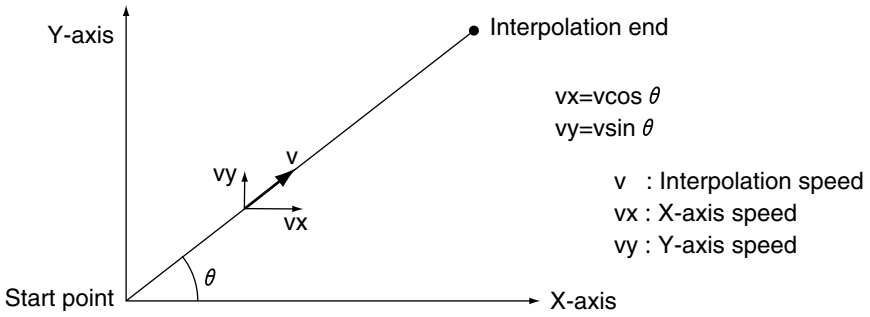


To perform an external interrupt, set address A+0006,0076 of parameter 1.

⇒ See item "External interrupt" and details of parameters.

[3] Linear interpolation

Linear interpolation can be performed on two or more specified axes. The desired axis on which linear interpolation is performed is specified in the axis designation in the step data. At this time, the target speed set to the step data of the axis that was started up becomes the interpolation speed. For details on the step data setting, see item "Details of step data."



(Note) Interpolation speed is expressed as the speed data to set to step data. At this time, when the interpolation speed is resolved to the speed of each axis (vx and vy in the above example), set so that the maximum speed set to each axis parameter is not exceeded. (⇒ See "Appendix" data.)

8-4 Data setup procedure in program operation

The following shows the procedure for performing program operation on the X-axis.

① Set the display mode using switches.

↓

② Set the block data (parameters 1 and 2, position, speed, step, etc.) of each axis to registers (file 1, etc.) on the PLC.

- Also set parameter 2 when an electronic gear, closed loop control and absolute value control is used.

When absolute control operation based on an absolute system is performed, connectable servo drivers are limited. See the detailed explanation in "About absolute value control."

↓

③ Block-transfer the block data of each axis (PLC→PS).
⇒ See the ladder programs on pages 5-40, 5-54 and 5-60.

↓

④ Save the block data of each axis to flash ROM.

↓

⑤ Reset the error.

↓

⑥ Perform a zero return.

↓

⑦ Set the step No. to be executed. Select the startup method (continuous/single-step).
Turn the (continuous/single-step) step No. set enable switch to ON.
Turn the program operation startup relay ON.

- In the case of an external startup, input the external startup signal with the external startup selection relay OFF (n+02003 in case of X-axis).

8-5 Timing chart in program operation

The following describes single-step startup and the timing charts at startup with the X-axis as an example. First, the busy flag and step No. enable that must be first understood at program operation are described.

[1] Busy flag

This flag turns ON while pulse output is being processed for each axis, and turns OFF when execution is completed.
New startups cannot be executed while the busy flag is ON.

See timing charts "[3] Single-step startup timing chart" and "[4] Startup timing chart."

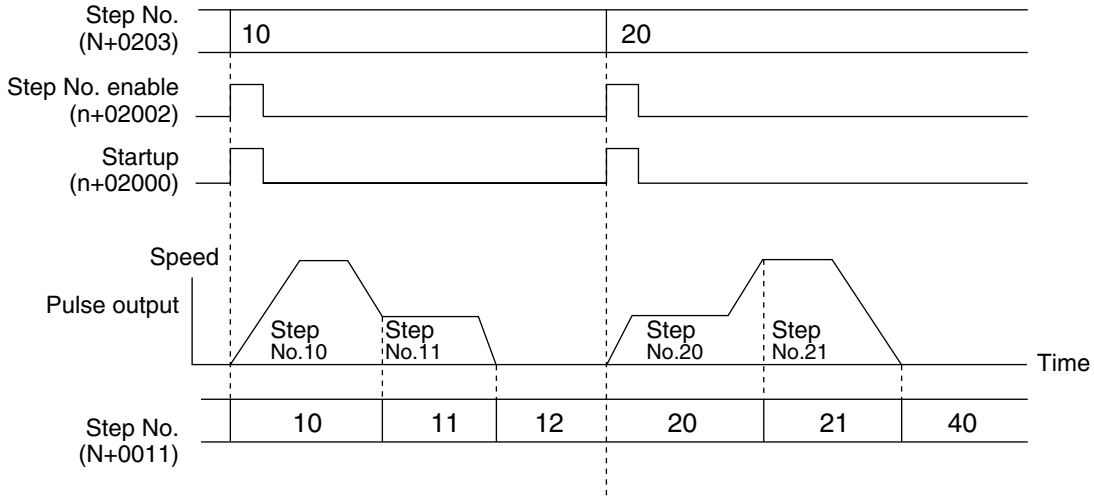
[2] Step No. enable

Step No. enable is used when specifying the step No. to start operation on.
After the step No. is set, and step No. enable is turned ON, the program is executed from the specified step No. (N+0011) at the ON rising edge of the startup.

The timing chart for when the operation pattern of each step data is set as follows is indicated with the X-axis as an example.

8

[
Step No.10: continuous, jump destination 00 (jump OFF)
Step No.11: single-step, jump destination 00 (jump OFF)
Step No.20: continuous, jump destination 00 (jump OFF)
Step No.21: single-step, jump destination 40
]

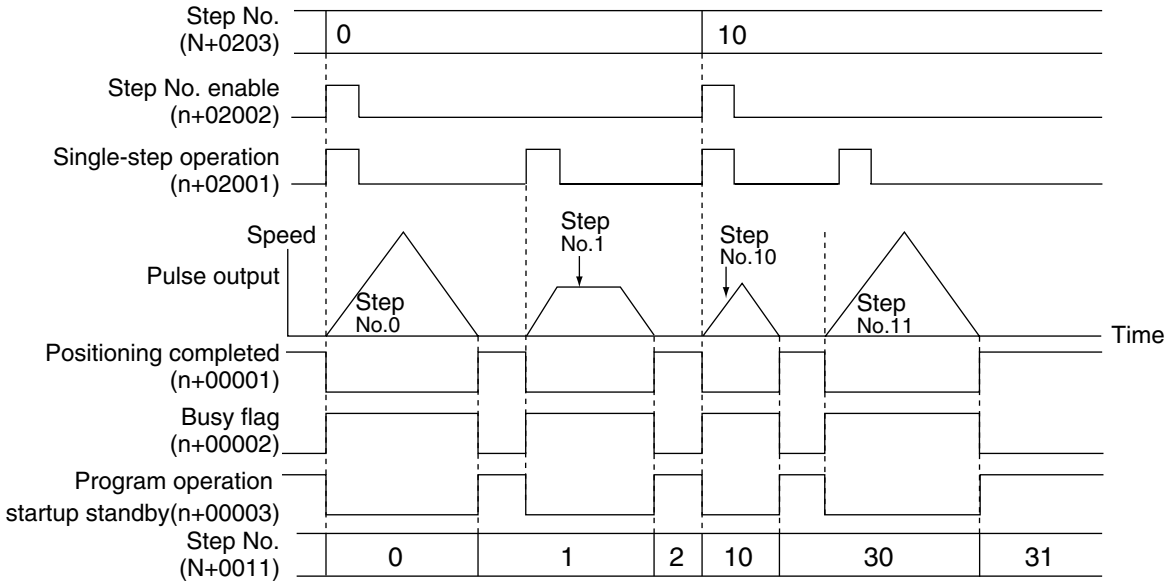


[3] Timing chart of startup by single-step operation

Startup by single-step operation is used to cause a stop at each step data.
Startup by single-step operation is handled as "single-step" regardless of the setting of the step data operation pattern, and the program stops by a single startup.

The timing chart for when the operation pattern of each step data is set as follows is indicated with the X-axis as an example.

[Step No.0: continuous, jump destination 00 Step No.1: automatic, jump destination 00
Step No.10: continuous, jump destination 30 Step No.11: automatic, jump destination 00]



• When single-step startup is turned OFF to ON with step No. enable OFF after a power ON or a reset, the program operation data error (error code 035) occurs.
When single-step startup is executed again with step No. enable OFF, the step No. to be executed is as follows;

Previous conditions / Operation pattern	Single-step startup state changed from OFF to ON with step No. enable OFF
Single-step operation completed Continuous operation completed Automatic operation completed	① Previous executed step No.+1 (jump destination in previous step data is 00) ② No.**: (jump destination in previous step data is **)
Deceleration stop	Aborted step No. is re-executed.

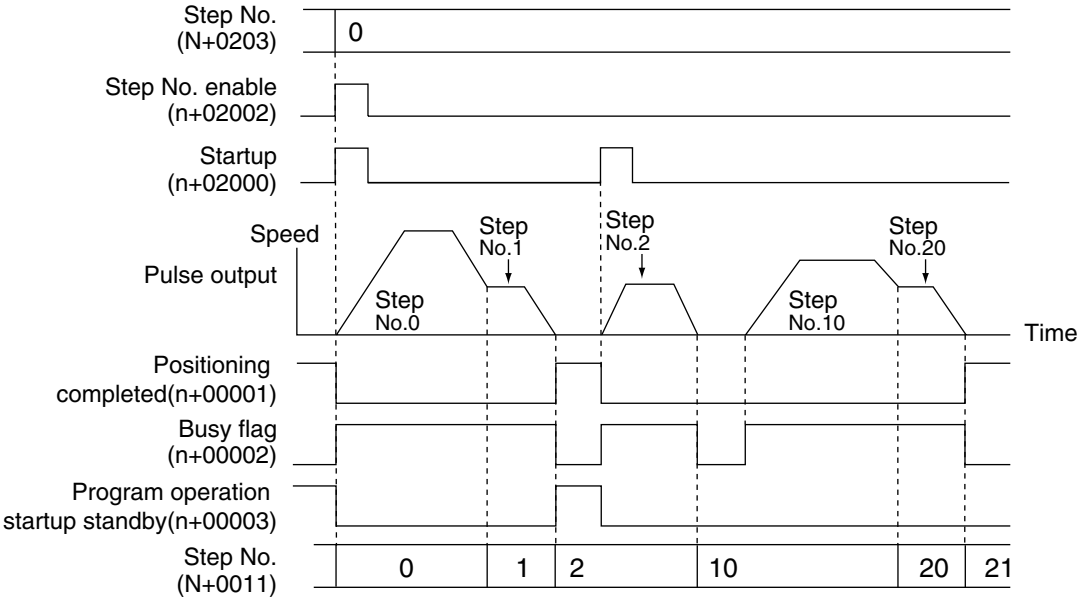
[4] Startup timing chart

For startup, operation following the operation pattern of each step data is executed from any desired step No.

When the step No. whose operation pattern is set to "single-step" is executed, pulse output is stopped and program execution stands by for startup after positioning is completed.

The following shows the timing chart for when the operation pattern of each step data is set as follows with the X-axis as an example.

[Step No.0: continuous, jump destination 00 Step No.1: single-step, jump destination 00
Step No.2: automatic, jump destination 10 Step No.10: continuous, jump destination 20
Step No.20: single-step, jump destination 00]

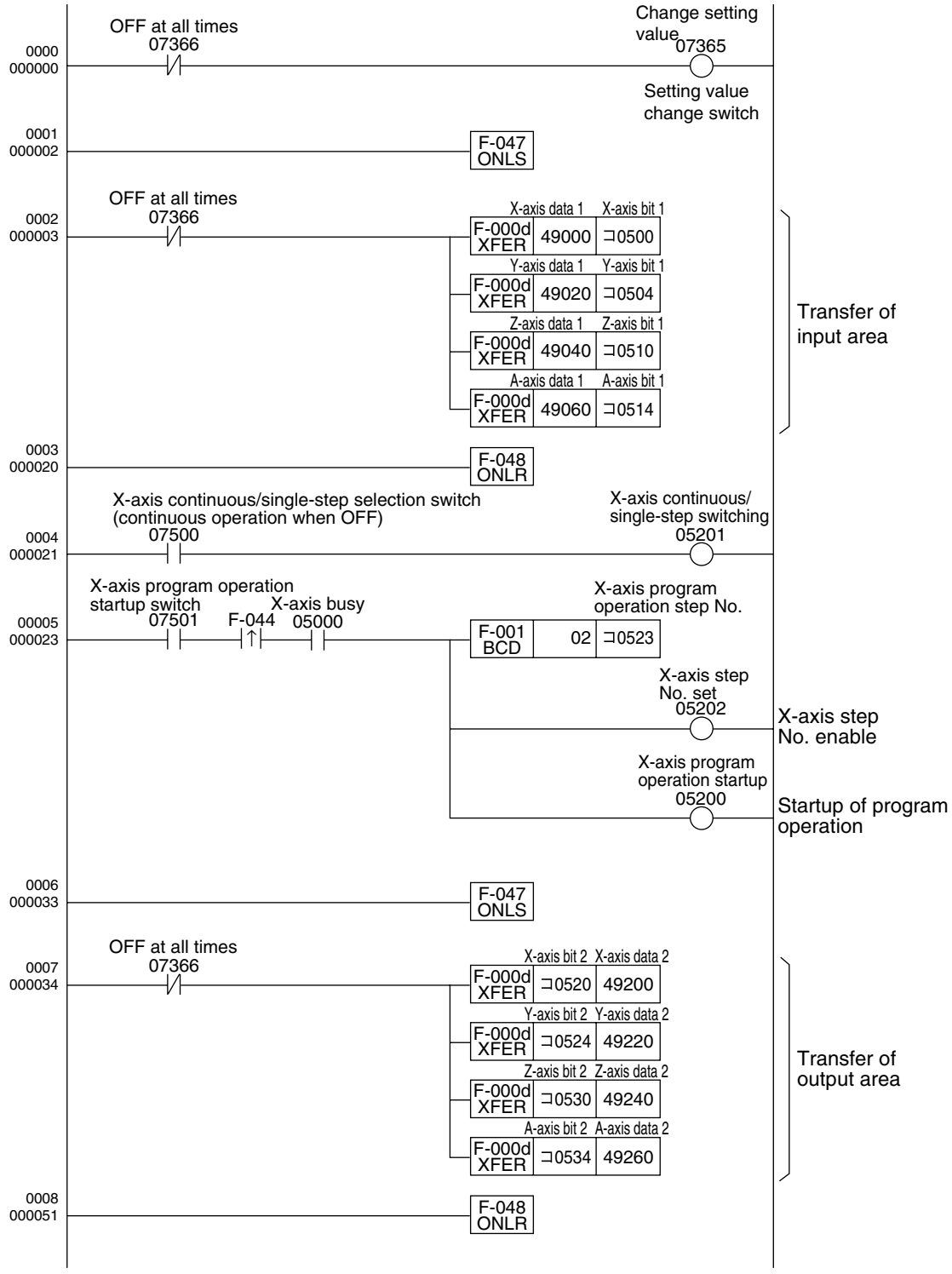


- When single-step startup is turned OFF to ON with step No. enable OFF after a power ON or a reset, the program operation data error (error code 035) occurs.

  For details on the step No. that is executed when startup is executed again with step No. enable OFF, see the single-step startup table.

8-6 Example of program

The following shows an example of a ladder program for starting up the X-axis program data (step No.2) when the top address of the special I/O data area is 49000.



■ **Program operation step data** (For details, ⇒see page 5-7.)

Address		Bit							
		7	6	5	4	3	2	1	0
J+0000		Axis designation (4=X-axis, 5=X-axis, 6=X-axis, 7=X-axis)				Operation pattern (0, 1, 2, 3, BCD)			
J+0001		Acceleration time No. (0 to 8) *0 is parameter value.				Deceleration time No. (0 to 8) *0 is parameter value.			
J+0002		Startup speed No. (00 to 64) *00 is parameter value.							
J+0003		Target speed No. (00 to 64) *00 is jog operation speed of parameter value.							
J+0004		Dwell timer No. (00 to 16) *00 is "dwell timer disabled."							
J+0005		Position data No. (01 to 99)							
J+0006		Output code (01 to 99)							
J+0007	When operation pattern is set to "Single step", "Automatic" and "Continuous"	Jump destination step No. (00 to 99) • When set to "00", the program advances to the next (incremented by "1") step.							
	When operation pattern is set to "Speed operation"	Speed No. after external interrupt (00 to 64) • When set to "00", the speed after parameter interrupt is enabled.							

• J indicates the top address of step data No.01 to 99.

The following shows the timing charts that indicate operation at startup by the step data below to describe typical program operation. The settings of data in steps is also provided.

[1] Step data when performing program operation on X-axis

X-axis step data Step No.2

	1(BCD)
2(BCD)	3(BCD)
2(BCD)	
10(BCD)	
01(BCD)	
02(BCD)	
05(BCD)	
00(BCD)	

----- X-axis designation ("1" in Hex) — Operation pattern 1 (automatic)
----- Acceleration time No.2 (X-axis data) — Deceleration time No.3 (X-axis data)
----- Startup speed No.22 (X-axis data)
----- Target speed No.10 (X-axis data)
----- Dwell timer No.01 (X-axis data)
----- Position data No.02 (X-axis data)
----- Output code 05
----- Jump destination 3 (No.2+1)

X-axis step data Step No.3

	2(BCD)
4(BCD)	8(BCD)
15(BCD)	
11(BCD)	
01(BCD)	
02(BCD)	
01(BCD)	
09(BCD)	

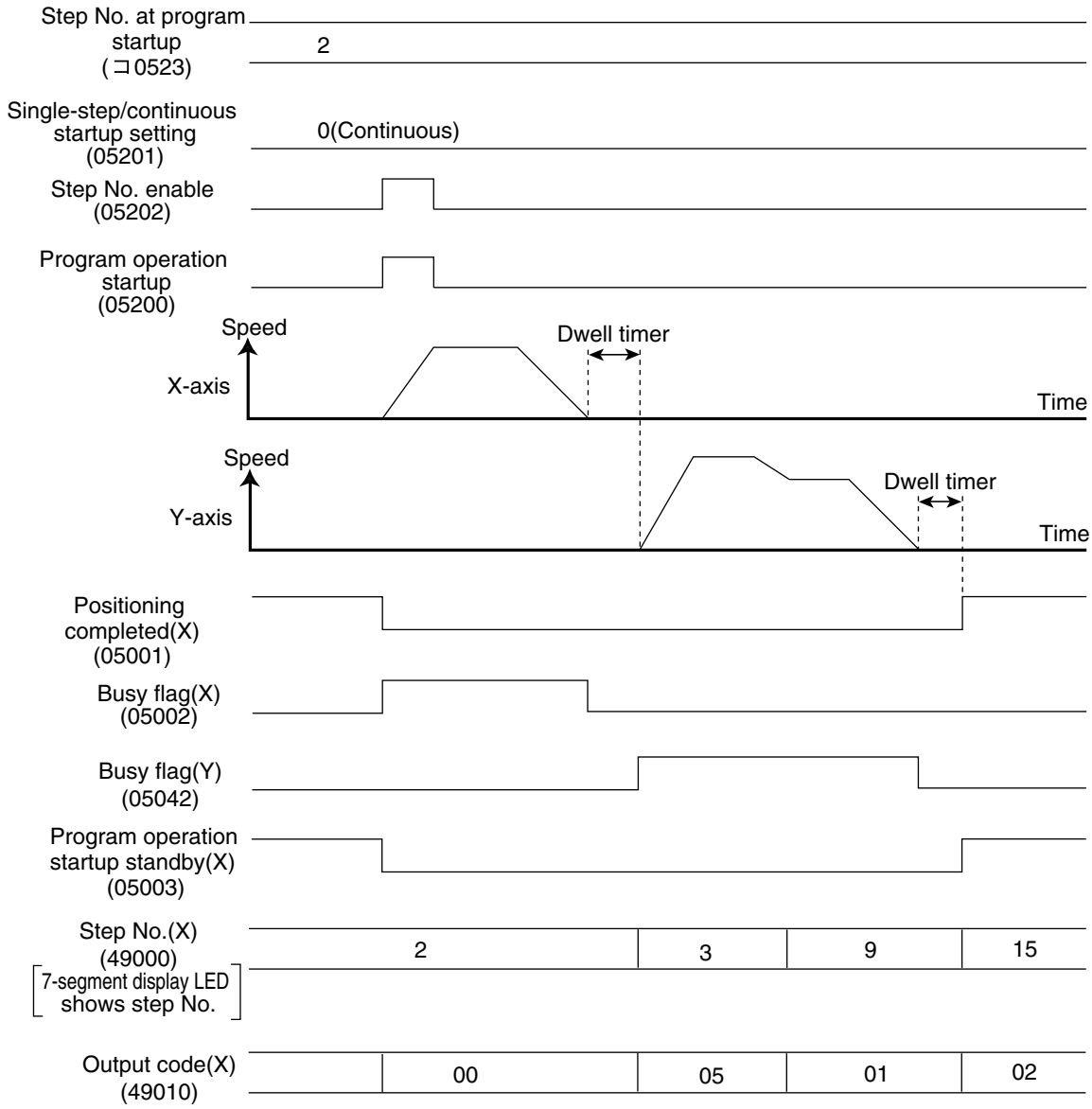
----- Y-axis designation ("2" in Hex) — Operation pattern 2 (continuous)
----- Acceleration time No.2 (X-axis data) — Deceleration time No.8 (X-axis data)
----- Startup speed No.15 (X-axis data)
----- Target speed No.11 (X-axis data)
----- Dwell timer No.00 (X-axis data)
----- Position data No.02 (Y-axis data)
----- Output code 01
----- Jump destination 9

X-axis step data Step No.9

	0(BCD)
2(BCD)	3(BCD)
20(BCD)	
15(BCD)	
01(BCD)	
05(BCD)	
02(BCD)	
15(BCD)	

----- Y-axis designation ("2" in Hex) — Operation pattern 0 (single-step)
----- Acceleration time No.2 (X-axis data) — Deceleration time No.3 (X-axis data)
----- Startup speed No.20 (X-axis data)
----- Target speed No.15 (X-axis data)
----- Dwell timer No.01 (X-axis data)
----- Position data No.05 (Y-axis data)
----- Output code 02
----- Jump destination 15

● **Timing chart when operation is performed on one axis at a time started up by X-axis**



[2] Step data when performing program operation on Y-axis

Y-axis step data Step No.2

	1(BCD)
2(BCD)	3(BCD)
22(BCD)	
10(BCD)	
01(BCD)	
02(BCD)	
05(BCD)	
05(BCD)	

----- X-axis designation ("1" in Hex) — Operation pattern 1 (automatic)
----- Acceleration time No.2 (Y-axis data) — Deceleration time No.3 (Y-axis data)
----- Startup speed No.22 (Y-axis data)
----- Target speed No.10 (Y-axis data)
----- Dwell timer No.01 (Y-axis data)
----- Position data No.02 (X-axis data)
----- Output code 05
----- Jump destination 5

Y-axis step data Step No.5

	2(BCD)
4(BCD)	8(BCD)
15(BCD)	
11(BCD)	
01(BCD)	
02(BCD)	
01(BCD)	
09(BCD)	

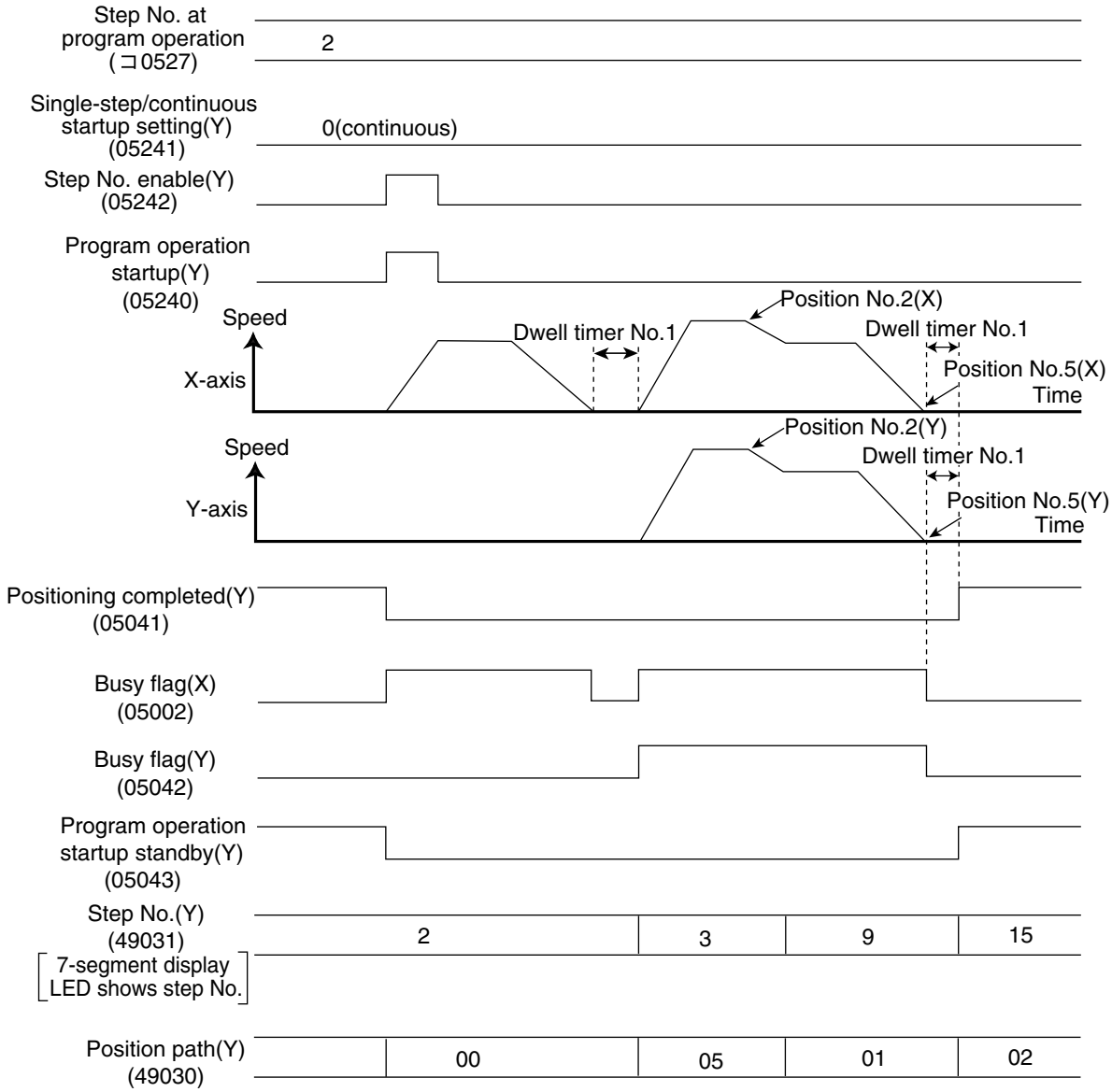
----- X-/Y-axis designation ("3" in Hex) — Operation pattern 2 (continuous)
----- Acceleration time No.4 (Y-axis data) — Deceleration time No.8 (Y-axis data)
----- Startup speed No.15 (Y-axis data)
----- Target speed No.11 (Y-axis data)
----- Dwell timer No.00 (Y-axis data)
----- Position data No.02 (X-, Y-axis data)
----- Output code 01
----- Jump destination 9

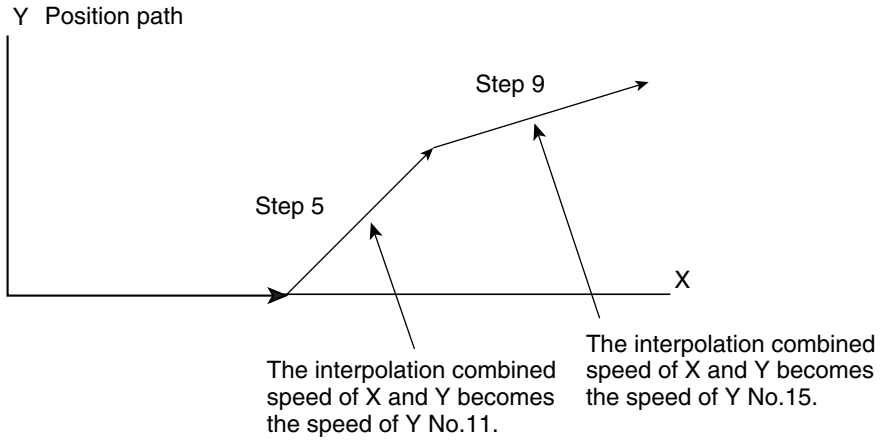
Y-axis step data Step No.9

	0(BCD)
2(BCD)	3(BCD)
20(BCD)	
15(BCD)	
01(BCD)	
05(BCD)	
02(BCD)	
15(BCD)	

----- X-/Y-axis designation ("3" in Hex) — Operation pattern 0 (single-step)
----- Acceleration time No.2 (Y-axis data) — Deceleration time No.3 (Y-axis data)
----- Startup speed No.20 (Y-axis data)
----- Target speed No.15 (Y-axis data)
----- Dwell timer No.01 (Y-axis data)
----- Position data No.05 (X-, Y-axis data)
----- Output code 02
----- Jump destination 15

● **Timing chart when interpolation is performed on two axes after the X-axis that started up by the Y-axis operates in program operation**





Chapter 9 Closed Loop Control

This module captures information from the encoder using a high-speed counter, and performs three operations (operation modes 0, 1 and 2) using those values (feedback values). To use closed loop control 1 or 2, the following settings must be set to parameters 1 and 2 in advance. Also, note that restrictions apply to these settings.

(⇒ See electronic-gear related setting restrictions.)

9-1 Setting items required in closed loop control

- Close loop mode selection (parameter 2 - 0000)
- Compensation time (parameter 2 - 0001)
- Encoder count direction (parameter 2 - 0002)
- Closed loop control permissible range (parameter 2 0004 to 0007)
- Completed pulse permissible range (parameter 2 - 0010 to 0013)
- Electronic gear 1 (parameter 2 - 0030 to 0037)
- Electronic gear 2 (parameter 2 - 0040 to 0047)
- Enabling of external positioning completed signal (parameter 1 - 0000 bit 7)
- Positioning monitoring time (parameter 1 - 0066 to 0067)
- Operation at software limit error (parameter 1 - 0075 bits 4 to 7)

(Note) When closed loop modes 1 and 2 are used, software limit disabled cannot be used.

9-2 Description of operation in operation modes

[1] Mode 0

Though closed loop control is not performed, the present value can be displayed in real time according to the feedback data. This mode can be used without matching the instruction pulse and the unit of the feedback pulse by the electronic gear.

When the electronic gear (values of electronic gears 1 and 2 all "1"), and the resolution of the instruction system and feedback system are not the same, a difference in the present value of the feedback system occurs at a fixed ratio with respect to the instruction value. For example, when the gear ratio between the motor and the encoder shaft is the same, and the encoder outputs 5 pulses (20 pulses when multiplied by a factor of 4) when 10 pulses have been output, the resolution becomes 1:2. At this time, the instruction system present value is 10 and the feedback value is 20. Operation is performed at this ratio at all times.

The feedback value becomes 0 at power ON and by a zero return. When speed control is performed in this mode, use this module with the software limit set to "ON". When the software limit is set to "OFF", a shift in the pulse occurs when the minimum value or maximum value (Å}9999999) is exceeded.

■ **Applications**

① This is used to move a different axis or turn a contact ON when a point on the positioning coordinates (feedback value) is reached.

② Broken lines, etc. can be judged on systems that have no completion signal as the number of feedback pulses from the encoder can be monitored on the PC side.

[2] Mode 1

In this mode, errors are monitored according to the feedback data. An error is judged to stop operation when the coordinate value according to the output pulse and the coordinate value captured from the encoder have exceeded a fixed value (closed loop control allowable range). (Errors are monitored at all times during operation.)

When output of all instruction pulses is completed and then positioning does not fall within the completion pulse allowable range within the positioning monitoring time, the completion range error (017) is output and operation is stopped. Note, however, that when the completion signal was set to "enabled," the completion pulse allowable range is ignored, and judgment as to whether or not positioning completed by the completion signal is performed. (See the list relating to various setting values and operations.)

In this mode, compensation is not performed even if a shift occurs in the instruction value and feedback value.

This mode is used mainly for judgment as to whether the stepping motor is out of sync. Set the closed loop allowable range in instruction pulse control units.

(Note) When judging whether the stepping motor is output of sync, set the closed loop control allowable range to 1/50 or more of the maximum instruction speed. For example, when the maximum instruction speed is 50 kpps, the closed loop control allowable range must be set to 1000 pulses or more.

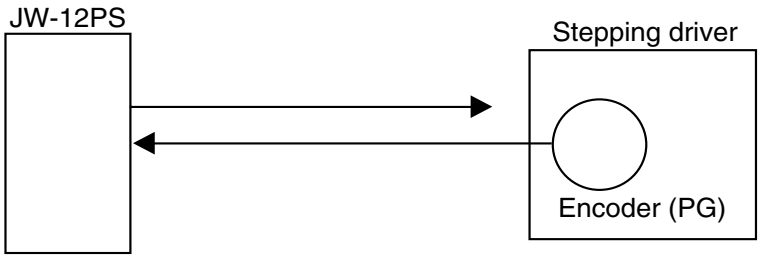
In systems that use a servo, normally, deviation is judged on the driver side. So, set the closed loop control allowable range to "0". When this range is set to "0", only the allowable range at completion is monitored in this mode.

■ Example

When the closed loop control allowable range is set to 500 and the completion pulse allowable range is set to 50, 5000 pulses is being output while JW-12PS is operating, the number of pulses from the encoder has fallen to 4500 or less.

An error (error 017) is also judged and an error is output when 10000 pulses are output as the instruction value at the final coordinate, operation ends, and the feedback pulse is 9950 or less.

- Set the ratio between the number of instruction pulses and number of feedback pulses from the encoder in parameters in advance.



[3] Mode 2

This mode is for performing positional compensation according to the feedback data. Compensation is performed so that deviation is eliminated after the positioning instruction pulse is output. When output of all instruction pulses is completed and then positioning does not fall within the completion pulse allowable range within the positioning monitoring time, the completion range error (017) is output and operation is stopped. When positioning does not fall within the closed loop control allowable range during operation, the closed loop control allowable range over error (error 015) is output and operation is stopped.

- Set the ratio between the number of instruction pulses and number of feedback pulses from the encoder in parameters in advance.

When this mode is used in stepping operations, it provides a function for correcting the position to the intended position even if the stepping motor gets out of sync. In this case, make the following two settings for distinguishing the extent of this out-of-sync (correctable or a fatal shift).

① Set the number of pulses for judging end of positioning. (completion pulse allowable range)
② Set the pulses for judging stepping motor out-of-sync. (closed loop control allowable range)

If a load is applied on one of the vertical axes, for example, when the servo is used, the servo deviation that cannot be tracked is compensated. In the case of a servo, deviation is judged on the driver side, so set the closed loop control allowable range to "0". When this range is set to "0", only the allowable range at completion is monitored in this mode.

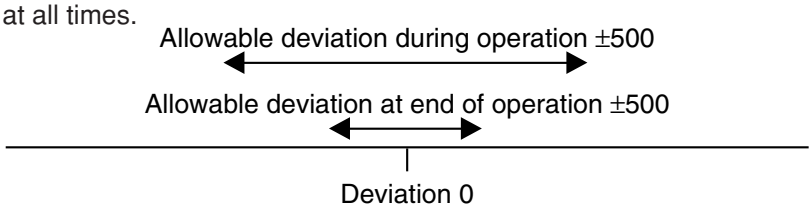
■ Example of connection with stepping motor (driver)

In the following example, let us assume the following conditions:

- operation up to position 5000 by direct operation
- a completion pulse allowable value of 5
- a closed loop control allowable range of 500

A completion range error (017) is output if the information from the encoder was 5006 after the JW-12PS started up and output 5000 pulses, and after the positioning monitoring time. A closed loop control allowable range over error (015) is output and operation is stopped if the deviation (error between instruction value and feedback value) is monitored during positioning and the feedback value was 5501 (deviation 501).

During operation, constantly monitor the deviation, and adjust the pulse so that deviation is eliminated at all times.



- Positioning does not fall within the allowable deviation in the monitoring time and an error does not occur even if the deviation at completion of operation is not "0".

■ Example of connection with servo driver

In the following example, let us assume the following conditions:

- operation up to position 5000 by direct operation
- a completion pulse allowable value of 5
- a closed loop control allowable range of 0

(The deviation range during operation is monitored on the driver side.)

A completion range error (017) is output if the information from the encoder was 506 after the JW-12PS started up and output 5000 pulses, and after the positioning monitoring time. During operation, the position is compensated at all times, however, this error is output when, for example, positioning does not fall within the completion range at completion due to a mechanical load.

- In this mode, the closed loop control allowable range is set to "0" and judgment during operation is not performed.

(Note) The compensation time set at parameter 2 - 0001 is the area to which the compensation speed when deviation is present is set.
"Compensation speed" refers to execution of compensation at the speed of one pulse per compensation time when there is a deviation of one pulse. For example, the compensation speed becomes 10 pulses (20 pps) per 500 ms when the compensation time is 500 ms at deviation 10 pulses. If the deviation decreases by the compensation pulse, the speed of the compensation pulse also falls correspondingly and the compensation speed reaches 0 at deviation 0 to absorb deviation.

9-3 Table of setting values and operations

The following describes the values of various parameters and operations according to the external positioning completed signal for two cases, a stepping driver and servo driver.

■ **Relationship between external positioning completed signal and closed loop control mode on a stepping motor**

External positioning completed signal (parameter 1 - 0007 bit 7)	Closed loop control mode (parameter 2 - 0000)		
	0(BCD)	1(BCD)	2(BCD)
Enabled 1	Program execution stands by for positioning completion input after the instruction pulse is output. An error (error 014) occurs if the completion signal does not arrive within the positioning monitoring time.	Program execution stands by for positioning completion input after the instruction pulse is output. An error (error 014) occurs if the completion signal does not arrive within the positioning monitoring time. An error (error 015) occurs when the closed loop control allowable range is monitored at all times and the range is exceeded.	Program execution stands by for positioning completion input after the instruction pulse is output. An error (error 014) occurs if the completion signal does not arrive within the positioning monitoring time. An error (error 015) occurs when the closed loop control allowable range is monitored at all times and the range is exceeded. During operation, deviation is monitored at all times and compensated.
Disabled 0	Operation ends immediately after the instruction pulse is output.	Operation ends immediately after the instruction pulse is output. An error (error 015) occurs when the closed loop control allowable range is monitored at all times and the range is exceeded. An error (error 017) occurs when positioning does not fall within the completion pulse range in the positioning monitoring time.	Program execution stands by for the feedback pulse to fall within the completion pulse allowable range after the instruction pulse is output. An error (error 017) occurs when positioning does not fall within the completion pulse range in the positioning monitoring time. An error (error 015) occurs when the closed loop control allowable range is monitored at all times and the range is exceeded. During operation, deviation is monitored at all times and compensated.

■ **Relationship between external positioning completed signal and closed loop control mode on a servo motor**

External positioning completed signal (parameter 1 - 0007 bit 7)	Closed loop control mode (parameter 2 - 0000)		
	0(BCD)	1(BCD)	2(BCD)
Enabled 1	Program execution stands by for positioning completion input after the instruction pulse is output. An error (error 014) occurs if the completion signal does not arrive within the positioning monitoring time.	Program execution stands by for positioning completion input after the instruction pulse is output. An error (error 014) occurs if the completion signal does not arrive within the positioning monitoring time.	Program execution stands by for positioning completion input after the instruction pulse is output. An error (error 014) occurs if the completion signal does not arrive within the positioning monitoring time. During operation, deviation is monitored at all times and compensated.
Disabled 0	Operation ends immediately after the instruction pulse is output.	Operation ends immediately after the instruction pulse is output. An error (error 017) occurs when positioning does not fall within the completion pulse range in the positioning monitoring time at completion.	Program execution stands by for the feedback pulse to fall within the completion pulse allowable range after the instruction pulse is output. An error (error 017) occurs when positioning does not fall within the completion pulse range in the positioning monitoring time. During operation, deviation is monitored at all times and compensated.

9-4 Mode setup methods

[1] Mode 0

■ Stepping/servo motor system (both)

① Wire the encoder.

② Set the count direction for encoder input at parameter 2 - 0001.

③ When an electronic gear is used, set the ratio between the output pulse and encoder input pulse at parameter 2 - 0030 to 0047. Electronic gear 1 (0030 to 0037) is the ratio setting for the instruction system, and electronic gear 2 (0040 to 0047) is the ratio setting for the feedback system. (⇒ See electronic-gear related setting restrictions.)

In this mode, operation is possible without using the electronic gear. In this case, the feedback pulse becomes the instruction value as this is a direct signal that is input to the encoder.

④ Set parameter 2 - 0000 to "00" (BCD).

[2] Mode 1

(1) Stepping motor system

① Wire the encoder.

② Set the count direction for encoder input at parameter 2 - 0001.

③ When an electronic gear is used, set the ratio between the output pulse and encoder input pulse at parameter 2 - 0030 to 0047. Electronic gear 1 (0030 to 0037) is the ratio setting for the instruction system, and electronic gear 2 (0040 to 0047) is the ratio setting for the feedback system. (=> See electronic-gear related setting restrictions.)

In this mode, the electronic gear must be set.

④ Set parameter 2 - 0000 to "01" (BCD).

⑤ Enter the number of allowable deviation pulses (number of output pulses - number of feedback pulses) to be monitored during operation to the closed loop control allowable range of parameter 2 - 0004 to 0007.

⑥ Enter the number of allowable deviation pulses (number of output pulses - number of feedback pulses) to be monitored at completion of operation to the completion pulse allowable range of parameter 2 - 0010 to 0013.

(2) Servo motor system

① Wire the encoder.

② Set the count direction for encoder input at parameter 2 - 0001.

③ When an electronic gear is used, set the ratio between the output pulse and encoder input pulse at parameter 2 - 0030 to 0047. Electronic gear 1 (0030 to 0037) is the ratio setting for the instruction system, and electronic gear 2 (0040 to 0047) is the ratio setting for the feedback system. (=> See electronic-gear related setting restrictions.)

In this mode, the electronic gear must be set.

④ Set parameter 2 - 0000 to "01" (BCD).

⑤ Enter the number of allowable deviation pulses (number of output pulses - number of feedback pulses) to be monitored at completion of operation to the completion pulse allowable range of parameter 2 - 0010 to 0013.

(Note) As the deviation during operation is monitored on the driver side, set the number of allowable deviation pulses (parameter 2 - 0004 to 0007) to "0".

[3] Mode 2

(1) Stepping motor system

① Wire the encoder.

② Set the count direction for encoder input at parameter 2 - 0001.

③ When an electronic gear is used, set the ratio between the output pulse and encoder input pulse at parameter 2 - 0030 to 0047. Electronic gear 1 (0030 to 0037) is the ratio setting for the instruction system, and electronic gear 2 (0040 to 0047) is the ratio setting for the feedback system. (⇒ See electronic-gear related setting restrictions.)
In this mode, the electronic gear must be set.

④ Set parameter 2 - 0000 to "02" (BCD).

⑤ Enter the number of allowable deviation pulses (number of output pulses - number of feedback pulses) to be monitored during operation to the closed loop control allowable range of parameter 2 - 0004 to 0007.

⑥ Enter the number of allowable deviation pulses (number of output pulses - number of feedback pulses) to be monitored at completion of operation to the completion pulse allowable range of parameter 2 - 0010 to 0013.

(2) Servo motor system

① Wire the encoder.

② Set the count direction for encoder input at parameter 2 - 0001.

③ When an electronic gear is used, set the ratio between the output pulse and encoder input pulse at parameter 2 - 0030 to 0047. Electronic gear 1 (0030 to 0037) is the ratio setting for the instruction system, and electronic gear 2 (0040 to 0047) is the ratio setting for the feedback system. (=> See electronic-gear related setting restrictions.)
In this mode, the electronic gear must be set.

④ Set parameter 2 - 0000 to "02" (BCD).

⑤ Enter the number of allowable deviation pulses (number of output pulses - number of feedback pulses) to be monitored at completion of operation to the completion pulse allowable range of parameter 2 - 0010 to 0013.

(Note) As the deviation during operation is monitored on the driver side, set the number of allowable deviation pulses (parameter 2 - 0004 to 0007) to "0".

Cautions when closed loop control 2 is used

- In closed loop control 2, when the resolution per pulse is the relationship in ①, the present position is not correctly adjusted (at deviation clear, for example) from the feedback. As compensation during operation cannot be performed accurately, be sure to use at the conditions in ② when using closed loop control mode 2.
  - ① Resolution of instruction pulse > resolution of feedback pulse (value obtained by multiplying by a factor of 4)
  - ② Resolution of instruction pulse ≧ resolution of feedback pulse (value obtained by multiplying by a factor of 4)

[Example]

When the instruction pulse is 2000 pulses per rotation, and the feedback pulse is 500 (value obtained by multiplying by a factor of 4), a shift of up to three pulses occurs. Reciprocal motion is repeated before and after the target position when compensation is performed as a result of this shift.

9-5 Electronic gear setup methods and restrictions

Normally, all coordinate-related data of JW-12PS/14PS is managed in pulses. However, when electronic gears 1/2 in parameter are used, data can be managed in mm, for example. (Speed data also becomes mm/s, for example.)

These electronic gears are used in closed loop control. Note, however, that care must be paid to the settings as the following restrictions apply.

[1] Restriction 1 when setting up the electronic gear

(1) Restrictions when setting up electronic gears M1 and D1

1.When setting the M1 value and D1 value of electronic gear 1, set their ratio to "100" or less.

M1/D1≦100

2.When interpolation is programmed, match the unit system of the axis to be interpolated by electronic gear 1 (M1/D1 value).

(2) Restrictions when setting up electronic gears M2 and D2

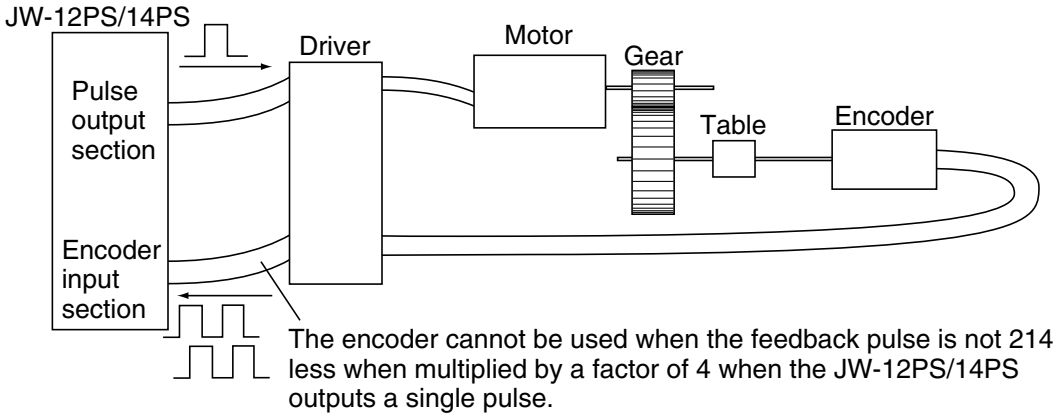
When setting the M1 value and D1 value of electronic gear 2, set their ratio to "214" or less.

M2/D2≦214

Cautions (selection of the encoder for feedback including the above restrictions)

• Take the following into consideration when setting the gear ratio of the encoder to be used for feedback.

Select an encoder whose feedback pulse becomes 214 or less when multiplied by a factor of 4 when this module outputs a single pulse. (When a large gear ratio is not set, general-purpose encoders can be used.)



■ **Setting example**

When M1 is set to 5000 and D1 is set to 500, D2 of electronic gear 2 normally becomes 500, the same as D1. At this time, the setting range of M2 is as follows:

M2/D2≦214

M2≦107000

When the number of feedback pulses (M2) from the encoder does not fall within this range, feedback control on this module cannot be used. (An encoder and a gear ratio are required.)

[2] Restriction 2 when setting up the electronic gear

All speed system data shown below is subject to the restriction in the following equations according to the setting of electronic gear 1 (M1/D1) as the pulse speed that can be output from this module is a maximum of 500 kpps (differential driver) or 250 kpps (open collector output).

- Differential driver output

  500kpps≧M1/D1×speed system data

- Open collector output

  250kpps≧M1/D1×speed system data

■ Speed system data items

- Reference speed (parameter 1 address A+0010 to 0013)
- Maximum speed (parameter 1 address A+0014 to 0017)
- Target speed (instruction speed at direct operation, speed data at program operation)

[Example]

Assuming that the M value is 400 and the D value is 40, the speed system data becomes as follows in the case of pulse differential output:

500kpps≧400/40×speed system data

50kpps≧speed system data

The speed system data must be set within this setting range.

[3] Details of electronic gear

(1) Electronic gear 1 (instruction value)

The "electronic gear" is a determined travel distance per single pulse among the pulses that are output from this module.

① **M1 value** (instruction value)

The value is the number of pulses that are required to turn the shaft that drives the table, for example, one rotation. This value is set to parameter 2 address B+0030 to 0033.

(Note) When a gear is attached to the motor and shaft, set the value taking the gear ratio into consideration.

② **D value** (instruction value)

This value sets the travel distance when the shaft that drive the table, for example, turns one rotation. This value is set to parameter 2 address B+0034 to 0037. Determine any unit (μm, mm, cm, m, degree, inch, etc.) as desired.

Normally, this setting value is calculated from the pitch of the shaft. Actual measured values are also acceptable.

■ Speed system data items

The instruction value M1 value becomes 200 when 100 pulses are required to operate the motor by one turn, and the gear ratio between the motor and shaft is 2:1 (shaft rotates one turn for every two motor rotations).

M=100×2/1=200

Also, the instruction value D1 value becomes 30 when the minimum unit to be managed is set to 0.1 mm assuming that a single rotation of the shaft causes 3 mm of travel. (unit: $mm \times 10^{-1}$)

Accordingly, the relationship becomes 200/30<=100a, and no problems are posed within the restrictions of electronic gear 1.

- The speed limit value is as follows:

  500 kpps ≧ M1/D1×speed system data

  75 kpps ≧ speed system data

(2) Electronic gear 2

① **M2 coefficient** (encoder value)

This value is the number of pulses that are returned from the encoder (PG) when the shaft that drives the table, for example, rotates one turn.

② **D2 coefficient** (encoder value)

This value sets the travel distance when the shaft that drive the table, for example, turns one rotation.

Determine any unit (μ m, mm, cm, m, degree, inch, etc.) as desired.

Normally, set the same value as the instruction value D1 coefficient.

③ **Setup method**

Set the number of required pulses from the encoder to the encoder M value (parameter 2 address B+0040 to 0043) when the drive shaft rotates one turn. The equation for calculating the M value is as follows as the feedback value of this module is captured at a factor of four at all times.

M2 coefficient = encoder (PG) pulse count/rotation × gear reduction ratio × multiplication (fixed to "4")

where,

encoder pulse count/rotation: Number of pulses output by PG when encoder (PG) is rotated one turn

gear reduction ratio: gear reduction ratio of gear

multiplication: 4 (fixed to "4")

For the D2 value, set the same value as the instruction D1 value. Though the minimum unit for the feedback value can be changed, compensation using the feedback value or comparison and other functions cannot be used at this time.

■ **Setting example**

The instruction value M2 value becomes 1200 when the encoder (PG) outputs 30 pulses per rotation, and the gear ratio between the motor and shaft is 10:1 (shaft rotates one turn for every ten motor rotations).

M=30×10/1×4=1200

Also, the instruction value D2 value becomes 30 when the minimum unit to be managed is set to 0.1 mm assuming that a single rotation of the shaft causes 3 mm of travel. (unit: mm × 10^{-1}, same as instruction value)

Accordingly, the relationship becomes M2/D2=40≦214, and no problems are posed within the restrictions of electronic gear 2.

Chapter 10 Absolute System

An absolute system can be configured on this module by using servo driver systems made by specific manufacturers. In an absolute system, the present value is not cleared from memory even when the module is powered OFF. Absolute values held on the driver side are automatically read by communications when the module is powered backed ON or when the absolute present value read relay is turned ON. A system combining an absolute system and closed loop control can also be configured. (When closed loop control is used, see the item "Closed loop control.")

[1] Parameters and operation data relating to absolute system

● **Parameter 2 (special parameter)**

Set as follows as block No.01. (must be set independently on each axis)

Address	Byte	Default	Function	
0020	1	00	Absolute value control mode selection	00: Absolute value control "Disabled" 01: Operation mode 1 The present value is rewritten at power ON or when the absolute present value read relay turns ON.
0021	1	00	Absolute value control driver model selection	00: Model 1 (made by Wako Giken)

• "****" in B+**** indicates the numerical value of the address.

● **Operation data (assignment of special I/O data area)**

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PLC←PS)	0001	0021	0041	0061	2	Driver communications completed • Enabled only when absolute value control is enabled.	↑ ↓	Completed At start
Output (PLC→PS)	0202	0222	0242	0262	7	Read absolute present position [↑] *Enabled only when absolute value control is enabled		

*JW-14PS only

• "****" in N+**** indicates the numerical value of the address.

[2] Driver and motor that can configure an absolute system

The driver and motor in the following table can configure an absolute system on this module.

Driver	Motor	Manufacturer
GPPA1 Series • Contact the manufacturer regarding the official model No. as the model No. differs according to the number of words.	GPPA1 Series dedicated motor • Contact the manufacturer regarding the official model No. as the model No. differs according to the number of words.	(Made by Wako Giken) • Encoder is made by Nikon.

[3] Absolute system setup procedure

① **Wire connector CN1 for tool connection and the driver communications connector for this module. (See below.)**

• This module is not provided with the communications connector for this module, and must be prepared by the customer.

Page 4-3 lists the model No. and manufacturer of the connector.

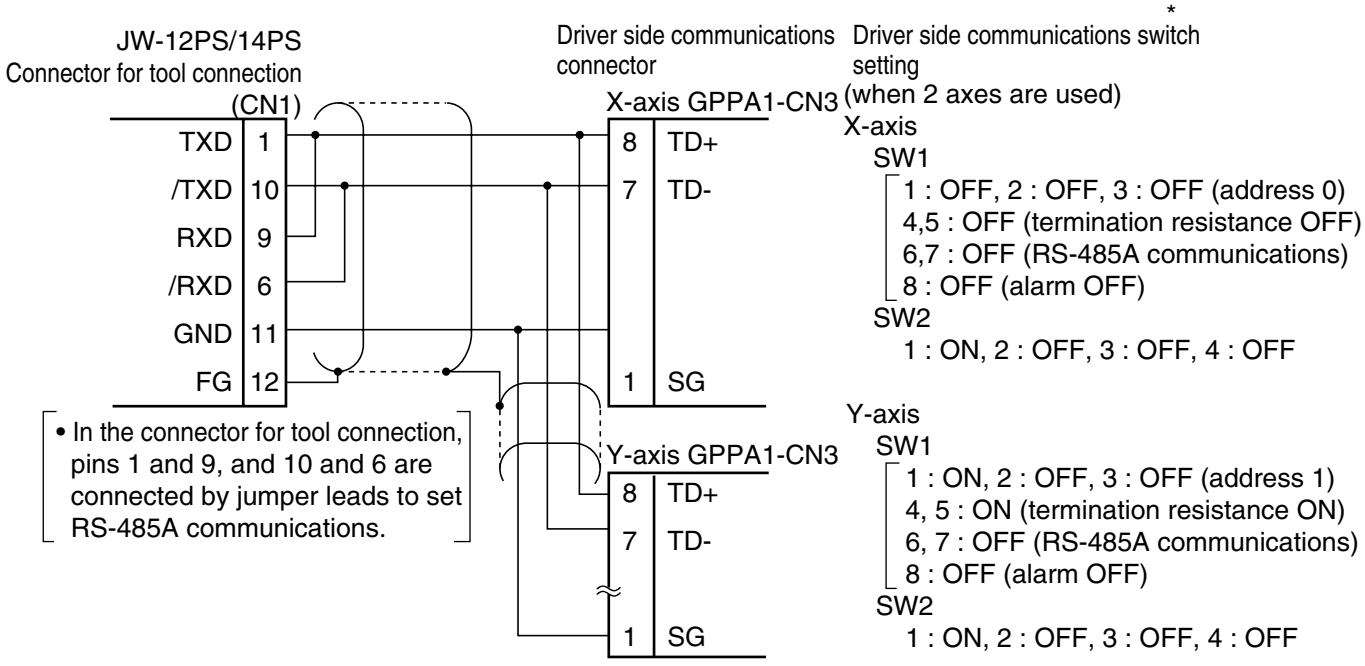
② **Make the various settings on the driver side.**

• The following describes the switching settings. For details, see the User's Manual for the driver. The communications specifications of this module are described in "Chapter 2 Specifications." Match these specifications on the driver side.

③ **Set parameter 2 on this module.**

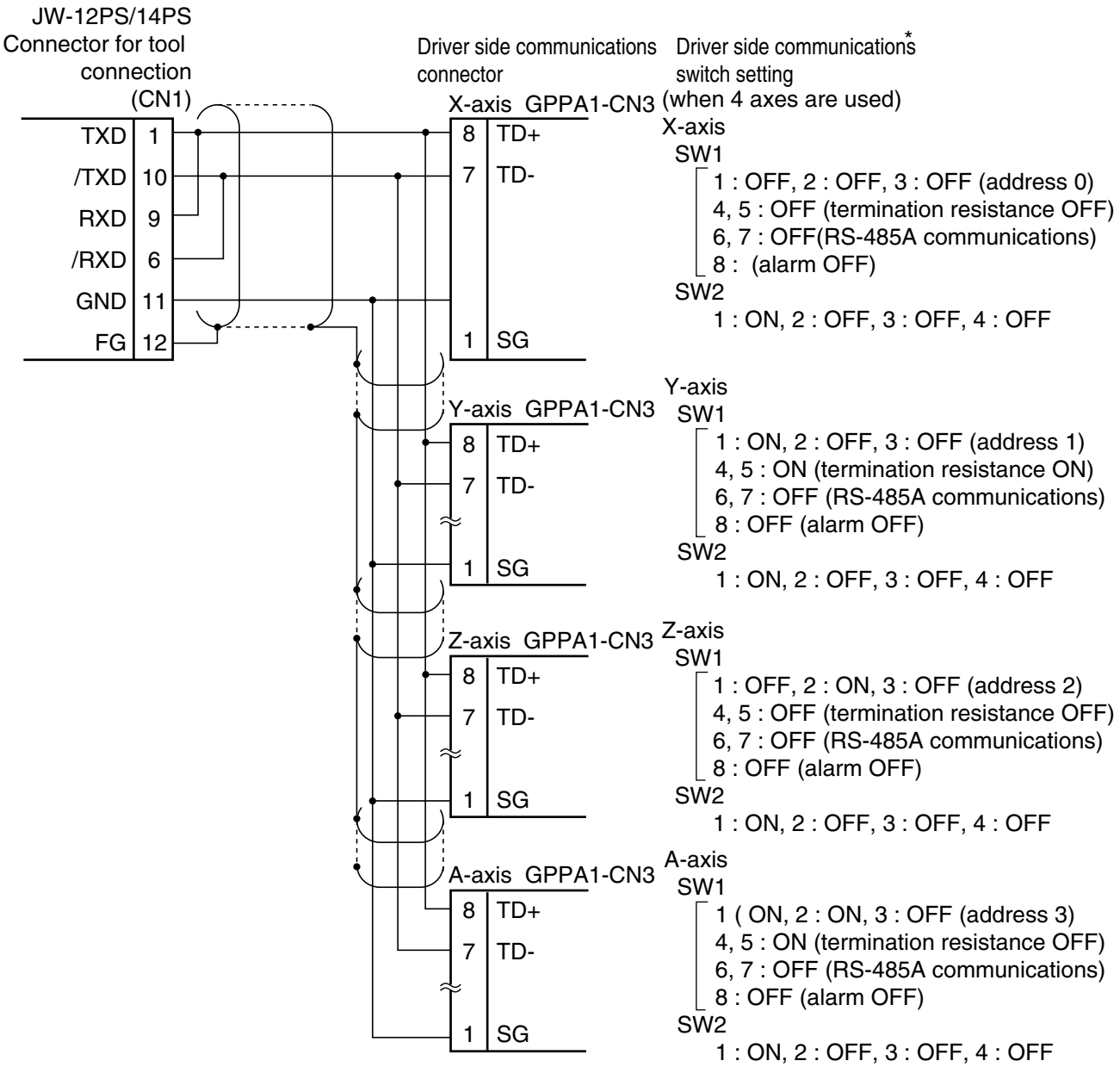
• Set address B+0020 of parameter 2 to "01" (absolute value control mode enabled). (The setting of address B+0021 of parameter 2 differs according to the driver. Set "00" when the driver made by Wako Giken is connected.)

■ **Wiring between this module and driver (X-/Y-axes)**



* For details, see the instruction manual for the driver.

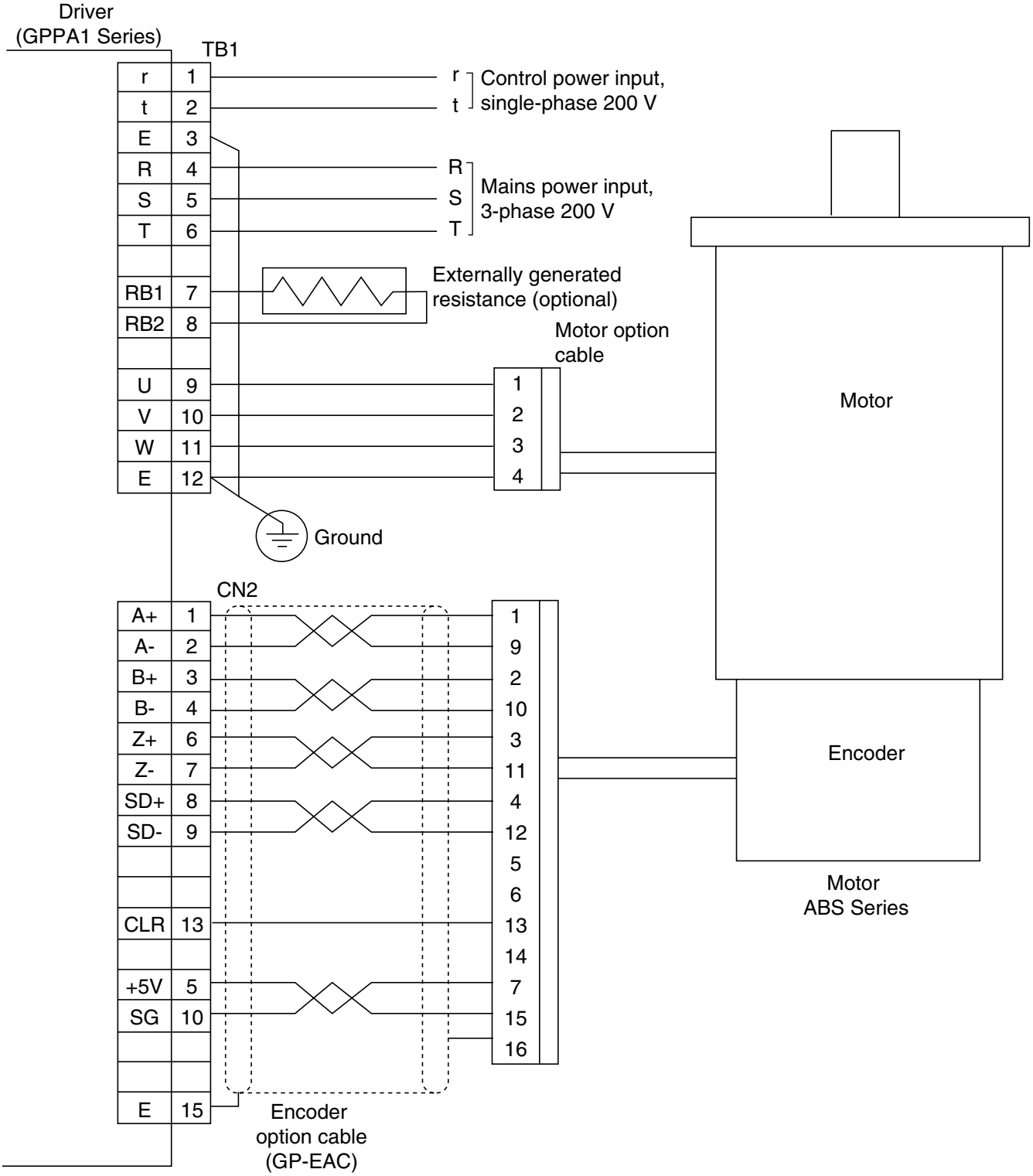
■ **Wiring between this module and driver (X-/Y-/Z-/A-axes)**



* For details, see the instruction manual for the driver.

Reference

■ **Connection between driver, power supply and motor (absolute encoder made by Nikon)**



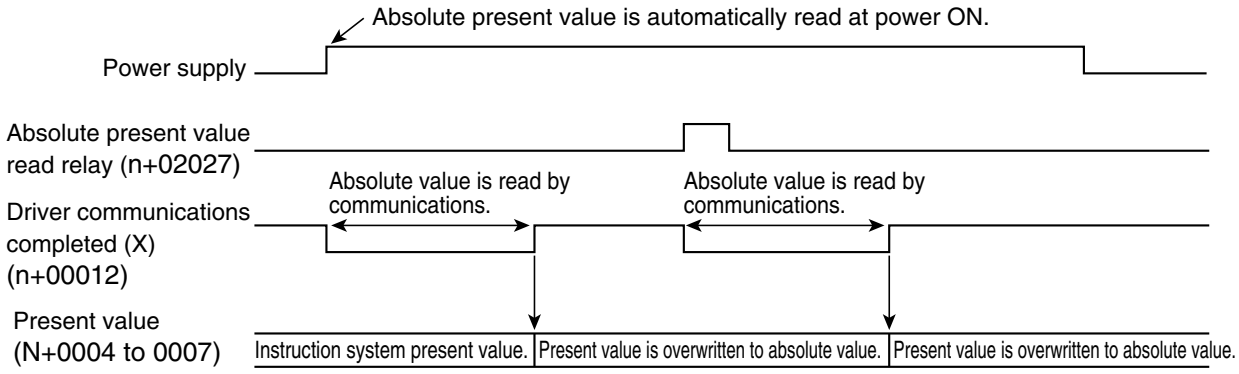
• For details, see the instruction manual for the driver.

[4] Reading absolute values

On this system, the absolute value is automatically read to the driver from this module when the module is powered ON. At this time, a retry is performed for five seconds until reading is completed in consideration of the driver's startup time. If data is not returned from the driver during these five seconds, an absolute driver communications error (error code 016) occurs.

The instruction present value is rewritten to the absolute present value by turning the absolute present value read relay (n+02027 in the case of the X-axis) ON even during communications.

■ Data read timing at power ON and when the absolute present value read relay turns ON in an X-axis absolute system



(Note) This module sometimes outputs several pulses when the module is powered OFF. Accordingly, a deviation of several pulses is sometimes generated before and after a power OFF. However, absolute present positions held by the encoder do not deviate.

[5] Matching the mechanical origin on an absolute system

The origin on an absolute system becomes the origin of the absolute value encoder. When there exists a mechanical origin on a workpiece, the origin can be matched by the following procedure.

① Set parameters 1 and 2 so that zero return can be performed in an absolute system. At this time, set the origin compensation data to "0". After finishing setting, block transfer the settings and save the block data (save to flash ROM).

↓

② Perform a zero return. (Stop program operation at the mechanical origin on the workpiece.)

↓

③ Turn the absolute present position read relay ON to read the present position of the absolute value encoder.

↓

④ Set the value of the present position that is read as it is to the origin compensation data of parameter 1. After finishing setting, block transfer the settings and save the block data (save to flash ROM).

↓

⑤ Turn the absolute present position read relay ON to read the present position of the absolute value encoder. (At this time, setting is completed if the present value is "0".)

Chapter 11 Other Functions

11-1 Jog operation

The following describes the various data and operations when jog operation is performed.

[1] Outline of function

Operation is started up on axes in the specified direction, speed and acceleration time while jog is ON. When jog turns OFF, operation decelerates at the specified deceleration time and comes to a stop.

[2] Jog operation execution procedure

① Set the speed instruction value and acceleration/deceleration time No. to the operation data area.
- When "0" is specified, the parameter value is taken.

↓

② Startup by Jog+ or Jog-.
- When the startup speed of the parameter is set, the startup speed is enabled.

[3] Assignment of operation relay and operation data settings

"*****" in N+**** indicates the numerical value of the address.

● **Operation relay** (assignment of special I/O data area)

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	2	Busy flag	0	Non-busy state
							1	Busy state
Output (PC→PS)	0200	0220	0240	0260	6	Jog+ (CW jog operation instruction)	0	Stop
							1	Busy state
					7	Jog- (CCW jog operation instruction)	0	Stop
							1	Busy state

*JW-14PS only

- Though the movable range is restricted when the software limit has been set to is disabled (CW limit is smaller than or equal to CCW limit) on axis each parameter, when Å}9999999 is exceeded by jog operation, operation becomes intermittent, and positioning is no longer possible, and zero return must be performed.

(Note) Parameter values are enabled when speed data and acceleration/deceleration time No. are "00".

● **Operation data** (assignment of special I/O data area)

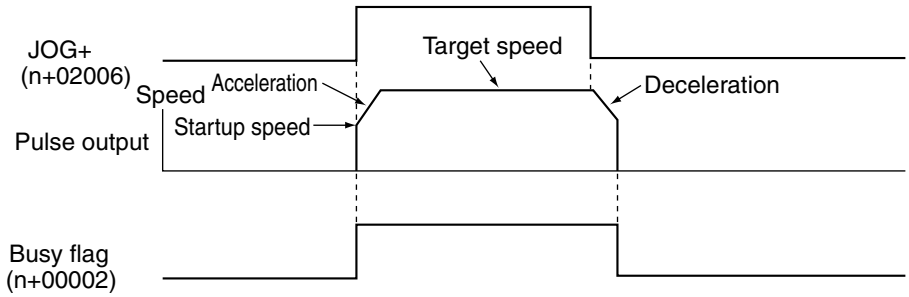
I/O	Byte address of data memory				Bit	Function	
	X-axis	Y-axis	Z-axis*	A-axis*			
Output	0214	0234	0254	0274	0 to 7	Speed instruction value (10^1 10^0)	• When 000000, the jog operation speed of parameters becomes the speed instruction value.
	0215	0235	0255	0275	0 to 7	Speed instruction value (10^3 10^2)	
	0216	0236	0256	0276	0 to 7	Speed instruction value (10^5 10^4)	
	0217	0237	0257	0277	0 to 3	Acceleration time No. (0 to 8) * When 0, setting value of parameter	
					4 to 7	Deceleration time No. (0 to 8) *When 0, setting value of parameter	

*JW-14PS only

When the speed data and acceleration/deceleration time No. is changed during jog operation, program operation is performed at the new settings.

[4] Timing chart

The following shows the timing chart during jog operation on the X-axis.

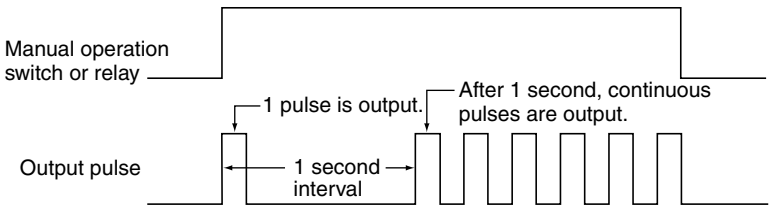


n is the top address (in relay units) of the special I/O data area.

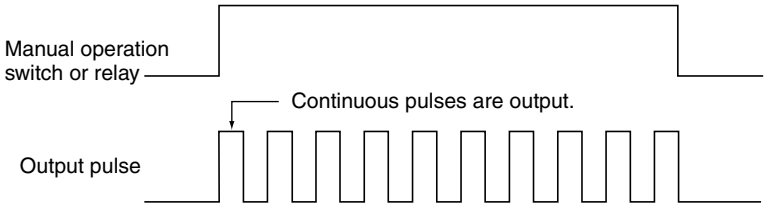
[5] 1-second wait operation (inching)

When parameter 1 address A+0075 bits 0 to 3 are set to "1" (BCD), the 1st pulse is output, and continuous pulses are output after a 1-second interval.

①1-second wait ON



②1-second wait OFF



11

11-2 Teaching

The following describes data and operations when teaching is performed.

[1] Outline of teaching function

The present position is captured to the position data No. (teaching address) during teaching.
The teaching mode is entered at the ON rising edge of teaching, and the present position is captured to the position data at its falling edge.

- Perform teaching after the origin has been confirmed. The present position unconfirmed error (error code 039) occurs if the origin is not confirmed.
- When teaching is confirmed, the value is overwritten to the position data area in internal memory on the module. As this value is lost by a power OFF or a reset, save the data to retain the value.

[2] Teaching execution procedure

① Set the position data No. at teaching.

② Turn the teaching bit OFF to ON.
- The 7-segment LED display blinks at this time.

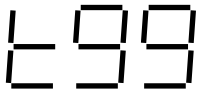
(display when "99" is registered)

⇐ blinking

Indicates the teaching mode.

③ Move the axis to the teaching position.
(by jog operation, direct operation, etc.)

④ Stop the axis, and turn the teaching bit to OFF.
- At this time, when the 7-segment LED display lights, the coordinates are written to internal memory.



⇐ Lit

⑤ Reset the error.
- Exit the teaching mode.

[3] Assignment of operation relay and operation data settings

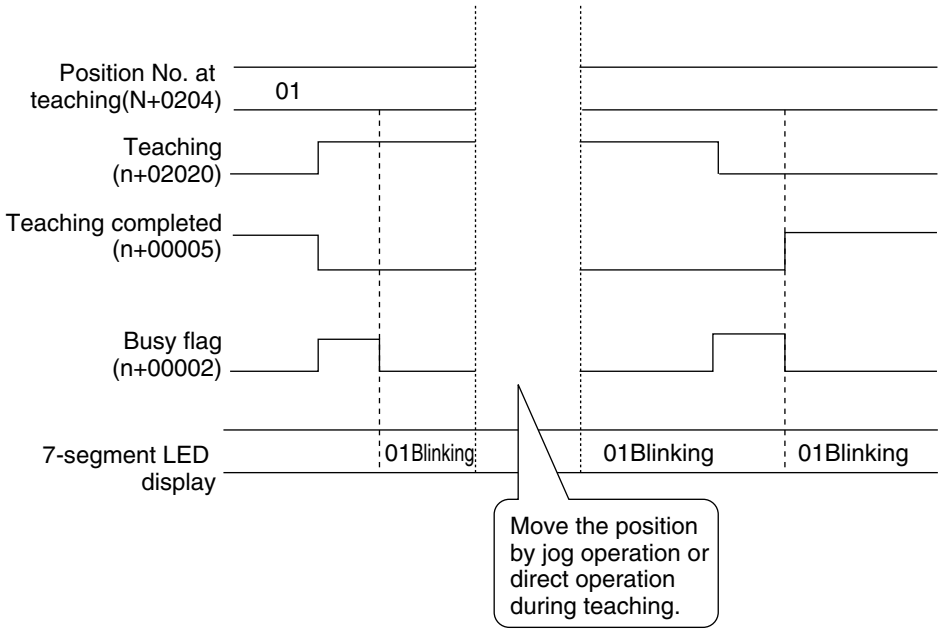
I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input	0000	0020	0040	0060	2	Busy flag	0	Non-busy state
							1	Busy state
					5	Teaching completed	↑	Completed
							↓	At start
Output	0202	0222	0242	0262	0	Teaching		
	0204	0224	0244	0264	0 to 7	Position No. at teaching (00 to 99)		

*JW-14PS

• "*****" in N+**** indicates the numerical value of the address.

[4] Timing chart

The following shows the timing chart when teaching is performed on the X-axis.
In this example, the present position is captured to position No.2.



• N and n are the top address of the special I/O data area. (N: byte unit, n: relay unit)

11

11-3 Interrupt jog feed

The following describes the various data and operations when interrupt jog feed is performed.
To use the interrupt jog feed function, be sure to set parameter 1 (address A+0076 bits 0 to 3) to "1".

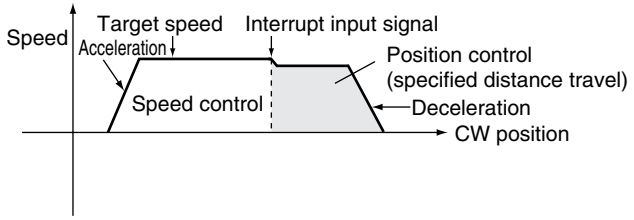
• Operation mode setting of general-purpose input (parameter 1 - address 0076 bits 0 to 3)

Setting value	Description	Remarks
0	Regular input (Operation state of general-purpose input relays is monitored.)	Default
1	Interrupt input (Speed control is switched to position control at ↑.)	—
2	External startup input (Both external startup and startup by the internal startup relay are enabled.)	—

[1] Outline of function

The "interrupt jog feed" function moves the axis started up by speed control in the same direction as the advance direction by a specified travel distance to perform positioning when the external input interrupt input signal (CN2/3 pins 8 and 20) are input.
There are two startup modes, startup from program operation and startup from direct operation.

● Specified distance travel in advance direction



(Note) When there is inversion according to the interrupt input signal of travel in the direction opposite to the advance direction, there is no acceleration or deceleration.

[2] Startup from program operation

With program operation, after the operation pattern in the step data is set to "3: speed control," this step No. is started up and program execution waits for the interrupt input signal.

(1) Description at program operation

The general-purpose input signal functions as an external interrupt signal after the operation pattern=3 (speed control) step is executed.
The travel distance after an interrupt detection is the value of the position data set in the step data of the target step No., and axes move by that value and then come to a stop.
The speed and acceleration/deceleration time after an interrupt detection (when the speed is changed or at a final stop) follows the step data of the target step No.

- The travel direction after an interrupt is generated is the same direction as the operation direction.
- The present value at speed control operation and when an interrupt is generated follows the parameter (6: present value at speed control operation) setting.

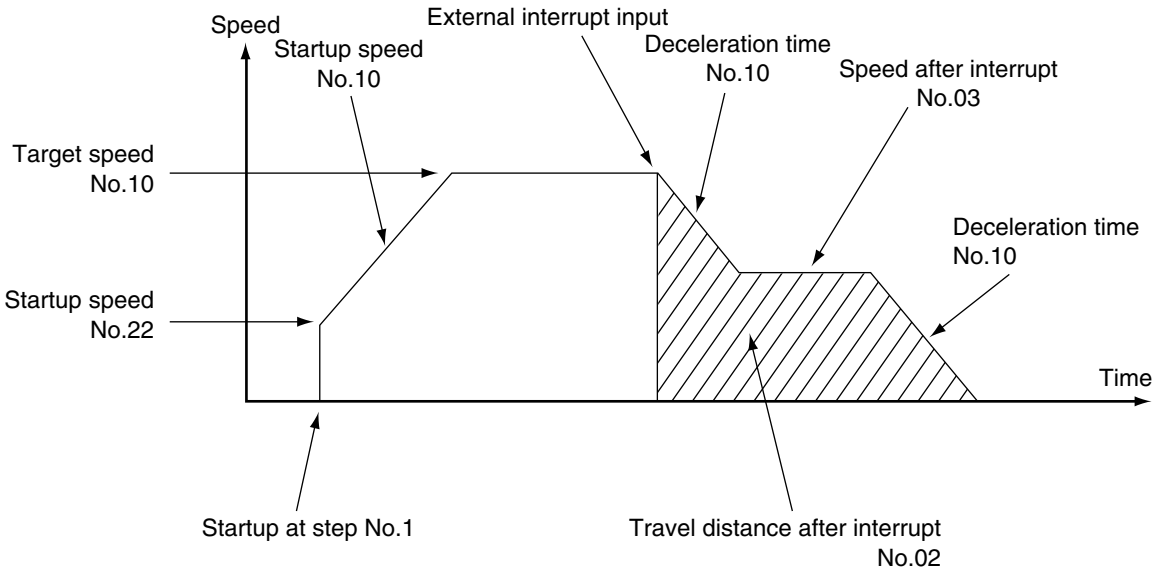
(Note) Speed control operation can be stopped only by "external interrupt" and "deceleration stop."

(2) Program operation step data

The following typical example of speed control describes program operation when operation is started up by the following step data and an external interrupt is input.

■ **Step data at program operation in speed control of X-axis**

X-axis step data	Step No.1	
	3(BCD)	---- X-axis designation ("1" in Hex) — Operation pattern 3 (speed)
2(BCD)	3(BCD)	---- Acceleration time No.2 (X-axis data) — Deceleration time No.3 (X-axis data)
22(BCD)		---- Startup speed No.22 (X-axis data)
10(BCD)		---- Target speed No.10 (X-axis data)
01(BCD)		---- Dwell timer No.00 (disabled)
02(BCD)		---- Travel distance after interrupt, and pulse direction No.02 (X-axis data)*
05(BCD)		---- Output code 05
03(BCD)		---- Speed No.03 after interrupt (X-axis data)



* The polarity of the position data of No.2 is the direction in which the pulse is output when speed control is performed. (CW direction when "+" and CCW direction when "-")

[3] Startup by direct operation

Operation starts up by speed control startup in direct operation, and program execution stands by for an interrupt input signal.

[Description at direct operation]

The general-purpose input signal functions as the external interrupt signal after speed control startup.

The travel distance after an interrupt detection is the value set by the position instruction value at startup, and axes move by that value and come to a stop. The speed after an interrupt detection is the speed set in parameter 1 (address A+0054 to 0057: speed after interrupt).

The acceleration/deceleration time after an interrupt detection (when the speed is changed or at a final stop) is the value set by the acceleration/deceleration time No. at startup.

- When the address A+0054 to 0057 of parameter 1 is set to "00000000", the speed before the interrupt is maintained.
- The travel distance after an interrupt is generated is the same direction as the operation direction.
- The present value in speed control operation or when an interrupt is generated follows the setting of parameter 1 (address A+0006: present value at speed control operation).

[4] Speed control operation

When operation is started up with the "position control/speed control setting" relay set to "1", speed control operation is executed.

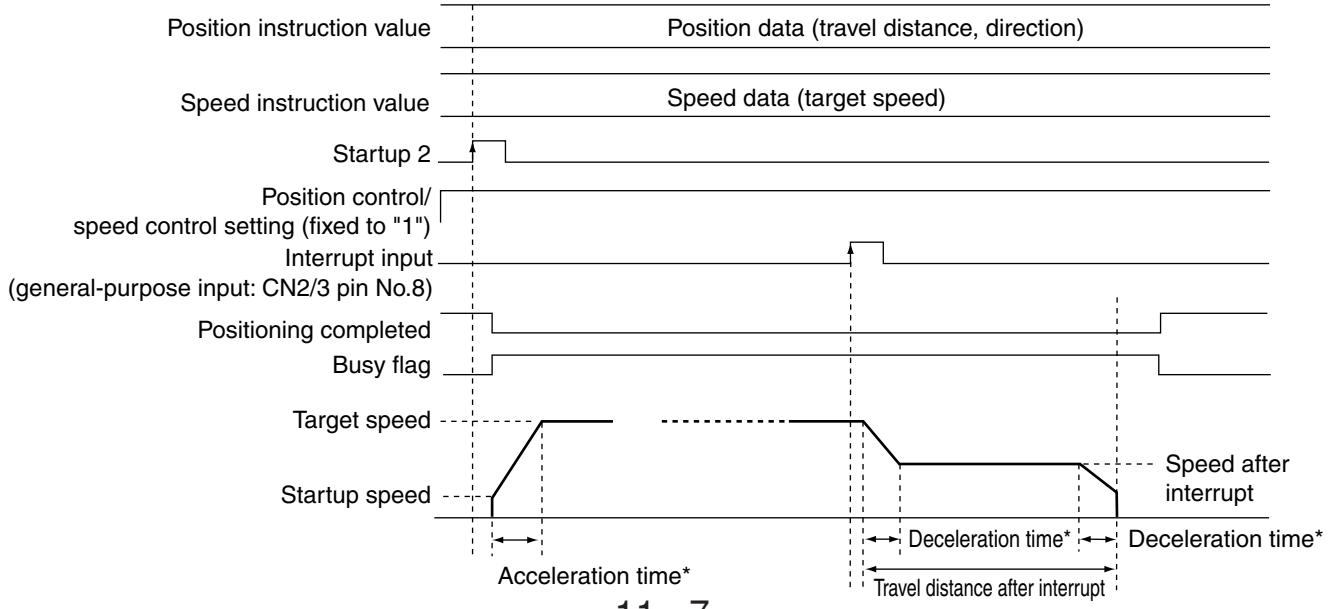
Speed control operation can be stopped only by "external interrupt" and "deceleration stop."

(1) Required operation data and setting memory

Operation data	Setting memory	Description of setting
Position data	Position instruction value (N+0210 to 0213 when X-axis)	Special I/O data area • "Position data" is the travel distance after an interrupt. • The "Sign" bit is the direction designation (0: CW, 1: CCW) • The "A/I" bit is disabled.
Speed data	Speed instruction value (N+0214 to 0216 when X-axis)	Special I/O data area • When "0", this becomes the parameter setting value.
Acceleration time	Acceleration time No. (N+0217 bits 0 to 3 when X-axis)	Special I/O data area • The acceleration time must be set to block data (first half of block No.3). • When "0", this becomes the parameter setting value.
Deceleration time	Deceleration time No. (N+0217 bits 4 to 7 when X-axis)	Special I/O data area • The deceleration time must be set to block data (last half of block No.3). • When "0", this becomes the parameter setting value.
Startup speed	Startup speed	Parameter 1 (address A+0020 to 0023)
Speed after interrupt	Speed after interrupt	Parameter 1 (address A+0054 to 0057)

(2) Basic timing chart

Though the following timing chart is for direct operation, the timing of operation after interrupt input is the same as that for program operation.



[5] Assignment of operation parameter and operation I/O data setting

● Assignment of special I/O data area

<table>
<tr><th rowspan="2">I/O</th><th colspan="4">Byte address of data memory</th><th rowspan="2">Bit</th><th colspan="4">Functions</th></tr>
<tr><th>X-axis</th><th>Y-axis</th><th>Z-axis*</th><th>A-axis*</th></tr>
<tr><td rowspan="2">Input
(PC←PS)</td><td rowspan="2">0000</td><td rowspan="2">0020</td><td rowspan="2">0040</td><td rowspan="2">0060</td><td rowspan="2">2</td><td colspan="2" rowspan="2">Busy flag</td><td>0</td><td>Non-busy state</td></tr>
<tr><td>1</td><td>Busy state</td></tr>
<tr><td rowspan="3">Output
(PC→PS)</td><td rowspan="3">0200</td><td rowspan="3">0220</td><td rowspan="3">0240</td><td rowspan="3">0260</td><td>0</td><td>At program operation</td><td colspan="3">Startup 1 [↑]</td></tr>
<tr><td>4</td><td rowspan="2">At direct operation</td><td colspan="3">Startup 2 [↑]</td></tr>
<tr><td>5</td><td>Position control/ speed control setting</td><td>1</td><td>Speed control startup</td></tr>
</table>

*JW-14PS only

• "*****" in A+**** indicates the numerical value of the address.

● Parameter 1 (regular parameter)

Set as follows as block No.01. (must be set independently on each axis)

Address	Byte	Default	Function	
0006	1	00	Present position at speed control operation	00: Present position data updated as it is (also updated at an interrupt detection) 01: Present position data updated as it is (zero preset at an interrupt detection) 02: Present position data set to "0" at speed control startup, and present position data not updated (Present position data is also not updated after an interrupt has occurred, and remains at "0" until startup of the next position control.)
0054 to 0057	4	00000000	Speed after interrupt	000000 to 500000 pps (enabled only at direct operation) • When "000000", the speed before the interrupt is continued. • 1 byte is not used.
0076	Bit 0 to 3	0	General-purpose input operation mode setting	1: Interrupt input (Speed control is switched to position control at ↑.)

• "*****" in A+**** indicates the numerical value of the address.

11-4 Forced intervention startup

The forced intervention startup instruction is enabled only in program operation. It is used, for example, to avert the present operation in program operation in an emergency.

[1] Outline of function

The step No. to which forced intervention startup is specified. Pulse output of the currently executing program operation is stopped (without a deceleration) and execution is performed starting with the preset step No. at the ON rising edge of forced intervention operation.
Step No. enable need not be set to ON.

[2] Procedure for use of forced intervention operation

① Set forced intervention operation to the step data.

↓

② When forced intervention operation is required, set the step No. preset at ① and change forced intervention operation from OFF to ON.

[3] Assignment of operation relay

For details of step data in program operation, see "Details of step data."

● **Assignment of special I/O data area**

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	2	Busy flag	0	Non-busy state
							1	Busy state
Output (PC→PS)	0201	0221	0241	0261	4	Forced intervention startup [↑]		
	0203	0223	0243	0263	0 to 7	Step No. at program operation (00 to 99)		

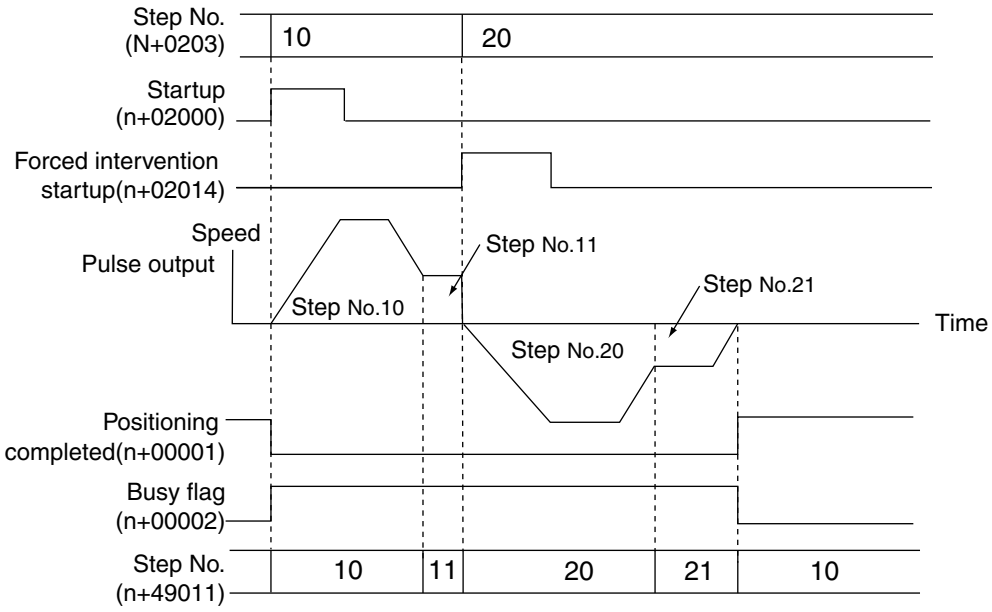
*JW-14PS only

• "****" in N+**** indicates the numerical value of the address.

[4] Timing chart

The following describes the timing chart when the operation pattern of each step data is set as follows with the X-axis as an example.

Step No.10, No.20: continuous
Step No.11, No.21: single-step
In this example, forced intervention operation of step No.20 is executed while step No.10 and 11 are being executed.



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11-5 Deceleration stop

The currently started up axis is made to decelerate and then comes to a stop.

[1] Outline of function

This function is executed at the ON rising edge of deceleration stop.
When a deceleration stop is executed in program operation, operation stops by the data of the deceleration time No. set to the step data. Otherwise, operation stops by the deceleration time No. set in the operation data area.

[2] Assignment of operation relay

● **Assignment of special I/O data area**

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	2	Busy flag	0	Non-busy state
							1	Busy state
Output (PC→PS)	0201	0221	0241	0261	3	Deceleration stop [↑]		

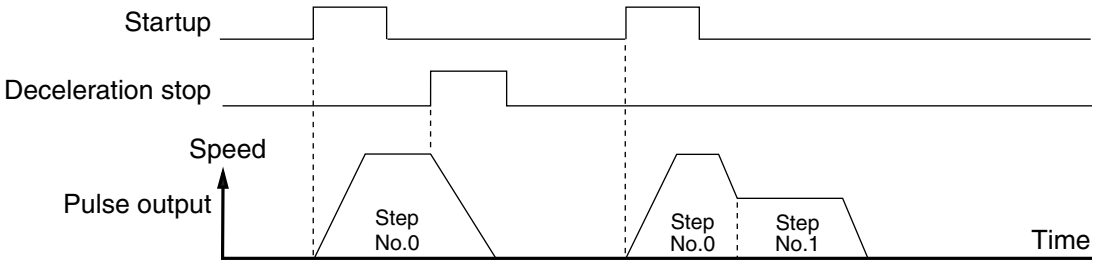
*JW-14PS only

• "*****" in N+**** indicates the numerical value of the address.

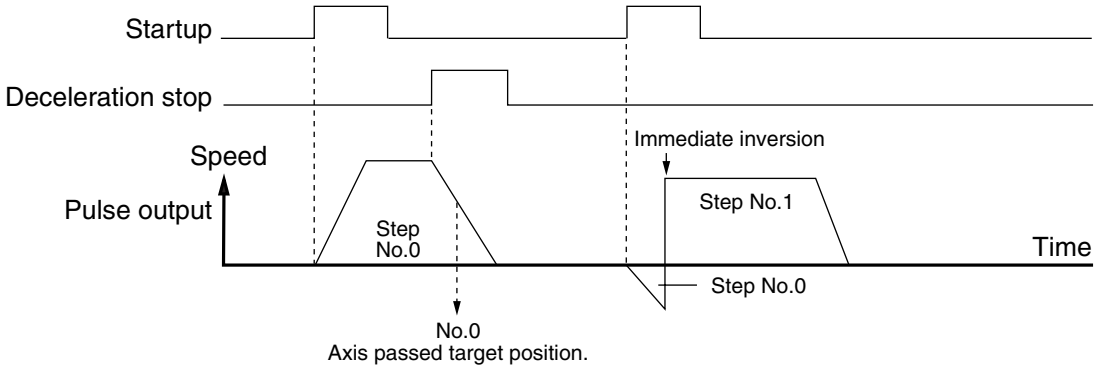
[3] Deceleration stop during positioning

(1) Deceleration stop during positioning by absolute value

When program execution is stopped before the target position by deceleration stop, subsequent positioning can be resumed by starting up positioning.

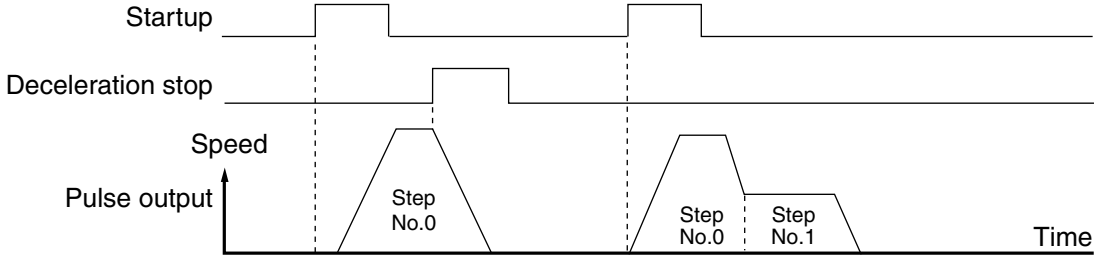


When "continuous" is selected as the operation pattern, positioning is executed at the target position of step No.0, operation is inverted immediately without acceleration/deceleration, and positioning of step No.1 is executed.



(2) Deceleration stop during positioning by incremental value

When program execution stops by deceleration stop, the step data that was being executed at that time is re-executed.



(3) Deceleration stop at linear interpolation operation

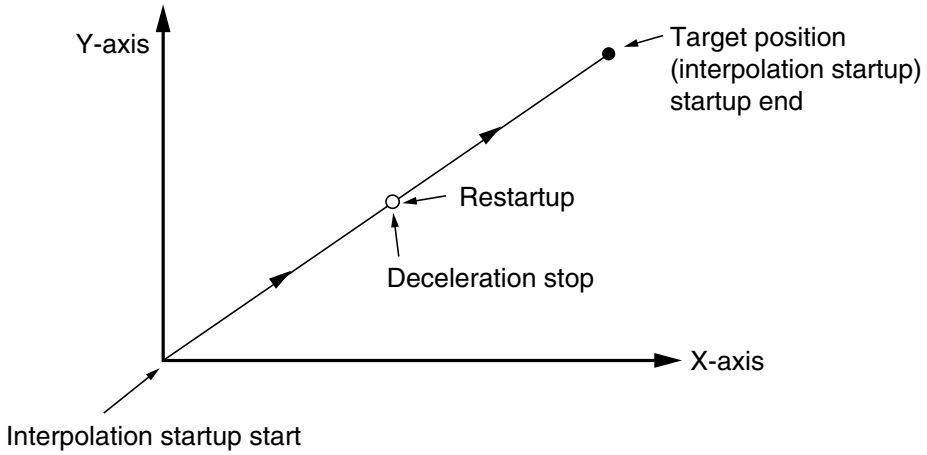
Deceleration stop at linear interpolation is executed by the rising edge of deceleration stop execution (operation relay area) of one of the currently operating axes.

For example, when linear interpolation is being operated on the X- and Y-axes, deceleration stop is executed at the rising edge of deceleration stop execution on the X-axis or deceleration stop execution on the Y-axis.

When a startup is executed again, the position data of each axis to be operated differs according to the incremental value or absolute value, and the target position differs as follows. The following description is for linear interpolation on the X-axis and Y-axis.

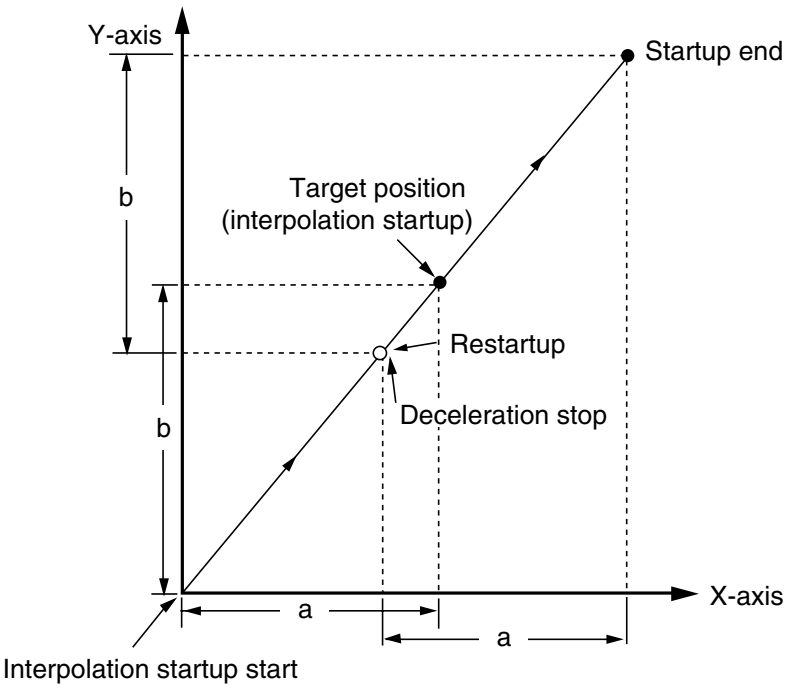
① **X-axis: absolute value, Y-axis: absolute value**

When program execution is stopped before the target position by deceleration stop, subsequent positioning is resumed on both axes by starting up positioning.



② **X-axis: incremental value, Y-axis: incremental value**

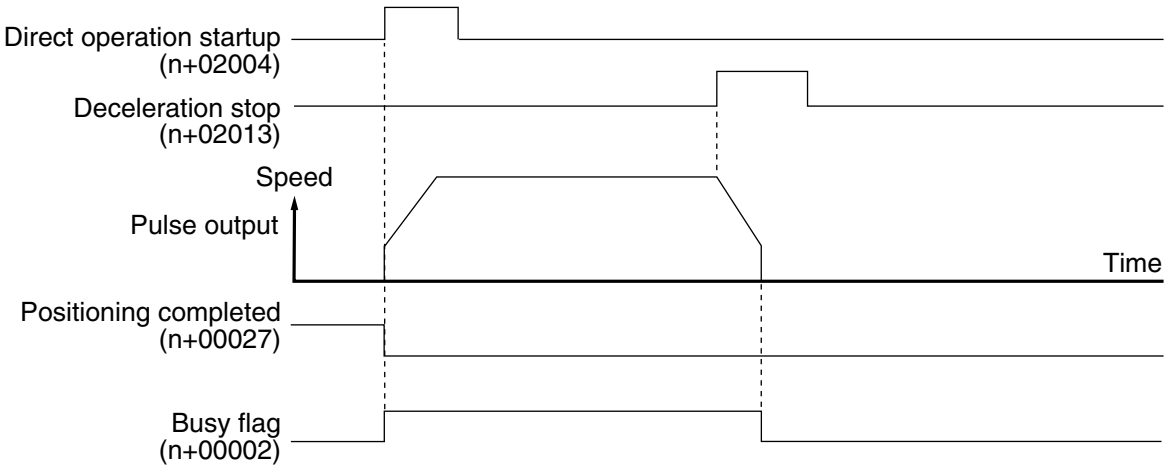
When program execution is stopped by deceleration stop, the step data that was stopped is resumed on both axes by starting up positioning.



(Note) Basically, with interpolation operation, set both axes to the same coordinate management (absolute value/incremental value) mode.

[4] Timing chart

The following shows the timing chart when the currently started up X-axis is decelerated and stopped by direct operation.



11-6 Change present position

Change the present position to any value.

[1] Outline of function

The value set to the operation data area is changed to at the ON rising edge of the present position preset. After this, the origin is in a confirmed state. When "0" is changed to, that position becomes the origin.

The original position cannot be specified as this origin when a positional shift has occurred as it differs from the origin according to the external input signal.

[2] Assignment of operation relay and operation data setting

● **Assignment of special I/O data area**

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	2	Busy flag	0	Non-busy state
							1	Busy state
					4	No origin flag	0	Origin
							1	No origin
Output (PC→PS)	0201	0221	0241	0261	2	Present position preset [↑]		
	0210	0230	0250	0270	0 to 7	Position instruction value (10^0 10^1)		
	0211	0231	0251	0271	0 to 7	Position instruction value (10^2 10^3)		
	0212	0232	0252	0272	0 to 7	Position instruction value (10^4 10^5)		
	0213	0233	0253	0273	0 to 7	Position instruction value (sign A/I 10^6)		

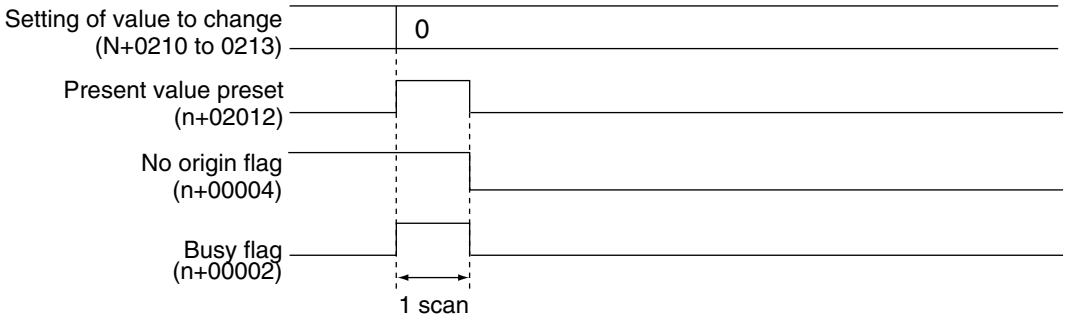
*JW-14PS only

• "*****" in N+**** indicates the numerical value of the address.

[3] Timing chart

The following shows the timing chart when the present value of the X-axis is set to "0".

The no origin flag turns OFF as the present position becomes the origin when "0" is set.



11-7 Override

Override is used to change the speed of axis startup.

[1] Outline of function

While override enable is ON, the override set to the operation data area is captured to change the target speed.

An override within the range 1 to 999% is valid. The target speed set in program operation, direct operation and jog operation is set as 100%.

$$\text{Target speed} = \text{Specified speed} \times \frac{\text{Override}}{100}$$

An override applied on pulse output during a zero return is invalid. Note, however, that when origin compensation is set to ON, override on the compensation data worth of pulse output is valid.

- "0%" cannot be specified for the override. When "0%" is specified, the override is enabled, and pulse output stops.
- Operation is performed at the maximum speed when the maximum speed (parameter 1 address A+0014 to 0017) is exceeded by an override.

[2] Assignment of operation relay and operating data setting

● **Assignment of special I/O data area**

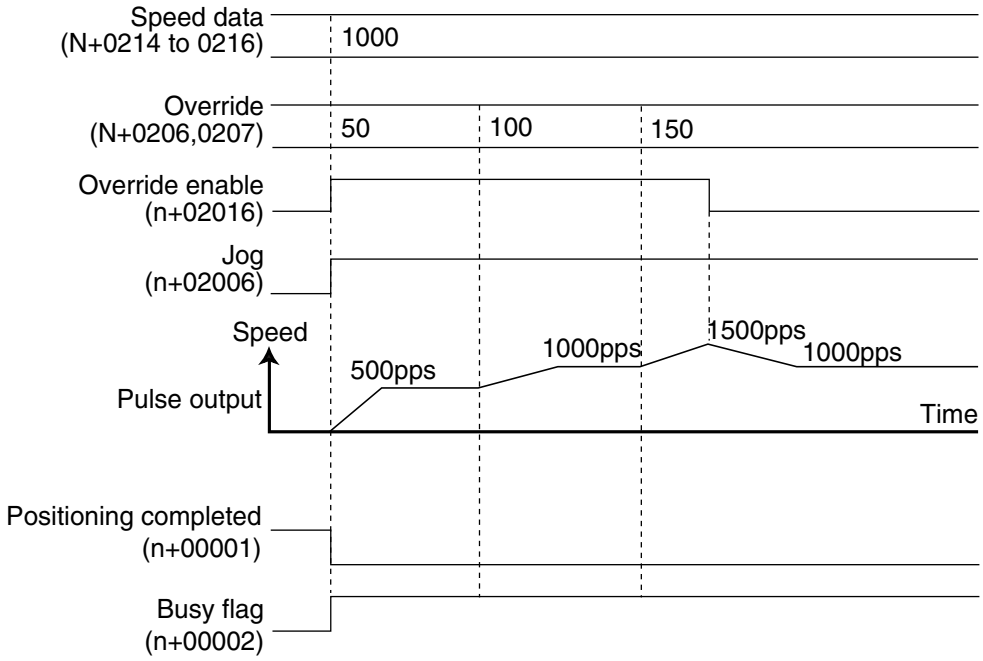
I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Output (PC→PS)	0201	0221	0241	0261	6	Override enable	1	Enabled
	0206	0226	0246	0266	0 to 7	Override value, lower (00 to 99)	Set override value within range 000 to 999%.	
	0207	0227	0247	0267	0 to 7	Override value, upper (00 to 99)		
	0214	0234	0254	0274	0 to 7	Speed instruction value (10^1 10^0)	When 000000, the jog operation speed of parameters becomes the speed instruction value.	
	0215	0235	0255	0275	0 to 7	Speed instruction value (10^3 10^2)		
	0216	0236	0256	0276	0 to 7	Speed instruction value (10^5 10^4)		

*JW-14PS only

- "*****" in N+**** indicates the numerical value of the address.

[3] Timing chart

The following shows the timing chart for when the target speed is changed by the override while jog operation is being executed on the X-axis. In this example, the specified target speed is taken to be "1000 pps."



11-8 Clear error

[1] Outline of function

When the following inputs turn ON on this module, pulse output is interrupted and pulses are not output from then on:

- Emergency stop input signal
- CW limit input
- CCW limit input
- CW/CCW software limit
- Driver error input

After each of the above inputs are turned OFF, pulse can be output by the ON rising edge of error reset. When each of the inputs is turned ON, setting as to whether or not an origin unconfirmed state is set can be specified by parameter 1 address A+0001. When the origin has been set to unconfirmed, and each input is turned ON, the no origin flag turns ON.

An error also occurs when a mistake is made in operation, for example, when setting data. However, in this instance, the error is cleared and the origin (present value) becomes unconfirmed when clear error is turned ON.

[2] Operation relay assignment

● **Assignment of special I/O data area**

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	2	Busy flag	0	Non-busy state
							1	Busy state
					4	No origin flag	0	Origin
							1	No origin
Output (PC→PS)	0201	0221	0241	0261	7	Clear error [↑] (pulse output inhibit canceled)		

*JW-14PS only

- "****" in N+**** indicates the numerical value of the address.

[3] Parameter settings

● **Parameter 1** (regular parameter)

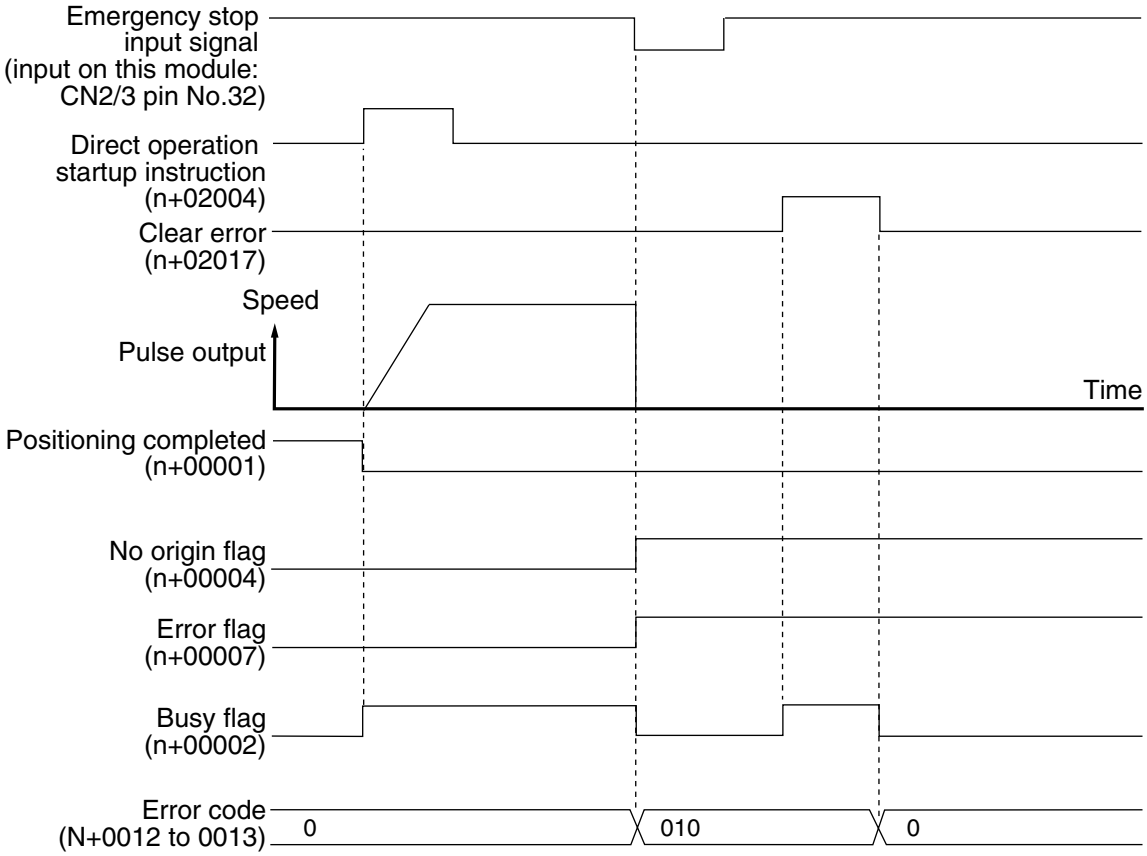
Set as follows as block No.01. (must be set independently on each axis)

Address	Bit	Default	Function	
0001	0	0	Designation of origin unconfirmed at hardware error	0: Previous state held at emergency stop, limit input or driver error 1: State forcibly set to origin unconfirmed state
	1	0	Designation of origin unconfirmed at software limit error	0: Present value held at error 1: State forcibly set to origin unconfirmed state

- "*****" in A+**** indicates the numerical value of the address.

[4] Timing chart

The following shows the timing chart when the emergency stop input signal turns ON during execution of direct operation on the X-axis. This timing charts assumes that the setting (parameter 1) for setting to an origin unconfirmed state is turned ON by the emergency stop input signal.



11-9 Clear deviation output

Clear deviation output (CN2/3 pin Nos.6 and 18) turns ON for about 20 ms according to the change in state of the clear deviation relay from OFF to ON. Clear deviation is enabled only in a stopped state.

The state of the present value is as follows:

1. When this module is used in an open loop control system, and clear deviation is output, the present value (origin) becomes unconfirmed.
2. When this module is used in a closed loop control system, and clear deviation is output, the value calculated from the pulse value of the feedback system is input to the pulse value of the instruction system.

Clear deviation output is automatically output at the following conditions in addition to the ON/OFF state of this relay:

1. Clear deviation output turns ON for about 20 ms when zero return is completed.
2. Clear deviation output turns ON for about 20 ms together with suspension of pulse output when an emergency stop is executed.
   (according to setting of parameter 1 (address A+0000 bit 5) "Emergency stop input function selection")

(1) Assignment of operation relay (assignment of special I/O data area)

I/O	Byte address of data memory				Bit	Function		
	X-axis	Y-axis	Z-axis*	A-axis*				
Input (PC←PS)	0000	0020	0040	0060	2	Busy flag	0	Clear deviation
							1	Non-busy state
Output (PC→PS)	0201	0221	0241	0261	5	Busy state	0	OFF
							1	ON

*JW-14PS only

• "*****" in N+**** indicates the numerical value of the address.

(2) External I/O connector pin arrangement

Pin No.	Name
6 (X-/Z-axes) / 18 (Y-/A-axes)	Clear deviation output/origin alignment instruction output (24 V)

Note

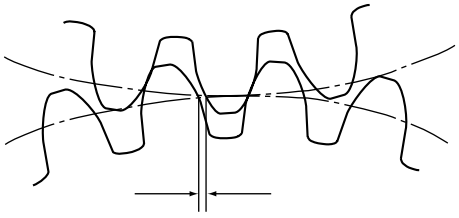
• When the servo is powered ON with a deviation having occurred, the motor suddenly operates, which is dangerous.
When only the servo driver is turned OFF and the motor is operated, be sure to clear the deviation.

11-10 Backlash compensation

[1] Outline of function

"Backlash" is the gear meshing error that occurs between the drive shaft and the mechanical system that is driven.

When backlash occurs it causes a proportionate amount of shift in positioning from the forward direction and from the reverse direction. Backlash can be compensated to eliminate this shift.

<table>
<tr><th>Setting value (BCD)</th><th>Description</th></tr>
<tr><td>0
(default)
to
9999</td><td>Set the compensation amount (P) of backlash (error on mechanical system).
 
Compensation amount (setting value)
Additional feedback pulses proportionate to the compensation amount are output each time that the positioning direction changes.
<table>
<tr><td>037</td><td>10^1</td><td>10^0</td></tr>
<tr><td>040</td><td>10^3</td><td>10^2</td></tr>
</table>
A parameter setting error is output when a code other than a BCD is set.</td></tr>
</table>

The backlash compensation speed becomes the startup speed.

[2] Axis parameter settings

● **Parameter 1 (regular parameter)**

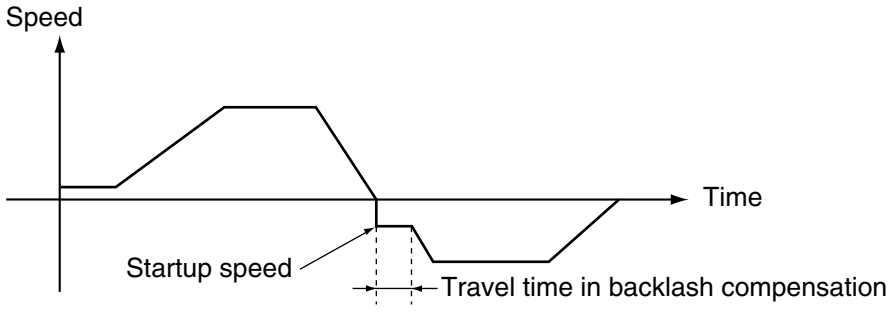
Set as follows as block No.01. (must be set independently on each axis)

Address	Byte	Default	Function	
0020 to 0023	4	00000000	Startup speed	000001 to 500000 pps *Remaining 1 byte is not used.
0064 to 0065	2	0000	Backlash compensation data	0000 to 9999

• "****" in A+**** indicates the numerical value of the address.

[3] Backlash compensation operation

● **Reciprocal operation on single axis**

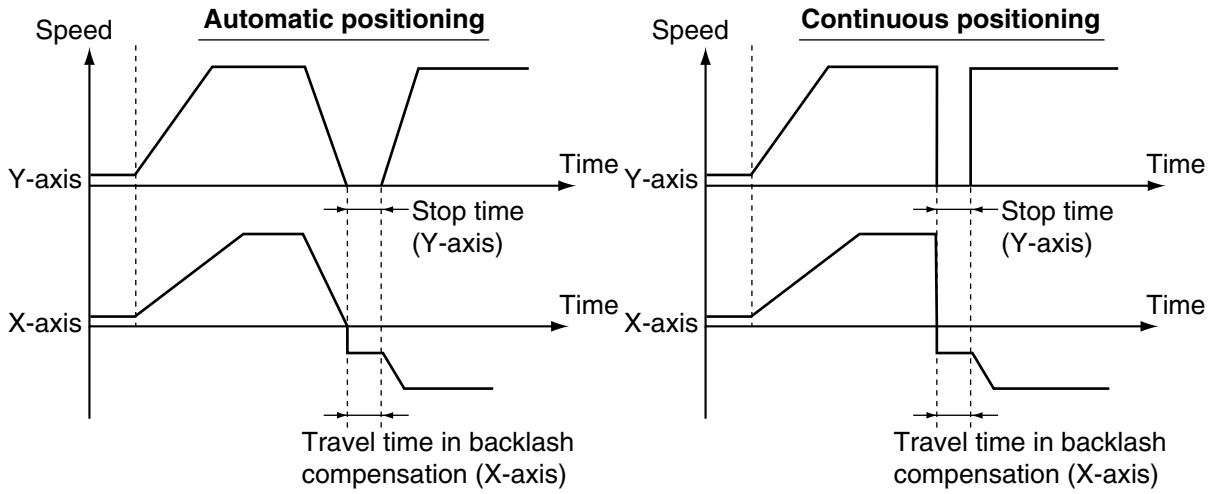


(Note) when the startup speed is set to "0", backlash is compensated by 4 pps (minimum pulse unit of this module) as the resolution is four.

[4] Backlash compensation at linear interpolation

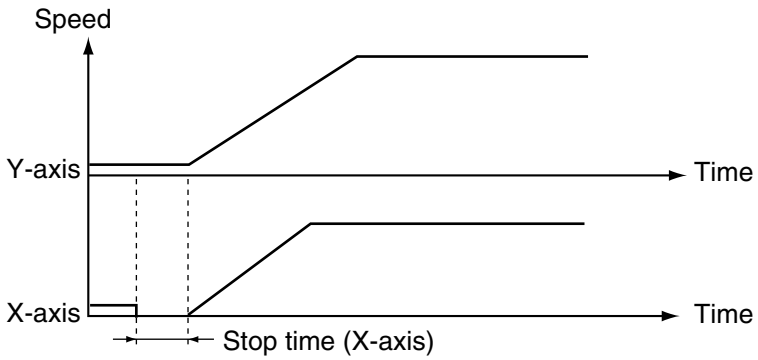
Backlash compensation can be set to operate on individual axes during linear interpolation on two or more axes. While backlash compensation is being output, pulse output on other interpolated axes is stopped.

[Example] Linear interpolation of X-axis and Y-axis



When the backlash compensation data differs for each axis to be linear interpolated, program execution stands by for all interpolation operation outputs and travel accelerates while compensation is being output simultaneously.

[Example] Linear interpolation of X-axis and Y-axis



11

11-11 General-purpose input

The general-purpose input signal is captured directly on this module, and sets its operation mode to parameters.

• General-purpose input operation mode setting (parameter 1: address A+0076 bits 0 to 3)

Setting value	Description	Remarks
0	Regular input (Operation state of general-purpose input relays is monitored.)	Default
1	Interrupt input (Speed control is switched to position control at the rising edge of the general-purpose input signal.)	—
2	External startup input (Both external startup and startup by the internal startup relay are enabled.)	—

(1) Regular input

Normally, the state of the general-purpose input is monitored on the general-purpose input relay. The general-purpose input relay can be used in user applications (ladder programs).

(2) Interrupt input

① **At direct operation**

After speed control is started up, the general-purpose input signal functions as an external interrupt signal.

The travel distance after an interrupt detection is the value set by the position instruction value at startup, and the axes move by that value and come to a stop.

The speed after an interrupt detection is the speed set at parameter 1 (address A+0054 to 0057: speed after interrupt).

The acceleration/deceleration time after an interrupt detection (when the speed is changed or at a final stop) is the value set by the acceleration/deceleration time No. at startup.

- When the address A+0054 to 0057 of parameter 1 is set to "00000000", the speed before the interrupt is maintained.
- The travel direction after an interrupt is generated is the same direction as the operation direction.
- The present value in speed control operation and when an interrupt is generated follows the setting of parameter 1 (address A+0006: present value at speed control operation).

② **At program operation**

The general-purpose input signal functions as an external interrupt signal after the operation pattern=3 (speed control) step is executed.

The travel distance after an interrupt detection is the value of the position data set in the step data of the target step No., and axes move by that value and then come to a stop.

The speed and acceleration/deceleration time after an interrupt detection (when the speed is changed or at a final stop) follows the step data of the target step No.

- The travel direction after an interrupt is generated is the same direction as the operation direction.
- The present value at speed control operation and when an interrupt is generated follows the parameter 1 (address A+0006: present value at speed control operation) setting.

(Note) Speed control operation can be stopped only by "external interrupt" and "deceleration stop."

(3) External startup input

The general-purpose input functions as an external startup for direct operation and program operation. (At this time, both startup by internal startup relay and external startup are enabled.)

As external startup can be started up by a general-purpose input that is input directly to this module, high-speed startup that is not influenced by the scan time of PLC is possible.

11-12 General-purpose output

The general-purpose output signal is captured directly on this module, and sets the operation mode to parameters.

• General-purpose input operation mode setting (parameter 1: address A+0076 bits 4 to 7)

Setting value	Description	Remarks
0	Regular output (The state of the general-purpose output relay is output.)	Default
1	Interrupt output (ON or OFF when present value matches the interrupt output position data) • Interrupt output ON/OFF is determined by the "A/I" bit in the interrupt output position data.1: ON, 0: OFF	—

(1) Regular output

Normally, the state of the general-purpose output relay (internal relay) is output.

The general-purpose output relay can be used in user applications (ladder programs).

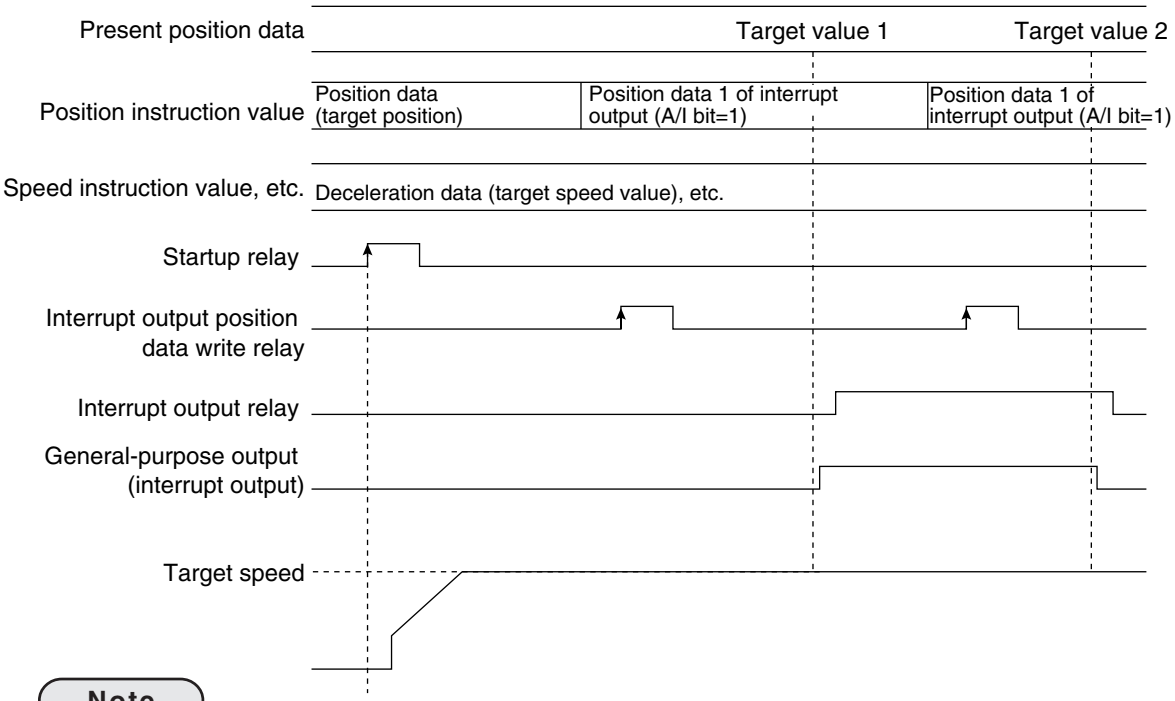
(2) Interrupt output (enabled during direct operation, program operation and jog operation)

When the present value arrives at the preset interrupt output position, the ON/OFF state of the general-purpose output relay at that time is output as an interrupt output.

The interrupt output position data is set at the "interrupt output position data write relay" before a startup or during operation.

The position instruction data when the state of the "interrupt output position data write relay" changes from OFF to ON is registered as "position data of interrupt output" and the "interrupt output ON/OFF designation."

Operation example (position data of interrupt output is set during operation in direct operation)



Note

- The state of interrupt output changes only when an interrupt is detected (when the setting value matches the present value).
- Though the position data of interrupt output can be set countless times during operation, interrupt output does not operate when the position data to set has been set to a position that is arrived at in 5 ms or less from the time (rising edge of interrupt output position data write relay) that the position data was set.
- When closed loop control is used, the feedback value is used as the present value to change interrupt output.

Chapter 12 Trial Operation

Trial operation by the following procedure comes in handy when wiring for positioning or when setting up system memory.

1 Set the switches on the module.

Set the MODE switch on the module to match the axis to be displayed.

2 Install this module.

Attach the JW-12/14PS to the rack panel.

3 Wire the module.

Wire the module referring to "Connection method."

4 Turn the PLC and this module ON.

Turn the PLC power supply and external power supply (24 VDC) ON. (These power supplies need not be turned ON simultaneously.)

5 I/O registration

Assign the special I/O data register (256 bytes) for this module by optional I/O registration.

(Note 1) Automatic I/O registration cannot be used on the JW50H/70H/100H mounted with this module.

6 Set parameter 1 (2) to the PLC.

Set parameter 1 (2) by block transfer.

7 Turn the servo driver ON (servo systems only).

Turn only the control power supply of the servo driver ON.

(Note 2) Leave the mains power supply (for motor) OFF.

8 Check and reset any errors.

See "Chapter 13 Troubleshooting."

9 Output clear deviation (servo systems only).

This step is not required if there is no deviation on the driver side.

CAUTION! The following operation causes the motor to operate.

10 Turn the mains power supply ON (servo ON: servo systems only).

A servo lock is applied to the motor if there is an error in the wiring. "Servo lock" refers to the state where the motor attempts to return to its original state when an external force causes the motor shaft to rotate.

(Note 3) If the polarities are wired incorrectly on the pulse generator, tachogenerator and motor, the motor may operate at high speed. Check the wiring again.

11 Perform jog operation.

Perform jog operation to test if the jog speed is appropriate.

- For details on the jog operation method, see "Chapter 10 Jog Operation."
- To disable jog operation when the module is used in closed loop control, cancel closed loop control in parameter 1. If jog operation is performed with jog operation disabled in parameter 1, check the wiring of the pulse generator (encoder) as miswiring is a probable cause.

12 Perform a zero return.

13 Input the positioning program by direct operation.

See the ladder program in "Chapter 8 Direct Operation."

(Note 4) The purpose of this step is operate this module, servo driver and motor for adjustment at system startup.

14 Input the actual program. (END)

The above procedure should help you understand how to start up this module.

Now, create an actual positioning program.

Chapter 13 Troubleshooting

13-1 Checks to perform when an error occurs and how to recover from an error

Perform the following to recover from errors that occur.

① **At power ON and at startup of this module** (when confirming operation after setting parameter or various data)

When this happens, check the hardware and the various block data on this module. Eliminate the cause of the error following the error code displayed at this time. After clearing the error, reset the error, and perform operation according to the regular startup procedure.

② **Error caused by emergency stop, etc. during operation**

When the pulse driver is used, the cause of this error can be eliminated, and the error can be recovered successfully by performing an error reset. However, in systems using a servo driver, the timing that a deviation clear is output and setting of the present value (origin) to unconfirmed are important. See tables 1 to 3 as the conditions for clearing the deviation and for setting the present value (origin) to unconfirmed by the external input signal differ according to the various parameters. Item "13-2" describes recovery from an emergency stop on a servo system and cautions to follow.

Table 1: Present value when a deviation clear or error clear according to the closed loop control mode is executed

Parameter \ Relay input			Clear deviation instruction	Clear error
Closed loop control mode selection [parameter 2 address 0000]	0	Closed loop control disabled	The present value (origin) forcibly becomes unconfirmed.	The present value is held.
	1	Emergency stop when the number of encoder pulses exceeds the closed loop control allowable range	The present position is adjusted from the instruction pulse.	The present position is adjusted from the instruction pulse.
	2	Compensation operation is performed so that allowable range is entered when the number of encoder pulses is outside of the closed loop control allowable range.	The present position is adjusted from the encoder pulse.	The present position is adjusted from the encoder pulse. At this time, a deviation clear is automatically output.

Table 2: Present value when software limit error, driver error or limit end error occurs

Parameter \ Signal input			Driver error	Limit input	Software limit detection
Designation of origin unconfirmed at hardware error [parameter 1 address 0001 bit 0]	0	The previous state is held at an emergency input, limit input and driver error.	The present value is held.	The present value is held.	—
	1	The state is forcibly set to the origin unconfirmed state.	The present value (origin) forcibly becomes unconfirmed.	The present value (origin) forcibly becomes unconfirmed.	—
Designation of origin unconfirmed at software limit error [parameter 1 address 0001 bit 0]	0	The present value is held at an error.	—	—	The present value is held.
	1	The state is forcibly set to the origin unconfirmed state.	—	—	The present value (origin) forcibly becomes unconfirmed.

Table 3: Present value when a 24 V power error or emergency stop error occurs

Parameter 2 / Signal input Parameter 1			24 V power error			Emergency stop error		
			Closed loop control mode selection (parameter 2 address 0000)			Closed loop control mode selection (parameter 2 address 0000)		
Content of parameter			0 (closed loop control disabled)	1 (emergency stop when the number of encoder pulses exceeds the closed loop control allowable range)	2 (Compensation operation is performed so that the allowable range is entered when the number of encoder pulses is outside of the closed loop control allowable range.)	0 (closed loop control disabled)	1 (emergency stop when the number of encoder pulses exceeds the closed loop control allowable range)	2 (Compensation operation is performed so that the allowable range is entered when the number of encoder pulses is outside of the closed loop control allowable range.)
Emergency stop input function selection [parameter 1 address 0005]	0	Pulse output only is stopped.	The present value is held.	The present value is held.	The present value is held.	The present value is held.	The present value is held.	The present value is held.
	1	Pulse output only is stopped and reset of the deviation clear is output.	The present value (origin) forcibly becomes unconfirmed.	The present position is adjusted from the instruction pulse.	The present position is adjusted from the encoder pulse.	The present value (origin) forcibly becomes unconfirmed.	The present position is adjusted from the instruction pulse.	The present position is adjusted from the encoder pulse.
Designation of origin unconfirmed at hardware error [parameter 1 address 0001 bit 0]	0	The previous state is held at an emergency stop, limit input or driver error.	The present value is held. Note, however, that emergency stop input function selection is given priority when it is set to "1".					
	0	The state is forcibly set to the origin unconfirmed state.	The present value (origin) forcibly becomes unconfirmed.					

13-2 Cautions in system configuration with servo driver

There are four ways to configure this module and the servo.

	Method of use	Parameter setting	
		Closed loop control mode selection [parameter 2 address 0000]	Absolute value control mode selection [parameter 2 address 0020]
(1)	When an incremental type driver is used	0, 1	Unused (0)
(2)	When an incremental type driver and encoder feedback are used	2	Unused (0)
(3)	When an absolute system-compatible driver is used	0, 1	Used (1)
(4)	When an absolute system-compatible driver and encoder feedback are used	2	Used (1)

Though there is no difference in control during regular operation, operation of this module differs during zero return caused by an emergency stop, for example. So, correspondingly matching control must be performed.

What is problematic is that a positional shift may occur when the procedure is performed incorrectly in adjustment of the present position between this module and the servo driver. This is caused by the shift between the present value counter in this module and the present value counter in the servo driver, and occurs by control of the servo driver motor power supply. (as the position information of the axis that moved by external force and inertia when the motor was turned OFF).

You can select whether to hold the present value (origin) when an error occurs or set the origin to unconfirmed by [designation of origin unconfirmed at hardware error (parameter 1 - 0001- bit 0)], [emergency stop input function selection (parameter 1 - 0000 - bit 5)] and [designation of origin unconfirmed at software limit error (parameter 1 - 0001 - bit 1)].
When the previous state is set to "held" (see tables 1 to 3), this module judges that the servo driver can control the motor at all times. Even if an emergency stop, etc. occurs, the present value is held on the assumption that this module is positioning at all times to the instructed position by the servo driver's deviation counter.
When the servo driver is not in a state where the motor can be controlled at all times (when the servo power supply is OFF as a result of the interlock with emergency stop, etc.), the present value (origin) must be set to unconfirmed (see tables 1 to 3). This is because the servo driver's deviation counter is no longer matched with the present value of this module when the servo is recovered. So, a zero return is required at restartup when there is no compensation operation function according to the absolute system or encoder feedback.

The following describes the recovery procedure in the configurations (1) to (4) above.

(1) When an incremental type driver is used

When powered ON, this module clears the present value to "0" (zero). Also, when a zero return is performed, the position where zero return ends becomes "0". When an error (emergency stop, etc.) occurs and the servo is turned OFF, perform zero return by the following procedure:

① Clear the error.
② Clear deviation.
③ Turn the servo ON.
④ Turn the servo ON.

(2) When an incremental type driver and encoder feedback are used

When powered ON, this module clears the present value to "0" (zero). Also, when a zero return is performed, the position where zero return ends becomes "0". When an error (emergency stop, etc.) occurs and the servo is turned OFF, perform zero return by the following procedure:

① Clear the error.
② Clear deviation.
(③The present position from the encoder feedback counter is adjusted.)
④ Turn the servo ON.
③ is automatically executed internally following a deviation clear.

(3) When an absolute system-compatible driver is used

When powered ON, this module asks the driver for the present value, and matches the present value to the absolute data from the driver. The driver is asked for the present value and the present value is matched to the absolute data from the driver also when the absolute present value read relay is turned ON. When the servo is turned OFF by an emergency stop, etc., perform zero return by the following procedure:

① Clear the error.
② Clear deviation.
③ Turn the servo ON.
④ Read the absolute present position.
Reading of the absolute present position can be instructed by the relay at any time if motor operation has stopped.

(4) When an absolute system-compatible driver and encoder feedback are used

When powered ON, this module asks the driver for the present value, and matches the present value to the absolute data from the driver. When the servo is turned OFF by an emergency stop, etc., perform zero return by the following procedure:

① Clear the error.
② Clear deviation.
(③The present position from the encoder feedback counter is adjusted.)
④ Turn the servo ON.
③ is automatically executed internally following the deviation clear. Reading of the absolute present position can be instructed by the relay at any time if motor operation has stopped.

(Note 1) The instruction present position is read to read to the servo driver on an absolute system. Reading must be performed after a deviation clear is executed with the servo OFF when reading the value as this is the value of the instruction system counter and not the count value of the encoder. If the instruction present position is read before a deviation clear, the present position cannot be used as the count value of the encoder becomes an unadjusted value.

(Note 2) Clear signal output at a zero return is an important element in determining the accuracy of zero return. Due to this, in acceptance of the driver's clear signal, the edge of the signal is more effective than its level on positional shift. (driver adjustment) This is because, when the signal level is used, the deviation counter stops for 20 ms (signal output time for positioning), encoder pulses that arrive in that time are ignored, and this causes a proportional error.

13-3 Error tables

The order of priority when an error occurs is as follows: X-axis, Y-axis, Z-axis and A-axis. When all errors on the X-axis are cancelled, errors for the Y-axis are then displayed, and so forth. When the X-axis is in error, the X LED blinks, and other LEDs are out. (Even if an error occurs on other axes, the LED for that axis does not blink until errors on the X-axis are cleared.)

When an error common to all axes occurs, all LEDs for the X, Y, Z and A axes blink.

Error code	Detection timing	Error item	Content/cause of error	Operation state at error	Remedy
000	At all times	Normal state (common to all axes)	——	——	——
001	At power ON	Hardware error (common to all axes)	The hardware of this module is in error.	——	Replace the module.
002	At power ON	Data corruption (common to all axes)	The block data of each axis saved to flash ROM is corrupted.	The block data of each axis saved to flash ROM is corrupted.	Transfer the block data of each axis to clear the error, and turn the power ON again or perform a reset.
003	At all times	24 V power not supplied (common to all axes)	Power is not being supplied to the 24 VDC input terminal.	Before startup, an error is output and operation is not started up.. During operation, an error is output and operation is immediately stopped.	Check the power supply and the wiring, and cancel the error after the recovery.
004	At writing to flash ROM	Flash ROM error (common to all axes)	Data was saved to flash ROM but could not be written.	The error code is output. (The error code is automatically canceled when writing can be performed successfully.)	Write again. If the error re-occurs even after a write, replace the module.
010	At all times	Emergency stop (error displayed separately for each axis, error axis LED blinking)	The emergency stop signal was input.	Before startup, an error is output and operation is not started up.. During operation, an error is output and operation is immediately stopped.	——
011	At all times	CW limit end detection (on individual axes)	The CW limit end input signal was input.	Before startup, an error is output and operation is not started up.. During operation, an error is output and operation is immediately stopped.	Move the axis in the CCW direction manually or by jog operation to escape from the CW limit end, and then clear the error.
012	At all times	CCW limit end detection (on individual axes)	The CCW limit end input signal was input.	Before startup, an error is output and operation is not started up.. During operation, an error is output and operation is immediately stopped.	Move the axis in the CW direction manually or by jog operation to escape from the CW limit end, and then clear the error.

Error code	Detection timing	Error item	Content/cause of error	Operation state at error	Remedy
013	At all times	Driver error detection (on individual axes)	The driver is in error, and an error signal from the driver has been detected. (Normally, the driver ready signal becomes OFF.)	Before startup, an error is output and operation is not started up.. During operation, an error is output and operation is stopped.	Eliminate the error on the driver, reset the driver error, and clear the error on this module.
014	At positioning completion	Completion signal error (on individual axes)	There was no positioning completion signal from the servo driver within the preset time.	An error is output and the next operation cannot be performed.	Adjust the positioning completed monitoring time, and adjust the gain of the servo system.
015	At closed loop control	Closed loop control allowable range over error	The allowable range has been exceeded in closed loop control modes 1 and 2.	An error is output and the next operation cannot be performed.	Look into the cause of why operation did not stop in the allowable range, cancel that state, and reset the error. (Though the error cannot be specified, there is the possibility that the setting range has been set too narrow. This error can be remedied by increasing the setting range if possible.) Look into the cause of why operation did not stop in the allowable range, cancel that state, and reset the error. (Though the error cannot be specified, there is the possibility that the setting range has been set too narrow. This error can be remedied by increasing the setting range if possible.)
016	At communication with the driver in absolute value communications	Absolute driver communications error	Failed to read the absolute (absolute value control) communication data from the driver.	An error is output and startup cannot be performed.	Make sure that the wiring on the absolute communications section with the driver and the driver settings are correct. To recover from this error, eliminate the cause of the error, and then reset the error.
017	At closed loop control	Completion pulse allowable range over error	The allowable range has been exceeded in closed loop control modes 1 and 2.	An error is output and the next operation cannot be performed.	Look into the cause of why operation did not stop in the allowable range, cancel that state, and reset the error. (Though the error cannot be specified, there is the possibility that the setting range has been set too narrow. This error can be remedied by increasing the setting range if possible.) Look into the cause of why operation did not stop in the allowable range, cancel that state, and reset the error. (Though the error cannot be specified, there is the possibility that the setting range has been set too narrow. This error can be remedied by increasing the setting range if possible.)

Error code	Detection timing	Error item	Content/cause of error	Operation state at error	Remedy
030	At all times	Software limit CW limit end detection (on individual axes)	The axis arrived at the CW limit end of the software limit.	Before startup, an error is output and operation is not started up.. During operation, an error is output and operation is stopped.	Move the axis by jog operation in the CCW direction to escape from the CW limit end, and then clear the error. Or, perform a zero return to recover from the error.
031	At all times	Software limit CCW limit end detection (on individual axes)	The axis arrived at the CCW limit end of the software limit.	Before startup, an error is output and operation is not started up.. During operation, an error is output and operation is stopped.	Move the axis by jog operation in the CW direction to escape from the CCW limit end, and then clear the error. Or, perform a zero return to recover from the error.
032	At startup	Maximum speed over error (on individual axes)	The axis speed at interpolation exceeded the maximum speed.	An error is output and operation is not started up..	Calculate the speed of each axis from the interpolation speed at which operation is to be started up, and change the interpolation speed so that it falls within the maximum speed of each axis, or change the value of the maximum speed of each axis in parameters to match the interpolation speed to be started up at. After making these changes, clear the error on this module. * See Note 1 for details of the way of thinking behind this.
033	At startup	Operation speed data error (on individual axes)	The setting speed at operation has exceeded the setting range or the maximum speed.	An error is output and operation is not started up..	Change the operation speed data to within the maximum speed.
034	At all times	Nested instruction error (on individual axes)	1. Multiple instructions have been executed on the same axis. (instructions on the startup system, teaching, error reset, present value preset) 2. A startup system instruction has been executed on a busy axis. (Note, however, that an error is not generated for nested startup during direct operation.) 3. A data save was executed during execution of various instructions (e.g. startup system instructions, jog, zero return, teaching, error reset, interrupt jog feed) on all axes.	1. If the next instruction is a startup system instruction, only that axis decelerates and comes to a stop. In interpolation operation, the interpolated axis decelerates and comes to a stop. 2. The next instruction is not executed. Only the error is displayed. 3. If the next instruction is a startup system instruction, only that axis decelerates and comes to a stop. In interpolation operation, the interpolated axis decelerates and comes to a stop.	1. Reset the error, set so that multiple instructions on the same axis do not turn ON, and execute the instruction again. 2. Reset the error, and change so that the instruction is not executed on the busy axis. 3. Reset the error, and change so that data is not saved during instruction execution.

Error code	Detection timing	Error item	Content/cause of error	Operation state at error	Remedy
035	At startup	Program operation data area (on individual axes)	The step data or step No. is not contained in the data at program operation startup.	An error is output and operation is not started up.	Enter the correct step data or step No. and reset the error.
037	At data registration	Teaching No. error (on individual axes)	The coordinate No. at writing of teaching data is out of the setting range.	Error is output and data registration is not performed.	Set the coordinate No. to within the setting range.
039	At each startup, and teaching	Present position unconfirmed	Perform the following operation when the origin is not confirmed by zero return: • Direct operation of absolute value control • Program operation of absolute value control • Teaching • Move origin	An error is output and operation is not started up.	Execute zero return.

Error code	Detection timing	Error item	Content/cause of error	Operation state at error	Remedy
2**	At data transfer	Parameter 1 error	The value of parameter 1 has exceeded the setting range. The problem location (address) in the parameter is the location marked "**".	Before startup, an error is detected and operation is not started up.. During operation, an error is detected and operation is stopped.	Correct the problem location in the parameter, and transfer the block data to clear the error.
3**	At data transfer	Parameter 2 error	The value of parameter 2 has exceeded the setting range. The problem location (address) in the parameter is the location marked "**".	Before startup, an error is detected and operation is not started up.. During operation, an error is detected and operation is stopped.	Correct the problem location in the parameter, and transfer the block data to clear the error.
4**	At data transfer	Speed data error	The value of the speed data has exceeded the setting range. An additional error is displayed when the value of the speed data exceeds the maximum speed at interpolation in direct operation. The problem location (speed No.) in the speed data is the location marked "**".	Before startup, an error is detected and operation is not started up.. During operation, an error is detected and operation is stopped.	Correct the problem location in the speed data, and transfer the block data to clear the error.
5**	At data transfer	Coordinate data error	The value of the coordinate data has exceeded the setting range. The problem location (coordinate No.) in the coordinate data is the location marked "**".	Before startup, an error is detected and operation is not started up.. During operation, an error is detected and operation is stopped.	Correct the problem location in the coordinate data, and transfer the block data to clear the error.
6**	At data transfer	Step data error	The value of the step data has exceeded the setting range. The problem location (step No.) in the step data is the location marked "*".	Before startup, an error is detected and operation is not started up.. During operation, an error is detected and operation is stopped.	Correct the problem location in the step data, and transfer the block data to clear the error.
70* 71*	At data transfer	Dwell timer data error	The value of the dwell timer data has exceeded the setting range. The problem location in the dwell timer data is as follows. Errors for dwell timer data No.0 to 15 become 600 to 615.	Before startup, an error is detected and operation is not started up.. During operation, an error is detected and operation is stopped.	Correct the problem location in the dwell timer data, and transfer the block data to clear the error.

Error code	Detection timing	Error item	Content/cause of error	Operation state at error	Remedy
72*	At data transfer	M output data error	The value of the M output data has exceeded the setting range. The problem location (M output No.) in the deceleration data is the location marked "*".	Before startup, the error is output and operation is not started up.. During operation, the error is output, and operation is stopped.	Correct the problem location in the M output data, and transfer the block data to clear the error.
73*	At data transfer	Acceleration time data error	The value of the acceleration time data has exceeded the setting range. The problem location (acceleration data No.) in the acceleration data is the location marked "*".	Before startup, the error is output and operation is not started up.. During operation, the error is output, and operation is stopped.	Correct the problem location in the acceleration data, and transfer the block data to clear the error.
74*	At data transfer	Deceleration time data error	The value of the deceleration time data has exceeded the setting range. The problem location (deceleration data No.) in the deceleration data is the location marked "*".	Before startup, the error is output and operation is not started up.. During operation, the error is output, and operation is stopped.	Correct the problem location in the deceleration data, and transfer the block data to clear the error.
751 to 999	Reserved area	——	——	——	——

Appendix

Appendix 1 Setting the sinusoidal acceleration/deceleration speed

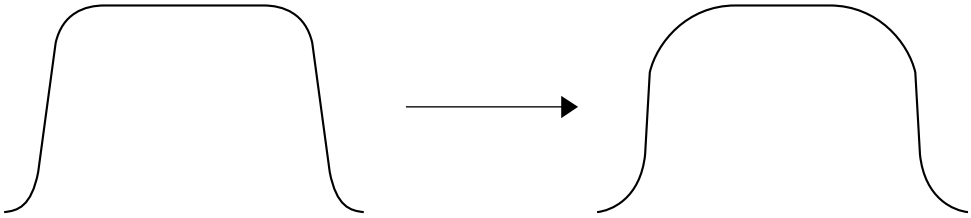
Set the acceleration/deceleration curve in sinusoidal drive to parameter 1 address A+0074.

(1) Ramp drive: setting value 00

Ramp drive is as follows in point-to-point control.

(2) Sinusoidal drive: setting value 01 to 99

Sinusoidal drive, normally, is used for smoothing movement of externally connected machines. As shown below, the larger the numerical value set, the smoother (rounder) the curves of angles of the ramp become. The radius of these curves change according to the target speed, acceleration/deceleration time and other factors. Determine the optimum values while actually changing values and monitoring operation as the curve changes according to the device to be used and adjustment of servo gain.



■ Time lag in sinusoidal acceleration/deceleration

When the sinusoidal acceleration/deceleration speed is set, pay attention as a time lag such as that shown below occurs.

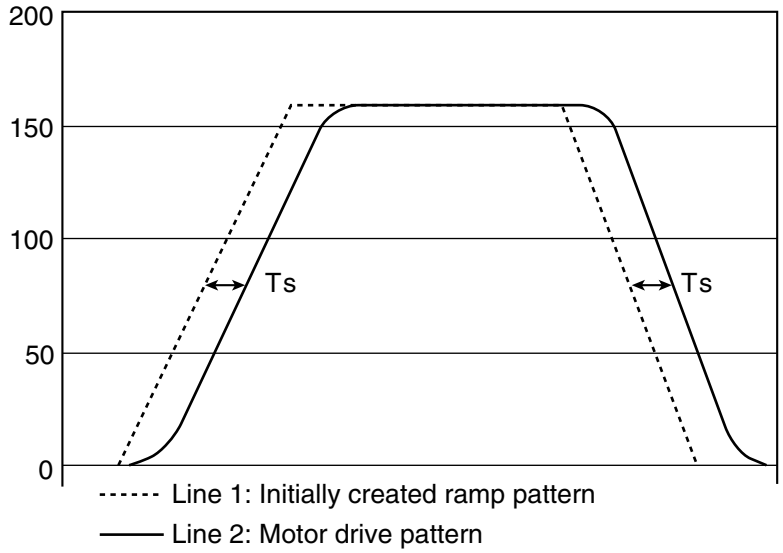
Where,

Ts=Tacc*S/100

Ts: Sinusoidal lag time (lag time near center of acceleration of lines 1 and 2 in the figure below)

Tacc: Acceleration time

S: Acceleration/deceleration curve (0 to 99%) of parameter 1



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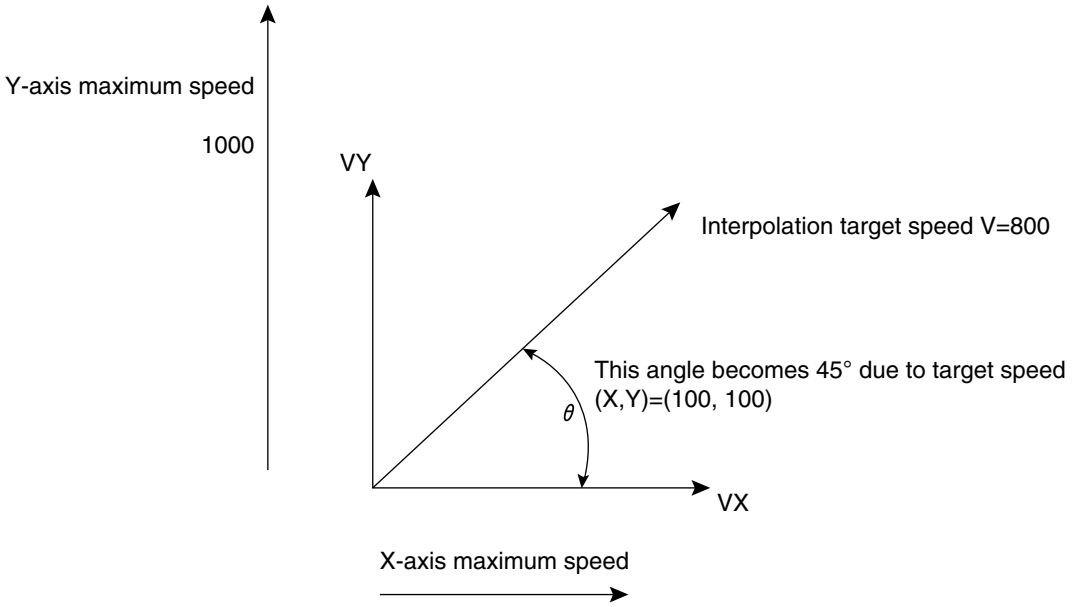
Appendix 2 Way of thinking behind interpolation and maximum speed of each axis

When two axes have been started up in direct operation using interpolation, the speed of each axis may exceed the maximum speed determined in parameters.

[Example] In the following parameter settings, the maximum speed over error occurs as the maximum speed of the X-axis is exceeded:

- Maximum speed of X-axis: 500
- Maximum speed of Y-axis: 1000
- Target X coordinate: 1000
- Target Y coordinate: 100
- Target speed: 800

In program operation, this module can recognize the fact that the maximum speed has been exceeded when program operation data is registered. For this reason, a step error (not a maximum speed error) is output when the data is registered. (See the additional explanation below.)



The maximum speed of each axis is as follows when the interpolation (target) speed is set to "800":

$VX=V\cos\theta$
$=800\cos 45$
$=565.7$
$VY=V\sin\theta$
$=565.7$

And, the value of VX exceeds the maximum speed of the X-axis.

[Additional Explanation]

Normally, the speed error does not occur even if the maximum speed of the X-axis is set to "500" in parameters, and the data of X-axis speed No.1 is registered as "600" (value of 500 or more).

Reason: This is because the X-axis speed data may be the combined interpolation speed of the X-axis program data. As described above, the step error is output for the first time when data is registered to the step data for program operation, and that value exceeds the maximum speed.

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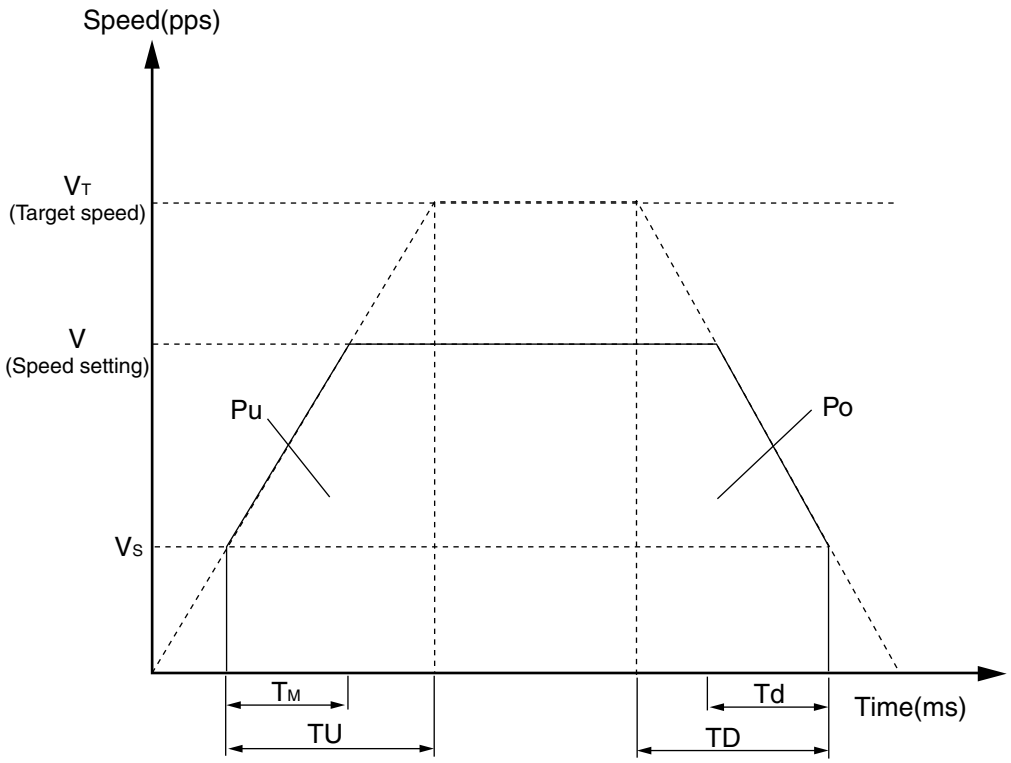
Appendix 3 Way of thinking behind acceleration/acceleration time

The acceleration time is the time from speed 0 up to when reference speed (parameter 1 address A+0010 to 0013) is reached. The deceleration time is the time from the reference speed up to when speed 0 is reached.

Accordingly, the time until the set speed is reached, the time from the set speed up to 0 or the startup speed, and the number of pulses at this time in actual positioning are calculated by the following equations:



where,

Vs: Startup speed (parameter 1 address A+0020 to 0023)

VT: Reference speed (parameter 1 address A+0010 to 0013)

V: Target speed (data)

Tu: Acceleration time from startup speed (Vs) to target speed (V)

Td: Deceleration time from target speed (V) to startup speed (Vs)

TU: Preset acceleration time (data)

TD: Preset deceleration time (data)

The number of pulses in the acceleration/deceleration intervals is calculated as follows:

$$Tu = \frac{V_H - V_L}{V_M - V_L} T_{AU} \qquad T_M = \frac{V - V_S}{V_T - V_S} \cdot TU$$

$$T_D = \frac{V_H - V_L}{V_M - V_L} T_{AD} \qquad T_d = \frac{V - V_S}{V_T - V_S} \cdot TD$$

$$\text{Number of acceleration interval pulses } PU = \frac{1}{2} T_U (V+V_S)$$

$$\text{Number of deceleration interval pulses } PD = \frac{1}{2} T_d (V+V_S)$$

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Appendix 4 Ladder programming of various operations

The following pages show an example of a ladder program (simply called "ladder example" from here on) relating to operation of this module.
This ladder example is for the X-axis when the top address of the special I/O data area is set to ⊐1000.
The following explains various operations.

① **Jog operation**
Jog operation is performed in the + direction for the duration that 6000 is ON. (In the ladder example, the speed is 2000 pps, and the acceleration/deceleration No. is the parameter value.)
Jog operation is performed in the - direction for the duration that 6001 is ON. (In the ladder example, the speed is -150000 pps, and the acceleration/deceleration No. is for each of two axes.)

② **Teaching**
When 6005 is turned ON, this module enters the teaching mode. When a location is specified by jog operation, for example, and 6005 is turned OFF, that location is taught. (In the ladder example, teaching is performed at coordinate No.5.)

③ **Zero return**
When 6010 is turned ON, zero return is started.

④ **Move origin**
When 6011 is turned ON, move to origin is performed.

⑤ **Present value preset**
When 6012 is turned ON, the present value is overwritten to the preset value. (In the ladder example, 3000 is overwritten to the preset value.)

⑥ **Clear error**
When 6020 is turned ON, the error is cleared.

⑦ **Clear deviation**
When 6021 is turned ON, the deviation is cleared.

⑧ **Deceleration stop**
When 6025 is turned ON, a deceleration stop is started.

⑨ **Direct operation by incremental value coordinates**
When 6030 is turned ON, direction operation is performed using absolute value coordinates. (In the ladder example, positioning is performed at speed 100000 pps and by parameter values for the acceleration/deceleration speed No. at absolute value coordinate 200000.)

⑩ **Direct operation by absolute value coordinates**
When 6031 is turned ON, direction operation is performed using incremental value coordinates. (In the ladder example, positioning is performed at speed 250000 pps and by acceleration/deceleration speed No.1 for incremental value coordinate - 500000.)

⑪ **Direct operation startup of speed control**
When 6032 turns ON, direct operation is performed by speed control. (In the ladder example, operation is performed at speed 250000 pps and by parameter values for the acceleration/deceleration speed No. in the - direction. When an external interrupt is entered, external interrupt travel distance of 50000 pulses are output and operation comes to a stop at the external interrupt speed (parameter value).

⑫ **Selection of program operation continuous/single-step startup**

When 6040 is OFF, continuous operation is started up when program operation is started up. When 6040 is ON, single-step operation is started up when program operation is started up.

⑬ **Program operation startup (step No. enabled)**

When 6041 turns ON, program operation using the step No. is performed. (In the ladder example, program operation is started up from step No.3.)

⑭ **Program operation startup (step No. disabled)**

When 6042 turns ON, program operation is started up from the step currently stored to memory by the previous operation.

⑮ **Forced intervention startup**

When 6043 turns ON, forced intervention is started up at the determined step No. (In the ladder example, forced intervention is started up by the data of step No.10.)

⑯ **Override value set**

When 6050 turns ON, the override value is set. (In the ladder example, the value is set to 600%.)

⑰ **Override enable**

Operation is performed at the speed ratio determined by the override value for the duration that 6051 is ON.

⑱ **Interrupt output setting**

When 6060 is ON, the coordinate point where interrupt output turns ON is set. (In the ladder example, the interrupt output turns ON at 6000.)

When 6061 is ON, the coordinate point where interrupt output turns OFF is set. (In the ladder example, the interrupt output turns OFF at 24000.)

⑲ **General-purpose output ON/OFF**

When 6062 is ON, the external output turns ON, and when it is OFF, the external output turns OFF.

⑳ **Save block data**

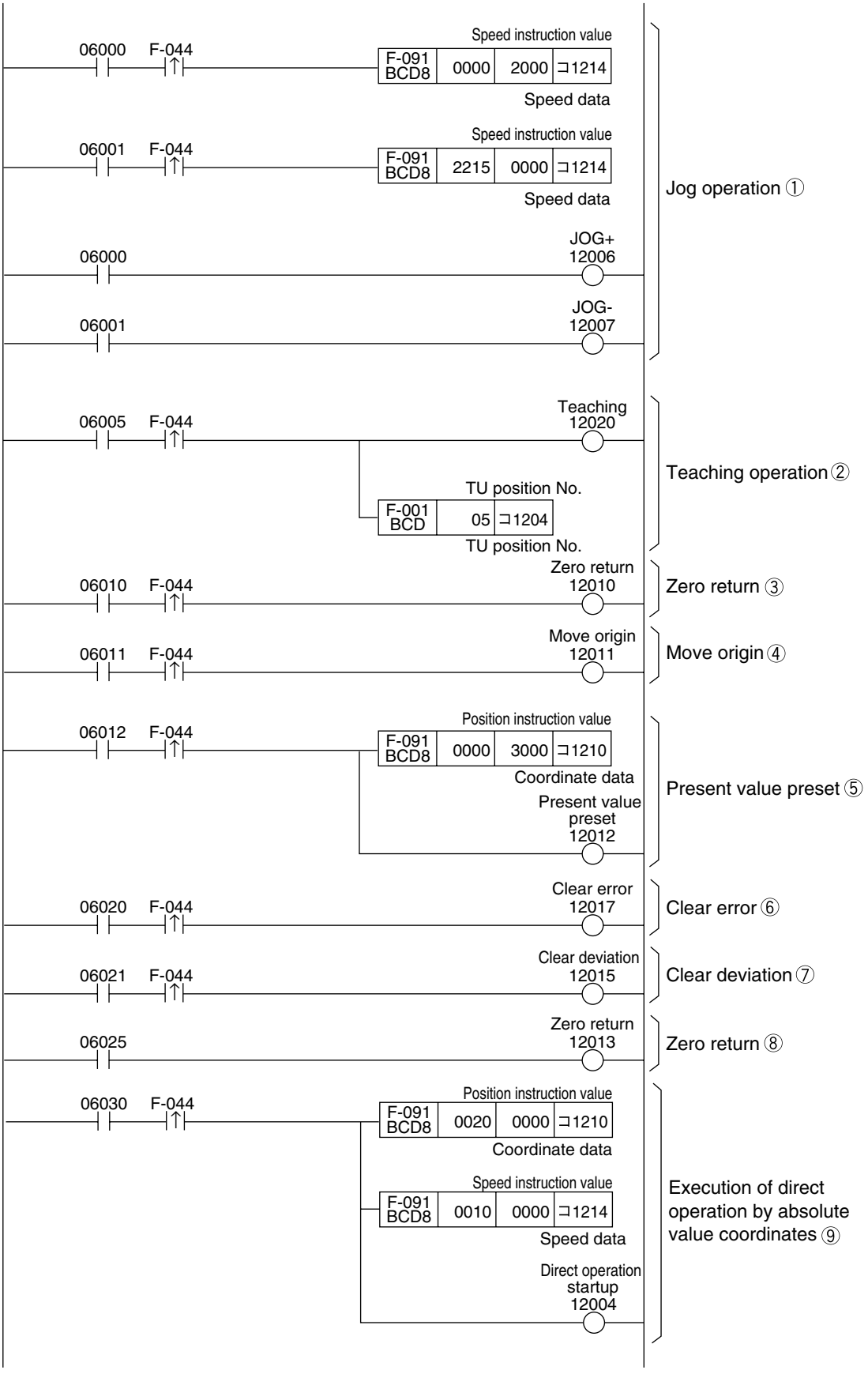
When 6070 is ON, block data is saved to flash ROM. (This must be performed after block transfer.)

㉑ **Switch present position display**

When 6075 is OFF, the instruction value is entered to the present position data area. When it turns ON, the feedback data from the encoder is entered to this area. (This is enabled only when the module has been wired in the closed loop control mode.)

㉒ **Read absolute present position**

When 6076 turns ON, the absolute data is read from the absolute-compatible encoder and the present value (instruction value) is overwritten.


Speed instruction value
06000
F-044
F-091 BCD8
0000
2000
⊐1214
Speed data
Speed instruction value
06001
F-044
F-091 BCD8
2215
0000
⊐1214
Speed data
Jog operation ①
JOG+ 12006
06000
JOG- 12007
06001
Teaching 12020
06005
F-044
TU position No.
F-001 BCD
05
⊐1204
TU position No.
Teaching operation ②
Zero return 12010
06010
F-044
Zero return ③
Move origin 12011
06011
F-044
Move origin ④
Position instruction value
06012
F-044
F-091 BCD8
0000
3000
⊐1210
Coordinate data
Present value preset 12012
Present value preset ⑤
Clear error 12017
06020
F-044
Clear error ⑥
Clear deviation 12015
06021
F-044
Clear deviation ⑦
Zero return 12013
06025
Zero return ⑧
Position instruction value
06030
F-044
F-091 BCD8
0020
0000
⊐1210
Coordinate data
Speed instruction value
F-091 BCD8
0010
0000
⊐1214
Speed data
Direct operation startup 12004
Execution of direct operation by absolute value coordinates ⑨

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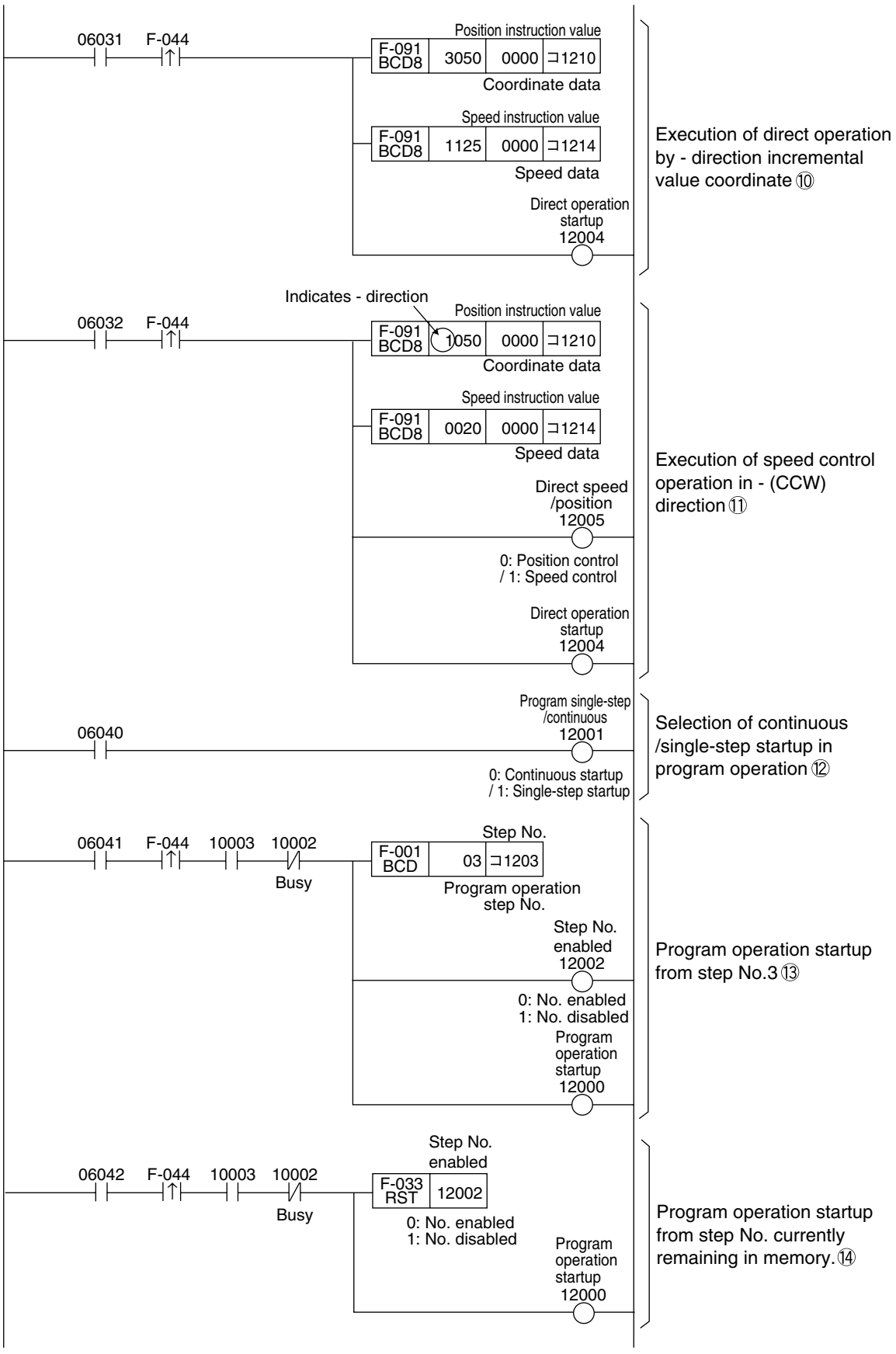
06031
F-044
Position instruction value
F-091 BCD8
3050
0000
⊐1210
Coordinate data
Speed instruction value
F-091 BCD8
1125
0000
⊐1214
Speed data
Direct operation startup 12004
Execution of direct operation by - direction incremental value coordinate ⑩
Indicates - direction
06032
F-044
Position instruction value
F-091 BCD8
1050
0000
⊐1210
Coordinate data
Speed instruction value
F-091 BCD8
0020
0000
⊐1214
Speed data
Direct speed /position 12005
0: Position control / 1: Speed control
Direct operation startup 12004
Execution of speed control operation in - (CCW) direction ⑪
Program single-step /continuous 12001
06040
0: Continuous startup / 1: Single-step startup
Selection of continuous /single-step startup in program operation ⑫
06041
F-044
10003
10002
Busy
Step No.
F-001 BCD
03
⊐1203
Program operation step No.
Step No. enabled 12002
0: No. enabled
1: No. disabled
Program operation startup 12000
Program operation startup from step No.3 ⑬
Step No. enabled
06042
F-044
10003
10002
Busy
F-033 RST
12002
0: No. enabled
1: No. disabled
Program operation startup 12000
Program operation startup from step No. currently remaining in memory. ⑭

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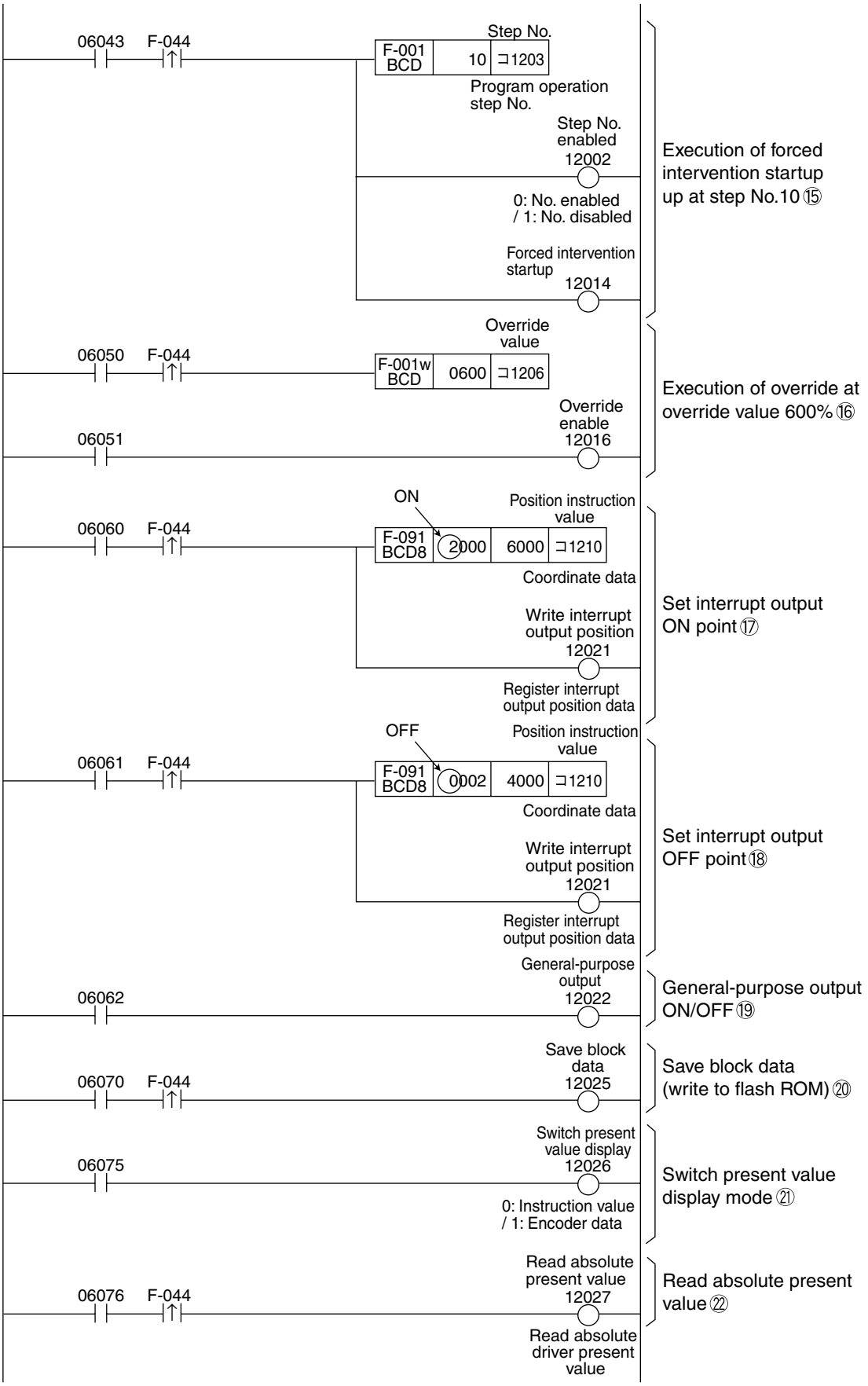
06043
F-044
Step No.
F-001 BCD
10
⊐1203
Program operation step No.
Step No. enabled
12002
0: No. enabled / 1: No. disabled
Forced intervention startup
12014
Execution of forced intervention startup up at step No.10 ⑮
Override value
06050
F-044
F-001w BCD
0600
⊐1206
Override enable
12016
06051
Execution of override at override value 600% ⑯
ON
Position instruction value
06060
F-044
F-091 BCD8
2000
6000
⊐1210
Coordinate data
Write interrupt output position
12021
Register interrupt output position data
Set interrupt output ON point ⑰
OFF
Position instruction value
06061
F-044
F-091 BCD8
0002
4000
⊐1210
Coordinate data
Write interrupt output position
12021
Register interrupt output position data
Set interrupt output OFF point ⑱
General-purpose output
12022
06062
General-purpose output ON/OFF ⑲
Save block data
12025
06070
F-044
Save block data (write to flash ROM) ⑳
Switch present value display
12026
06075
0: Instruction value / 1: Encoder data
Switch present value display mode ㉑
Read absolute present value
12027
06076
F-044
Read absolute driver present value
Read absolute present value ㉒

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Appendix 5 Table of block data for each axis applied to file 1 with sample ladder program used

When setting the various block data to file 1, refer to the byte addresses listed in the table below.

[1] For X-axis

Block No.	Byte address		Default	Signal name	Data format	Remarks
0	0000	Bit0	0	Selection of output pulse signal system	0,1(bit)	———
		〃 1	0	Selection of limit input signal logic	0,1(bit)	
		〃 2	0	Selection of origin proximity input signal logic	0,1(bit)	
		〃 3	0	Selection of origin input signal logic	0,1(bit)	
		〃 4	0	Selection of general-purpose input signal logic	0,1(bit)	
		〃 5	0	Selection of emergency stop input function	0,1(bit)	
		〃 6	0	Selection of emergency stop enabled axis* X-axis parameter only enabled	0,1(bit)	
		〃 7	0	Enabling of external positioning completed signal	0,1(bit)	
	0001	Bit0	0	Designation of origin unconfirmed at hardware error	0,1(bit)	
		〃 1	0	Designation of origin unconfirmed at software limit error	0,1(bit)	
		〃 2	0	Selection of driver error input logic	0,1(bit)	
		〃 3 to 7	0	Reserved area	———	
	0002	〃 0 to 3	0	Zero return operation mode setting	BCD 1 digit (0.5 bytes)	
		〃 4 to 7	0	Zero return direction setting	BCD 1 digit (0.5 bytes)	
	0003		0	Origin detection method setting	BCD 2 digits (1 byte)	
	0004 to 0005		1	Origin count	BCD 4 digits (2 bytes)	
	0006		0	Present position at speed control operation	BCD 2 digits (1 byte)	
	0007		0	Operating axis selection	Managed in bits	
	0010 to 0013		0	Reference speed	BCD 8 digits (4 bytes)	
	0014 to 0017		0	Maximum speed	BCD 8 digits (4 bytes)	
	0020 to 0023		0	Startup speed	BCD 8 digits (4 bytes)	
	0024 to 0027		0	Acceleration time	BCD 8 digits (4 bytes)	
	0030 to 0033		0	Deceleration time	BCD 8 digits (4 bytes)	
	0034 to 0037		0	Zero return (high speed)	BCD 8 digits (4 bytes)	
	0040 to 0043		0	Zero return (low speed)	BCD 8 digits (4 bytes)	
	0044 to 0047		-9999999	CCW side software limit value	BCD 8 digits (4 bytes)	- when bit 1 of 8th digit is ON
	0050 to 0053		9999999	CW side software limit value	BCD 8 digits (4 bytes)	
	0054 to 0057		0	Speed after interrupt	BCD 8 digits (4 bytes)	
	0060 to 0063		0	Origin compensation data	BCD 8 digits (4 bytes)	
	0064 to 0065		0	Backlash compensation data	BCD 4 digits (2 bytes)	
	0066 to 0067		0	Positioning monitoring time	BCD 4 digits (2 bytes)	
	0070 to 0073		0	Jog (initial) operation speed	BCD 8 digits (4 bytes)	
	0074		3	Acceleration/deceleration curve (00 to 99%)	BCD 2 digits (1 byte)	
	0075	Bit0 to 3	0	Jog operation mode	BCD 1 digit (0.5 bytes)	
		〃 4 to 7	0	Operation at software limit error	BCD 1 digit (0.5 bytes)	
	0076	Bit0 to 3	0	General-purpose input operation mode setting	BCD 1 digit (0.5 bytes)	
		〃 4 to 7	0	General-purpose output operation mode setting	BCD 1 digit (0.5 bytes)	
	0077		0	Parameter common setting (X-axis parameter only enabled)	BCD 2 digits (1 byte)	
1	0100		0	Closed loop control mode selection	BCD 2 digits (1 byte)	———
	0101		99	Compensation time (unit: 0.1 secs)	BCD 2 digits (1 byte)	
	0102		0	Encoder count direction	BCD 2 digits (1 byte)	
	0103		0	Reserved area	———	
	0104 to 0107		0	Closed loop control allowable range (unsigned)	BCD 8 digits (4 bytes)	
	0110 to 0117		0	Reserved	———	
	0120		0	Absolute value control mode selection	BCD 2 digits (1 byte)	
	0121		0	Absolute value control driver model selection	BCD 2 digits (1 byte)	
	0122 to 0127		0	Reserved area	———	
	0130 to 0133		1	Electronic gear 1 (M value)	BCD 8 digits (4 bytes)	
	0134 to 0137		1	Electronic gear 1 (D value)	BCD 8 digits (4 bytes)	
	0140 to 0143		1	Electronic gear 2 (M value)	BCD 8 digits (4 bytes)	
	0144 to 0147		1	Electronic gear 2 (D value)	BCD 8 digits (4 bytes)	
	0150 to 0153		0	Jog (initial) operation speed	BCD 8 digits (4 bytes)	
	0154 to 0177		0	Reserved area	———	
2	0200 to 0203		0	M output 0 lower limit range	BCD 8 digits (4 bytes)	- when bit 1 of 8th digit is ON
	0204 to 0207		0	M output 0 upper limit range	BCD 8 digits (4 bytes)	
	0210 to 0213		0	M output 1 lower limit range	BCD 8 digits (4 bytes)	
	0214 to 0217		0	M output 1 upper limit range	BCD 8 digits (4 bytes)	
	0220 to 0223		0	M output 2 lower limit range	BCD 8 digits (4 bytes)	
	0224 to 0227		0	M output 2 upper limit range	BCD 8 digits (4 bytes)	
	0230 to 0233		0	M output 3 lower limit range	BCD 8 digits (4 bytes)	
	0234 to 0237		0	M output 3 upper limit range	BCD 8 digits (4 bytes)	
	0240 to 0243		0	M output 4 lower limit range	BCD 8 digits (4 bytes)	
	0244 to 0247		0	M output 4 upper limit range	BCD 8 digits (4 bytes)	
	0250 to 0253		0	M output 5 lower limit range	BCD 8 digits (4 bytes)	
	0254 to 0257		0	M output 5 upper limit range	BCD 8 digits (4 bytes)	
	0260 to 0263		0	M output 6 lower limit range	BCD 8 digits (4 bytes)	
	0264 to 0267		0	M output 6 upper limit range	BCD 8 digits (4 bytes)	
	0270 to 0273		0	M output 7 lower limit range	BCD 8 digits (4 bytes)	
	0274 to 0277		0	M output 7 upper limit range	BCD 8 digits (4 bytes)	
3	0300 to 0303		0	Acceleration time data 1	BCD 8 digits (4 bytes)	8th and 7th digits unused
	0304 to 0307		0	Acceleration time data 2	BCD 8 digits (4 bytes)	
	0310 to 0313		0	Acceleration time data 3	BCD 8 digits (4 bytes)	
	0314 to 0317		0	Acceleration time data 4	BCD 8 digits (4 bytes)	

Block No.	Byte address	Default	Signal name	Data format	Remarks
3	0320 to 0323	0	Acceleration data 5	BCD 8 digits (4 bytes)	8th and 7th digits unused
	0324 to 0327	0	Acceleration data 6	BCD 8 digits (4 bytes)	
	0330 to 0333	0	Acceleration data 7	BCD 8 digits (4 bytes)	
	0334 to 0337	0	Acceleration data 8	BCD 8 digits (4 bytes)	
	0340 to 0343	0	Deceleration data 1	BCD 8 digits (4 bytes)	
	0344 to 0347	0	Deceleration data 2	BCD 8 digits (4 bytes)	
	0350 to 0353	0	Deceleration data 3	BCD 8 digits (4 bytes)	
	0354 to 0357	0	Deceleration data 4	BCD 8 digits (4 bytes)	
	0360 to 0363	0	Deceleration data 5	BCD 8 digits (4 bytes)	
	0364 to 0367	0	Deceleration data 6	BCD 8 digits (4 bytes)	
	0370 to 0373	0	Deceleration data 7	BCD 8 digits (4 bytes)	
	0374 to 0377	0	Deceleration data 8	BCD 8 digits (4 bytes)	
4	0400 to 0401	0	Dwell timer data 1	BCD 4 digits (4 bytes)	8th and 7th digits unused
	0402 to 0403	0	Dwell timer data 2	BCD 4 digits (4 bytes)	
	0404 to 0405	0	Dwell timer data 3	BCD 4 digits (4 bytes)	
	0406 to 0407	0	Dwell timer data 4	BCD 4 digits (4 bytes)	
	0410 to 0411	0	Dwell timer data 5	BCD 4 digits (4 bytes)	
	0412 to 0413	0	Dwell timer data 6	BCD 4 digits (4 bytes)	
	0414 to 0415	0	Dwell timer data 7	BCD 4 digits (4 bytes)	
	0416 to 0417	0	Dwell timer data 8	BCD 4 digits (4 bytes)	
	0420 to 0421	0	Dwell timer data 9	BCD 4 digits (4 bytes)	
	0422 to 0423	0	Dwell timer data 10	BCD 4 digits (4 bytes)	
	0424 to 0425	0	Dwell timer data 11	BCD 4 digits (4 bytes)	
	0426 to 0427	0	Dwell timer data 12	BCD 4 digits (4 bytes)	
	0430 to 0431	0	Dwell timer data 13	BCD 4 digits (4 bytes)	
	0432 to 0433	0	Dwell timer data 14	BCD 4 digits (4 bytes)	
	0434 to 0435	0	Dwell timer data 15	BCD 4 digits (4 bytes)	
	0436 to 0437	0	Dwell timer data 16	BCD 4 digits (4 bytes)	
5	0500 to 0503	0	Speed data No.1		8th and 7th digits unused
	0504 to 0507	0	Speed data No.2		
	0510 to 0513	0	Speed data No.3		
	0514 to 0517	0	Speed data No.4		
	0520 to 0523	0	Speed data No.5		
	0524 to 0527	0	Speed data No.6		
	0530 to 0533	0	Speed data No.7		
	0534 to 0537	0	Speed data No.8		
	0540 to 0543	0	Speed data No.9		
	0544 to 0547	0	Speed data No.10		
	0550 to 0553	0	Speed data No.11		
	0554 to 0557	0	Speed data No.12		
	0560 to 0563	0	Speed data No.13		
	0564 to 0567	0	Speed data No.14		
	0570 to 0573	0	Speed data No.15		
	0574 to 0577	0	Speed data No.16		
6	0600 to 0603	0	Speed data No.17		8th and 7th digits unused
	0604 to 0607	0	Speed data No.18		
	0610 to 0613	0	Speed data No.19		
	0614 to 0617	0	Speed data No.20		
	0620 to 0623	0	Speed data No.21		
	0624 to 0627	0	Speed data No.22		
	0630 to 0633	0	Speed data No.23		
	0634 to 0637	0	Speed data No.24		
	0640 to 0643	0	Speed data No.25		
	0644 to 0647	0	Speed data No.26		
	0650 to 0653	0	Speed data No.27		
	0654 to 0657	0	Speed data No.28		
	0660 to 0663	0	Speed data No.29		
	0664 to 0667	0	Speed data No.30		
	0670 to 0673	0	Speed data No.31		
	0674 to 0677	0	Speed data No.32		
7	0700 to 0703	0	Speed data No.33		8th and 7th digits unused
	0704 to 0707	0	Speed data No.34		
	0710 to 0713	0	Speed data No.35		
	0714 to 0717	0	Speed data No.36		
	0720 to 0723	0	Speed data No.37		
	0724 to 0727	0	Speed data No.38		
	0730 to 0733	0	Speed data No.39		
	0734 to 0737	0	Speed data No.40		
	0740 to 0743	0	Speed data No.41		
	0744 to 0747	0	Speed data No.42		
	0750 to 0753	0	Speed data No.43		
	0754 to 0757	0	Speed data No.44		
	0760 to 0763	0	Speed data No.45		
	0764 to 0767	0	Speed data No.46		
	0770 to 0773	0	Speed data No.47		
	0774 to 0777	0	Speed data No.48		

Block No.	Byte address	Default	Signal name	Data format	Remarks
8	1000 to 1003	0	Speed data No.49	BCD 8 digits (4 bytes)	8th and 7th digits unused
	1004 to 1007	0	Speed data No.50	BCD 8 digits (4 bytes)	
	1010 to 1013	0	Speed data No.51	BCD 8 digits (4 bytes)	
	1014 to 1017	0	Speed data No.52	BCD 8 digits (4 bytes)	
	1020 to 1023	0	Speed data No.53	BCD 8 digits (4 bytes)	
	1024 to 1027	0	Speed data No.54	BCD 8 digits (4 bytes)	
	1030 to 1033	0	Speed data No.55	BCD 8 digits (4 bytes)	
	1034 to 1037	0	Speed data No.56	BCD 8 digits (4 bytes)	
	1040 to 1043	0	Speed data No.57	BCD 8 digits (4 bytes)	
	1044 to 1047	0	Speed data No.58	BCD 8 digits (4 bytes)	
	1050 to 1053	0	Speed data No.59	BCD 8 digits (4 bytes)	
	1054 to 1057	0	Speed data No.60	BCD 8 digits (4 bytes)	
	1060 to 1063	0	Speed data No.61	BCD 8 digits (4 bytes)	
	1064 to 1067	0	Speed data No.62	BCD 8 digits (4 bytes)	
	1070 to 1073	0	Speed data No.63	BCD 8 digits (4 bytes)	
	1074 to 1077	0	Speed data No.64	BCD 8 digits (4 bytes)	
9	1100 to 1103	0	Position data No.1	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	1104 to 1107	0	Position data No.2	BCD 8 digits (4 bytes)	
	1110 to 1113	0	Position data No.3	BCD 8 digits (4 bytes)	
	1114 to 1117	0	Position data No.4	BCD 8 digits (4 bytes)	
	1120 to 1123	0	Position data No.5	BCD 8 digits (4 bytes)	
	1124 to 1127	0	Position data No.6	BCD 8 digits (4 bytes)	
	1130 to 1133	0	Position data No.7	BCD 8 digits (4 bytes)	
	1134 to 1137	0	Position data No.8	BCD 8 digits (4 bytes)	
	1140 to 1143	0	Position data No.9	BCD 8 digits (4 bytes)	
	1144 to 1147	0	Position data No.10	BCD 8 digits (4 bytes)	
	1150 to 1153	0	Position data No.11	BCD 8 digits (4 bytes)	
	1154 to 1157	0	Position data No.12	BCD 8 digits (4 bytes)	
	1160 to 1163	0	Position data No.13	BCD 8 digits (4 bytes)	
	1164 to 1167	0	Position data No.14	BCD 8 digits (4 bytes)	
	1170 to 1173	0	Position data No.15	BCD 8 digits (4 bytes)	
	1174 to 1177	0	Position data No.16	BCD 8 digits (4 bytes)	
10	1200 to 1203	0	Position data No.17	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	1204 to 1207	0	Position data No.18	BCD 8 digits (4 bytes)	
	1210 to 1213	0	Position data No.19	BCD 8 digits (4 bytes)	
	1214 to 1217	0	Position data No.20	BCD 8 digits (4 bytes)	
	1220 to 1223	0	Position data No.21	BCD 8 digits (4 bytes)	
	1224 to 1227	0	Position data No.22	BCD 8 digits (4 bytes)	
	1230 to 1233	0	Position data No.23	BCD 8 digits (4 bytes)	
	1234 to 1237	0	Position data No.24	BCD 8 digits (4 bytes)	
	1240 to 1243	0	Position data No.25	BCD 8 digits (4 bytes)	
	1244 to 1247	0	Position data No.26	BCD 8 digits (4 bytes)	
	1250 to 1253	0	Position data No.27	BCD 8 digits (4 bytes)	
	1254 to 1257	0	Position data No.28	BCD 8 digits (4 bytes)	
	1260 to 1263	0	Position data No.29	BCD 8 digits (4 bytes)	
	1264 to 1267	0	Position data No.30	BCD 8 digits (4 bytes)	
	1270 to 1273	0	Position data No.31	BCD 8 digits (4 bytes)	
	1274 to 1277	0	Position data No.32	BCD 8 digits (4 bytes)	
11	1300 to 1303	0	Position data No.33	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	1304 to 1307	0	Position data No.34	BCD 8 digits (4 bytes)	
	1310 to 1313	0	Position data No.35	BCD 8 digits (4 bytes)	
	1314 to 1317	0	Position data No.36	BCD 8 digits (4 bytes)	
	1320 to 1323	0	Position data No.37	BCD 8 digits (4 bytes)	
	1324 to 1327	0	Position data No.38	BCD 8 digits (4 bytes)	
	1330 to 1333	0	Position data No.39	BCD 8 digits (4 bytes)	
	1334 to 1337	0	Position data No.40	BCD 8 digits (4 bytes)	
	1340 to 1343	0	Position data No.41	BCD 8 digits (4 bytes)	
	1344 to 1347	0	Position data No.42	BCD 8 digits (4 bytes)	
	1350 to 1353	0	Position data No.43	BCD 8 digits (4 bytes)	
	1354 to 1357	0	Position data No.44	BCD 8 digits (4 bytes)	
	1360 to 1363	0	Position data No.45	BCD 8 digits (4 bytes)	
	1364 to 1367	0	Position data No.46	BCD 8 digits (4 bytes)	
	1370 to 1373	0	Position data No.47	BCD 8 digits (4 bytes)	
	1374 to 1377	0	Position data No.48	BCD 8 digits (4 bytes)	
12	1400 to 1403	0	Position data No.49	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	1404 to 1407	0	Position data No.50	BCD 8 digits (4 bytes)	
	1410 to 1413	0	Position data No.51	BCD 8 digits (4 bytes)	
	1414 to 1417	0	Position data No.52	BCD 8 digits (4 bytes)	
	1420 to 1423	0	Position data No.53	BCD 8 digits (4 bytes)	
	1424 to 1427	0	Position data No.54	BCD 8 digits (4 bytes)	
	1430 to 1433	0	Position data No.55	BCD 8 digits (4 bytes)	
	1434 to 1437	0	Position data No.56	BCD 8 digits (4 bytes)	
	1440 to 1443	0	Position data No.57	BCD 8 digits (4 bytes)	
	1444 to 1447	0	Position data No.58	BCD 8 digits (4 bytes)	
	1450 to 1453	0	Position data No.59	BCD 8 digits (4 bytes)	
	1454 to 1457	0	Position data No.60	BCD 8 digits (4 bytes)	
	1460 to 1463	0	Position data No.61	BCD 8 digits (4 bytes)	

Block No.	Byte address	Default	Signal name	Data format	Remarks
12	1464 to 1467	0	Position data No.62	BCD 8 digits (4 bytes)	
	1470 to 1473	0	Position data No.63	BCD 8 digits (4 bytes)	
	1474 to 1477	0	Position data No.64	BCD 8 digits (4 bytes)	
13	1500 to 1503	0	Position data No.65	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	1504 to 1507	0	Position data No.66	BCD 8 digits (4 bytes)	
	1510 to 1513	0	Position data No.67	BCD 8 digits (4 bytes)	
	1514 to 1517	0	Position data No.68	BCD 8 digits (4 bytes)	
	1520 to 1523	0	Position data No.69	BCD 8 digits (4 bytes)	
	1524 to 1527	0	Position data No.70	BCD 8 digits (4 bytes)	
	1530 to 1533	0	Position data No.71	BCD 8 digits (4 bytes)	
	1534 to 1537	0	Position data No.72	BCD 8 digits (4 bytes)	
	1540 to 1543	0	Position data No.73	BCD 8 digits (4 bytes)	
	1544 to 1547	0	Position data No.74	BCD 8 digits (4 bytes)	
	1550 to 1553	0	Position data No.75	BCD 8 digits (4 bytes)	
	1554 to 1557	0	Position data No.76	BCD 8 digits (4 bytes)	
	1560 to 1563	0	Position data No.77	BCD 8 digits (4 bytes)	
	1564 to 1567	0	Position data No.78	BCD 8 digits (4 bytes)	
	1570 to 1573	0	Position data No.79	BCD 8 digits (4 bytes)	
	1574 to 1577	0	Position data No.80	BCD 8 digits (4 bytes)	
14	1600 to 1603	0	Position data No.81	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	1604 to 1607	0	Position data No.82	BCD 8 digits (4 bytes)	
	1610 to 1613	0	Position data No.83	BCD 8 digits (4 bytes)	
	1614 to 1617	0	Position data No.84	BCD 8 digits (4 bytes)	
	1620 to 1623	0	Position data No.85	BCD 8 digits (4 bytes)	
	1624 to 1627	0	Position data No.86	BCD 8 digits (4 bytes)	
	1630 to 1633	0	Position data No.87	BCD 8 digits (4 bytes)	
	1634 to 1637	0	Position data No.88	BCD 8 digits (4 bytes)	
	1640 to 1643	0	Position data No.89	BCD 8 digits (4 bytes)	
	1644 to 1647	0	Position data No.90	BCD 8 digits (4 bytes)	
	1650 to 1653	0	Position data No.91	BCD 8 digits (4 bytes)	
	1654 to 1657	0	Position data No.92	BCD 8 digits (4 bytes)	
	1660 to 1663	0	Position data No.93	BCD 8 digits (4 bytes)	
	1664 to 1667	0	Position data No.94	BCD 8 digits (4 bytes)	
	1670 to 1673	0	Position data No.95	BCD 8 digits (4 bytes)	
	1674 to 1677	0	Position data No.96	BCD 8 digits (4 bytes)	
15	1700 to 1703	0	Position data No.97	BCD 8 digits (4 bytes)	
	1704 to 1707	0	Position data No.98	BCD 8 digits (4 bytes)	
	1710 to 1713	0	Position data No.99	BCD 8 digits (4 bytes)	
16	2000 to 2007	0	Step data No.1	BCD 16 digits (8 bytes)	———
	2010 to 2017	0	Step data No.2	BCD 16 digits (8 bytes)	
	2020 to 2027	0	Step data No.3	BCD 16 digits (8 bytes)	
	2030 to 2037	0	Step data No.4	BCD 16 digits (8 bytes)	
	2040 to 2047	0	Step data No.5	BCD 16 digits (8 bytes)	
	2050 to 2057	0	Step data No.6	BCD 16 digits (8 bytes)	
	2060 to 2067	0	Step data No.7	BCD 16 digits (8 bytes)	
	2070 to 2077	0	Step data No.8	BCD 16 digits (8 bytes)	
17	2100 to 2107	0	Step data No.9	BCD 16 digits (8 bytes)	
	2110 to 2117	0	Step data No.10	BCD 16 digits (8 bytes)	
	2120 to 2127	0	Step data No.11	BCD 16 digits (8 bytes)	
	2130 to 2137	0	Step data No.12	BCD 16 digits (8 bytes)	
	2140 to 2147	0	Step data No.13	BCD 16 digits (8 bytes)	
	2150 to 2157	0	Step data No.14	BCD 16 digits (8 bytes)	
	2160 to 2167	0	Step data No.15	BCD 16 digits (8 bytes)	
	2170 to 2177	0	Step data No.16	BCD 16 digits (8 bytes)	
18	2200 to 2207	0	Step data No.17	BCD 16 digits (8 bytes)	
	2210 to 2217	0	Step data No.18	BCD 16 digits (8 bytes)	
	2220 to 2227	0	Step data No.19	BCD 16 digits (8 bytes)	
	2230 to 2237	0	Step data No.20	BCD 16 digits (8 bytes)	
	2240 to 2247	0	Step data No.21	BCD 16 digits (8 bytes)	
	2250 to 2257	0	Step data No.22	BCD 16 digits (8 bytes)	
	2260 to 2267	0	Step data No.23	BCD 16 digits (8 bytes)	
	2270 to 2277	0	Step data No.24	BCD 16 digits (8 bytes)	
19	2300 to 2307	0	Step data No.25	BCD 16 digits (8 bytes)	
	2310 to 2317	0	Step data No.26	BCD 16 digits (8 bytes)	
	2320 to 2327	0	Step data No.27	BCD 16 digits (8 bytes)	
	2330 to 2337	0	Step data No.28	BCD 16 digits (8 bytes)	
	2340 to 2347	0	Step data No.29	BCD 16 digits (8 bytes)	
	2350 to 2357	0	Step data No.30	BCD 16 digits (8 bytes)	
	2360 to 2367	0	Step data No.31	BCD 16 digits (8 bytes)	
	2370 to 2377	0	Step data No.32	BCD 16 digits (8 bytes)	

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Block No.	Byte address	Default	Signal name	Data format	Remarks
20	2400 to 2407	0	Step data No.33	BCD 16 digits (8 bytes)	
	2410 to 2417	0	Step data No.34	BCD 16 digits (8 bytes)	
	2420 to 2427	0	Step data No.35	BCD 16 digits (8 bytes)	
	2430 to 2437	0	Step data No.36	BCD 16 digits (8 bytes)	
	2440 to 2447	0	Step data No.37	BCD 16 digits (8 bytes)	
	2450 to 2457	0	Step data No.38	BCD 16 digits (8 bytes)	
	2460 to 2467	0	Step data No.39	BCD 16 digits (8 bytes)	
	2470 to 2477	0	Step data No.40	BCD 16 digits (8 bytes)	
21	2500 to 2507	0	Step data No.41	BCD 16 digits (8 bytes)	
	2510 to 2517	0	Step data No.42	BCD 16 digits (8 bytes)	
	2520 to 2527	0	Step data No.43	BCD 16 digits (8 bytes)	
	2530 to 2537	0	Step data No.44	BCD 16 digits (8 bytes)	
	2540 to 2547	0	Step data No.45	BCD 16 digits (8 bytes)	
	2550 to 2557	0	Step data No.46	BCD 16 digits (8 bytes)	
	2560 to 2567	0	Step data No.47	BCD 16 digits (8 bytes)	
	2570 to 2577	0	Step data No.48	BCD 16 digits (8 bytes)	
22	2600 to 2607	0	Step data No.49	BCD 16 digits (8 bytes)	
	2610 to 2617	0	Step data No.50	BCD 16 digits (8 bytes)	
	2620 to 2627	0	Step data No.51	BCD 16 digits (8 bytes)	
	2630 to 2637	0	Step data No.52	BCD 16 digits (8 bytes)	
	2640 to 2647	0	Step data No.53	BCD 16 digits (8 bytes)	
	2650 to 2657	0	Step data No.54	BCD 16 digits (8 bytes)	
	2660 to 2667	0	Step data No.55	BCD 16 digits (8 bytes)	
	2670 to 2677	0	Step data No.56	BCD 16 digits (8 bytes)	
23	2700 to 2707	0	Step data No.57	BCD 16 digits (8 bytes)	
	2710 to 2717	0	Step data No.58	BCD 16 digits (8 bytes)	
	2720 to 2727	0	Step data No.59	BCD 16 digits (8 bytes)	
	2730 to 2737	0	Step data No.60	BCD 16 digits (8 bytes)	
	2740 to 2747	0	Step data No.61	BCD 16 digits (8 bytes)	
	2750 to 2757	0	Step data No.62	BCD 16 digits (8 bytes)	
	2760 to 2767	0	Step data No.63	BCD 16 digits (8 bytes)	
	2770 to 2777	0	Step data No.64	BCD 16 digits (8 bytes)	
24	3000 to 3007	0	Step data No.65	BCD 16 digits (8 bytes)	
	3010 to 3017	0	Step data No.66	BCD 16 digits (8 bytes)	
	3020 to 3027	0	Step data No.67	BCD 16 digits (8 bytes)	
	3030 to 3037	0	Step data No.68	BCD 16 digits (8 bytes)	
	3040 to 3047	0	Step data No.69	BCD 16 digits (8 bytes)	
	3050 to 3057	0	Step data No.70	BCD 16 digits (8 bytes)	
	3060 to 3067	0	Step data No.71	BCD 16 digits (8 bytes)	
	3070 to 3077	0	Step data No.72	BCD 16 digits (8 bytes)	
25	3100 to 3107	0	Step data No.73	BCD 16 digits (8 bytes)	
	3110 to 3117	0	Step data No.74	BCD 16 digits (8 bytes)	
	3120 to 3127	0	Step data No.75	BCD 16 digits (8 bytes)	
	3130 to 3137	0	Step data No.76	BCD 16 digits (8 bytes)	
	3140 to 3147	0	Step data No.77	BCD 16 digits (8 bytes)	
	3150 to 3157	0	Step data No.78	BCD 16 digits (8 bytes)	
	3160 to 3167	0	Step data No.79	BCD 16 digits (8 bytes)	
	3170 to 3177	0	Step data No.80	BCD 16 digits (8 bytes)	
26	3200 to 3207	0	Step data No.81	BCD 16 digits (8 bytes)	
	3210 to 3217	0	Step data No.82	BCD 16 digits (8 bytes)	
	3220 to 3227	0	Step data No.83	BCD 16 digits (8 bytes)	
	3230 to 3237	0	Step data No.84	BCD 16 digits (8 bytes)	
	3240 to 3247	0	Step data No.85	BCD 16 digits (8 bytes)	
	3250 to 3257	0	Step data No.86	BCD 16 digits (8 bytes)	
	3260 to 3267	0	Step data No.87	BCD 16 digits (8 bytes)	
	3270 to 3277	0	Step data No.88	BCD 16 digits (8 bytes)	
27	3300 to 3307	0	Step data No.89	BCD 16 digits (8 bytes)	
	3310 to 3317	0	Step data No.90	BCD 16 digits (8 bytes)	
	3320 to 3327	0	Step data No.91	BCD 16 digits (8 bytes)	
	3330 to 3337	0	Step data No.92	BCD 16 digits (8 bytes)	
	3340 to 3347	0	Step data No.93	BCD 16 digits (8 bytes)	
	3350 to 3357	0	Step data No.94	BCD 16 digits (8 bytes)	
	3360 to 3367	0	Step data No.95	BCD 16 digits (8 bytes)	
	3370 to 3377	0	Step data No.96	BCD 16 digits (8 bytes)	
28	3400 to 3407	0	Step data No.97	BCD 16 digits (8 bytes)	
	3410 to 3417	0	Step data No.98	BCD 16 digits (8 bytes)	
	3420 to 3427	0	Step data No.99	BCD 16 digits (8 bytes)	
29	3500 to 3577	0	Reserved area		
30	3600 to 3677	0	Reserved area		
31	3700 to 3777	0	Reserved area		

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[2] For Y-axis

Block No.	Byte address		Default	Signal name	Data format	Remarks
0	4000	Bit0	0	Selection of output pulse signal system	0,1(bit)	———
		〃 1	0	Selection of limit input signal logic	0,1(bit)	
		〃 2	0	Selection of origin proximity input signal logic	0,1(bit)	
		〃 3	0	Selection of origin input signal logic	0,1(bit)	
		〃 4	0	Selection of general-purpose input signal logic	0,1(bit)	
		〃 5	0	Selection of emergency stop input function	0,1(bit)	
		〃 6	0	Selection of emergency stop enabled axis* X-axis parameter only enabled	0,1(bit)	
		〃 7	0	Enabling of external positioning completed signal	0,1(bit)	
	4001	Bit0	0	Designation of origin unconfirmed at hardware error	0,1(bit)	
		〃 1	0	Designation of origin unconfirmed at software limit error	0,1(bit)	
		〃 2	0	Selection of driver error input logic	0,1(bit)	
		〃3 to 7	0	Reserved area	———	
	4002	〃0 to 3	0	Zero return operation mode setting	BCD 1 digit (0.5 bytes)	
		〃4 to 7	0	Zero return direction setting	BCD 1 digit (0.5 bytes)	
	4003		0	Origin detection method setting	BCD 2 digits (1 byte)	
	4004 to 4005		1	Origin count	BCD 4 digits (2 bytes)	
	4006		0	Present position at speed control operation	BCD 2 digits (1 byte)	
	4007		0	Operating axis selection	Managed in bits	
	4010 to 4013		0	Reference speed	BCD 8 digits (4 bytes)	
	4014 to 4017		0	Maximum speed	BCD 8 digits (4 bytes)	
	4020 to 4023		0	Startup speed	BCD 8 digits (4 bytes)	
	4024 to 4027		0	Acceleration time	BCD 8 digits (4 bytes)	
	4030 to 4033		0	Deceleration time	BCD 8 digits (4 bytes)	
	4034 to 4037		0	Zero return (high speed)	BCD 8 digits (4 bytes)	
	4040 to 4043		0	Zero return (low speed)	BCD 8 digits (4 bytes)	
	4044 to 4047		-9999999	CCW side software limit value	BCD 8 digits (4 bytes)	- when bit 1 of 8th digit is ON
	4050 to 4053		9999999	CW side software limit value	BCD 8 digits (4 bytes)	
	4054 to 4057		0	Speed after interrupt	BCD 8 digits (4 bytes)	
	4060 to 4063		0	Origin compensation data	BCD 8 digits (4 bytes)	
	4064 to 4065		0	Backlash compensation data	BCD 4 digits (2 bytes)	
	4066 to 4067		0	Positioning monitoring time	BCD 4 digits (2 bytes)	
	4070 to 4073		0	Jog (initial) operation speed	BCD 8 digits (4 bytes)	
	4074		3	Acceleration/deceleration curve (00 to 99%)	BCD 2 digits (1 byte)	
	4075	Bit0 to 3	0	Jog operation mode	BCD 1 digit (0.5 bytes)	
		〃 4 to 7	0	Operation at software limit error	BCD 1 digit (0.5 bytes)	
	4076	Bit0 to 3	0	General-purpose input operation mode setting	BCD 1 digit (0.5 bytes)	
		〃 4 to 7	0	General-purpose output operation mode setting	BCD 1 digit (0.5 bytes)	
	4077		0	Parameter common setting (X-axis parameter only enabled)	BCD 2 digits (1 byte)	
1	4100		0	Closed loop control mode selection	BCD 2 digits (1 byte)	———
	4101		99	Compensation time (unit 0.1 seconds)	BCD 2 digits (1 byte)	
	4102		0	Encoder count direction	BCD 2 digits (1 byte)	
	4103		0	Reserved area	———	
	4104 to 4107		0	Closed loop control allowable range (unsigned)	BCD 8 digits (4 bytes)	
	4110 to 4117		0	Reserved	———	
	4120		0	Absolute value control mode selection	BCD 2 digits (1 byte)	
	4121		0	Absolute value control driver model selection	BCD 2 digits (1 byte)	
	4122 to 4127		0	Reserved area	———	
	4130 to 4133		1	Electronic gear 1 (M value)	BCD 8 digits (4 bytes)	
	4134 to 4137		1	Electronic gear 1 (D value)	BCD 8 digits (4 bytes)	
	4140 to 4143		1	Electronic gear 2 (M value)	BCD 8 digits (4 bytes)	
	4144 to 4147		1	Electronic gear 2 (D value)	BCD 8 digits (4 bytes)	
	4150 to 4153		0	Jog (initial) operation speed	BCD 8 digits (4 bytes)	
	4154 to 4177		0	Reserved area	———	
2	4200 to 4203		0	M output 0 lower limit range	BCD 8 digits (4 bytes)	- when bit 1 of 8th digit is ON
	4204 to 4207		0	M output 0 upper limit range	BCD 8 digits (4 bytes)	
	4210 to 4213		0	M output 1 lower limit range	BCD 8 digits (4 bytes)	
	4214 to 4217		0	M output 1 upper limit range	BCD 8 digits (4 bytes)	
	4220 to 4223		0	M output 2 lower limit range	BCD 8 digits (4 bytes)	
	4224 to 4227		0	M output 2 upper limit range	BCD 8 digits (4 bytes)	
	4230 to 4233		0	M output 3 lower limit range	BCD 8 digits (4 bytes)	
	4234 to 4237		0	M output 3 upper limit range	BCD 8 digits (4 bytes)	
	4240 to 4243		0	M output 4 lower limit range	BCD 8 digits (4 bytes)	
	4244 to 4247		0	M output 4 upper limit range	BCD 8 digits (4 bytes)	
	4250 to 4253		0	M output 5 lower limit range	BCD 8 digits (4 bytes)	
	4254 to 4257		0	M output 5 upper limit range	BCD 8 digits (4 bytes)	
	4260 to 4263		0	M output 6 lower limit range	BCD 8 digits (4 bytes)	
	4264 to 4267		0	M output 6 upper limit range	BCD 8 digits (4 bytes)	
	4270 to 4273		0	M output 7 lower limit range	BCD 8 digits (4 bytes)	
	4274 to 4277		0	M output 7 upper limit range	BCD 8 digits (4 bytes)	
3	4300 to 4303		0	Acceleration time data 1	BCD 8 digits (4 bytes)	8th and 7th digits unused
	4304 to 4307		0	Acceleration time data 2	BCD 8 digits (4 bytes)	
	4310 to 4313		0	Acceleration time data 3	BCD 8 digits (4 bytes)	
	4314 to 4317		0	Acceleration time data 4	BCD 8 digits (4 bytes)	
	4320 to 4323		0	Acceleration time data 5	BCD 8 digits (4 bytes)	
	4324 to 4327		0	Acceleration time data 6	BCD 8 digits (4 bytes)	
	4330 to 4333		0	Acceleration time data 7	BCD 8 digits (4 bytes)	
	4334 to 4337		0	Acceleration time data 8	BCD 8 digits (4 bytes)	

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Block No.	Byte address	Default	Signal name	Data format	Remarks
3	4340 to 4343	0	Deceleration data 1	BCD 8 digits (4 bytes)	8th and 7th digits unused
	4344 to 4347	0	Deceleration data 2	BCD 8 digits (4 bytes)	
	4350 to 4353	0	Deceleration data 3	BCD 8 digits (4 bytes)	
	4354 to 4357	0	Deceleration data 4	BCD 8 digits (4 bytes)	
	4360 to 4363	0	Deceleration data 5	BCD 8 digits (4 bytes)	
	4364 to 4367	0	Deceleration data 6	BCD 8 digits (4 bytes)	
	4370 to 4373	0	Deceleration data 7	BCD 8 digits (4 bytes)	
	4374 to 4377	0	Deceleration data 8	BCD 8 digits (4 bytes)	
4	4400 to 4401	0	Dwell timer data 1	BCD 4 digits (2 bytes)	8th and 7th digits unused
	4402 to 4403	0	Dwell timer data 2	BCD 4 digits (2 bytes)	
	4404 to 4405	0	Dwell timer data 3	BCD 4 digits (2 bytes)	
	4406 to 4407	0	Dwell timer data 4	BCD 4 digits (2 bytes)	
	4410 to 4411	0	Dwell timer data 5	BCD 4 digits (2 bytes)	
	4412 to 4413	0	Dwell timer data 6	BCD 4 digits (2 bytes)	
	4414 to 4415	0	Dwell timer data 7	BCD 4 digits (2 bytes)	
	4416 to 4417	0	Dwell timer data 8	BCD 4 digits (2 bytes)	
	4420 to 4421	0	Dwell timer data 9	BCD 4 digits (2 bytes)	
	4422 to 4423	0	Dwell timer data 10	BCD 4 digits (2 bytes)	
	4424 to 4425	0	Dwell timer data 11	BCD 4 digits (2 bytes)	
	4426 to 4427	0	Dwell timer data 12	BCD 4 digits (2 bytes)	
	4430 to 4431	0	Dwell timer data 13	BCD 4 digits (2 bytes)	
	4432 to 4433	0	Dwell timer data 14	BCD 4 digits (2 bytes)	
	4434 to 4435	0	Dwell timer data 15	BCD 4 digits (2 bytes)	
	4436 to 4437	0	Dwell timer data 16	BCD 4 digits (2 bytes)	
5	4500 to 4503	0	Speed data No.1		8th and 7th digits unused
	4504 to 4507	0	Speed data No.2		
	4510 to 4513	0	Speed data No.3		
	4514 to 4517	0	Speed data No.4		
	4520 to 4523	0	Speed data No.5		
	4524 to 4527	0	Speed data No.6		
	4530 to 4533	0	Speed data No.7		
	4534 to 4537	0	Speed data No.8		
	4540 to 4543	0	Speed data No.9		
	4544 to 4547	0	Speed data No.10		
	4550 to 4553	0	Speed data No.11		
	4554 to 4557	0	Speed data No.12		
	4560 to 4563	0	Speed data No.13		
	4564 to 4567	0	Speed data No.14		
	4570 to 4573	0	Speed data No.15		
	4574 to 4577	0	Speed data No.16		
6	4600 to 4603	0	Speed data No.17		8th and 7th digits unused
	4604 to 4607	0	Speed data No.18		
	4610 to 4613	0	Speed data No.19		
	4614 to 4617	0	Speed data No.20		
	4620 to 4623	0	Speed data No.21		
	4624 to 4627	0	Speed data No.22		
	4630 to 4633	0	Speed data No.23		
	4634 to 4637	0	Speed data No.24		
	4640 to 4643	0	Speed data No.25		
	4644 to 4647	0	Speed data No.26		
	4650 to 4653	0	Speed data No.27		
	4654 to 4657	0	Speed data No.28		
	4660 to 4663	0	Speed data No.29		
	4664 to 4667	0	Speed data No.30		
	4670 to 4673	0	Speed data No.31		
	4674 to 4677	0	Speed data No.32		
7	4700 to 4703	0	Speed data No.33		8th and 7th digits unused
	4704 to 4707	0	Speed data No.34		
	4710 to 4713	0	Speed data No.35		
	4714 to 4717	0	Speed data No.36		
	4720 to 4723	0	Speed data No.37		
	4724 to 4727	0	Speed data No.38		
	4730 to 4733	0	Speed data No.39		
	4734 to 4737	0	Speed data No.40		
	4740 to 4743	0	Speed data No.41		
	4744 to 4747	0	Speed data No.42		
	4750 to 4753	0	Speed data No.43		
	4754 to 4757	0	Speed data No.44		
	4760 to 4763	0	Speed data No.45		
	4764 to 4767	0	Speed data No.46		
	4770 to 4773	0	Speed data No.47		
	4774 to 4777	0	Speed data No.48		

Block No.	Byte address	Default	Signal name	Data format	Remarks
8	5000 to 5003	0	Speed data No.49	BCD 8 digits (4 bytes)	8th and 7th digits unused
	5004 to 5007	0	Speed data No.50	BCD 8 digits (4 bytes)	
	5010 to 5013	0	Speed data No.51	BCD 8 digits (4 bytes)	
	5014 to 5017	0	Speed data No.52	BCD 8 digits (4 bytes)	
	5020 to 5023	0	Speed data No.53	BCD 8 digits (4 bytes)	
	5024 to 5027	0	Speed data No.54	BCD 8 digits (4 bytes)	
	5030 to 5033	0	Speed data No.55	BCD 8 digits (4 bytes)	
	5034 to 5037	0	Speed data No.56	BCD 8 digits (4 bytes)	
	5040 to 5043	0	Speed data No.57	BCD 8 digits (4 bytes)	
	5044 to 5047	0	Speed data No.58	BCD 8 digits (4 bytes)	
	5050 to 5053	0	Speed data No.59	BCD 8 digits (4 bytes)	
	5054 to 5057	0	Speed data No.60	BCD 8 digits (4 bytes)	
	5060 to 5063	0	Speed data No.61	BCD 8 digits (4 bytes)	
	5064 to 5067	0	Speed data No.62	BCD 8 digits (4 bytes)	
	5070 to 5073	0	Speed data No.63	BCD 8 digits (4 bytes)	
	5074 to 5077	0	Speed data No.64	BCD 8 digits (4 bytes)	
9	5100 to 5103	0	Position data No.1	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	5104 to 5107	0	Position data No.2	BCD 8 digits (4 bytes)	
	5110 to 5113	0	Position data No.3	BCD 8 digits (4 bytes)	
	5114 to 5117	0	Position data No.4	BCD 8 digits (4 bytes)	
	5120 to 5123	0	Position data No.5	BCD 8 digits (4 bytes)	
	5124 to 5127	0	Position data No.6	BCD 8 digits (4 bytes)	
	5130 to 5133	0	Position data No.7	BCD 8 digits (4 bytes)	
	5134 to 5137	0	Position data No.8	BCD 8 digits (4 bytes)	
	5140 to 5143	0	Position data No.9	BCD 8 digits (4 bytes)	
	5144 to 5147	0	Position data No.10	BCD 8 digits (4 bytes)	
	5150 to 5153	0	Position data No.11	BCD 8 digits (4 bytes)	
	5154 to 5157	0	Position data No.12	BCD 8 digits (4 bytes)	
	5160 to 5163	0	Position data No.13	BCD 8 digits (4 bytes)	
	5164 to 5167	0	Position data No.14	BCD 8 digits (4 bytes)	
	5170 to 5173	0	Position data No.15	BCD 8 digits (4 bytes)	
	5174 to 5177	0	Position data No.16	BCD 8 digits (4 bytes)	
10	5200 to 5203	0	Position data No.17	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	5204 to 5207	0	Position data No.18	BCD 8 digits (4 bytes)	
	5210 to 5213	0	Position data No.19	BCD 8 digits (4 bytes)	
	5214 to 5217	0	Position data No.20	BCD 8 digits (4 bytes)	
	5220 to 5223	0	Position data No.21	BCD 8 digits (4 bytes)	
	5224 to 5227	0	Position data No.22	BCD 8 digits (4 bytes)	
	5230 to 5233	0	Position data No.23	BCD 8 digits (4 bytes)	
	5234 to 5237	0	Position data No.24	BCD 8 digits (4 bytes)	
	5240 to 5243	0	Position data No.25	BCD 8 digits (4 bytes)	
	5244 to 5247	0	Position data No.26	BCD 8 digits (4 bytes)	
	5250 to 5253	0	Position data No.27	BCD 8 digits (4 bytes)	
	5254 to 5257	0	Position data No.28	BCD 8 digits (4 bytes)	
	5260 to 5263	0	Position data No.29	BCD 8 digits (4 bytes)	
	5264 to 5267	0	Position data No.30	BCD 8 digits (4 bytes)	
	5270 to 5273	0	Position data No.31	BCD 8 digits (4 bytes)	
	5274 to 5277	0	Position data No.32	BCD 8 digits (4 bytes)	
11	5300 to 5303	0	Position data No.33	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	5304 to 5307	0	Position data No.34	BCD 8 digits (4 bytes)	
	5310 to 5313	0	Position data No.35	BCD 8 digits (4 bytes)	
	5314 to 5317	0	Position data No.36	BCD 8 digits (4 bytes)	
	5320 to 5323	0	Position data No.37	BCD 8 digits (4 bytes)	
	5324 to 5327	0	Position data No.38	BCD 8 digits (4 bytes)	
	5330 to 5333	0	Position data No.39	BCD 8 digits (4 bytes)	
	5334 to 5337	0	Position data No.40	BCD 8 digits (4 bytes)	
	5340 to 5343	0	Position data No.41	BCD 8 digits (4 bytes)	
	5344 to 5347	0	Position data No.42	BCD 8 digits (4 bytes)	
	5350 to 5353	0	Position data No.43	BCD 8 digits (4 bytes)	
	5354 to 5357	0	Position data No.44	BCD 8 digits (4 bytes)	
	5360 to 5363	0	Position data No.45	BCD 8 digits (4 bytes)	
	5364 to 5367	0	Position data No.46	BCD 8 digits (4 bytes)	
	5370 to 5373	0	Position data No.47	BCD 8 digits (4 bytes)	
	5374 to 5377	0	Position data No.48	BCD 8 digits (4 bytes)	
12	5400 to 5403	0	Position data No.49	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	5404 to 5407	0	Position data No.50	BCD 8 digits (4 bytes)	
	5410 to 5413	0	Position data No.51	BCD 8 digits (4 bytes)	
	5414 to 5417	0	Position data No.52	BCD 8 digits (4 bytes)	
	5420 to 5423	0	Position data No.53	BCD 8 digits (4 bytes)	
	5424 to 5427	0	Position data No.54	BCD 8 digits (4 bytes)	
	5430 to 5433	0	Position data No.55	BCD 8 digits (4 bytes)	
	5434 to 5437	0	Position data No.56	BCD 8 digits (4 bytes)	
	5440 to 5443	0	Position data No.57	BCD 8 digits (4 bytes)	
	5444 to 5447	0	Position data No.58	BCD 8 digits (4 bytes)	
	5450 to 5453	0	Position data No.59	BCD 8 digits (4 bytes)	
	5454 to 5457	0	Position data No.60	BCD 8 digits (4 bytes)	
	5460 to 5463	0	Position data No.61	BCD 8 digits (4 bytes)	

Block No.	Byte address	Default	Signal name	Data format	Remarks
12	5464 to 5467	0	Position data No.62	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	5470 to 5473	0	Position data No.63	BCD 8 digits (4 bytes)	
	5474 to 5477	0	Position data No.64	BCD 8 digits (4 bytes)	
13	5500 to 5503	0	Position data No.65	BCD 8 digits (4 bytes)	
	5504 to 5507	0	Position data No.66	BCD 8 digits (4 bytes)	
	5510 to 5513	0	Position data No.67	BCD 8 digits (4 bytes)	
	5514 to 5517	0	Position data No.68	BCD 8 digits (4 bytes)	
	5520 to 5523	0	Position data No.69	BCD 8 digits (4 bytes)	
	5524 to 5527	0	Position data No.70	BCD 8 digits (4 bytes)	
	5530 to 5533	0	Position data No.71	BCD 8 digits (4 bytes)	
	5534 to 5537	0	Position data No.72	BCD 8 digits (4 bytes)	
	5540 to 5543	0	Position data No.73	BCD 8 digits (4 bytes)	
	5544 to 5547	0	Position data No.74	BCD 8 digits (4 bytes)	
	5550 to 5553	0	Position data No.75	BCD 8 digits (4 bytes)	
	5554 to 5557	0	Position data No.76	BCD 8 digits (4 bytes)	
	5560 to 5563	0	Position data No.77	BCD 8 digits (4 bytes)	
	5564 to 5567	0	Position data No.78	BCD 8 digits (4 bytes)	
	5570 to 5573	0	Position data No.79	BCD 8 digits (4 bytes)	
	5574 to 5577	0	Position data No.80	BCD 8 digits (4 bytes)	
14	5600 to 5603	0	Position data No.81	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	5604 to 5607	0	Position data No.82	BCD 8 digits (4 bytes)	
	5610 to 5613	0	Position data No.83	BCD 8 digits (4 bytes)	
	5614 to 5617	0	Position data No.84	BCD 8 digits (4 bytes)	
	5620 to 5623	0	Position data No.85	BCD 8 digits (4 bytes)	
	5624 to 5627	0	Position data No.86	BCD 8 digits (4 bytes)	
	5630 to 5633	0	Position data No.87	BCD 8 digits (4 bytes)	
	5634 to 5637	0	Position data No.88	BCD 8 digits (4 bytes)	
	5640 to 5643	0	Position data No.89	BCD 8 digits (4 bytes)	
	5644 to 5647	0	Position data No.90	BCD 8 digits (4 bytes)	
	5650 to 5653	0	Position data No.91	BCD 8 digits (4 bytes)	
	5654 to 5657	0	Position data No.92	BCD 8 digits (4 bytes)	
	5660 to 5663	0	Position data No.93	BCD 8 digits (4 bytes)	
	5664 to 5667	0	Position data No.94	BCD 8 digits (4 bytes)	
	5670 to 5673	0	Position data No.95	BCD 8 digits (4 bytes)	
	5674 to 5677	0	Position data No.96	BCD 8 digits (4 bytes)	
15	5700 to 5703	0	Position data No.97	BCD 8 digits (4 bytes)	
	5704 to 5707	0	Position data No.98	BCD 8 digits (4 bytes)	
	5710 to 5713	0	Position data No.99	BCD 8 digits (4 bytes)	
16	6000 to 6007	0	Step data No.1	BCD 16 digits (8 bytes)	———
	6010 to 6017	0	Step data No.2	BCD 16 digits (8 bytes)	
	6020 to 6027	0	Step data No.3	BCD 16 digits (8 bytes)	
	6030 to 6037	0	Step data No.4	BCD 16 digits (8 bytes)	
	6040 to 6047	0	Step data No.5	BCD 16 digits (8 bytes)	
	6050 to 6057	0	Step data No.6	BCD 16 digits (8 bytes)	
	6060 to 6067	0	Step data No.7	BCD 16 digits (8 bytes)	
	6070 to 6077	0	Step data No.8	BCD 16 digits (8 bytes)	
17	6100 to 6107	0	Step data No.9	BCD 16 digits (8 bytes)	
	6110 to 6117	0	Step data No.10	BCD 16 digits (8 bytes)	
	6120 to 6127	0	Step data No.11	BCD 16 digits (8 bytes)	
	6130 to 6137	0	Step data No.12	BCD 16 digits (8 bytes)	
	6140 to 6147	0	Step data No.13	BCD 16 digits (8 bytes)	
	6150 to 6157	0	Step data No.14	BCD 16 digits (8 bytes)	
	6160 to 6167	0	Step data No.15	BCD 16 digits (8 bytes)	
	6170 to 6177	0	Step data No.16	BCD 16 digits (8 bytes)	
18	6200 to 6207	0	Step data No.17	BCD 16 digits (8 bytes)	
	6210 to 6217	0	Step data No.18	BCD 16 digits (8 bytes)	
	6220 to 6227	0	Step data No.19	BCD 16 digits (8 bytes)	
	6230 to 6237	0	Step data No.20	BCD 16 digits (8 bytes)	
	6240 to 6247	0	Step data No.21	BCD 16 digits (8 bytes)	
	6250 to 6257	0	Step data No.22	BCD 16 digits (8 bytes)	
	6260 to 6267	0	Step data No.23	BCD 16 digits (8 bytes)	
	6270 to 6277	0	Step data No.24	BCD 16 digits (8 bytes)	
19	6300 to 6307	0	Step data No.25	BCD 16 digits (8 bytes)	
	6310 to 6317	0	Step data No.26	BCD 16 digits (8 bytes)	
	6320 to 6327	0	Step data No.27	BCD 16 digits (8 bytes)	
	6330 to 6337	0	Step data No.28	BCD 16 digits (8 bytes)	
	6340 to 6347	0	Step data No.29	BCD 16 digits (8 bytes)	
	6350 to 6357	0	Step data No.30	BCD 16 digits (8 bytes)	
	6360 to 6367	0	Step data No.31	BCD 16 digits (8 bytes)	
	6370 to 6377	0	Step data No.32	BCD 16 digits (8 bytes)	

Block No.	Byte address	Default	Signal name	Data format	Remarks
20	6400 to 6407	0	Step data No.33	BCD 16 digits (8 bytes)	
	6410 to 6417	0	Step data No.34	BCD 16 digits (8 bytes)	
	6420 to 6427	0	Step data No.35	BCD 16 digits (8 bytes)	
	6430 to 6437	0	Step data No.36	BCD 16 digits (8 bytes)	
	6440 to 6447	0	Step data No.37	BCD 16 digits (8 bytes)	
	6450 to 6457	0	Step data No.38	BCD 16 digits (8 bytes)	
	6460 to 6467	0	Step data No.39	BCD 16 digits (8 bytes)	
	6470 to 6477	0	Step data No.40	BCD 16 digits (8 bytes)	
21	6500 to 6507	0	Step data No.41	BCD 16 digits (8 bytes)	
	6510 to 6517	0	Step data No.42	BCD 16 digits (8 bytes)	
	6520 to 6527	0	Step data No.43	BCD 16 digits (8 bytes)	
	6530 to 6537	0	Step data No.44	BCD 16 digits (8 bytes)	
	6540 to 6547	0	Step data No.45	BCD 16 digits (8 bytes)	
	6550 to 6557	0	Step data No.46	BCD 16 digits (8 bytes)	
	6560 to 6567	0	Step data No.47	BCD 16 digits (8 bytes)	
	6570 to 6577	0	Step data No.48	BCD 16 digits (8 bytes)	
22	6600 to 6607	0	Step data No.49	BCD 16 digits (8 bytes)	
	6610 to 6617	0	Step data No.50	BCD 16 digits (8 bytes)	
	6620 to 6627	0	Step data No.51	BCD 16 digits (8 bytes)	
	6630 to 6637	0	Step data No.52	BCD 16 digits (8 bytes)	
	6640 to 6647	0	Step data No.53	BCD 16 digits (8 bytes)	
	6650 to 6657	0	Step data No.54	BCD 16 digits (8 bytes)	
	6660 to 6667	0	Step data No.55	BCD 16 digits (8 bytes)	
	6670 to 6677	0	Step data No.56	BCD 16 digits (8 bytes)	
23	6700 to 6707	0	Step data No.57	BCD 16 digits (8 bytes)	
	6710 to 6717	0	Step data No.58	BCD 16 digits (8 bytes)	
	6720 to 6727	0	Step data No.59	BCD 16 digits (8 bytes)	
	6730 to 6737	0	Step data No.60	BCD 16 digits (8 bytes)	
	6740 to 6747	0	Step data No.61	BCD 16 digits (8 bytes)	
	6750 to 6757	0	Step data No.62	BCD 16 digits (8 bytes)	
	6760 to 6767	0	Step data No.63	BCD 16 digits (8 bytes)	
	6770 to 6777	0	Step data No.64	BCD 16 digits (8 bytes)	
24	7000 to 7007	0	Step data No.65	BCD 16 digits (8 bytes)	
	7010 to 7017	0	Step data No.66	BCD 16 digits (8 bytes)	
	7020 to 7027	0	Step data No.67	BCD 16 digits (8 bytes)	
	7030 to 7037	0	Step data No.68	BCD 16 digits (8 bytes)	
	7040 to 7047	0	Step data No.69	BCD 16 digits (8 bytes)	
	7050 to 7057	0	Step data No.70	BCD 16 digits (8 bytes)	
	7060 to 7067	0	Step data No.71	BCD 16 digits (8 bytes)	
	7070 to 7077	0	Step data No.72	BCD 16 digits (8 bytes)	
25	7100 to 7107	0	Step data No.73	BCD 16 digits (8 bytes)	
	7110 to 7117	0	Step data No.74	BCD 16 digits (8 bytes)	
	7120 to 7127	0	Step data No.75	BCD 16 digits (8 bytes)	
	7130 to 7137	0	Step data No.76	BCD 16 digits (8 bytes)	
	7140 to 7147	0	Step data No.77	BCD 16 digits (8 bytes)	
	7150 to 7157	0	Step data No.78	BCD 16 digits (8 bytes)	
	7160 to 7167	0	Step data No.79	BCD 16 digits (8 bytes)	
	7170 to 7177	0	Step data No.80	BCD 16 digits (8 bytes)	
26	7200 to 7207	0	Step data No.81	BCD 16 digits (8 bytes)	
	7210 to 7217	0	Step data No.82	BCD 16 digits (8 bytes)	
	7220 to 7227	0	Step data No.83	BCD 16 digits (8 bytes)	
	7230 to 7237	0	Step data No.84	BCD 16 digits (8 bytes)	
	7240 to 7247	0	Step data No.85	BCD 16 digits (8 bytes)	
	7250 to 7257	0	Step data No.86	BCD 16 digits (8 bytes)	
	7260 to 7267	0	Step data No.87	BCD 16 digits (8 bytes)	
	7270 to 7277	0	Step data No.88	BCD 16 digits (8 bytes)	
27	7300 to 7307	0	Step data No.89	BCD 16 digits (8 bytes)	
	7310 to 7317	0	Step data No.90	BCD 16 digits (8 bytes)	
	7320 to 7327	0	Step data No.91	BCD 16 digits (8 bytes)	
	7330 to 7337	0	Step data No.92	BCD 16 digits (8 bytes)	
	7340 to 7347	0	Step data No.93	BCD 16 digits (8 bytes)	
	7350 to 7357	0	Step data No.94	BCD 16 digits (8 bytes)	
	7360 to 7367	0	Step data No.95	BCD 16 digits (8 bytes)	
	7370 to 7377	0	Step data No.96	BCD 16 digits (8 bytes)	
28	7400 to 7407	0	Step data No.97	BCD 16 digits (8 bytes)	
	7410 to 7417	0	Step data No.98	BCD 16 digits (8 bytes)	
	7420 to 7427	0	Step data No.99	BCD 16 digits (8 bytes)	
29	7500 to 7577	0	Reserved area		
30	7600 to 7677	0	Reserved area		
31	7700 to 7777	0	Reserved area		

A

[3] For Z-axis

Block No.	Byte address		Default	Signal name	Data format	Remarks
0	10000	Bit0	0	Selection of output pulse signal system	0,1(bit)	———
		〃 1	0	Selection of limit input signal logic	0,1(bit)	
		〃 2	0	Selection of origin proximity input signal logic	0,1(bit)	
		〃 3	0	Selection of origin input signal logic	0,1(bit)	
		〃 4	0	Selection of general-purpose input signal logic	0,1(bit)	
		〃 5	0	Selection of emergency stop input function	0,1(bit)	
		〃 6	0	Selection of emergency stop enabled axis* X-axis parameter only enabled	0,1(bit)	
		〃 7	0	Enabling of external positioning completed signal	0,1(bit)	
	10001	Bit0	0	Designation of origin unconfirmed at hardware error	0,1(bit)	
		〃 1	0	Designation of origin unconfirmed at software limit error	0,1(bit)	
		〃 2	0	Selection of driver error input logic	0,1(bit)	
		〃 3 to 7	0	Reserved area	———	
	10002	〃 0 to 3	0	Zero return operation mode setting	BCD 1 digit (0.5 bytes)	
		〃 4 to 7	0	Zero return direction setting	BCD 1 digit (0.5 bytes)	
	10003		0	Origin detection method setting	BCD 2 digits (1 byte)	
	10004 to 10005		1	Origin count	BCD 4 digits (2 bytes)	
	10006		0	Present position at speed control operation	BCD 2 digits (1 byte)	
	10007		0	Operating axis selection	Managed in bits	
	10010 to 10013		0	Reference speed	BCD 8 digits (4 bytes)	
	10014 to 10017		0	Maximum speed	BCD 8 digits (4 bytes)	
	10020 to 10023		0	Startup speed	BCD 8 digits (4 bytes)	
	10024 to 10027		0	Acceleration time	BCD 8 digits (4 bytes)	
	10030 to 10033		0	Deceleration time	BCD 8 digits (4 bytes)	
	10034 to 10037		0	Zero return (high speed)	BCD 8 digits (4 bytes)	
	10040 to 10043		0	Zero return (low speed)	BCD 8 digits (4 bytes)	
	10044 to 10047		-9999999	CCW side software limit value	BCD 8 digits (4 bytes)	- when bit 1 of 8th digit is ON
	10050 to 10053		9999999	CW side software limit value	BCD 8 digits (4 bytes)	
	10054 to 10057		0	Speed after interrupt	BCD 8 digits (4 bytes)	
	10060 to 10063		0	Origin compensation data	BCD 8 digits (4 bytes)	
	10064 to 10065		0	Backlash compensation data	BCD 4 digits (2 bytes)	
	10066 to 10067		0	Positioning monitoring time	BCD 4 digits (2 bytes)	
	10070 to 10073		0	Jog (initial) operation speed	BCD 8 digits (4 bytes)	
	10074		3	Acceleration/deceleration curve (00 to 99%)	BCD 2 digits (1 byte)	
	10075	Bit0 to 3	0	Jog operation mode	BCD 1 digit (0.5 bytes)	
		〃 4 to 7	0	Operation at software limit error	BCD 1 digit (0.5 bytes)	
	10076	Bit0 to 3	0	General-purpose input operation mode setting	BCD 1 digit (0.5 bytes)	
		〃 4 to 7	0	General-purpose output operation mode setting	BCD 1 digit (0.5 bytes)	
	10077		0	Parameter common setting (X-axis parameter only enabled)	BCD 2 digits (1 byte)	
1	10100		0	Closed loop control mode selection	BCD 2 digits (1 byte)	———
	10101		99	Compensation time (unit 0.1 seconds)	BCD 2 digits (1 byte)	
	10102		0	Encoder count direction	BCD 2 digits (1 byte)	
	10103		0	Reserved area	———	
	10104 to 10107		0	Closed loop control allowable range (unsigned)	BCD 8 digits (4 bytes)	
	10110 to 10117		0	Reserved	———	
	10120		0	Absolute value control mode selection	BCD 2 digits (1 byte)	
	10121		0	Absolute value control driver model selection	BCD 2 digits (1 byte)	
	10122 to 10127		0	Reserved area	———	
	10130 to 10133		1	Electronic gear 1 (M value)	BCD 8 digits (4 bytes)	
	10134 to 10137		1	Electronic gear 1 (D value)	BCD 8 digits (4 bytes)	
	10140 to 10143		1	Electronic gear 2 (M value)	BCD 8 digits (4 bytes)	
	10144 to 10147		1	Electronic gear 2 (D value)	BCD 8 digits (4 bytes)	
	10150 to 10153		0	Jog (initial) operation speed	BCD 8 digits (4 bytes)	
	10154 to 10177		0	Reserved area	———	
2	10200 to 10203		0	M output 0 lower limit range	BCD 8 digits (4 bytes)	- when bit 1 of 8th digit is ON
	10204 to 10207		0	M output 0 upper limit range	BCD 8 digits (4 bytes)	
	10210 to 10213		0	M output 1 lower limit range	BCD 8 digits (4 bytes)	
	10214 to 10217		0	M output 1 upper limit range	BCD 8 digits (4 bytes)	
	10220 to 10223		0	M output 2 lower limit range	BCD 8 digits (4 bytes)	
	10224 to 10227		0	M output 2 upper limit range	BCD 8 digits (4 bytes)	
	10230 to 10233		0	M output 3 lower limit range	BCD 8 digits (4 bytes)	
	10234 to 10237		0	M output 3 upper limit range	BCD 8 digits (4 bytes)	
	10240 to 10243		0	M output 4 lower limit range	BCD 8 digits (4 bytes)	
	10244 to 10247		0	M output 4 upper limit range	BCD 8 digits (4 bytes)	
	10250 to 10253		0	M output 5 lower limit range	BCD 8 digits (4 bytes)	
	10254 to 10257		0	M output 5 upper limit range	BCD 8 digits (4 bytes)	
	10260 to 10263		0	M output 6 lower limit range	BCD 8 digits (4 bytes)	
	10264 to 10267		0	M output 6 upper limit range	BCD 8 digits (4 bytes)	
	10270 to 10273		0	M output 7 lower limit range	BCD 8 digits (4 bytes)	
	10274 to 10277		0	M output 7 upper limit range	BCD 8 digits (4 bytes)	
3	10300 to 10303		0	Acceleration time data 1	BCD 8 digits (4 bytes)	8th and 7th digits unused
	10304 to 10307		0	Acceleration time data 2	BCD 8 digits (4 bytes)	
	10310 to 10313		0	Acceleration time data 3	BCD 8 digits (4 bytes)	
	10314 to 10317		0	Acceleration time data 4	BCD 8 digits (4 bytes)	
	10320 to 10323		0	Acceleration time data 5	BCD 8 digits (4 bytes)	
	10324 to 10327		0	Acceleration time data 6	BCD 8 digits (4 bytes)	
	10330 to 10333		0	Acceleration time data 7	BCD 8 digits (4 bytes)	
	10334 to 10337		0	Acceleration time data 8	BCD 8 digits (4 bytes)	

Block No.	Byte address	Default	Signal name	Data format	Remarks
3	10340 to 10343	0	Deceleration data 1	BCD 8 digits (4 bytes)	8th and 7th digits unused
	10344 to 10347	0	Deceleration data 2	BCD 8 digits (4 bytes)	
	10350 to 10353	0	Deceleration data 3	BCD 8 digits (4 bytes)	
	10354 to 10357	0	Deceleration data 4	BCD 8 digits (4 bytes)	
	10360 to 10363	0	Deceleration data 5	BCD 8 digits (4 bytes)	
	10364 to 10367	0	Deceleration data 6	BCD 8 digits (4 bytes)	
	10370 to 10373	0	Deceleration data 7	BCD 8 digits (4 bytes)	
	10374 to 10377	0	Deceleration data 8	BCD 8 digits (4 bytes)	
4	10400 to 10401	0	Dwell timer data 1	BCD 4 digits (2 bytes)	8th and 7th digits unused
	10402 to 10403	0	Dwell timer data 2	BCD 4 digits (2 bytes)	
	10404 to 10405	0	Dwell timer data 3	BCD 4 digits (2 bytes)	
	10406 to 10407	0	Dwell timer data 4	BCD 4 digits (2 bytes)	
	10410 to 10411	0	Dwell timer data 5	BCD 4 digits (2 bytes)	
	10412 to 10413	0	Dwell timer data 6	BCD 4 digits (2 bytes)	
	10414 to 10415	0	Dwell timer data 7	BCD 4 digits (2 bytes)	
	10416 to 10417	0	Dwell timer data 8	BCD 4 digits (2 bytes)	
	10420 to 10421	0	Dwell timer data 9	BCD 4 digits (2 bytes)	
	10422 to 10423	0	Dwell timer data 10	BCD 4 digits (2 bytes)	
	10424 to 10425	0	Dwell timer data 11	BCD 4 digits (2 bytes)	
	10426 to 10427	0	Dwell timer data 12	BCD 4 digits (2 bytes)	
	10430 to 10431	0	Dwell timer data 13	BCD 4 digits (2 bytes)	
	10432 to 10433	0	Dwell timer data 14	BCD 4 digits (2 bytes)	
	10434 to 10435	0	Dwell timer data 15	BCD 4 digits (2 bytes)	
	10436 to 10437	0	Dwell timer data 16	BCD 4 digits (2 bytes)	
5	10500 to 10503	0	Speed data No.1		8th and 7th digits unused
	10504 to 10507	0	Speed data No.2		
	10510 to 10513	0	Speed data No.3		
	10514 to 10517	0	Speed data No.4		
	10520 to 10523	0	Speed data No.5		
	10524 to 10527	0	Speed data No.6		
	10530 to 10533	0	Speed data No.7		
	10534 to 10537	0	Speed data No.8		
	10540 to 10543	0	Speed data No.9		
	10544 to 10547	0	Speed data No.10		
	10550 to 10553	0	Speed data No.11		
	10554 to 10557	0	Speed data No.12		
	10560 to 10563	0	Speed data No.13		
	10564 to 10567	0	Speed data No.14		
	10570 to 10573	0	Speed data No.15		
	10574 to 10577	0	Speed data No.16		
6	10600 to 10603	0	Speed data No.17		8th and 7th digits unused
	10604 to 10607	0	Speed data No.18		
	10610 to 10613	0	Speed data No.19		
	10614 to 10617	0	Speed data No.20		
	10620 to 10623	0	Speed data No.21		
	10624 to 10627	0	Speed data No.22		
	10630 to 10633	0	Speed data No.23		
	10634 to 10637	0	Speed data No.24		
	10640 to 10643	0	Speed data No.25		
	10644 to 10647	0	Speed data No.26		
	10650 to 10653	0	Speed data No.27		
	10654 to 10657	0	Speed data No.28		
	10660 to 10663	0	Speed data No.29		
	10664 to 10667	0	Speed data No.30		
	10670 to 10673	0	Speed data No.31		
	10674 to 10677	0	Speed data No.32		
7	10700 to 10703	0	Speed data No.33		8th and 7th digits unused
	10704 to 10707	0	Speed data No.34		
	10710 to 10713	0	Speed data No.35		
	10714 to 10717	0	Speed data No.36		
	10720 to 10723	0	Speed data No.37		
	10724 to 10727	0	Speed data No.38		
	10730 to 10733	0	Speed data No.39		
	10734 to 10737	0	Speed data No.40		
	10740 to 10743	0	Speed data No.41		
	10744 to 10747	0	Speed data No.42		
	10750 to 10753	0	Speed data No.43		
	10754 to 10757	0	Speed data No.44		
	10760 to 10763	0	Speed data No.45		
	10764 to 10767	0	Speed data No.46		
	10770 to 10773	0	Speed data No.47		
	10774 to 10777	0	Speed data No.48		

Block No.	Byte address	Default	Signal name	Data format	Remarks
8	11000 to 11003	0	Speed data No.49	BCD 8 digits (4 bytes)	8th and 7th digits unused
	11004 to 11007	0	Speed data No.50	BCD 8 digits (4 bytes)	
	11010 to 11013	0	Speed data No.51	BCD 8 digits (4 bytes)	
	11014 to 11017	0	Speed data No.52	BCD 8 digits (4 bytes)	
	11020 to 11023	0	Speed data No.53	BCD 8 digits (4 bytes)	
	11024 to 11027	0	Speed data No.54	BCD 8 digits (4 bytes)	
	11030 to 11033	0	Speed data No.55	BCD 8 digits (4 bytes)	
	11034 to 11037	0	Speed data No.56	BCD 8 digits (4 bytes)	
	11040 to 11043	0	Speed data No.57	BCD 8 digits (4 bytes)	
	11044 to 11047	0	Speed data No.58	BCD 8 digits (4 bytes)	
	11050 to 11053	0	Speed data No.59	BCD 8 digits (4 bytes)	
	11054 to 11057	0	Speed data No.60	BCD 8 digits (4 bytes)	
	11060 to 11063	0	Speed data No.61	BCD 8 digits (4 bytes)	
	11064 to 11067	0	Speed data No.62	BCD 8 digits (4 bytes)	
	11070 to 11073	0	Speed data No.63	BCD 8 digits (4 bytes)	
	11074 to 11077	0	Speed data No.64	BCD 8 digits (4 bytes)	
9	11100 to 11103	0	Position data No.1	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	11104 to 11107	0	Position data No.2	BCD 8 digits (4 bytes)	
	11110 to 11113	0	Position data No.3	BCD 8 digits (4 bytes)	
	11114 to 11117	0	Position data No.4	BCD 8 digits (4 bytes)	
	11120 to 11123	0	Position data No.5	BCD 8 digits (4 bytes)	
	11124 to 11127	0	Position data No.6	BCD 8 digits (4 bytes)	
	11130 to 11133	0	Position data No.7	BCD 8 digits (4 bytes)	
	11134 to 11137	0	Position data No.8	BCD 8 digits (4 bytes)	
	11140 to 11143	0	Position data No.9	BCD 8 digits (4 bytes)	
	11144 to 11147	0	Position data No.10	BCD 8 digits (4 bytes)	
	11150 to 11153	0	Position data No.11	BCD 8 digits (4 bytes)	
	11154 to 11157	0	Position data No.12	BCD 8 digits (4 bytes)	
	11160 to 11163	0	Position data No.13	BCD 8 digits (4 bytes)	
	11164 to 11167	0	Position data No.14	BCD 8 digits (4 bytes)	
	11170 to 11173	0	Position data No.15	BCD 8 digits (4 bytes)	
	11174 to 11177	0	Position data No.16	BCD 8 digits (4 bytes)	
10	11200 to 11203	0	Position data No.17	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	11204 to 11207	0	Position data No.18	BCD 8 digits (4 bytes)	
	11210 to 11213	0	Position data No.19	BCD 8 digits (4 bytes)	
	11214 to 11217	0	Position data No.20	BCD 8 digits (4 bytes)	
	11220 to 11223	0	Position data No.21	BCD 8 digits (4 bytes)	
	11224 to 11227	0	Position data No.22	BCD 8 digits (4 bytes)	
	11230 to 11233	0	Position data No.23	BCD 8 digits (4 bytes)	
	11234 to 11237	0	Position data No.24	BCD 8 digits (4 bytes)	
	11240 to 11243	0	Position data No.25	BCD 8 digits (4 bytes)	
	11244 to 11247	0	Position data No.26	BCD 8 digits (4 bytes)	
	11250 to 11253	0	Position data No.27	BCD 8 digits (4 bytes)	
	11254 to 11257	0	Position data No.28	BCD 8 digits (4 bytes)	
	11260 to 11263	0	Position data No.29	BCD 8 digits (4 bytes)	
	11264 to 11267	0	Position data No.30	BCD 8 digits (4 bytes)	
	11270 to 11273	0	Position data No.31	BCD 8 digits (4 bytes)	
	11274 to 11277	0	Position data No.32	BCD 8 digits (4 bytes)	
11	11300 to 11303	0	Position data No.33	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	11304 to 11307	0	Position data No.34	BCD 8 digits (4 bytes)	
	11310 to 11313	0	Position data No.35	BCD 8 digits (4 bytes)	
	11314 to 11317	0	Position data No.36	BCD 8 digits (4 bytes)	
	11320 to 11323	0	Position data No.37	BCD 8 digits (4 bytes)	
	11324 to 11327	0	Position data No.38	BCD 8 digits (4 bytes)	
	11330 to 11333	0	Position data No.39	BCD 8 digits (4 bytes)	
	11334 to 11337	0	Position data No.40	BCD 8 digits (4 bytes)	
	11340 to 11343	0	Position data No.41	BCD 8 digits (4 bytes)	
	11344 to 11347	0	Position data No.42	BCD 8 digits (4 bytes)	
	11350 to 11353	0	Position data No.43	BCD 8 digits (4 bytes)	
	11354 to 11357	0	Position data No.44	BCD 8 digits (4 bytes)	
	11360 to 11363	0	Position data No.45	BCD 8 digits (4 bytes)	
	11364 to 11367	0	Position data No.46	BCD 8 digits (4 bytes)	
	11370 to 11373	0	Position data No.47	BCD 8 digits (4 bytes)	
	11374 to 11377	0	Position data No.48	BCD 8 digits (4 bytes)	
12	11400 to 11403	0	Position data No.49	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	11404 to 11407	0	Position data No.50	BCD 8 digits (4 bytes)	
	11410 to 11413	0	Position data No.51	BCD 8 digits (4 bytes)	
	11414 to 11417	0	Position data No.52	BCD 8 digits (4 bytes)	
	11420 to 11423	0	Position data No.53	BCD 8 digits (4 bytes)	
	11424 to 11427	0	Position data No.54	BCD 8 digits (4 bytes)	
	11430 to 11433	0	Position data No.55	BCD 8 digits (4 bytes)	
	11434 to 11437	0	Position data No.56	BCD 8 digits (4 bytes)	
	11440 to 11443	0	Position data No.57	BCD 8 digits (4 bytes)	
	11444 to 11447	0	Position data No.58	BCD 8 digits (4 bytes)	
	11450 to 11453	0	Position data No.59	BCD 8 digits (4 bytes)	
	11454 to 11457	0	Position data No.60	BCD 8 digits (4 bytes)	
	11460 to 11463	0	Position data No.61	BCD 8 digits (4 bytes)	

Block No.	Byte address	Default	Signal name	Data format	Remarks
12	11464 to 11467	0	Position data No.62	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	11470 to 11473	0	Position data No.63	BCD 8 digits (4 bytes)	
	11474 to 11477	0	Position data No.64	BCD 8 digits (4 bytes)	
13	11500 to 11503	0	Position data No.65	BCD 8 digits (4 bytes)	
	11504 to 11507	0	Position data No.66	BCD 8 digits (4 bytes)	
	11510 to 11513	0	Position data No.67	BCD 8 digits (4 bytes)	
	11514 to 11517	0	Position data No.68	BCD 8 digits (4 bytes)	
	11520 to 11523	0	Position data No.69	BCD 8 digits (4 bytes)	
	11524 to 11527	0	Position data No.70	BCD 8 digits (4 bytes)	
	11530 to 11533	0	Position data No.71	BCD 8 digits (4 bytes)	
	11534 to 11537	0	Position data No.72	BCD 8 digits (4 bytes)	
	11540 to 11543	0	Position data No.73	BCD 8 digits (4 bytes)	
	11544 to 11547	0	Position data No.74	BCD 8 digits (4 bytes)	
	11550 to 11553	0	Position data No.75	BCD 8 digits (4 bytes)	
	11554 to 11557	0	Position data No.76	BCD 8 digits (4 bytes)	
	11560 to 11563	0	Position data No.77	BCD 8 digits (4 bytes)	
	11564 to 11567	0	Position data No.78	BCD 8 digits (4 bytes)	
	11570 to 11573	0	Position data No.79	BCD 8 digits (4 bytes)	
	11574 to 11577	0	Position data No.80	BCD 8 digits (4 bytes)	
14	11600 to 11603	0	Position data No.81	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	11604 to 11607	0	Position data No.82	BCD 8 digits (4 bytes)	
	11610 to 11613	0	Position data No.83	BCD 8 digits (4 bytes)	
	11614 to 11617	0	Position data No.84	BCD 8 digits (4 bytes)	
	11620 to 11623	0	Position data No.85	BCD 8 digits (4 bytes)	
	11624 to 11627	0	Position data No.86	BCD 8 digits (4 bytes)	
	11630 to 11633	0	Position data No.87	BCD 8 digits (4 bytes)	
	11634 to 11637	0	Position data No.88	BCD 8 digits (4 bytes)	
	11640 to 11643	0	Position data No.89	BCD 8 digits (4 bytes)	
	11644 to 11647	0	Position data No.90	BCD 8 digits (4 bytes)	
	11650 to 11653	0	Position data No.91	BCD 8 digits (4 bytes)	
	11654 to 11657	0	Position data No.92	BCD 8 digits (4 bytes)	
	11660 to 11663	0	Position data No.93	BCD 8 digits (4 bytes)	
	11664 to 11667	0	Position data No.94	BCD 8 digits (4 bytes)	
	11670 to 11673	0	Position data No.95	BCD 8 digits (4 bytes)	
	11674 to 11677	0	Position data No.96	BCD 8 digits (4 bytes)	
15	11700 to 11703	0	Position data No.97	BCD 8 digits (4 bytes)	
	11704 to 11707	0	Position data No.98	BCD 8 digits (4 bytes)	
	11710 to 11713	0	Position data No.99	BCD 8 digits (4 bytes)	
16	12000 to 12007	0	Step data No.1	BCD 16 digits (8 bytes)	———
	12010 to 12017	0	Step data No.2	BCD 16 digits (8 bytes)	
	12020 to 12027	0	Step data No.3	BCD 16 digits (8 bytes)	
	12030 to 12037	0	Step data No.4	BCD 16 digits (8 bytes)	
	12040 to 12047	0	Step data No.5	BCD 16 digits (8 bytes)	
	12050 to 12057	0	Step data No.6	BCD 16 digits (8 bytes)	
	12060 to 12067	0	Step data No.7	BCD 16 digits (8 bytes)	
	12070 to 12077	0	Step data No.8	BCD 16 digits (8 bytes)	
17	12100 to 12107	0	Step data No.9	BCD 16 digits (8 bytes)	
	12110 to 12117	0	Step data No.10	BCD 16 digits (8 bytes)	
	12120 to 12127	0	Step data No.11	BCD 16 digits (8 bytes)	
	12130 to 12137	0	Step data No.12	BCD 16 digits (8 bytes)	
	12140 to 12147	0	Step data No.13	BCD 16 digits (8 bytes)	
	12150 to 12157	0	Step data No.14	BCD 16 digits (8 bytes)	
	12160 to 12167	0	Step data No.15	BCD 16 digits (8 bytes)	
	12170 to 12177	0	Step data No.16	BCD 16 digits (8 bytes)	
18	12200 to 12207	0	Step data No.17	BCD 16 digits (8 bytes)	
	12210 to 12217	0	Step data No.18	BCD 16 digits (8 bytes)	
	12220 to 12227	0	Step data No.19	BCD 16 digits (8 bytes)	
	12230 to 12237	0	Step data No.20	BCD 16 digits (8 bytes)	
	12240 to 12247	0	Step data No.21	BCD 16 digits (8 bytes)	
	12250 to 12257	0	Step data No.22	BCD 16 digits (8 bytes)	
	12260 to 12267	0	Step data No.23	BCD 16 digits (8 bytes)	
	12270 to 12277	0	Step data No.24	BCD 16 digits (8 bytes)	
19	12300 to 12307	0	Step data No.25	BCD 16 digits (8 bytes)	
	12310 to 12317	0	Step data No.26	BCD 16 digits (8 bytes)	
	12320 to 12327	0	Step data No.27	BCD 16 digits (8 bytes)	
	12330 to 12337	0	Step data No.28	BCD 16 digits (8 bytes)	
	12340 to 12347	0	Step data No.29	BCD 16 digits (8 bytes)	
	12350 to 12357	0	Step data No.30	BCD 16 digits (8 bytes)	
	12360 to 12367	0	Step data No.31	BCD 16 digits (8 bytes)	
	12370 to 12377	0	Step data No.32	BCD 16 digits (8 bytes)	

Block No.	Byte address	Default	Signal name	Data format	Remarks
20	12400 to 12407	0	Step data No.33	BCD 16 digits (8 bytes)	
	12410 to 12417	0	Step data No.34	BCD 16 digits (8 bytes)	
	12420 to 12427	0	Step data No.35	BCD 16 digits (8 bytes)	
	12430 to 12437	0	Step data No.36	BCD 16 digits (8 bytes)	
	12440 to 12447	0	Step data No.37	BCD 16 digits (8 bytes)	
	12450 to 12457	0	Step data No.38	BCD 16 digits (8 bytes)	
	12460 to 12467	0	Step data No.39	BCD 16 digits (8 bytes)	
	12470 to 12477	0	Step data No.40	BCD 16 digits (8 bytes)	
21	12500 to 12507	0	Step data No.41	BCD 16 digits (8 bytes)	
	12510 to 12517	0	Step data No.42	BCD 16 digits (8 bytes)	
	12520 to 12527	0	Step data No.43	BCD 16 digits (8 bytes)	
	12530 to 12537	0	Step data No.44	BCD 16 digits (8 bytes)	
	12540 to 12547	0	Step data No.45	BCD 16 digits (8 bytes)	
	12550 to 12557	0	Step data No.46	BCD 16 digits (8 bytes)	
	12560 to 12567	0	Step data No.47	BCD 16 digits (8 bytes)	
	12570 to 12577	0	Step data No.48	BCD 16 digits (8 bytes)	
22	12600 to 12607	0	Step data No.49	BCD 16 digits (8 bytes)	
	12610 to 12617	0	Step data No.50	BCD 16 digits (8 bytes)	
	12620 to 12627	0	Step data No.51	BCD 16 digits (8 bytes)	
	12630 to 12637	0	Step data No.52	BCD 16 digits (8 bytes)	
	12640 to 12647	0	Step data No.53	BCD 16 digits (8 bytes)	
	12650 to 12657	0	Step data No.54	BCD 16 digits (8 bytes)	
	12660 to 12667	0	Step data No.55	BCD 16 digits (8 bytes)	
	12670 to 12677	0	Step data No.56	BCD 16 digits (8 bytes)	
23	12700 to 12707	0	Step data No.57	BCD 16 digits (8 bytes)	
	12710 to 12717	0	Step data No.58	BCD 16 digits (8 bytes)	
	12720 to 12727	0	Step data No.59	BCD 16 digits (8 bytes)	
	12730 to 12737	0	Step data No.60	BCD 16 digits (8 bytes)	
	12740 to 12747	0	Step data No.61	BCD 16 digits (8 bytes)	
	12750 to 12757	0	Step data No.62	BCD 16 digits (8 bytes)	
	12760 to 12767	0	Step data No.63	BCD 16 digits (8 bytes)	
	12770 to 12777	0	Step data No.64	BCD 16 digits (8 bytes)	
24	13000 to 13007	0	Step data No.65	BCD 16 digits (8 bytes)	
	13010 to 13017	0	Step data No.66	BCD 16 digits (8 bytes)	
	13020 to 13027	0	Step data No.67	BCD 16 digits (8 bytes)	
	13030 to 13037	0	Step data No.68	BCD 16 digits (8 bytes)	
	13040 to 13047	0	Step data No.69	BCD 16 digits (8 bytes)	
	13050 to 13057	0	Step data No.70	BCD 16 digits (8 bytes)	
	13060 to 13067	0	Step data No.71	BCD 16 digits (8 bytes)	
	13070 to 13077	0	Step data No.72	BCD 16 digits (8 bytes)	
25	13100 to 13107	0	Step data No.73	BCD 16 digits (8 bytes)	
	13110 to 13117	0	Step data No.74	BCD 16 digits (8 bytes)	
	13120 to 13127	0	Step data No.75	BCD 16 digits (8 bytes)	
	13130 to 13137	0	Step data No.76	BCD 16 digits (8 bytes)	
	13140 to 13147	0	Step data No.77	BCD 16 digits (8 bytes)	
	13150 to 13157	0	Step data No.78	BCD 16 digits (8 bytes)	
	13160 to 13167	0	Step data No.79	BCD 16 digits (8 bytes)	
	13170 to 13177	0	Step data No.80	BCD 16 digits (8 bytes)	
26	13200 to 13207	0	Step data No.81	BCD 16 digits (8 bytes)	
	13210 to 13217	0	Step data No.82	BCD 16 digits (8 bytes)	
	13220 to 13227	0	Step data No.83	BCD 16 digits (8 bytes)	
	13230 to 13237	0	Step data No.84	BCD 16 digits (8 bytes)	
	13240 to 13247	0	Step data No.85	BCD 16 digits (8 bytes)	
	13250 to 13257	0	Step data No.86	BCD 16 digits (8 bytes)	
	13260 to 13267	0	Step data No.87	BCD 16 digits (8 bytes)	
	13270 to 13277	0	Step data No.88	BCD 16 digits (8 bytes)	
27	13300 to 13307	0	Step data No.89	BCD 16 digits (8 bytes)	
	13310 to 13317	0	Step data No.90	BCD 16 digits (8 bytes)	
	13320 to 13327	0	Step data No.91	BCD 16 digits (8 bytes)	
	13330 to 13337	0	Step data No.92	BCD 16 digits (8 bytes)	
	13340 to 13347	0	Step data No.93	BCD 16 digits (8 bytes)	
	13350 to 13357	0	Step data No.94	BCD 16 digits (8 bytes)	
	13360 to 13367	0	Step data No.95	BCD 16 digits (8 bytes)	
	13370 to 13377	0	Step data No.96	BCD 16 digits (8 bytes)	
28	13400 to 13407	0	Step data No.97	BCD 16 digits (8 bytes)	
	13410 to 13417	0	Step data No.98	BCD 16 digits (8 bytes)	
	13420 to 13427	0	Step data No.99	BCD 16 digits (8 bytes)	
29	13500 to 13577	0	Reserved area		
30	13600 to 13677	0	Reserved area		
31	13700 to 13777	0	Reserved area		

A

[4] For A-axis

Block No.	Byte address		Default	Signal name	Data format	Remarks
0	14000	Bit0	0	Selection of output pulse signal system	0,1(bit)	———
		〃 1	0	Selection of limit input signal logic	0,1(bit)	
		〃 2	0	Selection of origin proximity input signal logic	0,1(bit)	
		〃 3	0	Selection of origin input signal logic	0,1(bit)	
		〃 4	0	Selection of general-purpose input signal logic	0,1(bit)	
		〃 5	0	Selection of emergency stop input function	0,1(bit)	
		〃 6	0	Selection of emergency stop enabled axis* X-axis parameter only enabled	0,1(bit)	
		〃 7	0	Enabling of external positioning completed signal	0,1(bit)	
	14001	Bit0	0	Designation of origin unconfirmed at hardware error	0,1(bit)	
		〃 1	0	Designation of origin unconfirmed at software limit error	0,1(bit)	
		〃 2	0	Selection of driver error input logic	0,1(bit)	
		〃 3 to 7	0	Reserved area	———	
	14002	〃 0 to 3	0	Zero return operation mode setting	BCD 1 digit (0.5 bytes)	
		〃 4 to 7	0	Zero return direction setting	BCD 1 digit (0.5 bytes)	
	14003		0	Origin detection method setting	BCD 2 digits (1 byte)	
	14004 to 14005		1	Origin count	BCD 4 digits (2 bytes)	
	14006		0	Present position at speed control operation	BCD 2 digits (1 byte)	
	14007		0	Operating axis selection	Managed in bits	
	14010 to 14013		0	Reference speed	BCD 8 digits (4 bytes)	
	14014 to 14017		0	Maximum speed	BCD 8 digits (4 bytes)	
	14020 to 14023		0	Startup speed	BCD 8 digits (4 bytes)	
	14024 to 14027		0	Acceleration time	BCD 8 digits (4 bytes)	
	14030 to 14033		0	Deceleration time	BCD 8 digits (4 bytes)	
	14034 to 14037		0	Zero return (high speed)	BCD 8 digits (4 bytes)	
	14040 to 14043		0	Zero return (low speed)	BCD 8 digits (4 bytes)	
	14044 to 14047		-9999999	CCW side software limit value	BCD 8 digits (4 bytes)	- when bit 1 of 8th digit is ON
	14050 to 14053		9999999	CW side software limit value	BCD 8 digits (4 bytes)	———
	14054 to 14057		0	Speed after interrupt	BCD 8 digits (4 bytes)	
	14060 to 14063		0	Origin compensation data	BCD 8 digits (4 bytes)	
	14064 to 14065		0	Backlash compensation data	BCD 4 digits (2 bytes)	
	14066 to 14067		0	Positioning monitoring time	BCD 4 digits (2 bytes)	
	14070 to 14073		0	Jog (initial) operation speed	BCD 8 digits (4 bytes)	
	14074		3	Acceleration/deceleration curve (00 to 99%)	BCD 2 digits (1 byte)	
	14075	Bit0 to 3	0	Jog operation mode	BCD 1 digit (0.5 bytes)	
		〃 4 to 7	0	Operation at software limit error	BCD 1 digit (0.5 bytes)	
	14076	Bit0 to 3	0	General-purpose input operation mode setting	BCD 1 digit (0.5 bytes)	
		〃 4 to 7	0	General-purpose output operation mode setting	BCD 1 digit (0.5 bytes)	
	14077		0	Parameter common setting (X-axis parameter only enabled)	BCD 2 digits (1 byte)	
1	14100		0	Closed loop control mode selection	BCD 2 digits (1 byte)	
	14101		99	Compensation time (unit 0.1 seconds)	BCD 2 digits (1 byte)	
	14102		0	Encoder count direction	BCD 2 digits (1 byte)	
	14103		0	Reserved area	———	
	14104 to 14107		0	Closed loop control allowable range (unsigned)	BCD 8 digits (4 bytes)	
	14110 to 14117		0	Reserved	———	
	14120		0	Absolute value control mode selection	BCD 2 digits (1 byte)	
	14121		0	Absolute value control driver model selection	BCD 2 digits (1 byte)	
	14122 to 14127		0	Reserved area	———	
	14130 to 14133		1	Electronic gear 1 (M value)	BCD 8 digits (4 bytes)	
	14134 to 14137		1	Electronic gear 1 (D value)	BCD 8 digits (4 bytes)	
	14140 to 14143		1	Electronic gear 2 (M value)	BCD 8 digits (4 bytes)	
	14144 to 14147		1	Electronic gear 2 (D value)	BCD 8 digits (4 bytes)	
	14150 to 14153		0	Jog (initial) operation speed	BCD 8 digits (4 bytes)	
	14154 to 14177		0	Reserved area	———	
2	14200 to 14203		0	M output 0 lower limit range	BCD 8 digits (4 bytes)	- when bit 1 of 8th digit is ON
	14204 to 14207		0	M output 0 upper limit range	BCD 8 digits (4 bytes)	
	14210 to 14213		0	M output 1 lower limit range	BCD 8 digits (4 bytes)	
	14214 to 14217		0	M output 1 upper limit range	BCD 8 digits (4 bytes)	
	14220 to 14223		0	M output 2 lower limit range	BCD 8 digits (4 bytes)	
	14224 to 14227		0	M output 2 upper limit range	BCD 8 digits (4 bytes)	
	14230 to 14233		0	M output 3 lower limit range	BCD 8 digits (4 bytes)	
	14234 to 14237		0	M output 3 upper limit range	BCD 8 digits (4 bytes)	
	14240 to 14243		0	M output 4 lower limit range	BCD 8 digits (4 bytes)	
	14244 to 14247		0	M output 4 upper limit range	BCD 8 digits (4 bytes)	
	14250 to 14253		0	M output 5 lower limit range	BCD 8 digits (4 bytes)	
	14254 to 14257		0	M output 5 upper limit range	BCD 8 digits (4 bytes)	
	14260 to 14263		0	M output 6 lower limit range	BCD 8 digits (4 bytes)	
	14264 to 14267		0	M output 6 upper limit range	BCD 8 digits (4 bytes)	
	14270 to 14273		0	M output 7 lower limit range	BCD 8 digits (4 bytes)	
	14274 to 14277		0	M output 7 upper limit range	BCD 8 digits (4 bytes)	
3	14300 to 14303		0	Acceleration time data 1	BCD 8 digits (4 bytes)	8th and 7th digits unused
	14304 to 14307		0	Acceleration time data 2	BCD 8 digits (4 bytes)	
	14310 to 14313		0	Acceleration time data 3	BCD 8 digits (4 bytes)	
	14314 to 14317		0	Acceleration time data 4	BCD 8 digits (4 bytes)	
	14320 to 14323		0	Acceleration time data 5	BCD 8 digits (4 bytes)	
	14324 to 14327		0	Acceleration time data 6	BCD 8 digits (4 bytes)	
	14330 to 14333		0	Acceleration time data 7	BCD 8 digits (4 bytes)	
	14334 to 14337		0	Acceleration time data 8	BCD 8 digits (4 bytes)	

Block No.	Byte address	Default	Signal name	Data format	Remarks
3	14340 to 14343	0	Deceleration data 1	BCD 8 digits (4 bytes)	8th and 7th digits unused
	14344 to 14347	0	Deceleration data 2	BCD 8 digits (4 bytes)	
	14350 to 14353	0	Deceleration data 3	BCD 8 digits (4 bytes)	
	14354 to 14357	0	Deceleration data 4	BCD 8 digits (4 bytes)	
	14360 to 14363	0	Deceleration data 5	BCD 8 digits (4 bytes)	
	14364 to 14367	0	Deceleration data 6	BCD 8 digits (4 bytes)	
	14370 to 14373	0	Deceleration data 7	BCD 8 digits (4 bytes)	
	14374 to 14377	0	Deceleration data 8	BCD 8 digits (4 bytes)	
4	14400 to 14401	0	Dwell timer data 1	BCD 4 digits (2 bytes)	8th and 7th digits unused
	14402 to 14403	0	Dwell timer data 2	BCD 4 digits (2 bytes)	
	14404 to 14405	0	Dwell timer data 3	BCD 4 digits (2 bytes)	
	14406 to 14407	0	Dwell timer data 4	BCD 4 digits (2 bytes)	
	14410 to 14411	0	Dwell timer data 5	BCD 4 digits (2 bytes)	
	14412 to 14413	0	Dwell timer data 6	BCD 4 digits (2 bytes)	
	14414 to 14415	0	Dwell timer data 7	BCD 4 digits (2 bytes)	
	14416 to 14417	0	Dwell timer data 8	BCD 4 digits (2 bytes)	
	14420 to 14421	0	Dwell timer data 9	BCD 4 digits (2 bytes)	
	14422 to 14423	0	Dwell timer data 10	BCD 4 digits (2 bytes)	
	14424 to 14425	0	Dwell timer data 11	BCD 4 digits (2 bytes)	
	14426 to 14427	0	Dwell timer data 12	BCD 4 digits (2 bytes)	
	14430 to 14431	0	Dwell timer data 13	BCD 4 digits (2 bytes)	
	14432 to 14433	0	Dwell timer data 14	BCD 4 digits (2 bytes)	
	14434 to 14435	0	Dwell timer data 15	BCD 4 digits (2 bytes)	
	14436 to 14437	0	Dwell timer data 16	BCD 4 digits (2 bytes)	
5	14500 to 14503	0	Speed data No.1		8th and 7th digits unused
	14504 to 14507	0	Speed data No.2		
	14510 to 14513	0	Speed data No.3		
	14514 to 14517	0	Speed data No.4		
	14520 to 14523	0	Speed data No.5		
	14524 to 14527	0	Speed data No.6		
	14530 to 14533	0	Speed data No.7		
	14534 to 14537	0	Speed data No.8		
	14540 to 14543	0	Speed data No.9		
	14544 to 14547	0	Speed data No.10		
	14550 to 14553	0	Speed data No.11		
	14554 to 14557	0	Speed data No.12		
	14560 to 14563	0	Speed data No.13		
	14564 to 14567	0	Speed data No.14		
	14570 to 14573	0	Speed data No.15		
	14574 to 14577	0	Speed data No.16		
6	14600 to 14603	0	Speed data No.17		8th and 7th digits unused
	14604 to 14607	0	Speed data No.18		
	14610 to 14613	0	Speed data No.19		
	14614 to 14617	0	Speed data No.20		
	14620 to 14623	0	Speed data No.21		
	14624 to 14627	0	Speed data No.22		
	14630 to 14633	0	Speed data No.23		
	14634 to 14637	0	Speed data No.24		
	14640 to 14643	0	Speed data No.25		
	14644 to 14647	0	Speed data No.26		
	14650 to 14653	0	Speed data No.27		
	14654 to 14657	0	Speed data No.28		
	14660 to 14663	0	Speed data No.29		
	14664 to 14667	0	Speed data No.30		
	14670 to 14673	0	Speed data No.31		
	14674 to 14677	0	Speed data No.32		
7	14700 to 14703	0	Speed data No.33		8th and 7th digits unused
	14704 to 14707	0	Speed data No.34		
	14710 to 14713	0	Speed data No.35		
	14714 to 14717	0	Speed data No.36		
	14720 to 14723	0	Speed data No.37		
	14724 to 14727	0	Speed data No.38		
	14730 to 14733	0	Speed data No.39		
	14734 to 14737	0	Speed data No.40		
	14740 to 14743	0	Speed data No.41		
	14744 to 14747	0	Speed data No.42		
	14750 to 14753	0	Speed data No.43		
	14754 to 14757	0	Speed data No.44		
	14760 to 14763	0	Speed data No.45		
	14764 to 14767	0	Speed data No.46		
	14770 to 14773	0	Speed data No.47		
	14774 to 14777	0	Speed data No.48		

Block No.	Byte address	Default	Signal name	Data format	Remarks
8	15000 to 15003	0	Speed data No.49	BCD 8 digits (4 bytes)	8th and 7th digits unused
	15004 to 15007	0	Speed data No.50	BCD 8 digits (4 bytes)	
	15010 to 15013	0	Speed data No.51	BCD 8 digits (4 bytes)	
	15014 to 15017	0	Speed data No.52	BCD 8 digits (4 bytes)	
	15020 to 15023	0	Speed data No.53	BCD 8 digits (4 bytes)	
	15024 to 15027	0	Speed data No.54	BCD 8 digits (4 bytes)	
	15030 to 15033	0	Speed data No.55	BCD 8 digits (4 bytes)	
	15034 to 15037	0	Speed data No.56	BCD 8 digits (4 bytes)	
	15040 to 15043	0	Speed data No.57	BCD 8 digits (4 bytes)	
	15044 to 15047	0	Speed data No.58	BCD 8 digits (4 bytes)	
	15050 to 15053	0	Speed data No.59	BCD 8 digits (4 bytes)	
	15054 to 15057	0	Speed data No.60	BCD 8 digits (4 bytes)	
	15060 to 15063	0	Speed data No.61	BCD 8 digits (4 bytes)	
	15064 to 15067	0	Speed data No.62	BCD 8 digits (4 bytes)	
	15070 to 15073	0	Speed data No.63	BCD 8 digits (4 bytes)	
	15074 to 15077	0	Speed data No.64	BCD 8 digits (4 bytes)	
9	15100 to 15103	0	Position data No.1	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	15104 to 15107	0	Position data No.2	BCD 8 digits (4 bytes)	
	15110 to 15113	0	Position data No.3	BCD 8 digits (4 bytes)	
	15114 to 15117	0	Position data No.4	BCD 8 digits (4 bytes)	
	15120 to 15123	0	Position data No.5	BCD 8 digits (4 bytes)	
	15124 to 15127	0	Position data No.6	BCD 8 digits (4 bytes)	
	15130 to 15133	0	Position data No.7	BCD 8 digits (4 bytes)	
	15134 to 15137	0	Position data No.8	BCD 8 digits (4 bytes)	
	15140 to 15143	0	Position data No.9	BCD 8 digits (4 bytes)	
	15144 to 15147	0	Position data No.10	BCD 8 digits (4 bytes)	
	15150 to 15153	0	Position data No.11	BCD 8 digits (4 bytes)	
	15154 to 15157	0	Position data No.12	BCD 8 digits (4 bytes)	
	15160 to 15163	0	Position data No.13	BCD 8 digits (4 bytes)	
	15164 to 15167	0	Position data No.14	BCD 8 digits (4 bytes)	
	15170 to 15173	0	Position data No.15	BCD 8 digits (4 bytes)	
	15174 to 15177	0	Position data No.16	BCD 8 digits (4 bytes)	
10	15200 to 15203	0	Position data No.17	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	15204 to 15207	0	Position data No.18	BCD 8 digits (4 bytes)	
	15210 to 15213	0	Position data No.19	BCD 8 digits (4 bytes)	
	15214 to 15217	0	Position data No.20	BCD 8 digits (4 bytes)	
	15220 to 15223	0	Position data No.21	BCD 8 digits (4 bytes)	
	15224 to 15227	0	Position data No.22	BCD 8 digits (4 bytes)	
	15230 to 15233	0	Position data No.23	BCD 8 digits (4 bytes)	
	15234 to 15237	0	Position data No.24	BCD 8 digits (4 bytes)	
	15240 to 15243	0	Position data No.25	BCD 8 digits (4 bytes)	
	15244 to 15247	0	Position data No.26	BCD 8 digits (4 bytes)	
	15250 to 15253	0	Position data No.27	BCD 8 digits (4 bytes)	
	15254 to 15257	0	Position data No.28	BCD 8 digits (4 bytes)	
	15260 to 15263	0	Position data No.29	BCD 8 digits (4 bytes)	
	15264 to 15267	0	Position data No.30	BCD 8 digits (4 bytes)	
	15270 to 15273	0	Position data No.31	BCD 8 digits (4 bytes)	
	15274 to 15277	0	Position data No.32	BCD 8 digits (4 bytes)	
11	15300 to 15303	0	Position data No.33	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	15304 to 15307	0	Position data No.34	BCD 8 digits (4 bytes)	
	15310 to 15313	0	Position data No.35	BCD 8 digits (4 bytes)	
	15314 to 15317	0	Position data No.36	BCD 8 digits (4 bytes)	
	15320 to 15323	0	Position data No.37	BCD 8 digits (4 bytes)	
	15324 to 15327	0	Position data No.38	BCD 8 digits (4 bytes)	
	15330 to 15333	0	Position data No.39	BCD 8 digits (4 bytes)	
	15334 to 15337	0	Position data No.40	BCD 8 digits (4 bytes)	
	15340 to 15343	0	Position data No.41	BCD 8 digits (4 bytes)	
	15344 to 15347	0	Position data No.42	BCD 8 digits (4 bytes)	
	15350 to 15353	0	Position data No.43	BCD 8 digits (4 bytes)	
	15354 to 15357	0	Position data No.44	BCD 8 digits (4 bytes)	
	15360 to 15363	0	Position data No.45	BCD 8 digits (4 bytes)	
	15364 to 15367	0	Position data No.46	BCD 8 digits (4 bytes)	
	15370 to 15373	0	Position data No.47	BCD 8 digits (4 bytes)	
	15374 to 15377	0	Position data No.48	BCD 8 digits (4 bytes)	
12	15400 to 15403	0	Position data No.49	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	15404 to 15407	0	Position data No.50	BCD 8 digits (4 bytes)	
	15410 to 15413	0	Position data No.51	BCD 8 digits (4 bytes)	
	15414 to 15417	0	Position data No.52	BCD 8 digits (4 bytes)	
	15420 to 15423	0	Position data No.53	BCD 8 digits (4 bytes)	
	15424 to 15427	0	Position data No.54	BCD 8 digits (4 bytes)	
	15430 to 15433	0	Position data No.55	BCD 8 digits (4 bytes)	
	15434 to 15437	0	Position data No.56	BCD 8 digits (4 bytes)	
	15440 to 15443	0	Position data No.57	BCD 8 digits (4 bytes)	
	15444 to 15447	0	Position data No.58	BCD 8 digits (4 bytes)	
	15450 to 15453	0	Position data No.59	BCD 8 digits (4 bytes)	
	15454 to 15457	0	Position data No.60	BCD 8 digits (4 bytes)	
	15460 to 15463	0	Position data No.61	BCD 8 digits (4 bytes)	

A

Block No.	Byte address	Default	Signal name	Data format	Remarks
12	15464 to 15467	0	Position data No.62	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	15470 to 15473	0	Position data No.63	BCD 8 digits (4 bytes)	
	15474 to 15477	0	Position data No.64	BCD 8 digits (4 bytes)	
13	15500 to 15503	0	Position data No.65	BCD 8 digits (4 bytes)	
	15504 to 15507	0	Position data No.66	BCD 8 digits (4 bytes)	
	15510 to 15513	0	Position data No.67	BCD 8 digits (4 bytes)	
	15514 to 15517	0	Position data No.68	BCD 8 digits (4 bytes)	
	15520 to 15523	0	Position data No.69	BCD 8 digits (4 bytes)	
	15524 to 15527	0	Position data No.70	BCD 8 digits (4 bytes)	
	15530 to 15533	0	Position data No.71	BCD 8 digits (4 bytes)	
	15534 to 15537	0	Position data No.72	BCD 8 digits (4 bytes)	
	15540 to 15543	0	Position data No.73	BCD 8 digits (4 bytes)	
	15544 to 15547	0	Position data No.74	BCD 8 digits (4 bytes)	
	15550 to 15553	0	Position data No.75	BCD 8 digits (4 bytes)	
	15554 to 15557	0	Position data No.76	BCD 8 digits (4 bytes)	
	15560 to 15563	0	Position data No.77	BCD 8 digits (4 bytes)	
	15564 to 15567	0	Position data No.78	BCD 8 digits (4 bytes)	
	15570 to 15573	0	Position data No.79	BCD 8 digits (4 bytes)	
	15574 to 15577	0	Position data No.80	BCD 8 digits (4 bytes)	
14	15600 to 15603	0	Position data No.81	BCD 8 digits (4 bytes)	At each position data No. • - when bit 1 of the 8th digit is ON + when bit 1 of the 8th digit is OFF • Incremental value when bit 2 of the 8th digit is ON Absolute value when bit 2 of the 8th digit is OFF
	15604 to 15607	0	Position data No.82	BCD 8 digits (4 bytes)	
	15610 to 15613	0	Position data No.83	BCD 8 digits (4 bytes)	
	15614 to 15617	0	Position data No.84	BCD 8 digits (4 bytes)	
	15620 to 15623	0	Position data No.85	BCD 8 digits (4 bytes)	
	15624 to 15627	0	Position data No.86	BCD 8 digits (4 bytes)	
	15630 to 15633	0	Position data No.87	BCD 8 digits (4 bytes)	
	15634 to 15637	0	Position data No.88	BCD 8 digits (4 bytes)	
	15640 to 15643	0	Position data No.89	BCD 8 digits (4 bytes)	
	15644 to 15647	0	Position data No.90	BCD 8 digits (4 bytes)	
	15650 to 15653	0	Position data No.91	BCD 8 digits (4 bytes)	
	15654 to 15657	0	Position data No.92	BCD 8 digits (4 bytes)	
	15660 to 15663	0	Position data No.93	BCD 8 digits (4 bytes)	
	15664 to 15667	0	Position data No.94	BCD 8 digits (4 bytes)	
	15670 to 15673	0	Position data No.95	BCD 8 digits (4 bytes)	
	15674 to 15677	0	Position data No.96	BCD 8 digits (4 bytes)	
15	15700 to 15703	0	Position data No.97	BCD 8 digits (4 bytes)	
	15704 to 15707	0	Position data No.98	BCD 8 digits (4 bytes)	
	15710 to 15713	0	Position data No.99	BCD 8 digits (4 bytes)	
16	16000 to 16007	0	Step data No.1	BCD 16 digits (8 bytes)	———
	16010 to 16017	0	Step data No.2	BCD 16 digits (8 bytes)	
	16020 to 16027	0	Step data No.3	BCD 16 digits (8 bytes)	
	16030 to 16037	0	Step data No.4	BCD 16 digits (8 bytes)	
	16040 to 16047	0	Step data No.5	BCD 16 digits (8 bytes)	
	16050 to 16057	0	Step data No.6	BCD 16 digits (8 bytes)	
	16060 to 16067	0	Step data No.7	BCD 16 digits (8 bytes)	
	16070 to 16077	0	Step data No.8	BCD 16 digits (8 bytes)	
17	16100 to 16107	0	Step data No.9	BCD 16 digits (8 bytes)	
	16110 to 16117	0	Step data No.10	BCD 16 digits (8 bytes)	
	16120 to 16127	0	Step data No.11	BCD 16 digits (8 bytes)	
	16130 to 16137	0	Step data No.12	BCD 16 digits (8 bytes)	
	16140 to 16147	0	Step data No.13	BCD 16 digits (8 bytes)	
	16150 to 16157	0	Step data No.14	BCD 16 digits (8 bytes)	
	16160 to 16167	0	Step data No.15	BCD 16 digits (8 bytes)	
	16170 to 16177	0	Step data No.16	BCD 16 digits (8 bytes)	
18	16200 to 16207	0	Step data No.17	BCD 16 digits (8 bytes)	
	16210 to 16217	0	Step data No.18	BCD 16 digits (8 bytes)	
	16220 to 16227	0	Step data No.19	BCD 16 digits (8 bytes)	
	16230 to 16237	0	Step data No.20	BCD 16 digits (8 bytes)	
	16240 to 16247	0	Step data No.21	BCD 16 digits (8 bytes)	
	16250 to 16257	0	Step data No.22	BCD 16 digits (8 bytes)	
	16260 to 16267	0	Step data No.23	BCD 16 digits (8 bytes)	
	16270 to 16277	0	Step data No.24	BCD 16 digits (8 bytes)	
19	16300 to 16307	0	Step data No.25	BCD 16 digits (8 bytes)	
	16310 to 16317	0	Step data No.26	BCD 16 digits (8 bytes)	
	16320 to 16327	0	Step data No.27	BCD 16 digits (8 bytes)	
	16330 to 16337	0	Step data No.28	BCD 16 digits (8 bytes)	
	16340 to 16347	0	Step data No.29	BCD 16 digits (8 bytes)	
	16350 to 16357	0	Step data No.30	BCD 16 digits (8 bytes)	
	16360 to 16367	0	Step data No.31	BCD 16 digits (8 bytes)	
	16370 to 16377	0	Step data No.32	BCD 16 digits (8 bytes)	

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Block No.	Byte address	Default	Signal name	Data format	Remarks
20	16400 to 16407	0	Step data No.33	BCD 16 digits (8 bytes)	
	16410 to 16417	0	Step data No.34	BCD 16 digits (8 bytes)	
	16420 to 16427	0	Step data No.35	BCD 16 digits (8 bytes)	
	16430 to 16437	0	Step data No.36	BCD 16 digits (8 bytes)	
	16440 to 16447	0	Step data No.37	BCD 16 digits (8 bytes)	
	16450 to 16457	0	Step data No.38	BCD 16 digits (8 bytes)	
	16460 to 16467	0	Step data No.39	BCD 16 digits (8 bytes)	
	16470 to 16477	0	Step data No.40	BCD 16 digits (8 bytes)	
21	16500 to 16507	0	Step data No.41	BCD 16 digits (8 bytes)	
	16510 to 16517	0	Step data No.42	BCD 16 digits (8 bytes)	
	16520 to 16527	0	Step data No.43	BCD 16 digits (8 bytes)	
	16530 to 16537	0	Step data No.44	BCD 16 digits (8 bytes)	
	16540 to 16547	0	Step data No.45	BCD 16 digits (8 bytes)	
	16550 to 16557	0	Step data No.46	BCD 16 digits (8 bytes)	
	16560 to 16567	0	Step data No.47	BCD 16 digits (8 bytes)	
	16570 to 16577	0	Step data No.48	BCD 16 digits (8 bytes)	
22	16600 to 16607	0	Step data No.49	BCD 16 digits (8 bytes)	
	16610 to 16617	0	Step data No.50	BCD 16 digits (8 bytes)	
	16620 to 16627	0	Step data No.51	BCD 16 digits (8 bytes)	
	16630 to 16637	0	Step data No.52	BCD 16 digits (8 bytes)	
	16640 to 16647	0	Step data No.53	BCD 16 digits (8 bytes)	
	16650 to 16657	0	Step data No.54	BCD 16 digits (8 bytes)	
	16660 to 16667	0	Step data No.55	BCD 16 digits (8 bytes)	
	16670 to 16677	0	Step data No.56	BCD 16 digits (8 bytes)	
23	16700 to 16707	0	Step data No.57	BCD 16 digits (8 bytes)	
	16710 to 16717	0	Step data No.58	BCD 16 digits (8 bytes)	
	16720 to 16727	0	Step data No.59	BCD 16 digits (8 bytes)	
	16730 to 16737	0	Step data No.60	BCD 16 digits (8 bytes)	
	16740 to 16747	0	Step data No.61	BCD 16 digits (8 bytes)	
	16750 to 16757	0	Step data No.62	BCD 16 digits (8 bytes)	
	16760 to 16767	0	Step data No.63	BCD 16 digits (8 bytes)	
	16770 to 16777	0	Step data No.64	BCD 16 digits (8 bytes)	
24	17000 to 17007	0	Step data No.65	BCD 16 digits (8 bytes)	
	17010 to 17017	0	Step data No.66	BCD 16 digits (8 bytes)	
	17020 to 17027	0	Step data No.67	BCD 16 digits (8 bytes)	
	17030 to 17037	0	Step data No.68	BCD 16 digits (8 bytes)	
	17040 to 17047	0	Step data No.69	BCD 16 digits (8 bytes)	
	17050 to 17057	0	Step data No.70	BCD 16 digits (8 bytes)	
	17060 to 17067	0	Step data No.71	BCD 16 digits (8 bytes)	
	17070 to 17077	0	Step data No.72	BCD 16 digits (8 bytes)	
25	17100 to 17107	0	Step data No.73	BCD 16 digits (8 bytes)	
	17110 to 17117	0	Step data No.74	BCD 16 digits (8 bytes)	
	17120 to 17127	0	Step data No.75	BCD 16 digits (8 bytes)	
	17130 to 17137	0	Step data No.76	BCD 16 digits (8 bytes)	
	17140 to 17147	0	Step data No.77	BCD 16 digits (8 bytes)	
	17150 to 17157	0	Step data No.78	BCD 16 digits (8 bytes)	
	17160 to 17167	0	Step data No.79	BCD 16 digits (8 bytes)	
	17170 to 17177	0	Step data No.80	BCD 16 digits (8 bytes)	
26	17200 to 17207	0	Step data No.81	BCD 16 digits (8 bytes)	
	17210 to 17217	0	Step data No.82	BCD 16 digits (8 bytes)	
	17220 to 17227	0	Step data No.83	BCD 16 digits (8 bytes)	
	17230 to 17237	0	Step data No.84	BCD 16 digits (8 bytes)	
	17240 to 17247	0	Step data No.85	BCD 16 digits (8 bytes)	
	17250 to 17257	0	Step data No.86	BCD 16 digits (8 bytes)	
	17260 to 17267	0	Step data No.87	BCD 16 digits (8 bytes)	
	17270 to 17277	0	Step data No.88	BCD 16 digits (8 bytes)	
27	17300 to 17307	0	Step data No.89	BCD 16 digits (8 bytes)	
	17310 to 17317	0	Step data No.90	BCD 16 digits (8 bytes)	
	17320 to 17327	0	Step data No.91	BCD 16 digits (8 bytes)	
	17330 to 17337	0	Step data No.92	BCD 16 digits (8 bytes)	
	17340 to 17347	0	Step data No.93	BCD 16 digits (8 bytes)	
	17350 to 17357	0	Step data No.94	BCD 16 digits (8 bytes)	
	17360 to 17367	0	Step data No.95	BCD 16 digits (8 bytes)	
	17370 to 17377	0	Step data No.96	BCD 16 digits (8 bytes)	
28	17400 to 17407	0	Step data No.97	BCD 16 digits (8 bytes)	
	17410 to 17417	0	Step data No.98	BCD 16 digits (8 bytes)	
	17420 to 17427	0	Step data No.99	BCD 16 digits (8 bytes)	
29	17500 to 17577	0	Reserved area		
30	17600 to 17677	0	Reserved area		
31	17700 to 17777	0	Reserved area		

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