CC-Link

Instruction Manual First Edition

ACON
PCON
SCON-CA

IAI America, Inc.

Please Read Before Use

Thank you for purchasing our product.

This Instruction Manual describes all necessary information to operate this product safely such as the operation procedure, structure and maintenance procedure.

Before operation, read this manual carefully and fully understand it to operate this product safely. The enclosed CD/DVD in this product package includes the Instruction Manual for this product.
For the operation of this product, print out the necessary sections in the Instruction Manual or display them using the personal computer.

After reading through this manual, keep this Instruction Manual at hand so that the operator of this product can read it whenever necessary.

[Important]

- This Instruction Manual is original.
- The product cannot be operated in any way unless expressly specified in this Instruction Manual. IAI shall assume no responsibility for the outcome of any operation not specified herein.
- Information contained in this Instruction Manual is subject to change without notice for the purpose of product improvement.
- If you have any question or comment regarding the content of this manual, please contact the IAI sales office near you.
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- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

⚠ Note : For the function stated below, refer to Instruction Manual.

	Instruction Manual/Overview	Manual No.
1	CC-Link Instruction Manual For X-SEL, TT, ASEL, PSEL, SSEL, SCON-C, RCS-C and E-Con, see this manual.	ME0123

Table of Contents

Safety Guide

“Safety Guide” has been written to use the machine safely and so prevent personal injury or property damage beforehand. Make sure to read it before the operation of this product.

Safety Precautions for Our Products

The common safety precautions for the use of any of our robots in each operation.

No.	Operation Description	Description
1	Model Selection	● This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications. 1) Medical equipment used to maintain, control or otherwise affect human life or physical health. 2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility) 3) Important safety parts of machinery (Safety device, etc.) ● Do not use it in any of the following environments. 1) Location where there is any inflammable gas, inflammable object or explosive 2) Place with potential exposure to radiation 3) Location with the ambient temperature or relative humidity exceeding the specification range 4) Location where radiant heat is added from direct sunlight or other large heat source 5) Location where condensation occurs due to abrupt temperature changes 6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid) 7) Location exposed to significant amount of dust, salt or iron powder 8) Location subject to direct vibration or impact ● Do not use the product outside the specifications. Failure to do so may considerably shorten

No.	Operation Description	Description
2	Transportation	● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● Consider well so that it is not bumped against anything or dropped during the transportation. ● Transport it using an appropriate transportation measure. ● Do not step or sit on the package. ● Do not put any heavy thing that can deform the package, on it. ● When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work. ● When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit. ● Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. ● Do not get on the load that is hung on a crane. ● Do not leave a load hung up with a crane. ● Do not stand under the load that is hung up with a crane.
3	Storage and Preservation	● The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation.
4	Installation and Start	(1) Installation of Robot Main Body and Controller, etc. ● Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. ● Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life. ● When using the product in any of the places specified below, provide a sufficient shield. 1) Location where electric noise is generated 2) Location where high electrical or magnetic field is present 3) Location with the mains or power lines passing nearby 4) Location where the product may come in contact with water, oil or chemical droplets

No.	Operation Description	Description
		(2) Cable Wiring ● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. ● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. ● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. ● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. ● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. ● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire.
4	Installation and Start	(3) Grounding ● Make sure to perform the grounding of type D (Former Type 3) for the controller. The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation.
		(4) Safety Measures ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury. ● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. ● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product. ● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input. ● When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury. ● Take the measure so that the work part is not dropped in power failure or emergency stop. ● Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. ● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.

No.	Operation Description	Description
5	Teaching	● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign “Under Operation” at the position easy to see. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.
6	Trial Operation	● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation. ● When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation. ● Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc. ● Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.
7	Automatic Operation	● Before the automatic operation is started up, make sure that there is nobody inside the safety protection fence. ● Before the automatic operation is started up, make sure that all the related peripheral machines are ready for the automatic operation and there is no error indication. ● Make sure to perform the startup operation for the automatic operation, out of the safety protection fence. ● In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product. ● When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.

No.	Operation Description	Description
8	Maintenance and Inspection	● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well. ● When the work is to be performed inside the safety protection fence, basically turn OFF the power switch. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign “Under Operation” at the position easy to see. ● For the grease for the guide or ball screw, use appropriate grease according to the Instruction Manual for each model. ● Do not perform the dielectric strength test. Failure to do so may result in a damage to the product. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.
9	Modification and Dismantle	● Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.
10	Disposal	● When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste. ● Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.

Alert Indication

The safety precautions are divided into “Danger”, “Warning”, “Caution” and “Notice” according to the warning level, as follows, and described in the Operation Manual for each model.

Level	Degree of Danger and Damage	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	 Danger
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could result in death or serious injury.	 Warning
Caution	This indicates a potentially hazardous situation which, if the product is not handled correctly, may result in minor injury or property damage.	 Caution
Notice	This indicates lower possibility for the injury, but should be kept to use this product properly.	 Notice

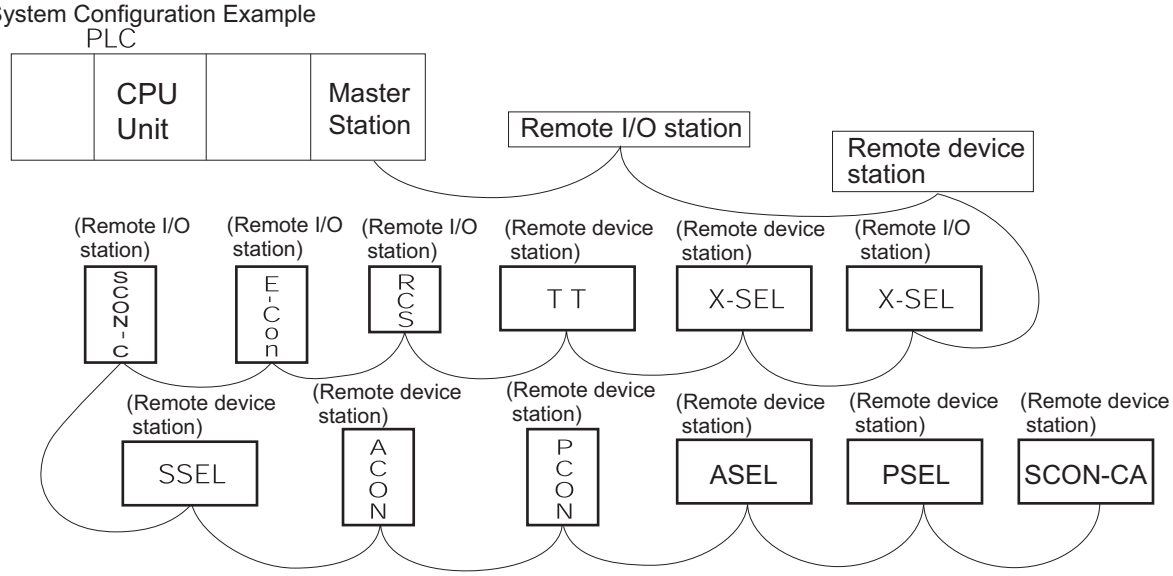
1. Overview

CC-Link stands for Control & Communication Link, which is a field network system.
For the controller for X-SEL, TT, RCS-C, E-CON, ASEL, PSEL, SSEL, SCON-C, ACON, PCON or SCON-CA, the system configuration with reduced wiring is enabled by means of connecting it to this CC-Link.
For CC-Link, there are two station types; Remote Device Station where bit data and word data communications are available and Remote I/O Station where only bit data communication is available. The controllers and remote station types are as follows.

This Instruction Manual states regarding ACON, PCON and SCON-CA.

Model	Type	Characteristic
X-SEL-J/K/P/Q, ASEL, PSEL, SSEL	Remote device station	● I/O data can be processed as bit data or word data. For each of input and output points, max. 256 points are available. ● It can be operated as the same as the control with PIO.
X-SEL-K	Remote I/O station	● This is the remote I/O module with 16 I/O points.
TT	Remote device station	● The TT's I/O data can be processed as bit data or word data. For each of input and output points, max. 256 points are available. ● It can be operated as the same as the control with PIO.
RCS-C	Remote I/O station	● It can be operated as the same as the control with PIO.
E-CON	Remote I/O station	● It can be operated as the same as the control with PIO.
SCON-C	Remote I/O station	● It can be operated as the same as the control with PIO.
ASEL, PSEL, SSEL	Remote device station	● It can be operated as the same as the control with PIO.
ACON, PCON, SCON-CA	Remote device station	● In addition to the processing as the same as the operation with PIO, it can be operated with the target position, speed and acceleration/deceleration speed directly setup using the values.

System Configuration Example



* For further information on CC-Link, refer to the Instruction Manuals for the master unit and the programmable controller (PLC) to be mounted.
Use this Instruction Manual together with the Instruction Manual of each controller.
CC-Link cannot be used for any method other than those described as possible in this Instruction Manual.

2. Interface Specifications

Item	Specification					
Communications standard	CC-Link Ver1.10					
Communications speed	10M/5M/2.5M/625k/156kbps					
Communications system	Broadcast polling system					
Synchronization system	Frame synchronization system					
Encoding system	NRZI					
Transmission path format	Bus format (EIA RS485 conformance)					
Transmission format	HDLC conformance					
Error control system	CRC ($X^{16} + X^{12} + X^5 + 1$)					
Number of occupied stations	ACON, PCON, SCON-CA : Remote device station MAX 4 stations					
Communications cable length (*1)	Communications speed (bps)	10M	5M	2.5M	625k	156K
	Overall cable length (m)	100	160	400	900	1200
Connector (*2)	Manufactured by Phoenix Contact: MSTBA2.5/5-G-5.08AU (ACON, PCON, SCON-CA)					

(*1) For T branch communication, refer to the Instruction Manuals for the master unit and PLC to be mounted.

(*2) The cable-side connector is a standard accessory.
Manufactured by Phoenix Contact:
SMSTB2.5/5-ST-5.08AU (ACON, PCON, SCON-CA)

3. ACON, PCON

3.1 Operation Modes and Functions

ACON or PCON applicable to CC-Link can be operated by means of selecting one mode out of the following five operation modes.

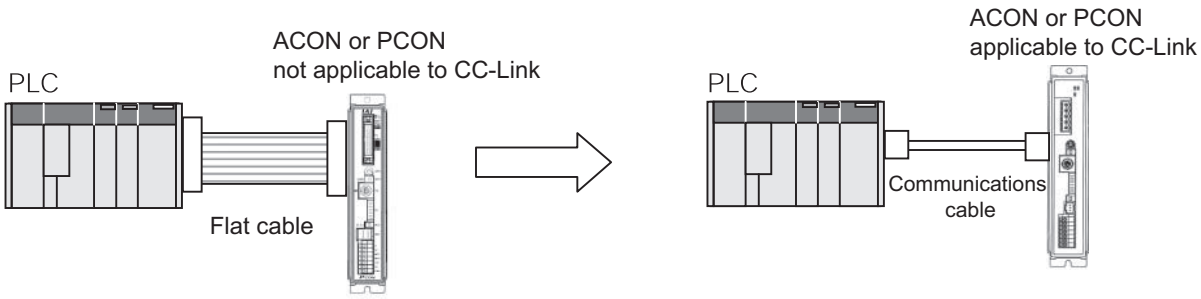
* Set the Station Data for the Master Station to “ver 1, Remote Device Station”.

Operation Modes and Main Functions

Main Function	Remote I/O Mode	Position / Simplified Direct Value Mode	Half Direct Value Mode	Full Direct Value Mode	Remote I/O Mode 2
No. of Occupied Stations	1 Station	1 Station	2 Stations	4 Stations	1 Station
Position Data Setup Operation	×	○(*1)	○	○	×
Speed/Acceleration Direct Command	×	×	○	○	×
Pressing Operation	○	○	○	○	○
Current Position Read	×	○	○	○	○
Current Speed Read	×	×	○	○	×
Position No. Setup Operation	○	○	×	×	○
Completed Position No. Read	○	○	×	×	○
No. of Connectable Axes	64	64	—	—	64
No. of Max. Position Tables	512	768	Unused	Unused	512

(*1) For the position data items except for position data, operate the system with the position No. set up.

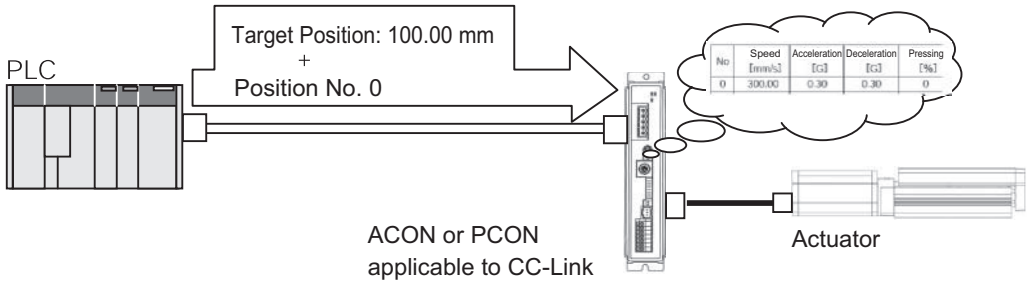
1) Remote I/O Mode : This is the operation method using CC-Link, instead of PIO (24V I/O).
No. of Occupied Stations: One Station



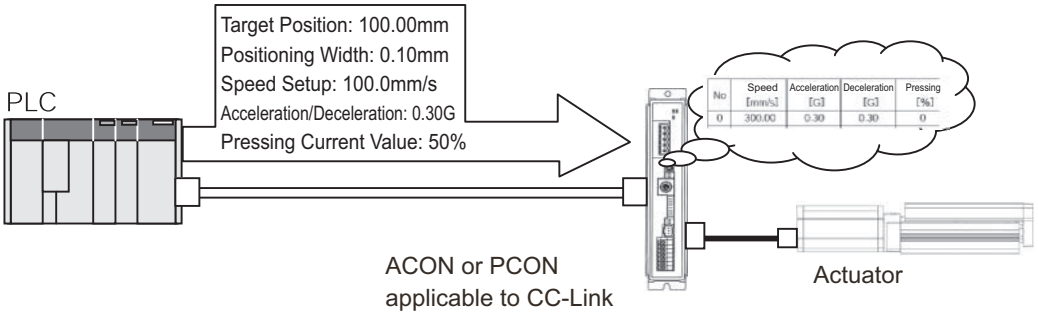
In the case of the connection using PIO

In the case of the connection using CC-Link

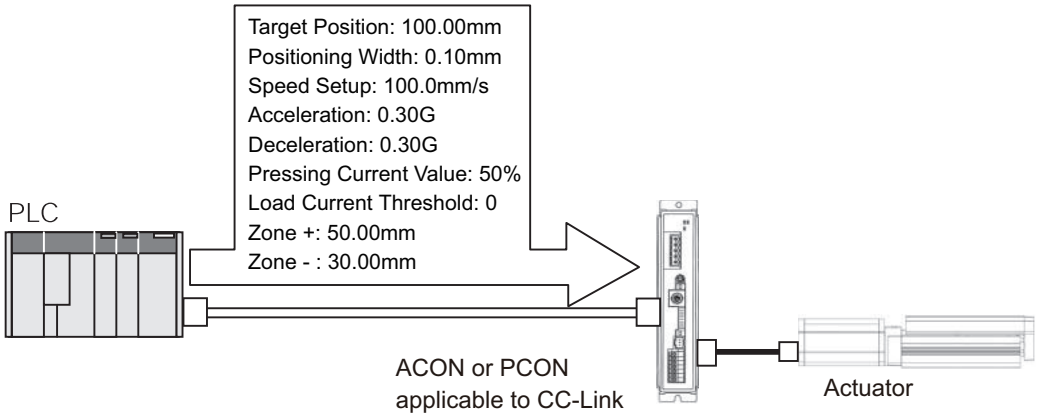
2) Position/Simplified Direct Value Mode : This is the operation method with the position No. set up.
Whether if setup the target position using a value directly by means of the change over of the control signal, or using the value registered on the position data, can be selected.
For “Speed”, “Acceleration/Deceleration” and “Positioning Width”, use the values already registered on the position data. The settable No. of position data items is max 768 points.
No. of Occupied Stations: One Station



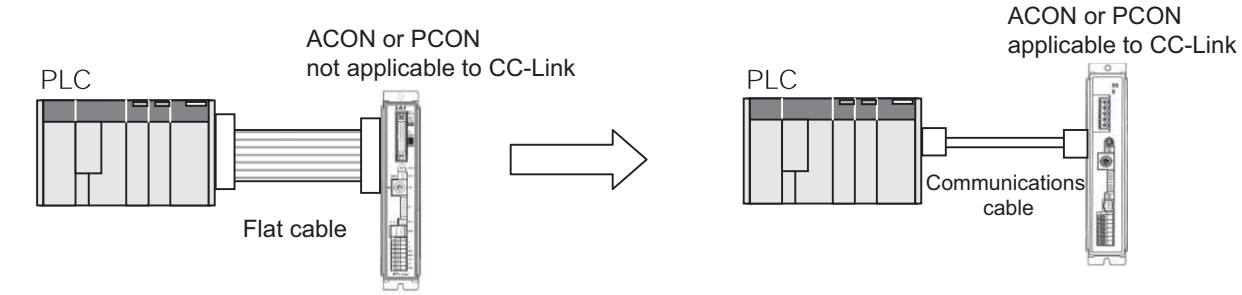
3) Half Direct Value Mode : This is the operation method with the “Speed”, “Acceleration/Deceleration”, “Pressing Current Value” set up directly using the numerical values, in addition to the “Target Position”.
No. of Occupied Stations: Two Stations



4) Full Direct Value Mode : This is the operation method with all the values ("Target Position", "Speed", "Acceleration/Deceleration", etc.) related to the position control set up directly using the numerical values.
No. of Occupied Stations: Four Stations



5) Remote I/O Mode 2 : This is the operation method using CC-Link, instead of PIO (24CV I/O).
The current position and command current value reading functions are added to the functions of (1).
No. of Occupied Stations: One Station



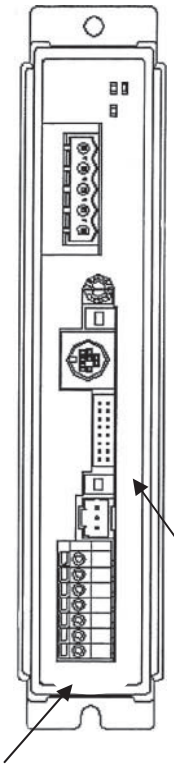
In the case of the connection using PIO

In the case of the connection using CC-Link

3.2 Model No.

The Model Nos. of ACON and PCON applicable to CC-Link are described as follows.

- ACON-C / CG-□-CC-□
- PCON-C / CG-□-CC-□



Printed Series Name

- ACON
- PCON

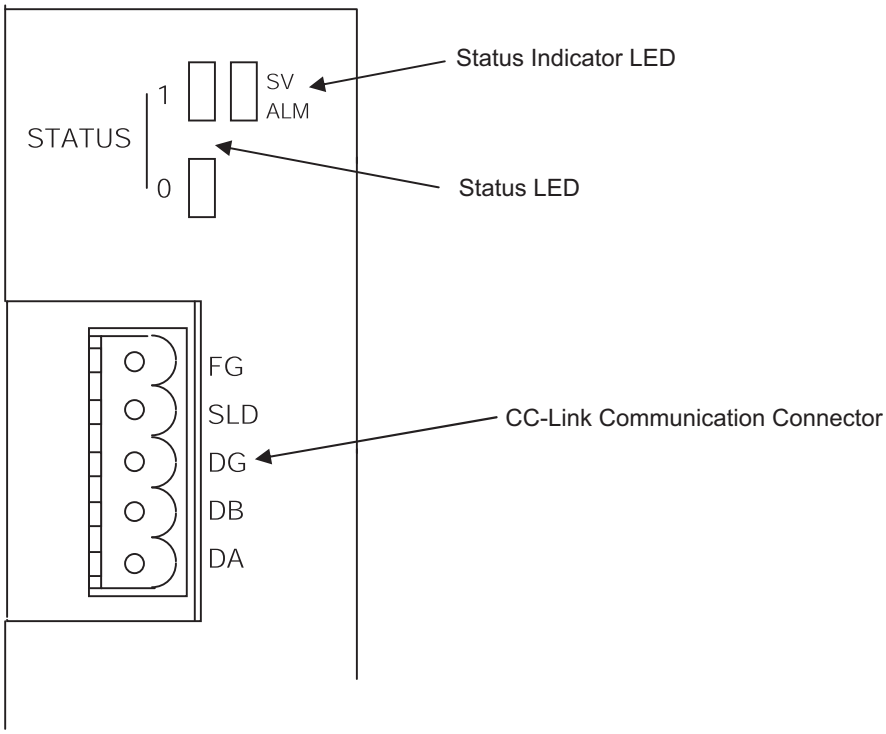
Front Panel Color

- ACON: Dark Blue
- PCON: Dark Green

3.3 CC-Link Interface

(1) Names of Each Section

The names of each section related to CC-Link are described as follows.



(2) Status LED Indication

The board operation status and network condition are obtained with the two LEDs located in the front of the controller.

LED	Color	Indication Status	Indication Description (Meaning)
STATUS1	OR	Illuminating	• An error occurs. (CRC Error/Station No. (parameters) Setting Error/Baud Rate Setting (parameters) Error) • Period between power up or software reset and the CC-Link initialization completion
		OFF	• Under Normal Communication
		Flashing	• Station No. setting or communication speed setting is changed during the communication.
STATUS0	GN	Illuminating	• Communicating normally
		OFF	• Not communicating

3.4 Operation Mode Selection (Setting)

The operation mode is set using the parameters.

Set the mode toggle switch on the front surface of the controller to “MANU” side and set the parameter No. 84 “FMOD: Field Bus Operation Mode” using the personal computer application software (V6,00 05 00 or later) (Refer to “3.10 CC-Link Related Parameters”).

Set Value	Operation Mode	Number of occupied stations
0: (Already set in system delivery)	Remote I/O Mode	1 Station
1	Position/Simplified Direct Value Mode	1 Station
2	Half Direct Value Mode	2 Stations
3	Full Direct Value Mode	4 Stations
4	Remote I/O Mode 2	1 Station

* Entering any value except for the ones described above will cause an “Excessive Input Value Error”.

Note: Set the Station Data for the Master Station to “ver 1 Remote Device Station”.

3.5 Station No. Setting

The Station No. is set using the parameters.

Set the parameter No. 85 “NADR: Field Bus Node Address” using the RC personal computer application software.

(Refer to “3.10 CC-Link Related Parameters”).

Settable Range: 1 to 64 (Already set in system delivery)

Note: The PLC's CC-Link head I/O address is decided depending on the master unit installation position and the number of I/O points occupied by the unit installed before it.
Following this head I/O address, the I/O addresses in PLC are allocated in order of the station No.
Also, for the details of the Station No. setting and I/O address setting in PLC, refer to the instruction manuals for the master unit and loaded PLC.

3.6 Communication Speed Setting

The communication speed is set using the parameters.

Set the parameter No. 86 “FBRS: Filed Bus Communication Speed” using the RC personal computer application software.

(Refer to “3.10 CC-Link Related Parameters”).

Set Value	Communication Speed
0: (Already set in system delivery)	156kbps
1	625kbps
2	2.5Mbps
3	5Mbps
4	10Mbps

* Entering any value except for the ones described above will cause an “Excessive Input Value Error”.

Note: After the parameter setting, turn on the power to the controller again and return the mode toggle switch on the front of the controller to “AUTO” side.
When the switch is set to “MANU”, the operation using PLC is not available.

3.7 Communication with the Master Station

The remote device station consists of 2 words for each I/O point and 4 words for the remote I/O data register per station.

Set the station data for the master station to the number of stations setup in the operation mode for each station No.

3.7.1 Each Operation Mode and Corresponding Allocated PLC Addresses

The addresses allocated for each operation mode are described as follows.

• PLC Output → ACON or PCON Input (* “n” shows the head register address per each axis).

PLC address	ACON or PCON DI and Input data register				
	Remote I/O mode Number of occupied stations: 1 Station	Position/Simplified Direct Value Mode Number of occupied stations: 1 Station	Half Direct Value Mode Number of occupied stations: 2 Stations	Full Direct Value Mode Number of occupied stations: 4 Stations	Remote I/O mode 2 Number of occupied stations: 1 Station
RY n0 – nF	Port No.0 – 15	Occupied Domain	Occupied Domain	Occupied Domain	Port No.0 – 15
RY (n+1)0 – (n+1)F	System Domain	System Domain			System Domain
RY (n+2)0 – (n+2)F					
RY (n+3)0 – (n+3)F					
RY (n+4)0 – (n+4)F					
RY (n+5)0 – (n+5)F					
RY (n+6)0 – (n+6)F					
RY (n+7)0 – (n+7)F				System Domain	
RWw (n+0)	Occupied Domain	Target Position	Target Position	Target Position	Occupied Domain
RWw (n+1)					
RWw (n+2)		Command position number	Positioning Width	Positioning Width	
RWw (n+3)		Control Signal			
RWw (n+4)			Speed	Speed	
RWw (n+5)			Acceleration/ Deceleration		
RWw (n+6)			Pressing Current Limit Value	Zone Value “+”	
RWw (n+7)			Control signal		
RWw (n+8)				Zone Value “-”	
RWw (n+9)					
RWw (n+A)				Acceleration	
RWw (n+B)				Deceleration	
RWw (n+C)				Pressing Current Limit Value	
RWw (n+D)				ACON: Occupied Domain PCON: Load Current Threshold	
RWw (n+E)				Control signal 1	
RWw (n+F)				Control signal 2	

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.

The System Domain stands for the system domain of the remote device station.

These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

• ACON or PCON Output → PLC Input side (* “n” shows the head register address per each axis).

PLC side address	ACON or PCON side DO and Output data register				
	Remote I/O mode	Position/Simplified Direct Value Mode	Half Direct Value Mode	Full Direct Value Mode	Remote I/O mode 2
	Number of occupied stations: 1 Station	Number of occupied stations: 1 Station	Number of occupied stations: 2 Stations	Number of occupied stations: 4 Stations	Number of occupied stations: 1 Station
RX n0 – nF	Port No.0 – 15	Occupied Domain	Occupied Domain	Occupied Domain	Port No.0 – 15
RX (n+1)0 – (n+1)F	System Domain	System Domain			System Domain
RX (n+2)0 – (n+2)F					
RX (n+3)0 – (n+3)F			System Domain		
RX (n+4)0 – (n+4)F					
RX (n+5)0 – (n+5)F					
RX (n+6)0 – (n+6)F					
RX (n+7)0 – (n+7)F				System Domain	
RWr (n+0)	Occupied Domain	Current Position	Current Position	Current Position	Current Position
RWr (n+1)					
RWr (n+2)		Completed Position No. (Simplified Alarm ID)	Command Current	Command Current	Command Current
RWr (n+3)		Status Signal			
RWr (n+4)			Current Speed	Current Speed	
RWr (n+5)					
RWr (n+6)			Alarm code	Alarm code	
RWr (n+7)			Status Signal	Occupied Domain	
RWr (n+8)					
RWr (n+9)					
RWr (n+A)					
RWr (n+B)					
RWr (n+C)					
RWr (n+D)					
RWr (n+E)					
RWr (n+F)				Status Signal	

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

3.7.2 Remote I/O Mode (Remote Device Station: No. of Occupied Stations: One Station)

This is the operation mode with the position No. set up as the same as using PIO (24V I/O). Set the position data using the RC personal computer application software or teaching pendant. The number of operable positions varies depending on the parameter No. 25 “PIO Pattern” setting.

The I/O specifications for the PIO pattern are described as follows (Refer to instruction manual for the controller main body for more information).

Parameter No. 25 Set Value	Operation Mode	I/O Specifications
0	Positioning mode	64 positioning points and 2 zone output points
1	Teaching mode	64 positioning points and 1 zone output point The positioning and jog operations are available. The current position can be written on the setup position data.
2	256 point mode	256 positioning points and 1 zone output point
3	512 point mode	512 positioning points and no zone output point
4	Electromagnetic valve mode 1	7 positioning points and 2 zone output points The direct operation command is available for each position No. The positioning completion signal is output for each position No.
5	Electromagnetic valve mode 2	3 positioning points and 2 zone output points It is operated with the Forward/Backward/Intermediate Position Commands. The positioning completion signal is output individually for each Forward End/Backward End/Intermediate Positions.

The robot cylinder's effective main functions that can be controlled using this mode, are as shown in the following table.

Robot Cylinder Function	PIO Pattern					
	0: Positioning mode	1: Teaching mode	2: 256 point mode	3: 512 point mode	4: Electromagnetic valve mode 1	5: Electromagnetic valve mode 2
Homing	○	○	○	○	○	×
Positioning	○	○	○	○	○	○
Speed, Acceleration and Deceleration Settings	○	○	○	○	○	○
Pitch Feeding (Inching)	○	○	○	○	○	○
Pressing Operation	○	○	○	○	○	×
Speed change during the movement	○	○	○	○	○	○
Different Acceleration Speed Operation in Deceleration	○	○	○	○	○	○
Pause	○	○	○	○	○	○(*1)
Zone Signal Output	○	○	○	×	○	○
PIO Pattern Selection (Set using the parameters)	○	○	○	○	○	○

O: Operation Available X: Operation Unavailable

(*1) It is available when the parameter No. 27 “Movement Command Type” is set to “0”. Turning “OFF” the “Movement Command” can stop the system temporarily.

(1) PLC Address Composition (* “n” shows the head register address for each axis).

Parameter No.84	Acon or Pcon side DI (Port No.)	PLC side	Acon or Pcon side DI (Port No.)	PLC side
0	0 to 15	RY n0 to nF	0 to 15	RX n0 to nF
	System Domain	RY (n+1)0 to (n+1)F	System Domain	RX (n+1)0 to (n+1)F
	Occupied Domain	RWw (n+0)	Occupied Domain	RWr (n+0)
		RWw (n+1)		RWr (n+1)
		RWw (n+2)		RWr (n+2)
		RWw (n+3)		RWr (n+3)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signals for each axis consists of 1 word for each I/O bit register.

- The I/O bit register is controlled using the ON/OFF signal in units of bit.

PLC Output (* “n” shows the head register address per each axis).

Address	one word = 16 bits															
RY (n+0)	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Controller Input Port No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

PLC Input (* “n” shows the head register address per each axis).

Address	one word = 16 bits															
RX (n+0)	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Controller Output Port No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

(3) I/O Signal Allocation

The controller's I/O port signal varies depending on the parameter No. 25 setting. (Refer to instruction manual for the controller main body for more information).

ACON

		Parameter No. 25 setting					
		Positioning mode		Teaching mode		256 point mode	
		0		1		2	
Classification	Port No.	Signal Names	Symbol	Signal Names	Symbol	Signal Names	Symbol
PLC Output→ ACON Input	0	Command position No.	PC1	Command position No.	PC1	Command position No.	PC1
	1		PC2		PC2		PC2
	2		PC4		PC4		PC4
	3		PC8		PC8		PC8
	4		PC16		PC16		PC16
	5		PC32		PC32		PC32
	6	Unavailable	—	Teaching Mode Command	MODE		PC64
	7		—	Jog/Inching selection	JISL		PC128
	8		—	+ Jog	JOG+	Unavailable	—
	9	Forced brake release	BKRL	- Jog	JOG-	Forced brake release	RKRL
	10	Operation mode	RMOD	Operation mode	RMOD	Operation mode	RMOD
	11	Return to origin	HOME	Return to origin	HOME	Return to origin	HOME
	12	Pause	*STP	Pause	*STP	Pause	*STP
	13	Positioning Start	CSTR	Positioning Start/ Position Data Import Command	CSTR/ PWRT	Positioning Start	CSTR
	14	Reset	RES	Reset	RES	Reset	RES
	15	Servo ON Command	SON	Servo ON Command	SON	Servo ON Command	SON
ACON Output →PLC Input	0	Completion position No.	PM1	Completion position No.	PM1	Completion position No.	PM1
	1		PM2		PM2		PM2
	2		PM4		PM4		PM4
	3		PM8		PM8		PM8
	4		PM16		PM16		PM16
	5		PM32		PM32		PM32
	6	Moving Signal	MOVE	Moving Signal	MOVE		PM64
	7	Zone 1	ZONE1	Teaching Mode Signal	MODES		PM128
	8	Position zone status	PZONE	Position zone status	PZONE	Position zone status	PZONE
	9	Operation Mode Status	RMDS	Operation Mode Status	RMDS	Operation Mode Status	RMDS
	10	Return to origin end	HEND	Return to origin end	HEND	Return to origin end	HEND
	11	Positioning end Signal	PEND	Positioning end Signal/ Position Data Import Completion	PEND/ WEND	Positioning end Signal	PEND
	12	Operation preparation end	SV	Operation preparation end	SV	Operation preparation end	SV
	13	Emergency stop	*EMGS	Emergency stop	*EMGS	Emergency stop	*EMGS
	14	Alarm	*ALM	Alarm	*ALM	Alarm	*ALM
	15	Unavailable	—	Unavailable	—	Unavailable	—

The symbol with a * mark shows the ON signal in normal condition.

The signals describing as “Unavailable” are not controlled. (ON/OFF is undefined).

ACON

		Parameter No. 25 setting					
		512 point mode		Electromagnetic valve mode 1		Electromagnetic valve mode 2	
		3		4		5	
Classification	Port No.	Signal Names	Symbol	Signal Names	Symbol	Signal Names	Symbol
PLC Output→ ACON Input	0	Command position No.	PC1	Start position 0	ST0	Start position 0	ST0
	1		PC2	Start position 1	ST1	Start position 1	ST1
	2		PC4	Start position 2	ST2	Start position 2	ST2
	3		PC8	Start position 3	ST3	Unavailable	—
	4		PC16	Start position 4	ST4		—
	5		PC32	Start position 5	ST5		—
	6		PC64	Start position 6	ST6		—
	7		PC128	Unavailable	—		—
	8		PC256		—		—
	9	Forced brake release	BKRL	Forced brake release	BKRL	Forced brake release	BKRL
	10	Operation mode	RMOD	Operation mode	RMOD	Operation mode	RMOD
	11	Return to origin	HOME	Return to origin	HOME	Unavailable	—
	12	Pause	*STP	Pause	*STP		—
	13	Positioning Start	CSTR	Positioning Start	—		—
	14	Reset	RES	Reset	RES	Reset	RES
	15	Servo ON Command	SON	Servo ON Command	SON	Servo ON Command	SON
ACON Output →PLC Input	0	Completion position No.	PM1	Completed position 0	PE0	Retracting end movement command 0	LS0
	1		PM2	Completed position 1	PE1	Retracting end movement command 1	LS1
	2		PM4	Completed position 2	PE2	Retracting end movement command 2	LS2
	3		PM8	Completed position 3	PE3	Unavailable	—
	4		PM16	Completed position 4	PE4		—
	5		PM32	Completed position 5	PE5		—
	6		PM64	Completed position 6	PE6		—
	7		PM128	Zone 1	ZONE1	Zone 1	ZONE1
	8		PM256	Position zone status	PZONE	Position zone status	PZONE
	9	Operation Mode Status	RMDS	Operation Mode Status	RMDS	Operation Mode Status	RMDS
	10	Return to origin end	HEND	Return to origin end	HEND	Return to origin end	HEND
	11	Positioning end Signal	PEND	Positioning end Signal	PEND	Unavailable	—
	12	Operation preparation end	SV	Operation preparation end	SV	Operation preparation end	SV
	13	Emergency stop	*EMGS	Emergency stop	*EMGS	Emergency stop	*EMGS
	14	Alarm	*ALM	Alarm	*ALM	Alarm	*ALM
	15	Unavailable	—	Unavailable	—	Unavailable	—

The symbol with a * mark shows the ON signal in normal condition.

The signals describing as “Unavailable” are not controlled. (ON/OFF is undefined).

PCON

		Parameter No. 25 setting					
		Positioning mode		Teaching mode		256 point mode	
		0		1		2	
Classification	Port No.	Signal Names	Symbol	Signal Names	Symbol	Signal Names	Symbol
PLC Output→ PCON Input	0	Command position No.	PC1	Command position No.	PC1	Command position No.	PC1
	1		PC2		PC2		PC2
	2		PC4		PC4		PC4
	3		PC8		PC8		PC8
	4		PC16		PC16		PC16
	5		PC32		PC32		PC32
	6	Unavailable	—	Teaching Mode Command	MODE		PC64
	7		—	Jog/Inching selection	JISL		PC128
	8		—	+ Jog	JOG+	Unavailable	—
	9	Forced brake release	BKRL	- Jog	JOG-	Forced brake release	RKRL
	10	Operation mode	RMOD	Operation mode	RMOD	Operation mode	RMOD
	11	Return to origin	HOME	Return to origin	HOME	Return to origin	HOME
	12	Pause	*STP	Pause	*STP	Pause	*STP
	13	Positioning Start	CSTR	Positioning Start/ Position Data Import Command	CSTR/ PWRT	Positioning Start	CSTR
	14	Reset	RES	Reset	RES	Reset	RES
	15	Servo ON Command	SON	Servo ON Command	SON	Servo ON Command	SON
PCON Output →PLC Input	0	Completion position No.	PM1	Completion position No.	PM1	Completion position No.	PM1
	1		PM2		PM2		PM2
	2		PM4		PM4		PM4
	3		PM8		PM8		PM8
	4		PM16		PM16		PM16
	5		PM32		PM32		PM32
	6	Moving Signal	MOVE	Moving Signal	MOVE		PM64
	7	Zone 1	ZONE1	Teaching Mode Signal	MODES		PM128
	8	Position zone status	PZONE	Position zone status	PZONE	Position zone status	PZONE
	9	Operation Mode Status	RMDS	Operation Mode Status	RMDS	Operation Mode Status	RMDS
	10	Return to origin end	HEND	Return to origin end	HEND	Return to origin end	HEND
	11	Positioning end Signal	PEND	Positioning end Signal/ Position Data Import Completion	PEND/ WEND	Positioning end Signal	PEND
	12	Operation preparation end	SV	Operation preparation end	SV	Operation preparation end	SV
	13	Emergency stop	*EMGS	Emergency stop	*EMGS	Emergency stop	*EMGS
	14	Alarm	*ALM	Alarm	*ALM	Alarm	*ALM
	15	Load output judgment/ Torque level	LOAD/ TRQS	Unavailable	—	Load output judgment/ Torque level	LOAD/ TRQS

The symbol with a * mark shows the ON signal in normal condition.

The signals describing as “Unavailable” are not controlled. (ON/OFF is undefined).

PCON

		Parameter No. 25 setting					
		512 point mode		Electromagnetic valve mode 1		Electromagnetic valve mode 2	
		3		4		5	
Classification	Port No.	Signal Names	Symbol	Signal Names	Symbol	Signal Names	Symbol
PLC Output→ PCON Input	0	Command position No.	PC1	Start position 0	ST0	Start position 0	ST0
	1		PC2	Start position 1	ST1	Start position 1	ST1
	2		PC4	Start position 2	ST2	Start position 2	ST2
	3		PC8	Start position 3	ST3	Unavailable	—
	4		PC16	Start position 4	ST4		—
	5		PC32	Start position 5	ST5		—
	6		PC64	Start position 6	ST6		—
	7		PC128	Unavailable	—		—
	8		PC256		—		—
	9	Forced brake release	BKRL	Forced brake release	BKRL	Forced brake release	BKRL
	10	Operation mode	RMOD	Operation mode	RMOD	Operation mode	RMOD
	11	Return to origin	HOME	Return to origin	HOME	Return to origin	—
	12	Pause	*STP	Pause	*STP	Pause	—
	13	Positioning Start	CSTR	Positioning Start	—	Positioning Start	—
	14	Reset	RES	Reset	RES	Reset	RES
	15	Servo ON Command	SON	Servo ON Command	SON	Servo ON Command	SON
PCON Output →PLC Input	0	Completion position No.	PM1	Completed position 0	PE0	Retracting end movement command 0	LS0
	1		PM2	Completed position 1	PE1	Retracting end movement command 1	LS1
	2		PM4	Completed position 2	PE2	Retracting end movement command 2	LS2
	3		PM8	Completed position 3	PE3	Unavailable	—
	4		PM16	Completed position 4	PE4		—
	5		PM32	Completed position 5	PE5		—
	6		PM64	Completed position 6	PE6		—
	7		PM128	Zone 1	ZONE1	Zone 1	ZONE1
	8		PM256	Position zone status	PZONE	Position zone status	PZONE
	9	Operation Mode Status	RMDS	Operation Mode Status	RMDS	Operation Mode Status	RMDS
	10	Return to origin end	HEND	Return to origin end	HEND	Return to origin end	HEND
	11	Positioning end Signal	PEND	Positioning end Signal	PEND	Unavailable	—
	12	Operation preparation end	SV	Operation preparation end	SV	Operation preparation end	SV
	13	Emergency stop	*EMGS	Emergency stop	*EMGS	Emergency stop	*EMGS
	14	Alarm	*ALM	Alarm	*ALM	Alarm	*ALM
	15	Load output judgment/ Torque level	LOAD/ TRQS	Load output judgment/ Torque level	LOAD/ TRQS	Unavailable	—

The symbol with a * mark shows the ON signal in normal condition.

The signals describing as “Unavailable” are not controlled. (ON/OFF is undefined).

3.7.3 Position/Simplified Direct Value Mode (Remote Device Station: No. of Occupied Stations: One Station)

This is the operation mode with the position No. set up. The change over of the control signals (PMOD signals), can select whether the target position is set directly using the value or the value registered on the position data is used.

For the speed, acceleration/deceleration and positioning width, etc., except for the target position, the values in the position table within the controller are used. Setup the position data referring the instruction manual for the controller main body.

The number of settable position data items is max. 768.

The robot cylinder's effective main functions that can be controlled using this mode, are as shown in the following table.

Robot Cylinder Function	○:Direct Control △:Indirect Control ×:Disabled	Remarks
Homing	○	
Positioning	○	
Speed, Acceleration and Deceleration Settings	△	Position data setting is required.
Pitch Feeding (Inching)	△	
Pressing Operation	△	
Speed change during the movement	△	
Different Acceleration Speed Operation in Deceleration	△	
Pause	○	
Zone Signal Output	△	Zone is set using the parameters.
PIO Pattern Selection	×	

(1) PLC Address Composition (* “n” shows the head register address for each axis).

Parameter No.84	Acon or Pcon side Input register	PLC side	Acon or Pcon side Output register	PLC side
1	Occupied Domain	RY n0 to nF	Occupied Domain	RX n0 to nF
	System Domain	RY (n+1)0 to (n+1)F	System Domain	RX (n+1)0 to (n+1)F
	Target Position	RWw (n+0)	Current Position	RWr (n+0)
		RWw (n+1)		RWr (n+1)
	Command position number	RWw (n+2)	Completed Position No. (Simplified Alarm CORD)	RWr (n+2)
	Control signal	RWw (n+3)	Status Signal	RWr (n+3)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signals for each axis consists of 4 words for each I/O bit register.

- The control signals and status signals are ON/OFF signals in units of bit.
- The target position and current position are expressed using 2-word (32 bits) binary data. The figures from –999999 to +999999 (Unit: 0.01mm) can be set in PLC. However, set the position data within the soft stroke range (0 to effective stroke length) for the actuator in question.
- The specified position No. and completed position No. are expressed using 1-word (16 bits) binary data. The figures from 0 to 767 can be set in PLC. However, set the position No. for which the operation conditions have been set in advance using the personal computer software or teaching pendant.

PLC Output

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWw (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Slave Word)																

RWw (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

one word = 16 bits

RWw (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command position No.							PC512	PC256	PC128	PC64	PC32	PC16	PC8	PC4	PC2	PC1

RWw (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Control signal	BKRL	RMOD	—	—	PMOD	MODE	PWRT	JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	CSTR

PLC Input

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Completed Position No.	—	—	—	—	—	—	PM512	PM256	PM128	PM64	PM32	PM16	PM8	PM4	PM2	PM1

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Status Signal	EMGS	PWR	ZONE1	ZONE2	PZONE	MODES	WEND	RMDS	—	—	PSFL	SV	ALM	MOVE	HEND	PEND

(3) I/O Signal Allocation (* "ON" in the table shows the corresponding bit of "1" and "OFF" shows "0".)

Signal Type		Bit	Symbol	Description	Details
PLC Output	Target Position	32bits Data	—	32-bit Signed Integer Set the target position on the absolute coordinates. The unit is 0.01mm and settable range is between –999999 to +999999. (Example) When it is "+25.40mm", set it as "2540". If the value larger than the value (0.2mm) inside the soft limit for the parameter, the movement would be limited to the inside the soft limit (0.2mm). * When the input is performed in hexadecimal notation, input the negative value using a compliment of 2.	3.9 (1)
	Command position number	16bits Data	PC1 to PC512	16-bit Integer For the operation, the position data is required, for which the operation conditions have been set in advance using the personal computer software or teaching pendant. Set up the position No. for which the data has been input using this register. The settable range is 0 to 767. In the case that any value out of the range is set, or position No. that has not been set is specified, an alarm is output.	3.9 (1)
	Control Signal	b15	BKRL	Brake Forcible Release: Brake Release with "ON".	3.7.7 (18)
		b14	RMOD	Operation Mode: "OFF" for "AUTO" Mode, "ON" for "MANU" mode	3.7.7 (19)
		b13	—	Unavailable	—
		b12			
		b11	PMOD	Position/Simplified Direct Value Change-Over "OFF" for Position Mode, "ON" for Simplified Direct Value Mode	3.7.7 (20)
		b10	MODE	Teaching Mode Command "OFF" for Normal Mode, "ON" for Teaching Mode	3.7.7 (16)
		b9	PWRT	Position Data Import Command "ON" for Position Data Import	3.7.7 (17)
		b8	JOG+	+ Jog: "ON" for Movement in the Opposite Direction of Home	3.7.7 (13)
		b7	JOG-	- Jog: "ON" for Movement to the Home Direction	3.7.7 (13)
		b6	JVEL	Jog Speed/Inching Distance Change-Over "OFF" for using the values set for the Parameter No. 26 "Jog Speed" and Parameter No. 48 "Inching Distance" "ON" for using the values set for the Parameter No. 47 "Jog Speed 2" and Parameter No. 49 "Inching Distance 2"	3.7.7 (14)
		b5	JISL	Jog/Inching Change-Over "OFF" for Jog Operation, "ON" for Inching Operation	3.7.7 (15)
		b4	SON	Servo ON Command: "ON" for Servo ON	3.7.7 (5)
		b3	RES	Reset: "ON" for Reset Execution	3.7.7 (4)
		b2	STP	Pause: "ON" for Pause Command	3.7.7 (11)
		b1	HOME	Homing: "ON" for Homing Command	3.7.7 (6)
		b0	CSTR	Positioning Start: "ON" for Movement Command	3.7.7 (7)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Signal Type		Bit	Symbol	Description	Details
PLC Input	Current Position	32bits	—	Current Position: 32-bit Signed Integer The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm When the value is read in hexadecimal notation, the negative figure is expressed as a compliment of 2.	3.9 (1)
	Completed Position No. (Simplified Alarm CODE)	16bits	PM1 to PM512	16-bit Integer It is moved to the target position and the positioning completed position No. within the positioning width is output. In the case that the position movement has not been performed at all, or during the movement, “0” is output. When an alarm is issued (in the case that the status signal ALM is “ON”), the simplified alarm code (Refer to the instruction manual for the controller main body) is output.	3.9 (1)
	Status Signal	b15	EMGS	Emergency Stop: “ON” for Emergency Stop Status	3.7.7 (2)
		b14	PWR	Controller Ready: “ON” for Ready	3.7.7 (1)
		b13	ZONE2	Zone 2: “ON” with the current position within the zone set range	3.7.7 (12)
		b12	ZONE1	Zone 1: “ON” with the current position within the zone set range	3.7.7 (12)
		b11	PZONE	Position Zone: “ON” with the current position within the position zone set range	3.7.7 (12)
		b10	MODES	Teaching Mode Signal; “ON” during teaching mode selection	3.7.7 (16)
		b9	WEND	Position Data Import Completion: “ON” for import completion	3.7.7 (17)
		b8	RMDS	Operation Mode Status: “OFF” for currently “AUTO” mode, “ON” for currently “MANU” mode	3.7.7 (19)
		b7	—	Unavailable	—
		b6			
		b5	PSEL	Pressing and a Miss: “ON” for pressing and a miss	3.7.7 (27)
		b4	SV	Operation Ready: “ON” with Servo ON	3.7.7 (5)
		b3	ALM	Alarm: “ON” with alarm issue	3.7.7 (3)
		b2	MOVE	Under Movement Signal: “ON” during Actuator Movement	3.7.7 (9)
		b1	HEND	Homing Completion “ON” with Homing Completion	3.7.7 (6)
		b0	PEND	Positioning Completion Signal: “ON” with Positioning Completion	3.7.7 (10)

3.7.4 Half Direct Value Mode (Remote Device Station: No. of Occupied Stations: Two Stations)

This is the operation mode with the target position, positioning width, speed, acceleration/deceleration and pressing current value set up in the PLC. Set the each value in I/O data register. When the zone function is used, set it using the parameter Nos. 1, 2, 23 and 24.

The robot cylinder's effective main functions that can be controlled using this mode, are as shown in the following table.

Robot Cylinder Function	○:Direct Control △:Indirect Control ×:Disabled	Remarks
Homing	○	
Positioning	○	
Speed, Acceleration and Deceleration Settings	○	
Pitch Feeding (Inching)	○	
Pressing Operation	○	
Speed change during the movement	○	
Different Acceleration Speed Operation in Deceleration	×	
Pause	○	
Zone Signal Output	△	Parameter setting is required.
PIO Pattern Selection	×	

(1) PLC Address Composition (* “n” shows the head register address for each axis).

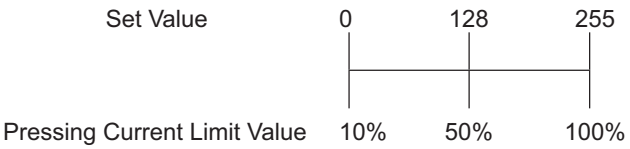
Parameter No.84	Acon or Pcon side Input register	PLC side	Acon or Pcon side Output register	PLC side
2	Occupied Domain	RY n0 to nF	Occupied Domain	RX n0 to nF
		RY (n+1)0 to (n+1)F		RX (n+1)0 to (n+1)F
		RY (n+2)0 to (n+2)F		RX (n+2)0 to (n+2)F
	System Domain	RY (n+3)0 to (n+3)F	System Domain	RX (n+3)0 to (n+3)F
	Target Position	RWw (n+0)	Current Position	RWr (n+0)
		RWw (n+1)		RWr (n+1)
	Positioning Width	RWw (n+2)	Command Current	RWr (n+2)
		RWw (n+3)		RWr (n+3)
	Speed	RWw (n+4)	Current Speed	RWr (n+4)
	Acceleration/Deceleration	RWw (n+5)		RWr (n+5)
	Pressing Current Limit Value	RWw (n+6)	Alarm code	RWr (n+6)
	Control signal	RWw (n+7)	Status Signal	RWr (n+7)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signals for each axis consists of 8 words for each I/O bit register.

- The control signals and status signals are ON/OFF signals in units of bit.
- The target position and current position are expressed using 2-word (32 bits) binary data. The figures from –999999 to +999999 (Unit: 0.01mm) can be set in PLC. However, set the position data within the soft stroke range (0 to effective stroke length) for the actuator in question.
- Set the positioning width. The positioning width is expressed using 2-word (32 bits) binary data. The figures from 1 to +999999 (Unit: 0.01mm) can be set in PLC.
- The specified speed is expressed using 1-word (16 bits) binary data. The figures from 0 to +65535 (Unit: 1.0mm/sec) can be set in PLC. Set the value that does not exceed the max. speed value for the actuator in question.
- The Acceleration/Deceleration is expressed using 1-word (16 bits) binary data. The figures from 1 to 300 (Unit: 0.01G) can be set in PLC. However, set the value that does not exceed the max. acceleration/deceleration value for the actuator in question.
- The pressing current limit value is expressed using 1-word (16 bits) binary data. The figures from 0 (0%) to 255 (100%) can be set in PLC. However, set the value within the settable range for the pressing current limit value (Refer to the catalog or instruction manual for the actuator) for the actuator in question.



- The command current is expressed using 2-word (32 bits) binary data (Unit: 1mA).
- The current speed is expressed using 2-word (32 bits) binary data (Unit: 0.01mm/sec).
- The alarm code is expressed using 1-word (16 bits) binary data.

PLC Output

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWw (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Slave Word)																

RWw (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWw (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Positioning Width (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWw (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Positioning Width (Host Word)	—	—	—	—	—	—	—	—	—	—	—	—	524,288	262,144	131,072	65,536

RWw (n+4)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Speed	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWw (n+5)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Acceleration/ Deceleration	—	—	—	—	—	—	—	256	128	64	32	16	8	4	2	1

RWw (n+6)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Pressing Current Limit Value	—	—	—	—	—	—	—	—	128	64	32	16	8	4	2	1

RWw (n+7)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Control signal	BKRL	RMOD	DIR	PUSH	—	—	—	JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	DSTR

PLC Input

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Host Word)	—	—	—	—	—	—	—	—	—	—	—	—	524,288	262,144	131,072	65,536

RWr (n+4)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Slave Word)																

RWr (n+5)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Host Word)																

When the Current Speed is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+6)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Alarm code																

RWr (n+7)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Status Signal	EMGS	PWR	ZONE2	ZONE1	—	—	—	RMDS	—	—	PSFL	SV	ALM	MOVE	HEND	PEND

(3) I/O Signal Allocation (* "ON" in the table shows the corresponding bit of "1" and "OFF" shows "0".)

Signal Type		Bit	Symbol	Description	Details
PLC Output	Target Position	32bits Data	—	32-bit Signed Integer Set the target position on the absolute coordinates. The unit is 0.01mm and settable range is between –999999 to +999999. (Example) When it is "+25.41mm", set it as "2541". If the value larger than the value (0.2mm) inside the soft limit for the parameter, the movement would be limited to the inside the soft limit (0.2mm). * When the input is performed in hexadecimal notation, input the negative value using a compliment of 2.	3.9 (2)
	Positioning Width	32bits Data	—	32-bit Integer The unit is 0.01mm and settable range is between +1 to +999999. (Example) In the case of "25.40mm", set it as "2540". This register value has two meanings depending on the operation type. 1) In the case of positioning operation, it shows the allowable range from the target position, that is regarded as the positioning completion. 2) In the case of pressing operation, it shows the pressing width value. Specify the normal operation or pressing operation using the "PUSH" control signal setting.	3.9 (2)
	Speed	16bits Data	—	16-bit Integer Set the speed in movement. Unit is 1.0mm/sec and settable range is between 0 and 65535. (Example) In the case of "254.0mm/sec", set it as "254". When the movement command is set with the value bigger than the max. speed, an alarm is issued.	3.9 (2)
	Acceleration/ Deceleration	16bits Data	—	16-bit Integer Set the acceleration/deceleration in movement (The same value is applied both to acceleration and deceleration). The unit is 0.01G and settable range is between 1 and 300. (Example) In the case of "0.30G", set is as "30". When the movement command is set with the value of "0" or bigger than the max. acceleration/deceleration value, an alarm is issued.	3.9 (2)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Signal Type		Bit	Symbol	Description	Details
PLC Output	Pressing Current Limit Value	16bits Data	—	16-bit Integer Set the current limit in pressing operation. The settable range is between 0 (0%) and 255 (100%). The actual settable range varies depending on each actuator. (Refer to the catalog or instruction manual for the actuator). When the movement command is set with the value bigger than the max. pressing current value, an alarm is issued.	3.9 (2)
	Control signal	b15	BKRL	Brake Forcible Release: “ON” for brake release	3.7.7 (18)
		b14	RMOD	Operation Mode: “OFF” for “AUTO” Mode, “ON” for “MANU” Mode	3.7.7 (19)
		b13	DIR	Pressing Direction Setup ”OFF” for the direction reducing the positioning width from the target position, “ON” for the direction adding the positioning width from the target position	3.7.7 (22)
		b12	PUSH	Pressing Setup: “OFF” for Positioning Operation, “ON” for Pressing Operation	3.7.7 (21)
		b11 b10 b9	—	Unavailable	—
		b8	JOG+	+ Jog: “ON” for Movement in the Opposite Direction of Home	3.7.7 (13)
		b7	JOG-	- Jog: “ON” for Movement to the Home Direction	3.7.7 (13)
		b6	JVEL	Jog Speed/Inching Distance Change-Over “OFF” for using the values set using the Parameter No. 26 “Jog Speed” and Parameter No. 48 “Inching Distance” “ON” for using the values set using the Parameter No. 47 “Jog Speed 2” and Parameter No. 49 “Inching Distance 2”	3.7.7 (14)
		b5	JISL	Jog/Inching Change-Over “OFF” for Jog Operation, “ON” for Inching Operation	3.7.7 (15)
		b4	SON	Servo ON Command: “ON” for Servo ON	3.7.7 (5)
		b3	RES	Reset: “ON” for Reset Execution	3.7.7 (4)
		b2	STP	Pause: “ON” for Pause Command	3.7.7 (11)
		b1	HOME	Homing: “ON” for Homing Command	3.7.7 (6)
		b0	DSTR	Positioning Command: “ON” for Movement Command	3.7.7 (8)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Signal Type		Bit	Symbol	Description	Details
PLC Input	Current Position	32bits Data	—	32-bit Integer with a Symbol The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm * When it is read in hexadecimal notation, input the negative value using a compliment of 2.	3.9 (2)
	Command Current	32bits Data	—	32-bit Integer It shows the current value in the current command. The unit is mA. Read Value: 000003FF$_H$ = 1023 (decimal system) = 1023mA	3.9 (2)
	Current Speed	32bits Data	—	32-bit Integer with a Symbol It shows the current speed. Positive Figure: Under movement in the opposite direction of home Negative Figure: Under movement in the home direction The unit is 0.01mm/sec. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm/sec * When it is read in hexadecimal notation, input the negative value using a compliment of 2.	3.9 (2)
	Alarm code	16bits Data	—	16-bit Integer When an alarm is issued, the alarm code is output. When any alarm is not issued, it is “0$_H$”. Refer to the instruction manual for the controller main body for the details of the alarms.	3.9 (2)
	Status Signal	b15	EMGS	Emergency Stop: “ON” for Emergency Stop Status	3.7.7 (2)
		b14	PWR	Controller Ready: “ON” for Ready	3.7.7 (1)
		b13	ZONE2	Zone 2: “ON” for the current position within the zone set range	3.7.7 (12)
		b12	ZONE1	Zone 1: “ON” for the current position within the zone set range	3.7.7 (12)
		b11	—	Unavailable	—
		b10			
		b9			
		b8	RMDS	Operation Mode Status: “OFF” for currently “AUTO” mode, “ON” for currently “MANU” mode	3.7.7 (19)
		b7	—	Unavailable	—
		b6			
		b5	PSEL	Pressing and a Miss: “ON” for pressing and a miss	3.7.7 (23)
		b4	SV	Operation Ready: “ON” with Servo ON	3.7.7 (5)
		b3	ALM	Alarm: “ON” with alarm issue	3.7.7 (3)
		b2	MOVE	Movement Signal: “ON” with Actuator Movement	3.7.7 (9)
		b1	HEND	Homing Completion “ON” with Homing Completion	3.7.7 (6)
		b0	PEND	Positioning Completion Signal: “ON” with Positioning Completion	3.7.7 (10)

3.7.5 Full Direct Value Mode (Remote Device Station: No. of Occupied Stations: Four stations)

This is the operation mode with all the values (target position, speed, etc.) set up directly using values from PLC.

Set each value in the I/O data register.

The robot cylinder's effective main functions that can be controlled using this mode, are as shown in the following table.

Robot Cylinder Function	○:Direct Control ×:Disabled
Homing	○
Positioning	○
Speed, Acceleration and Deceleration Settings	○
Pitch Feeding (Inching)	○
Pressing Operation	○
Speed change during the movement	○
Different Acceleration Speed	○
Operation in Deceleration	○
Pause	○
Zone Signal Output	○
PIO Pattern Selection	×

(1) PLC Address Composition (* “n” shows the head register address for each axis).

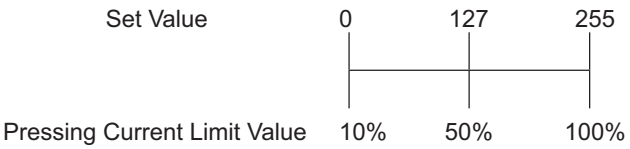
Parameter No.84	Acon or Pcon side Input register	PLC side	Acon or Pcon side Output register	PLC side
3	Occupied Domain	RY n0 to nF	Occupied Domain	RX n0 to nF
		RY (n+1)0 to (n+1)F		RX (n+1)0 to (n+1)F
		RY (n+2)0 to (n+2)F		RX (n+2)0 to (n+2)F
		RY (n+3)0 to (n+3)F		RX (n+3)0 to (n+3)F
		RY (n+4)0 to (n+4)F		RX (n+4)0 to (n+4)F
		RY (n+5)0 to (n+5)F		RX (n+5)0 to (n+5)F
		RY (n+6)0 to (n+6)F		RX (n+6)0 to (n+6)F
	System Domain	RY (n+7)0 to (n+7)F	System Domain	RX (n+7)0 to (n+7)F
	Target Position	RWw (n+0)	Current Position	RWr (n+0)
		RWw (n+1)		RWr (n+1)
	Positioning Width	RWw (n+2)	Command Current	RWr (n+2)
		RWw (n+3)		RWr (n+3)
	Speed	RWw (n+4)	Current Speed	RWr (n+4)
		RWw (n+5)		RWr (n+5)
	Zone Value “+”	RWw (n+6)	Alarm code	RWr (n+6)
		RWw (n+7)	Occupied Domain	RWr (n+7)
	Zone Value “-”	RWw (n+8)		RWr (n+8)
		RWw (n+9)		RWr (n+9)
	Acceleration	RWw (n+A)		RWr (n+A)
	Deceleration	RWw (n+B)		RWr (n+B)
	Pressing Current Limit Value	RWw (n+C)		RWr (n+C)
	ACON: Occupied Domain PCON: Load Current Threshold	RWw (n+D)		RWr (n+D)
	Control signal 1	RWw (n+E)		RWr (n+E)
	Control signal 2	RWw (n+F)	Status Signal	RWr (n+F)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signals for each axis consists of 16 words for each I/O bit register.

- The control signals1, control signals2 and status signals are ON/OFF signals in units of bit.
- The target position and current position are expressed using 2-word (32 bits) binary data. The figures from –999999 to +999999 (Unit: 0.01mm) can be set in PLC. However, set the position data within the soft stroke range (0 to effective stroke length) for the actuator in question.
- Set the positioning width. The positioning width is expressed using 2-word (32 bits) binary data. The figures from 1 to +999999 (Unit: 0.01mm) can be set in PLC.
- The specified speed is expressed using 2-word (32 bits) binary data. The figures from 0 to +999999 (Unit: 0.01mm/sec) can be set in PLC. Set the value that does not exceed the max. speed value for the actuator in question.
- The Acceleration and Deceleration are expressed using 1-word (16 bits) binary data. The figures from 1 to 300 (Unit: 0.01G) can be set in PLC. However, set the value that does not exceed the max. acceleration/deceleration value for the actuator in question.
- The pressing current limit value is expressed using 1-word (16 bits) binary data. The figures from 0 (0%) to 255 (100%) can be set in PLC. However, set the value within the settable range for the pressing current limit value (Refer to the catalog or instruction manual for the actuator) for the actuator in question.



- Set the load current threshold. The load current threshold is expressed using 1-word (16 bits) binary data. The figures from 0 (0%) to 255 (100%) can be set in PLC (Refer to pressing current limit value (above figure)).
- Zone Value “+” and Zone Value “-” are expressed using 2-word (32 bits) binary data. The figures from -999999 to +999999 (Unit: 0.01mm) can be set in PLC. However make sure to set the smaller value for the Zone Value “-” than that for the Zone Value “+”.
- The command current is expressed using 2-word (32 bits) binary data (Unit: 1mA).
- The current speed is expressed using 2-word (32 bits) binary data (Unit: 0.01mm/sec).
- The alarm code is expressed using 1-word (16 bits) binary data.

PLC Output

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWw (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Slave Word)																

RWw (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWw (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Positioning Width (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWw (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Positioning Width (Host Word)													524,288	262,144	131,072	65,536

RWw (n+4)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Speed (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWw (n+5)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Speed (Host Word)													524,288	262,144	131,072	65,536

RWw (n+6)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Zone Value “+” (Slave Word)																

RWw (n+7)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Zone Value “+” (Host Word)																

When the zone is shown using the negative figure, it is expressed using the complement of 2.

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWw (n+8)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Zone Value “-” (Slave Word)																

RWw (n+9)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Zone Value “-” (Host Word)																

When the zone value “-” is shown using the negative figure, it is expressed using the complement of 2.

RWw (n+A)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Acceleration								256	128	64	32	16	8	4	2	1

RWw (n+B)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Deceleration								256	128	64	32	16	8	4	2	1

RWw (n+C)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Pressing Current Limit Value									128	64	32	16	8	4	2	1

RWw (n+D)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Load Current Threshold (*3)									128	64	32	16	8	4	2	1

RWw (n+E)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command position number 1						(*1)			(*2)				INC	DIR	PUSH	

RWw (n+F)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command position number 2	BKRL	RMOD						JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	DSTR

(*1) RWw (n+E) b10 Signal Allocation

	Symbol	
Controller	ACON	PCON
b10	—	SMOD

(*2) RWw (n+E) b7 and b6 Signal Allocation

	Symbol	
Controller	ACON	PCON
b7	MOD1	—
b6	MOD0	—

(*3) This function is only for PCON. It can not be used in ACON.

PLC Input

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Host Word)																

When the current position is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Host Word)													524,288	262,144	131,072	65,536

RWr (n+4)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Slave Word)																

RWr (n+5)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Host Word)																

When the Current Speed is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+6)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Alarm code																

RWr (n+7) to RWr (n+F)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Unavailable																

RWr (n+F)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Status Signal	EMGS	PWR	ZONE2	ZONE1	PZONE	(*1)		RMDS	GHMS	PUSH	PSFL	SV	ALM	MOVE	HEND	PEND

(*1) RWr (n+E) b10 and b9 Signal Allocation

	Symbol	
Controller	ACON	PCON
b10	—	LOAD
b9	—	TRQS

(3) I/O Signal Allocation (* "ON" in the table shows the corresponding bit of "1" and "OFF" shows "0".)

Address		Bit	Symbol	Functions	Details
PLC Output	Target Position	32bits Data	—	32-bit Signed Integer Set the target position on the absolute coordinates. The unit is 0.01mm and settable range is between –999999 to +999999. (Example) When it is "+25.41mm", set it as "2541". If the value larger than the value (0.2mm) inside the soft limit for the parameter, the movement would be limited to the inside the soft limit (0.2mm). * When the input is performed in hexadecimal notation, input the negative value using a compliment of 2.	3.9 (3)
	Positioning Width	32bits Data	—	32-bit Integer The unit is 0.01mm and settable range is between +1 to +999999. (Example) In the case of "25.40mm", set it as "2540". This register value has two meanings depending on the operation type. 1) In the case of positioning operation, it shows the allowable range from the target position, that is regarded as the positioning completion. 2) In the case of pressing operation, it shows the pressing width value. Specify the normal operation or pressing operation using the "PUSH" control signal setting.	3.9 (3)
	Speed	32bits Data	—	32-bit Integer Set the speed in movement. Unit is 0.1mm/sec and settable range is between 0 and 999999. (Example) In the case of "254.1mm/sec", set it as "2541". When the movement command is set with the value bigger than the max. speed, an alarm is issued.	3.9 (3)
	Zone Value "+" Zone Value "-"	32bits Data	—	32-bit Integer with a Symbol Apart from the zone specified using the parameter setting, the zone signal effective after the homing operation is output. When the current position is inside of this "+" Value, the status signal "PZONE" is turned "ON". The unit for setting is 0.01mm and settable range is between –999999 and +999999. Input the value satisfying the relationship of "Zone Value "+" > Zone Value "-"". When this function is not to be used, the same value is applied to both Zone Values. * When it is input in hexadecimal notation, input the negative value using a compliment of 2.	3.9 (3)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

<table>
<tr><th colspan="2">Address</th><th>Bit</th><th colspan="2">Symbol</th><th>Functions</th><th>Details</th></tr>
<tr><td rowspan="19">PLC Output</td><td>Acceleration</td><td>16bits Data</td><td colspan="2">—</td><td rowspan="2">16-bit Integer
Set the acceleration and deceleration in the movement.
The unit is 0.01G and the settable range is from1 to 300.
(Example)
When it is 0.30G, set it as “30”.
When the movement command is issued with the value of “0” or bigger than the max. acceleration/deceleration value, an alarm is output.</td><td rowspan="2">3.9 (3)</td></tr>
<tr><td>Deceleration</td><td>16bits Data</td><td colspan="2">—</td></tr>
<tr><td>Pressing Current Limit Value</td><td>16bits Data</td><td colspan="2">—</td><td>16-bit Integer
Set the current limit in the pressing operation.
The settable range is between 0 (0%) and 255 (100%).
The actual settable range varies depending on each actuator. (Refer to the catalog or instruction manual for the actuator).
When the movement command is set with the value bigger than the max. pressing current value, an alarm is issued.</td><td>3.9 (3)</td></tr>
<tr><td>Load Current Threshold</td><td>16bits Data</td><td colspan="2">—</td><td>16-bit Integer
Set the current threshold in this register when whether or not the load current exceeds the threshold is judged.
The settable range is between 0 (0%) and 255 (100%).
When the judgment is not to be performed, set it to “0”.</td><td>3.9 (3)</td></tr>
<tr><td rowspan="17">Control signal 1</td><td>b15</td><td colspan="2" rowspan="5">—</td><td rowspan="5">Unavailable</td><td rowspan="5">—</td></tr>
<tr><td>b14</td></tr>
<tr><td>b13</td></tr>
<tr><td>b12</td></tr>
<tr><td>b11</td></tr>
<tr><td rowspan="2">b10</td><td>ACON</td><td>—</td><td>Unavailable</td><td>—</td></tr>
<tr><td>PCON</td><td>SMOD</td><td>Stop Control Mode: “ON” for servo control while it is stopped</td><td>3.7.7 (28)</td></tr>
<tr><td>b9</td><td colspan="2" rowspan="2">—</td><td rowspan="2">Unavailable</td><td rowspan="2">—</td></tr>
<tr><td>b8</td></tr>
<tr><td>b7</td><td rowspan="2">ACON</td><td>MOD1</td><td rowspan="2">Acceleration/Deceleration Mode
<table><tr><th>MOD1</th><th>MOD0</th><th>Functions</th></tr><tr><td>OFF</td><td>OFF</td><td>Trapezoid Pattern</td></tr><tr><td>OFF</td><td>ON</td><td>S-shaped Motion</td></tr><tr><td>ON</td><td>OFF</td><td>First-Order Lag Filter</td></tr></table></td><td rowspan="2">3.7.7 (29)</td></tr>
<tr><td>b6</td><td>MOD0</td></tr>
<tr><td>b7</td><td rowspan="2">PCON</td><td rowspan="2">—</td><td rowspan="2">Unavailable</td><td rowspan="2">—</td></tr>
<tr><td>b6</td></tr>
<tr><td>b5</td><td colspan="2" rowspan="2">—</td><td rowspan="2">Unavailable</td><td rowspan="2">—</td></tr>
<tr><td>b4</td></tr>
<tr><td>b3</td><td colspan="2">INC</td><td>Incremental Command
“OFF” for Absolute Position Command, “ON” for Relative Position Command</td><td>3.7.7 (24)</td></tr>
</table>

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Address		Bit	Symbol	Functions	Details
PLC Output	Control signal 1	b2	DIR	Pressing Direction Setup: “OFF” for the direction reducing the positioning width from the target position, “ON” for the direction adding the positioning width from the target position	3.7.7 (22)
		b1	PUSH	Pressing Setup: “OFF” for Positioning Operation, “ON” for Pressing Operation	3.7.7 (21)
		b0	—	Unavailable	—
	Control signal 2	b15	BKRL	Brake Forcible Release: “ON” for brake release	3.7.7 (18)
		b14	RMOD	Operation mode: “OFF” for Auto mode, “ON” for MANU mode	3.7.7 (19)
		b13	—	Unavailable	—
		b12			
		b11			
		b10			
		b9			
		b8	JOG+	+ Jog: “ON” for Movement in the Opposite Direction of Home	3.7.7 (13)
		b7	JOG-	- Jog: “ON” for Movement to the Home Direction	3.7.7 (13)
		b6	JVEL	Jog Speed/Inching Distance Change-Over: “OFF” for using the values set using the Parameter No. 26 “Jog Speed” and Parameter No. 48 “Inching Distance” “ON” for using the values set using the Parameter No. 47 “Jog Speed 2” and Parameter No. 49 “Inching Distance 2”	3.7.7 (14)
		b5	JISL	Jog/Inching Change-Over: “OFF” for Jog Operation, “ON” for Inching Operation	3.7.7 (15)
		b4	SON	Servo ON Command: “ON” for Servo ON	3.7.7 (5)
		b3	RES	Reset: “ON” for Reset Execution	3.7.7 (4)
		b2	STP	Pause: “ON” for Pause Command	3.7.7 (11)
		b1	HOME	Homing: “ON” for Homing Command	3.7.7 (6)
		b0	DSTR	Positioning Start: “ON” for Movement Command	3.7.7 (8)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Signal Type		Bit	Signal name		Description	Details
PLC Input	Current Position	32bits Data	—		32-bit Signed Integer The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm * When the value is read in hexadecimal notation, the negative figure is expressed as a compliment of 2.	3.9 (3)
	Command Current	32bits Data	—		32-bit Integer It shows the current value in the current command. The unit is mA. Read Value: 000003FF$_H$ = 1023 (decimal system) = 1023mA	3.9 (3)
	Current Speed	32bits Data	—		32-bit Signed Integer It shows the current speed. Positive Figure: Under movement in the opposite direction of the home Negative Figure: Under movement in the home direction The unit is 0.01mm/sec. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm/sec * When it is read in hexadecimal notation, input the negative value using a compliment of 2.	3.9 (3)
	Alarm code	16bits Data	—		16-bit Integer When an alarm is issued, the alarm code is output. When any alarm is not issued, it is “0”. Refer to the instruction manual for the controller main body for the details of the alarms.	3.9 (3)
	Status Signal	b15	EMGS		Emergency Stop: “ON” for Emergency Stop Status	3.7.7 (2)
		b14	PWR		Controller Ready: “ON” for Ready	3.7.7 (1)
		b13	ZONE2		Zone 2: “ON” for the current position within the zone set range	3.7.7 (12)
		b12	ZONE1		Zone 1: “ON” for the current position within the zone set range	3.7.7 (12)
		b11	PZONE		Position Zone: “ON” when the current position is within the position zone set range	3.7.7 (12)
		b10	ACON	—	Unavailable (ON/OFF is undefined)	—
			PCON	LOAD	Load Output Judgment “ON” for Reached “OFF” for Not reached (Refer to the instruction manual for the controller main body for more information).	3.7.7 (26)
		b9	ACON	—	Unavailable (ON/OFF is undefined).	—
			PCON	TRQS	Torque Level: “ON” for Reached “OFF” for Not Reached (Refer to the instruction manual for the controller main body for more information).	3.7.7 (27)
		b8	RMDS		Operation Mode Status: “OFF” for currently “AUTO” mode, “ON” for currently “MANU” mode	3.7.7 (19)
		b7	GHMS		Under Homing Operation: “ON” for Homing Operation	3.7.7 (6)
		b6	PUSHS		Under Pressing Operation: “ON” for Pressing Operation	3.7.7 (25)
		b5	PSEL		Pressing and a Miss: “ON” for pressing and a miss	3.7.7 (23)
		b4	SV		Operation Ready: “ON” with Servo ON	3.7.7 (5)
		b3	ALM		Alarm: “ON” with alarm issue	3.7.7 (3)
		b2	MOVE		Movement Signal: “ON” with Actuator Movement	3.7.7 (9)
		b1	HEND		Homing Completion: “ON” with Homing Completion	3.7.7 (6)
		b0	PEND		Positioning Completion Signal: “ON” with Positioning Completion	3.7.7 (10)

3.7.6 Remote I/O Mode 2 (Remote Device Station: No. of Occupied Stations: One Station)

This is the operation mode with the position No. set up as the same as using PIO (24V I/O). Set the position data using the RC personal computer application software or teaching pendant. The number of operable positions varies depending on the parameter No. 25 “PIO Pattern” setting.

The I/O specifications for the PIO pattern are described as follows (Refer to instruction manual for the controller main body for more information).

Parameter No. 25 Set Value	Operation Mode	I/O Specifications
0	Positioning mode	64 positioning points and 2 zone output points
1	Teaching mode	64 positioning points and 1 zone output point The positioning and jog operations are available. The current position can be written on the setup position data.
2	256 point mode	256 positioning points and 1 zone output point
3	512 point mode	512 positioning points and no zone output point
4	Electromagnetic valve mode 1	7 positioning points and 2 zone output points The direct operation command is available for each position No. The positioning completion signal is output for each position No.
5	Electromagnetic valve mode 2	3 positioning points and 2 zone output points It is operated with the Forward/Backward/Intermediate Position Commands. The positioning completion signal is output individually for each Forward End/Backward End/Intermediate Positions.

The robot cylinder's effective main functions that can be controlled using this mode, are as shown in the following table.

Robot Cylinder Function	PIO Pattern					
	0: Positioning mode	1: Teaching mode	2: 256 point mode	3: 512 point mode	4: Electromagnetic valve mode 1	5: Electromagnetic valve mode 2
Homing	○	○	○	○	○	×
Positioning	○	○	○	○	○	○
Speed, Acceleration and Deceleration Settings	○	○	○	○	○	○
Pitch Feeding (Inching)	○	○	○	○	○	○
Pressing Operation	○	○	○	○	○	×
Speed change during the movement	○	○	○	○	○	○
Different Acceleration Speed Operation in Deceleration	○	○	○	○	○	○
Pause	○	○	○	○	○	○(*1)
Zone Signal Output	○	○	○	×	○	○
PIO Pattern Selection (Set using the parameters)	○	○	○	○	○	○

O: Operation Available X: Operation Unavailable

(*1) It is available when the parameter No. 27 “Movement Command Type” is set to “0”. Turning “OFF” the “Movement Command” can stop the system temporarily.

(1) PLC Address Composition (* “n” shows the head register address for each axis).

Parameter No.84	Acon or Pcon side DI and Input register	PLC side	Acon or Pcon side DO and Output register	PLC side
4	Port No. 0 to 15	RY n0 to nF	Port No. 0 to 15	RX n0 to nF
	System Domain	RY (n+1)0 to (n+1)F	System Domain	RX (n+1)0 to (n+1)F
	Occupied Domain	RWw (n+0)	Current Position	RWr (n+0)
		RWw (n+1)		RWr (n+1)
		RWw (n+2)	Command Current	RWr (n+2)
		RWw (n+3)		RWr (n+3)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signal for each axis consists of 1 word for each I/O bit register.
The I/O signal for each axis consists of 4 words for each I/O data register.

- The I/O bit register controls with the ON/OFF signal in units of bit.
- The current position is expressed using 2-word (32 bits) binary data (Unit: 0.01mm).
- The command current is expressed using 2-word (32 bits) binary data (Unit: 1mA).

PLC Output (* “n” shows the head register address per each axis).

Address	one word = 16 bits															
RY (n+0)	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Controller Input Port No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

PLC Input (* “n” shows the head register address per each axis).

Address	one word = 16 bits															
RX (n+0)	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Controller Output Port No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Address	one word = 16 bits															
RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Host Word)																

When the negative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Host Word)													524,288	262,144	131,072	65,536

(3) I/O Signal Allocation

Refer to “3.7.2 Remote I/O Mode (3) I/O Signal Allocation” for each PIO pattern signal allocation.

The signal allocation for the Command Current and Current Position, is shown in the following table.

Signal Type		Bit	Symbol	Description	Details
PLC Input	Current Position	32bits Data	—	32-bit Signed Integer The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm * When the value is read in hexadecimal notation, the negative figure is expressed as a compliment of 2.	—
	Command Current	32bits Data	—	32-bit Integer It shows the current value in the current command. The unit is 1mA. Read Value: 000003FF$_H$ = 1023 (decimal system) = 1023mA	—

3.7.7 I/O Signal Control and Functions

* "ON" expresses the bit signal of "1" and "OFF" expresses the bit signal of "0".
The I/O control and functions used in the Position/Simplified Direct Value Mode, Half Direct Value Mode and Full Direct Value Mode, are described as follows. For the I/O signals for the Remote I/O Mode and Remote I/O Mode 2, refer to the instruction manual for the controller main body.

(1) Controller Ready (PWR) PLC Input Signal

When the controller can control the system after power up, it is turned "ON".

■ Function:

Regardless of the alarm or servo conditions, when the controller initialization is completed normally after power up and the controller can control the system, it is turned "ON".
Even in the alarm condition, when the controller can control the system, it is turned "ON".

(2) Emergency Stop (EMGS) PLC Input Signal

When the controller is stopped in an emergency, it is turned "ON".

■ Function:

When the controller is stopped in an emergency (motor driving power is cut off), it is turned "ON". When the emergency stop status is cleared, it is turned "OFF".

(3) Alarm (ALM) PLC Input Signal

When any error is detected using the controller protection circuit (function), it is turned "ON".

■ Function:

When any error is detected and the protection circuit (function) is activated, this signal is turned "ON". When the cause of the alarm is eliminated and the reset signal is turned "ON", the alarm is turned "OFF" in the case that it is the alarm with the operation cancellation level (In the case of the alarm with the cold start level, cycling the power is required).
When the alarm is detected, the Status Indicator LED (Refer to "3.3 CC-Link Interface") on the front surface of the controller illuminates in red.

(4) Reset (RES) PLC Output Signal

This signal has two functions. It can reset the controller alarm and cancel the reminder for planned movements during pause conditions.

■ Function:

1. When this signal is turned ON from OFF condition after eliminating the cause of the alarm during the alarm output, the alarm (ALM) signal can be reset (in the case of the alarm with the cold start level, cycling the power is required).
2. When this signal is turned ON from OFF condition during the pause condition, the reminder of the planned movement left can be cancelled.

(5) Servo ON Command (SON) PLC Output Signal
Operation Ready (SV) PLC Input Signal

When “SON” signal is turned “ON”, the servo-motor is turned “ON”. When the servo-motor is turned ON, the Status Indicator LED (Refer to “3.3 CC-Link Interface”) on the front surface of the controller illuminates in green.

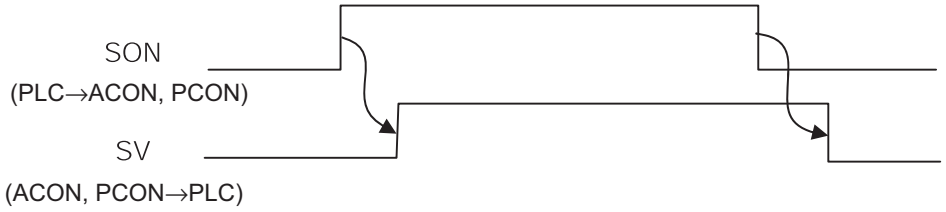
The “SV” signal is synchronized with this LED.

■ Function:

Using the “SON” signal, the turning ON/OFF of the controller is available.

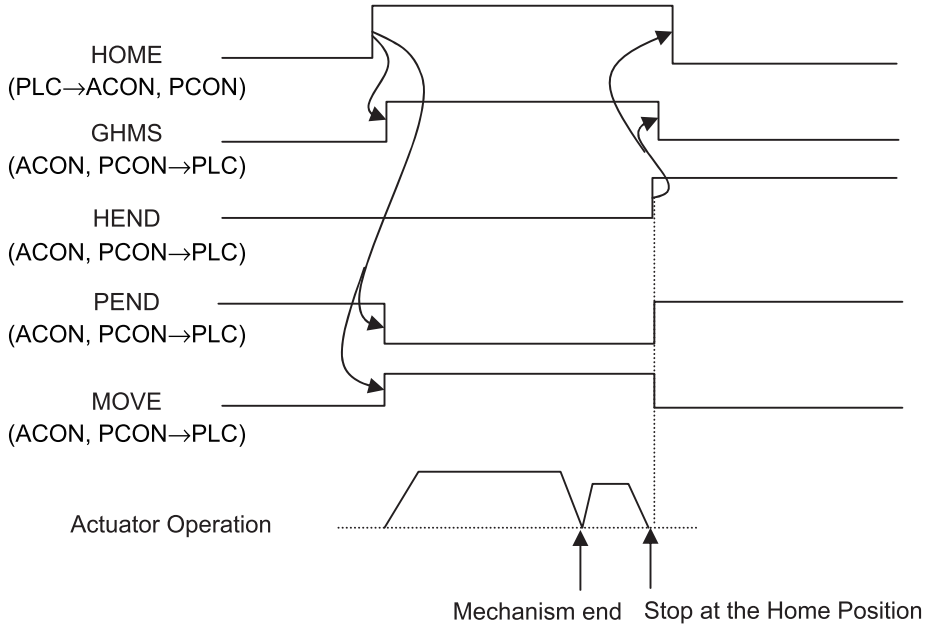
While the “SV” signal is ON, the controller's servo-motor is turned “ON” and the operation becomes available.

The relationship between the “SON” signal and “SV” signal is as follows.



(6) Homing (HOME) PLC Output Signal
Homing Completion (HEND) PLC Input Signal
Under Homing Operation (GHMS) PLC Input Signal

When the “HOME” signal is turned “ON”, this command is processed at the startup (ON edge), and the homing operation is performed automatically. During the homing operation, the “GHMS” signal is turned “ON”.
When the “HEND” signal is turned “ON”, turn “OFF” the “HOME” signal. Once the “HEND” signal is turned “ON”, it can not be turned “OFF” until the power is turned “OFF” or the “HOME” signal is input again.
Even after the completion of the homing operation, when the “HOME” signal is turned “ON”, the homing operation can be performed.



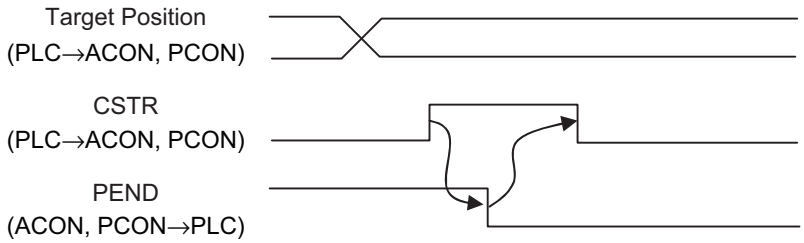
⚠ Caution: In the Remote I/O mode, Remote I/O Mode 2 and Position/Simplified Direct Value Mode, when the positioning command is issued without performing the homing operation after power up, the positioning is performed after the automatic homing operation. However, it is limited to only once after power up.
In the Half Direct Value Mode and Full Direct Value Mode, when the positioning command is issued without performing the homing operation after power up, the alarm for the “Error Code 83: ALARM HOME ABS (Absolute Position Movement Command in the Homing Unfinished Condition)” is issued (Operation Cancellation Level). Take the greatest care.

(7) Positioning Start (CSTR): Used in Position/Simplified Direct Value Mode, PLC Output Signal

This signal is processed at the startup (ON edge) and the positioning is performed to the target position with the specified position No. or set using the PLC's target position register.
Whether if the target position with the specified position No. is used or the setting using the PLC's target position register is used, depends on the Control Signal b11: “Position/Simplified Direct Value Change-Over (PMOD) Signal”.

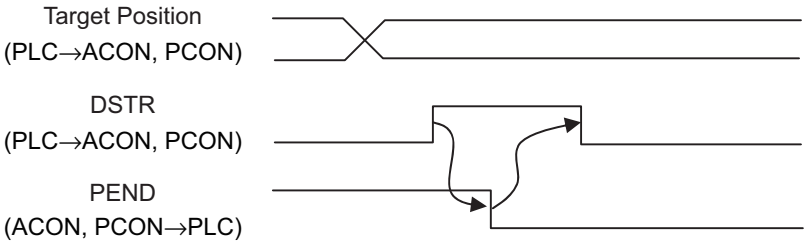
- PMOD = OFF: Target position data for the specified position No. is used.
- PMOD = ON: Value for the target position set using the PLC's target position register is used.

When this signal is issued in the condition where the homing operation has not performed at all after the power injection (HEND signal OFF), the positioning to the target position is performed after the homing operation is performed automatically.
Turn “OFF” this signal after confirming that the Positioning Completion Signal (PEND) signal has been turned “OFF”.



(8) Positioning Command (DSTR): Used in Half Direct Value Mode or Full Direct Value Mode, PLC Output Signal

This signal is processed at the startup (ON edge) and the positioning to the target position input in the PLC's target position register is performed. When this signal is issued in the condition where the homing operation has not performed at all after the power injection (HEND signal OFF), an alarm is issued (Operation Cancellation Level).
Turn “OFF” this signal after confirming that the Positioning Completion Signal (PEND) signal has been turned “OFF”.

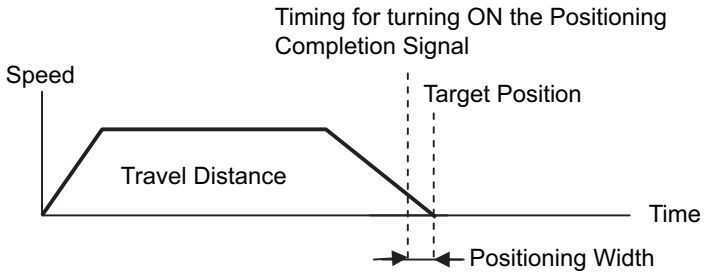


(9) Under Movement Signal (MOVE), PLC Input Signal

This signal is turned ON while the actuator's slider or rod is moving (including the pressing or jog operation after the homing operation).
After the completion of the positioning, homing or pressing operation, or during the pause condition, this signal is turned “OFF”.

(10) Positioning Completion Signal (PEND) PLC Input Signal

This signal is turned “ON” when the actuator is moved to the target position and reaches the positioning width and the pressing is completed.



When the servo-motor is turned ON from OFF condition, the positioning is performed with the position set as the target position. Accordingly, this signal is turned “ON” and after that, when the positioning operation is started with the homing (HOME) signal, positioning start (CSTR) signal and positioning command (DSTR) signal, this signal is turned “OFF”.

⚠ Caution: When the servo-motor is turned OFF or stopped in an emergency while the actuator is stopped at the target position, the PEND signal is turned “OFF” temporarily.
Then, when the servo-motor is turned “ON” and the actuator is within the positioning width, the PEND signal is turned “ON” again.
When the positioning is completed with the CSTR signal or DSTR signal turned “ON”, the PEND signal is not turned “ON”.

(11) Pause (STP) PLC Output Signal

When this signal is turned “ON”, the actuator movement is decelerated and stopped. When it is turned “OFF”, the actuator movement is restarted.
The acceleration in the operation restart or the deceleration in stopping operation, is expressed as the value for the acceleration/deceleration for the position No. set using the specified position No. register in the Position/Simplified Direct Value Mode, and as the value set in the acceleration/deceleration register in the Half Direct Value Mode.
In the Full Direct Value Mode, the value is expressed as the value set in the acceleration register or deceleration register.

(12) Zone 1 (ZONE 1) PLC Input Signal

Zone 2 (ZONE 2) PLC Input Signal

Position Zone (PZONE) PLC Input Signal

These signals are turned ON when the current position of the actuator is within the set domain and turned OFF when the current position is out of the set domain.

1) Zone 1, Zone 2

The zone is set using the user parameters.

The Zone 1 Signal is set using the parameter No. 1 “Zone 1 “+” Side” and No. 2 “Zone 1 “-” Side”.

The Zone 2 Signal is set using the parameter No. 23 “Zone 2 “+” Side” and No. 24 “Zone 2 “-” Side”.

The Zone 1 Signal and Zone 2 Signal become effective when the homing operation is completed. After that, even during the servo OFF, it is effective.

2) Position Zone

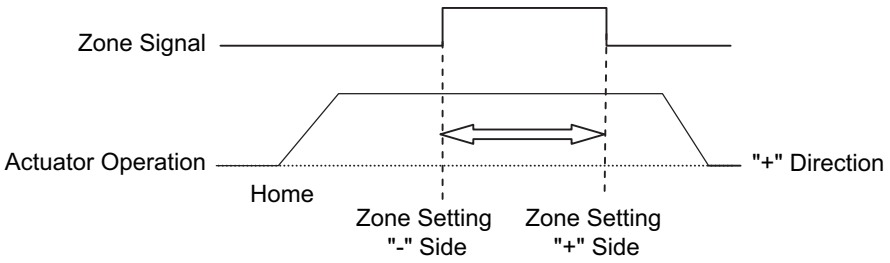
The zone is set using the position table I/O data register.

In the case of the Position/Simplified Direct Value Mode, the PZONE signal is set using the position table.

In the case of the Full Direct Value Mode, the PZONE signal is set using the Zone Value Register.

(*) In the Half Direct Value Mode, there is no PZONE signal.

The PZONE signal becomes effective with the movement command after the homing operation. After that, even during the servo OFF, it is effective.



(13) “+” Jog (JOG+) PLC Output Signal

“-” Jog (JOG-) PLC Output Signal

This signal is the command for the jog operation startup or inching operation startup.
In the case of the “+” command, the movement direction is to the opposite of the home and in the case of the “-” command, the movement direction is to the home.

1) Jog Operation

The jog operation is available when the Jog/Inching Change-Over Signal (JISL) is turned “OFF”.
While the “JOG+” is turned “ON”, the movement direction is to the opposite of the home and when it is turned “OFF”, the actuator is decelerated and stopped.
While the “JOG-” is turned “ON”, the movement direction is to the home, and when it is turned OFF, the actuator is decelerated and stopped.
The operation is performed based on the set values of the following parameters.

- The speed is based on the parameter value specified using the Jog Speed/Inching Distance Change-Over (JVEL) signal.
  JVEL Signal OFF : The speed is based on the parameter No. 26 “PIO Jog Speed” value.
  JVEL Signal ON : The speed is based on the parameter No. 47 “PIO Jog Speed 2” value.
- The Acceleration/Deceleration is based on the rated acceleration/deceleration (depending on the actuator).
- When both the JOG+ and JOG- signals are turned “ON”, the actuator is decelerated and stopped.

2) Inching Operation

The inching operation is available while the JISL signal is turned “ON”.
Once it is turned “ON”, the actuator is moved as much as the inching distance.
When the JOG+ is turned “ON”, the movement is to the opposite of the home and when the JOG- is turned “ON”, the movement is to the home.

- The operation is performed based on the set values of the following parameters.
- The speed is based on the parameter value specified using the Jog Speed/Inching Distance Change-Over (JVEL) signal.
  JVEL Signal OFF : The speed is based on the parameter No. 26 “PIO Jog Speed” value.
  JVEL Signal ON : The speed is based on the parameter No. 47 “PIO Jog Speed 2” value.
- The Travel Distance is based on the set values of the following parameters.
  JVEL Signal OFF : The travel distance is based on the parameter No. 48 “PIO Inching Distance” value.
  JVEL Signal ON : The travel distance is based on the parameter No. 49 “PIO Inching Distance 2” value.
- The Acceleration/Deceleration is based on the rated acceleration/deceleration (depending on the actuator).

During the normal operation, even when the “+” Jog Signal or “-” Jog Signal is turned “ON”, the normal operation is continued (The Jog signal is ignored).
In the pause condition, even when the “+” Jog Signal or “-” Jog Signal is turned “ON”, the actuator is not moved.

Note: Because the software stroke limit is disabled before the homing operation, the actuator might run against the mechanism end. Take the greatest care.

(14) Jog Speed/Inching Distance Change-Over (JVEL) PLC Output Signal

This change-over signal is used for the parameters specifying the jog speed when the jog operation is selected or the inching distance when the inching operation is selected.

The relationship is as follows:

JVEL Signal	Jog Operation : JISL = OFF	Inching Operation: JISL = ON
OFF	Parameter No. 26 “Jog Speed”	Parameter No. 26 “Jog Speed” Parameter No. 48 “Inching Distance”
ON	Parameter No. 47 “Jog Speed 2”	Parameter No. 47 “Jog Speed 2” Parameter No. 49 “Inching Distance 2”

(15) Jog/Inching Change-Over (JISL) PLC Output Signal

This signal changes over the jog operation and the inching operation.

JISL = OFF: Jog Operation

JISL = ON: Inching Operation

When the JISL signal is turned “ON” (for inching operation) during the jog operation, the actuator is decelerated and performs the inching operation.

When the JISL signal is turned “OFF” (for jog operation) during the inching operation, the actuator performs the jog operation after the movement is completed.

The relationship between the JISL Signal and Jog Speed/Inching Distance Change-Over (JVEL) Signal ON/OFF is described as follows.

		Jog Operation	Inching Operation
JISL		OFF	ON
JVEL = OFF	Speed	Parameter No. 26 “Jog Speed”	Parameter No. 26 “Jog Speed”
	Travel Distance	—	Parameter No. 48 “Inching Distance”
	Acceleration/ Deceleration	Rated Value (depending on the actuator)	Rated Value (depending on the actuator)
JVEL = ON	Speed	Parameter No. 47 “Jog Speed 2”	Parameter No. 47 “Jog Speed 2”
	Travel Distance	—	Parameter No. 49 “Inching Distance 2”
	Acceleration/ Deceleration	Rated Value (depending on the actuator)	Rated Value (depending on the actuator)
Operation		When JOG+/JOG- is “ON”:	When the JOG+/Jog- startup (ON edge) is detected:

(16) Teaching Mode Command (MODE) PLC Output Signal
Teaching Mode Signal (MODES) PLC Input Signal

When the MODE signal is turned “ON”, the normal operation mode is changed to the teaching mode.
When the mode for the controllers for each actuator is changed to the teaching mode, the MODES signal is turned ON.
After confirming that the MODES signal is turned “ON” on the PLC side, start the teaching operation.

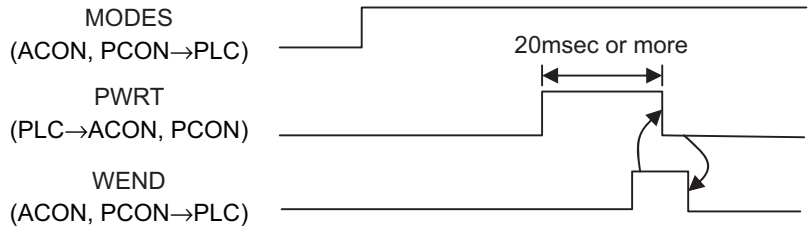
Note: In order to change the normal operation mode to the teaching mode, the following conditions are required.

- The actuator operation (motor) is stopped.
- The + JOG (JOG+) signal and – JOG (JOG-) signal are turned “OFF”.
- The Position Data Import Command (PWRT) Signal and Positioning Start (CSTR) Signal are turned “OFF”.

Note: When the PWRT signal is not turned OFF, the mode is not returned to the normal operation mode.

(17) Position Data Import Command (PWRT) Signal PLC Output Signal
Position Data Import Completion (WEND) Signal PLC Input Signal

The PWRT signal is available when the teaching mode signal (MODES) is turned “ON”.
Turn ON the PWRT signal (*1). Then, the current position data will be written in the position data box for the position No. set using the PLC's specified Position No. register (*2).
When the data writing is completed, the WEND signal is turned “ON”.
After the WEND signal is turned ON, turn OFF the PWRT signal in the host machine.
When the PWRT signal is turned ON before the WEND signal is turned “ON”, the WEND signal is not turned “ON”.
When the PWRT signal is turned “OFF” the WEND signal is also turned “OFF”.
(*1) Turn it ON for 20msec or more. If the time is shorter than 20msec, the writing is not completed.
(*2) When the data items except for the position have not been defined, the parameter initial values are written (Refer to the instruction manual for the controller main body).



(18) Brake Forcible Release (BKRL) Signal PLC Output Signal

Turning this signal “ON” can release the brake forcibly.

(19) Operation Mode (RMOD) PLC Output Signal
Operation Mode Status (RMDS) PLC Input Signal

The operation mode is selected with the RMOD signal and the MODE switch located on the front surface of the controller.
Also, which mode is currently set, AUTO or MANU, can be confirmed using the RMDS signal.
The operation modes with the combination of the RMOD signal and the MODE switch ON/OFF are described as follows.

	Controller MODE Switch set to “AUTO”	Controller MODE Switch set to “MANU”
RMOD Signal “OFF” (AUTO Mode Command)	AUTO Mode (RMDS = OFF)	MANU Mode (RMDS = ON)
RMOD Signal “ON” (MANU Mode Command)	MANU Mode (RMDS = ON)	MANU Mode (RMDS = ON)

Note: In MANU mode, the startup of the operation from PLC is not available.

(20) Position/Simplified Direct Value Change-Over (PMOD) PLC Output Signal

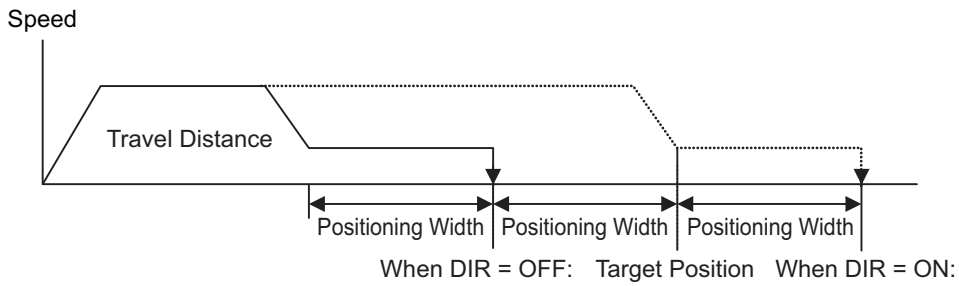
This signal changes over the use of the value registered in the controller position table for the target position in the movement and the use of the value specified in the PLC's target position register.
PMOD = OFF : Using the value register in the Position Table
PMOD = ON : Using the value specified in the Target Position Register

(21) Pressing Setup (PUSH) PLC Output Signal

When the movement command signal is output after this signal is turned ON, the pressing operation is performed.
When this signal is set to “OFF”, the normal positioning operation is performed.
(Refer to Item (2) Operation in Half Direct Value Mode in “3.9 Operation” for the setting timing for this signal).

(22) Pressing Direction Setup (DIR) PLC Output Signal

This signal specifies the pressing direction.
When this signal is turned “OFF”, the pressing operation is performed to the position expressed using the value reducing the positioning width from the target position.
When this signal is turned ON, the pressing operation is performed to the position expressed using the value adding the positioning width to the target position.
In the case of the normal pressing operation, this signal is disabled.
(Refer to Item (2) Operation in Half Direct Value Mode in “3.9 Operation” for the setting timing for this signal).



(23) Pressing and a Miss (PSFL) PLC Input Signal

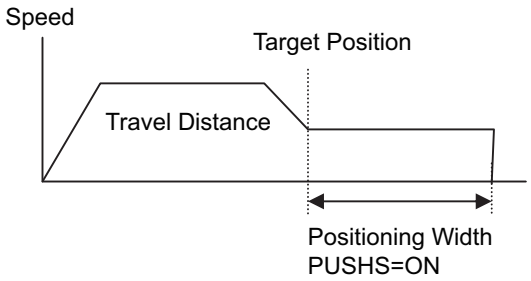
In the case that the pressing operation was performed, and the actuator moved the travel distance set in the controller position table positioning width or set using the PLC's positioning width register, but it was not pushed against the work, this signal is turned “ON”.
(Refer to Item (2) Operation in Half Direct Value Mode in “3.9 Operation” for the setting timing for this signal).

(24) Incremental Command (INC) PLC Output Signal

When the movement command is issued while this signal is turned “ON”, the actuator is moved to the position expressed as the value input in the PLC's target position register based on the current position (Incremental Movement).
When this signal is turned “OFF”, the actuator is moved to the position expressed as the value set in the PLC's target position register.

(25) Under Pressing Operation (PUSHS) PLC Input Signal

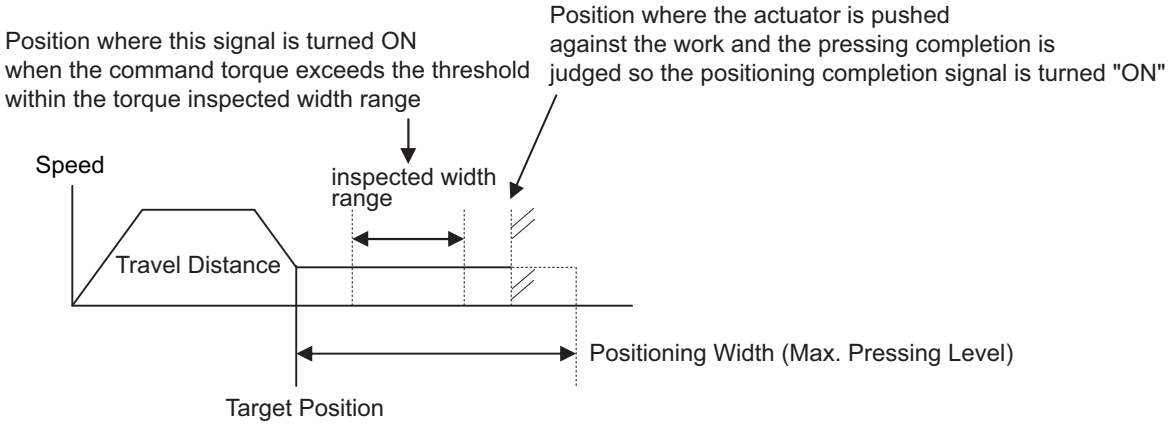
This signal is turned “ON” during the pressing operation.



This signal is turned “OFF” when the pressing and a miss signal or the next movement command signal is output, or the servo-motor is turned “OFF”.
(Refer to Item (2) Operation in Half Direct Value Mode in “3.9 Operation” for the setting timing for this signal).

(26) Load Output Judgment (LOAD) PLC Input Signal PCON Dedicated Function

This signal is available only in the pressing operation.
When this signal is used for pressing-in purpose, it should be know whether if the set load threshold is reached during the pressing operation.
The load threshold and inspected width range are set using the PLC's register. When the command torque (motor current) exceeds the threshold within the inspected width range, this signal is turned “ON”.
This signal judges the load output based on the fact that the command torque excesses the threshold for the specified time period.
This processing procedure is the same as for the pressing judgment. The judgment time period can be changed freely using the parameter No. 50 “Load Output Judgment Time Period”.
This signal is continued until the next movement command is received.

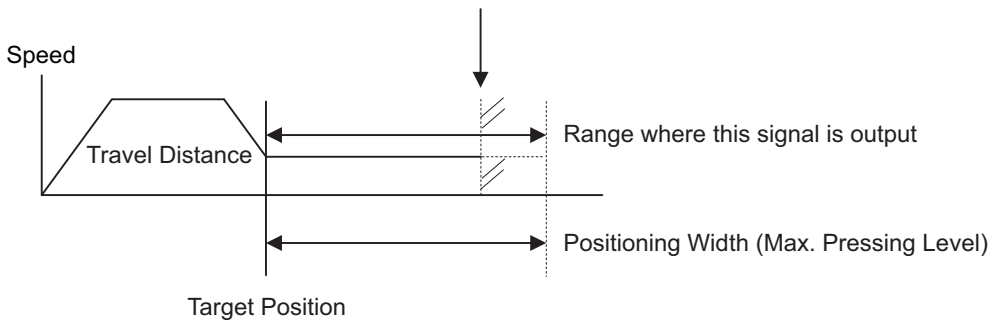


- Set the pressing speed using the parameter No. 34 “Pressing Speed”.
  When the machine is delivered, it has been individually set depending on the actuator characteristics. Set an appropriate speed considering the work material and shape.
- Set the parameter No. 50 “Load Output Judgment Time Period”.
- Set the parameter No. 51 “Torque Inspected Range” to “0” (enabled).
- Set the threshold inspected width using the PLC's Zone Value + Register or Zone Value - Register.
- Set the threshold using the PLC's Load Current Threshold Register.
- Set the positioning width using the PLC's Positioning Width Register.
  Set it a bit longer from the backmost position considering the mechanical dispersion of the work.
  Refer to the instruction manual for the controller for more information.

⚠ Warning:
- If the actuator pushes against the work before the target position, it is regarded as a servo-motor error.
  Take care of the positional relationship between the target position and the work position.
- The actuator continues to push the work with the pressing current at the stop time decided with the current limit value. It is not the stop condition, so take the greatest care to deal with it.

(27) Torque Level (TRQS) PLC Input Signal PCON Dedicated Function

This signal is available only in the pressing operation.
When the motor current reaches the load threshold during the pressing operation (moving up to the positioning width), this signal is turned “ON”.
Because the current level is monitored, when the current level is changed, this signal is turned “ON”.
The speed available for the pressing varies depends on the motor and leads, it is required to adjust the parameters.



- Set the pressing speed using the parameter No. 34 “Pressing Speed”.
  When the machine is delivered, it has been individually set depending on the actuator characteristics.
  Set an appropriate speed considering the work material and shape.
- Set the parameter No. 50 “Load Output Judgment Time Period”.
- Set the parameter No. 51 “Torque Inspected Range” to “1” (enabled).
- Set the threshold inspected width using the PLC's Zone Value + Register or Zone Value - Register.
- Set the threshold using the PLC's Load Current Threshold Register.
- Set the positioning width using the PLC's Positioning Width Register.
  Set it a bit longer from the backmost position considering the mechanical dispersion of the work.
  Refer to the instruction manual for the controller for more information.

⚠ Warning:
- If the actuator pushes against the work before the target position, it is regarded as a servo-motor error.
  Take care of the positional relationship between the target position and the work position.
- The actuator continues to push the work with the pressing current at the stop time decided with the current limit value. It is not the stop condition, so take the greatest care to deal with it.

(28) Stop Control Mode (SMOD) PLC Output Signal PCON Dedicated Function

One of the pulse motor general characteristics is that that the holding current in the stop mode is larger than that for the AC servo-motor. Because of this, when the stop time is longer at the standby position, the measure to reduce the power consumption at the stop mode is taken as one of the energy saving measures.

SMOD = ON: Full Servo Control System is used in the standby condition.

SMOD = OFF: Standby Condition

- Full Servo Control System

  By means of servo control of the pulse motor, the holding current can be reduced.

  The reduction level varies depending on the actuator type or load conditions. However, generally, the holding current will be 1/2 to 1/4.

  The actual holding current can be confirmed in the current monitor window in the personal computer application software.

  Note: Under the condition where any external force is given or depending on the stop position, slight vibration or abnormal noise might be caused.

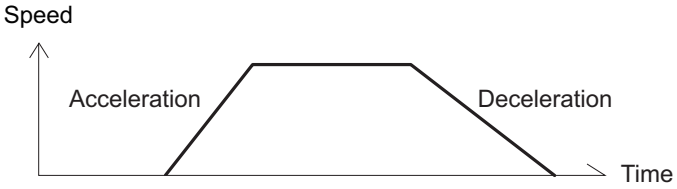
After confirming that there would be no trouble in whole system, use this signal.

(29) Acceleration/Deceleration Mode (MOD1, MOD0) PLC Output Signal ACON Dedicated Function

This signal is used to select the acceleration/deceleration pattern characteristics. Select one of them before the actuator movement command.

MOD1	MOD0	Pattern Name	Remarks
OFF	OFF	Trapezoid Pattern	Set in delivery
OFF	ON	S-shaped Motion	
ON	OFF	First-Order Lag Filter	
ON	ON	Unavailable	

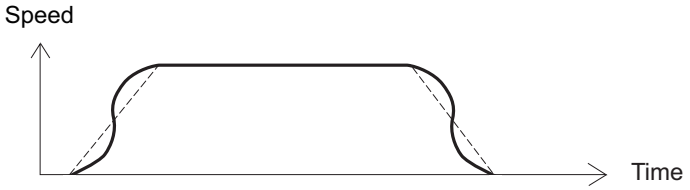
Trapezoid Pattern



* The Acceleration and Deceleration are set in the “Acceleration” and “Deceleration” data boxes on the position data.

S-shaped Motion

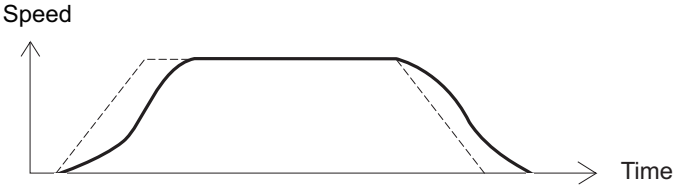
The S-shaped curve is described where at first in the acceleration, the line is gentle, but along the way, it suddenly becomes steep.
Use it in such application that setting the acceleration/deceleration rate high is desired because high tact time is required, but in the movement start or immediately before stop, low acceleration/deceleration rate is favorable.



* The S-shaped motion degree is set using the parameter No. 56 “S-Shaped Motion Ratio Setting”. The setting unit is % and setting range is from “0” to “100”.
(The above figure shows the image graph with the Parameter No. 56 set to “100”.
When it is set to “0”, the S-shaped motion is disabled.
However, note that this setting cannot be reflected to the jog and inching operations performed on a teaching tool such as PC.

First-Order Lag Filter

This describes much gentle acceleration/deceleration curve than that for the linear acceleration/deceleration (trapezoid pattern). Use it when it is not desired to give any slight vibration to the work in acceleration/deceleration operation.



* The first-order lag degree set using the parameter No. 55 “Position Command Primary Filter Time Constant”. The minimum input unit is 0.1msec and setting range is from “0.0” to “100.0”.
When it is set to “0”, the first-order lag filter is disabled.
However, note that this setting cannot be reflected to the jog and inching operations performed on a teaching tool such as PC.

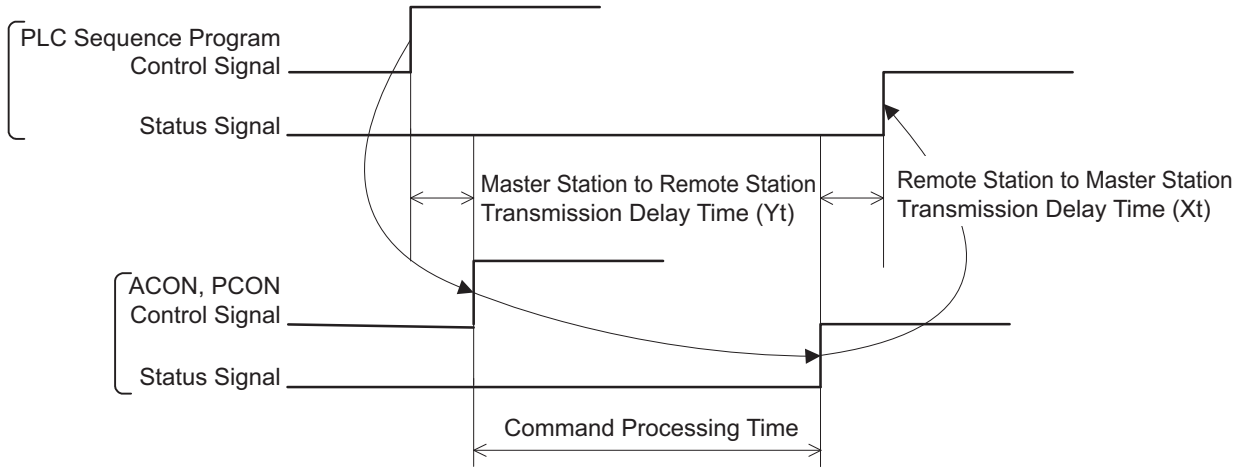
3.8 I/O Signal Timing

When any of the control signal is turned ON to perform the operation of the robot cylinder using the PLC's sequence program, the response (status) is returned to the PLC. The maximum response time is expressed using the following formula.

Max. Response Time (msec) = Yt + Xt + 2 + Command Processing Time (Operation Time, etc.)

Yt: Master Station to Remote I/O Station Transmission Delay Time
Xt: Remote I/O Station to Master Station Transmission Delay Time
} Filed Network Transmission Delay Time

For the Master Station to Remote I/O Station Transmission Delay Time (Yt) and the Remote I/O Station to Master Station Transmission Delay Time (Xt), refer to the instruction manuals for the CC-Link Master Unit and mounted PLC.



3.9 Operation

The timings for the basic operation examples in the Position/Simplified Direct Value Mode, Half Direct Value Mode and Full Direct Value Mode, are described.
For the Remote I/O Mode and Remote I/O Mode 2, refer to the instruction manual for the controller main body. (For the current position and current speed in the Remote I/O Mode, read from the PLC's register from time to time.)

(1) Operation in the Position/Simplified Direct Value Mode

It is operated with the position data written in the PLC's register and the speed, acceleration / deceleration, positioning width and pressing current limit value, etc. set using the position table.

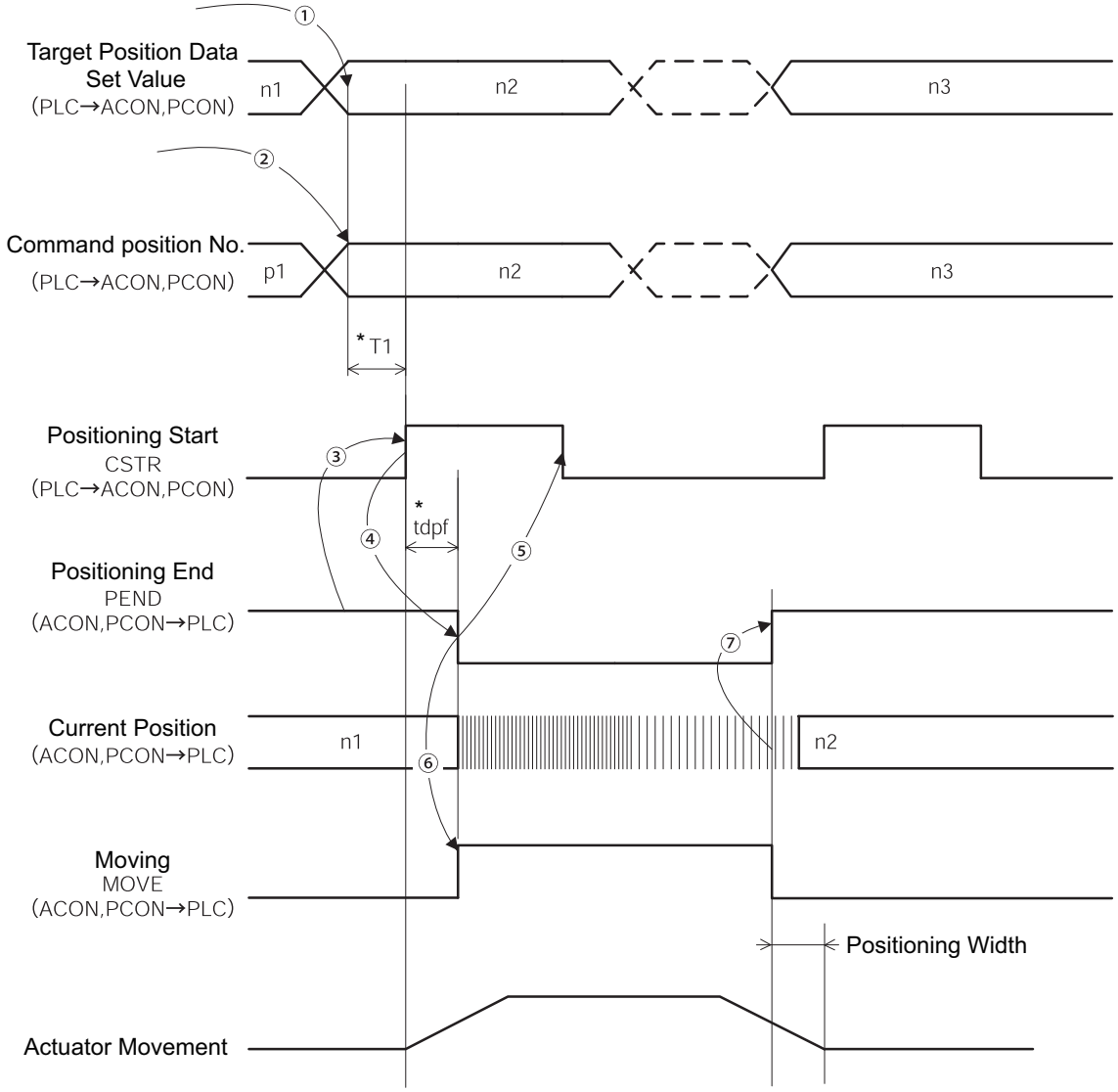
● Operation Example (General Positioning Operation)

(Preparation) Set the position data items (speed, acceleration/deceleration, positioning width, etc) except for the target position item, in the position table.
Turn ON the Position/Simplified Direct Value Change-Over Signal (PMOD).

1) Set the target position data in the target position register.
2) Set the position No. where the speed and acceleration/deceleration, etc., have been set, in the setup position No. register.
3) In the condition where the positioning completion (PEND) signal is turned “ON” or, Under Movement (MOVE) signal is turned “OFF”, turn “ON” the Positioning Start (CSTR) signal.
   The data items set in Steps 1) and 2) are read in the controller at the startup (ON edge) of the CSTR signal.
4) After the CSTR signal is turned “ON”, the PEND signal is turned OFF after tpdf.
5) After confirming that the PEND signal is turned “OFF” or MOVE signal is turned “ON”, turn “OFF” the CSTR signal. Do not change the value in the target position register until the CSRT signal is turned “OFF”.
6) At the same time when the PEND signal is turned “OFF”, the MOVE signal is turned “ON”.
7) The current position data is continuously updated. When the remaining travel distance becomes within the range of the positioning width set in the position data, and the CSTR signal is turned “OFF”, the PEND signal is turned “ON”. Then, the completed position No. is output to the completed position No. register.
   Accordingly, for the read of the completed position No. register when the positioning is completed, confirm it some time (Remaining Travel Distance Movement Time) after the PEND signal is turned “ON”.
   The current position data might be changed slightly even when the system is stopped.
8) The target position data can be changed during the actuator movement.
   In order to change the target position, change the target data and turn ON the CSTR signal after the time longer than the PLC scanning time has passed.
   Change the value for the CSTR signal after the time longer than the PLC scanning time has passed.

● Operation Example (Pressing Operation)

For the pressing operation, the current limit value is set in the pressing data box on the position data at the preparation stage.
When the positioning is performed onto the position No. for which the value is set in the pressing data box, the pressing operation is performed.



*T1: Considering the scanning time of the host controller, set it so that “T1 ≥ 0ms”.

*Yt + Xt ≤ tdpf ≤ Yt + Xt + 2 (msec)

(2) Operation in the Half Direct Value Mode

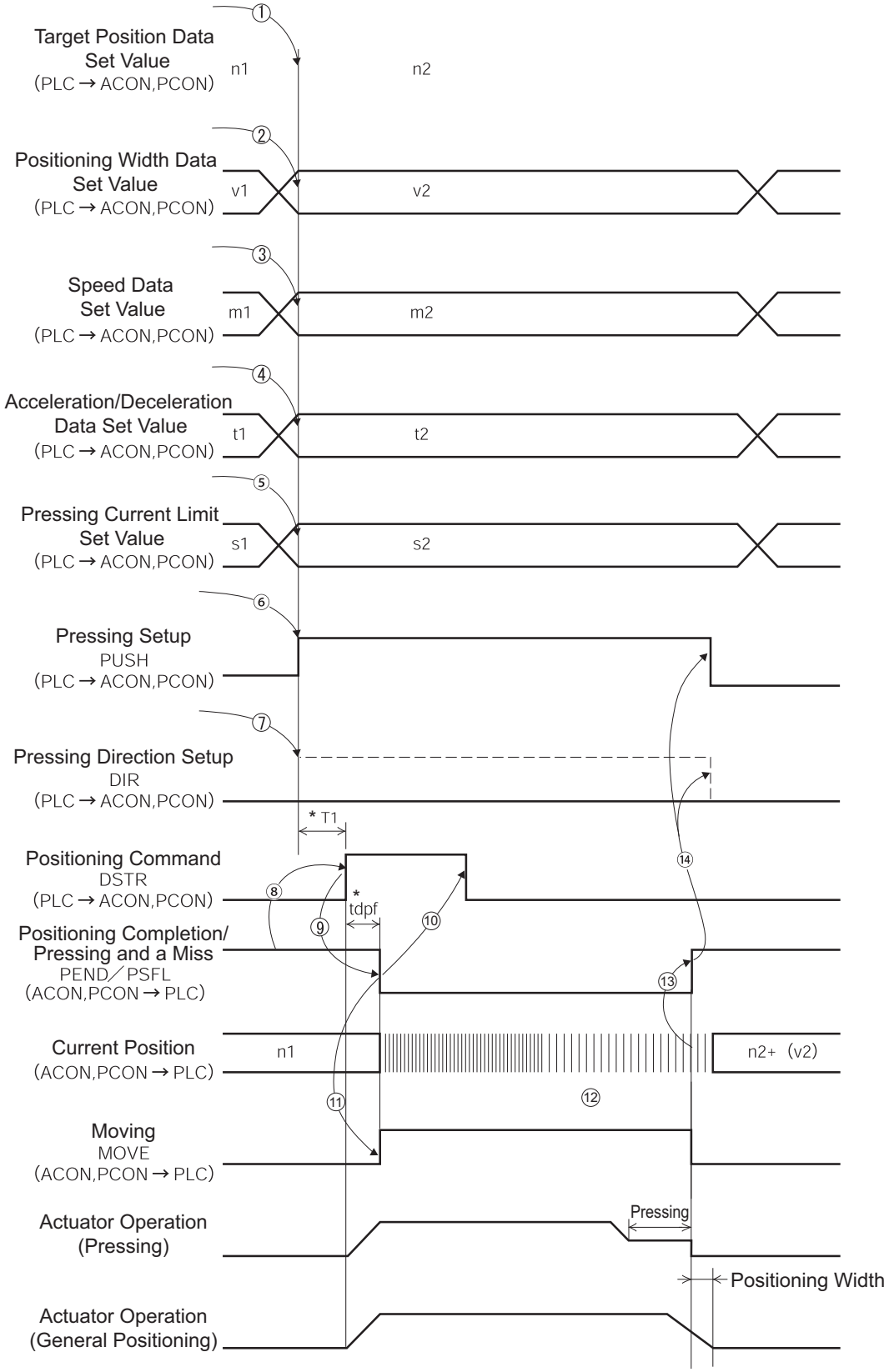
It is operated with the data set in the PLC's target position register, positioning width register, setup speed register, acceleration/deceleration register and pressing current limit setup register.

● Operation Example (Pressing Operation)

1) Set the target position data in the target position register.
2) Set the positioning width data in the positioning width register.
3) Set the speed data in the speed register.
4) Set the acceleration/deceleration data in the acceleration/deceleration register.
5) Set the pressing current limit data in the pressing current limit value register.
6) Turn “ON” the pressing setup (PUSH) signal.
7) Specify the pressing direction using the pressing direction setup (DIR) signal. (Refer to 3.7.7 (22))
8) In the condition where the positioning completion (PEND) signal is turned “ON” or under movement signal (MOVE) is turned “OFF”, turn “ON” the positioning command (DSTR) signal.
   The data items set in Steps 1) through 5) are read in the controller at the startup (ON edge) of the DSTR signal.
9) After the DSTR signal is turned “ON”, the PEND signal is turned “OFF” after tpdf.
10) After confirming that the PEND signal is turned “OFF” or the MOVE signal is turned “ON”, turn “OFF” the DSTR signal. Do not change any value in each register until the DSTR signal has been turned “OFF”.
11) At the same time when the PEND signal is turned “OFF”, the MOVE signal is turned “ON”.
12) The current position data is continuously updated.
13) When the DSTR signal is turned “OFF” and the motor current reaches the current limit value set in Step 5, the PEND signal is turned “ON” (pressing completion).
    Even when the positioning width set in Step 2) is reached, in the case that the current does not reach the motor current limit value set in Step 5), the pressing and a miss (PSFL) signal is turned “ON”. In this case, the PEND signal is not turned “ON” (pressing and a miss).
14) After the PEND signal or PSFL signal is turned “ON”, turn “OFF” the PUSH signal.

● Operation Example (General Positioning Operation)

For the general positioning operation, set the signal in Step 6) to “OFF”.
When the remaining travel distance becomes within the range of the positioning width set in the position data, and the DSTR signal is turned “OFF”, the PEND signal is turned “ON”.



*T1: Considering the scanning time of the host controller, set it so that “T1 ≥ 0ms”.

*Yt + Xt ≤ tdpf ≤ Yt + Xt + 2 (msec)

(3) Operation in the Full Direct Value Mode

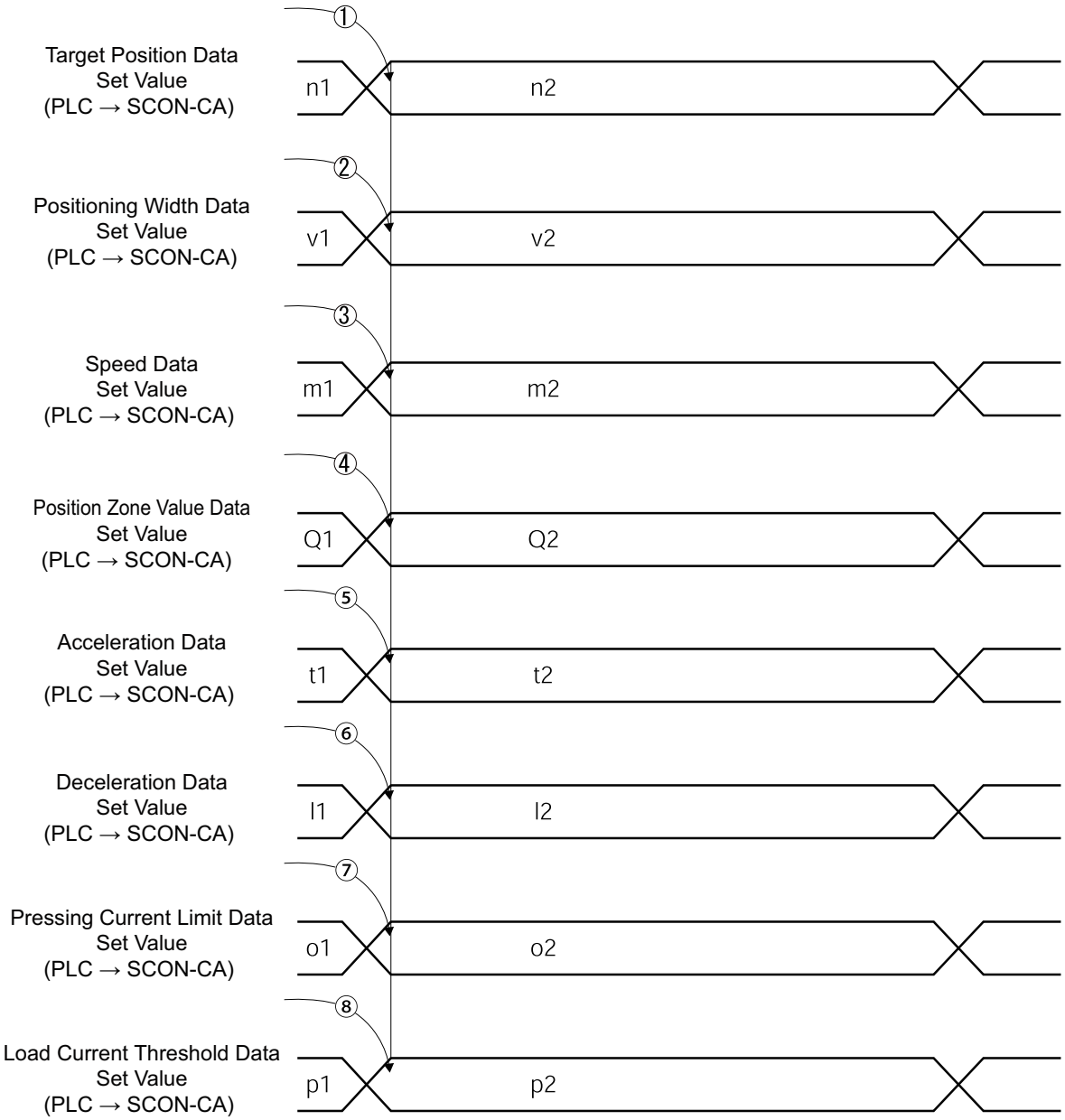
It is operated with all the required data items set in the PLC's registers including the target position register and positioning width register, etc.

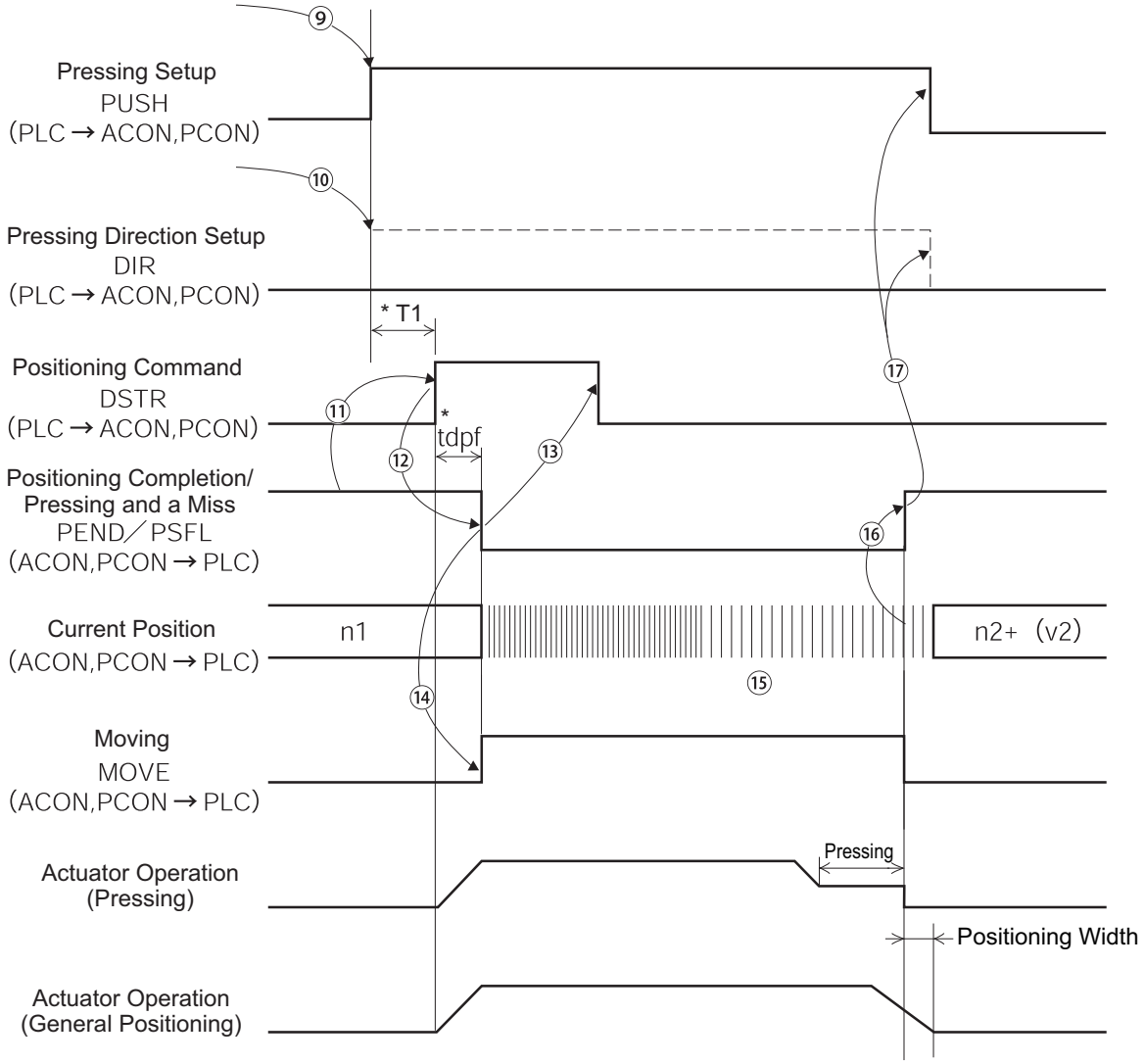
● Operation Example (Pressing Operation)

1) Set the target position data in the target position register.
2) Set the positioning width data in the positioning width register.
3) Set the speed data in the speed register.
4) Set the position zone output value data in the zone value + register and zone value - register.
5) Set the acceleration data in the acceleration register.
6) Set the deceleration data in the deceleration register.
7) Set the pressing current limit data in the pressing current limit value register.
8) Set the load current threshold data in the load current threshold setup register.
9) Turn “ON” the pressing setup (PUSH) signal.
10) Specify the pressing direction using the pressing direction setup (DIR) signal. (Refer to 3.7.7 (22))
11) In the condition where the positioning completion (PEND) signal is turned “ON” or under movement signal (MOVE) is turned “OFF”, turn “ON” the positioning command (DSTR) signal.
    The data items set in Steps 1) through 8) are read in the controller at the startup (ON edge) of the DSTR signal.
12) After the DSTR signal is turned “ON”, the PEND signal is turned “OFF” after tpdf.
13) After confirming that the PEND signal is turned “OFF” or the MOVE signal is turned “ON”, turn “OFF” the DSTR signal. Do not change any value in each register until the DSTR signal has been turned “OFF”.
14) At the same time when the PEND signal is turned “OFF”, the MOVE signal is turned “ON”.
15) The current position data is continuously updated.
16) When the DSTR signal is turned “OFF” and the motor current reaches the current limit value set in Step 7), the PEND signal is turned “ON” (pressing completion).
    Even when the positioning width set in Step 2) is reached, in the case that the current does not reach the motor current limit value set in Step 7), the pressing and a miss (PSFL) signal is turned “ON”. In this case, the PEND signal is not turned “ON” (pressing and a miss).
17) After the PEND signal or PSFL signal is turned “ON”, turn “OFF” the PUSH signal.

● Operation Example (General Positioning Operation)

For the general positioning operation, set the signal in Step 9) to “OFF”.
When the remaining travel distance becomes within the range of the positioning width set in the position data, and the DSTR signal is turned “OFF”, the PEND signal is turned “ON”.


①
Target Position Data
Set Value
(PLC → SCON-CA)
n1
n2
②
Positioning Width Data
Set Value
(PLC → SCON-CA)
v1
v2
③
Speed Data
Set Value
(PLC → SCON-CA)
m1
m2
④
Position Zone Value Data
Set Value
(PLC → SCON-CA)
Q1
Q2
⑤
Acceleration Data
Set Value
(PLC → SCON-CA)
t1
t2
⑥
Deceleration Data
Set Value
(PLC → SCON-CA)
l1
l2
⑦
Pressing Current Limit Data
Set Value
(PLC → SCON-CA)
o1
o2
⑧
Load Current Threshold Data
Set Value
(PLC → SCON-CA)
p1
p2



*T1: Considering the scanning time of the host controller, set it so that “T1≥0ms”.

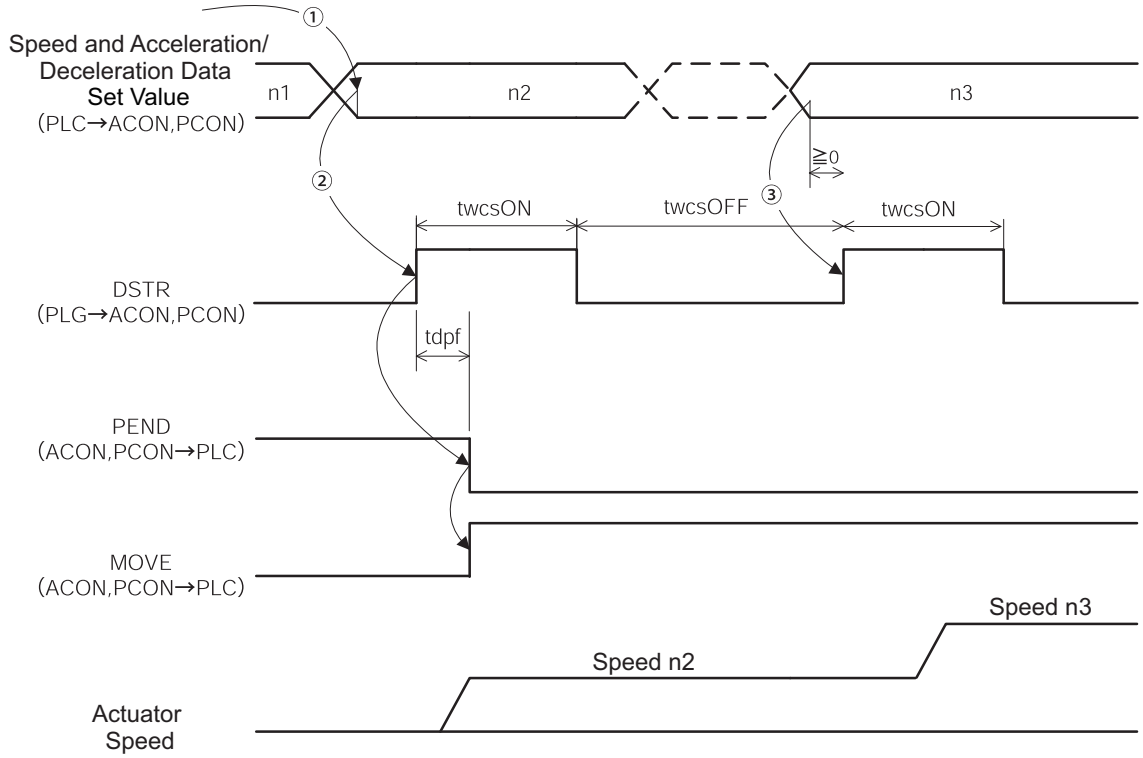
*Yt + Xt ≤ tdpf ≤ Yt + Xt + 2 (msec)

(4) Data Change during the Movement

In the Half Direct Value Mode and the Full Direct Value Mode, the change of any data set using the output data register, out of the target position data, speed data, positioning width, and current limit value during the pressing, during the movement is available. After changing the data, turn “ON” the positioning command (DSTR) for more than tdpf.

Also, after turning “OFF” the DSTR, set aside some time for “twcsON + twcsOFF” or more, until the next DSTR is turned “ON”.

The example is shows as follows, where the speed and acceleration/deceleration data items have been changed.



twcsON ≥ Yt + Xt + 2 (msec)
twcsOFF ≥ Yt + Xt + 2 (msec)
*Yt + Xt ≤ tpdf ≤ Yt + Xt + 2 (msec)

⚠ Caution :
1. When the speed has not been set or it is set to “0”, the actuator is not moved, but an alarm is not issued.
2. When the speed setting is changed to “0” during the movement, the actuator is decelerated and stopped, but an alarm is not issued.
3. Even when the acceleration/deceleration data only is changed during the movement, the setting of the target position data is required.
4. Even when the target position data only is changed during the movement, the setting of the acceleration/deceleration data is required.

3.10 CC-Link Related Parameters

The parameters related to CC-Link are from No. 84 to No. 90.

Classification: C: External Interface Related

No	Classification	Symbol	Name	Unit	Default Value set in the Factory before Delivery
1			Refer to instruction manual for the controller for the parameters No. 1 through No. 83.		
⏐					
83					
84	C	FMOD	Field Bus Operation Mode	—	0
85	C	NADR	Field Bus Node Address	—	1
86	C	FBRS	Filed Bus Communication Speed	Mbps	0
87	C	NTYP	Network Type	—	1
90	C	FMIO	Filed Bus I/O Format	—	3

● Filed Bus Operation Mode (No. 84 “FMOD”)

The operation mode is set using the values 0 to 4 for the parameter No. 84.

Parameter No. 84 Set Value	Mode Name	Station Data and No. of Occupied Stations	Description
0 (Set in delivery)	Remote I/O Mode	Remote Device Station: One Station	The operation is performed using the PIO (24V I/O) through the CC-Link.
1	Position/Simplified Direct Value Mode	Remote Device Station: One Station	The target position can be set directly using the value or the operation can be performed using position data value. The other values required for the operation are set on the position data.
2	Half Direct Value Mode	Remote Device Station: Two Stations	In addition to the target position, the speed, acceleration/deceleration and pressing current value are set directly using the values to perform the operation.
3	Full Direct Value Mode	Remote Device Station: Four Stations	All the values related to the position control are set using the values to perform the operation.
4	Remote I/O Mode 2	Remote Device Station: One Station	The current position and current speed reading functions are added to the functions in the remote I/O mode.

● Field Bus Node Address (No. 85 “NADR”)

The remote station No. is set for the parameter No. 85.

Setting Range: 1 to 64 (When the system is delivered it has been set to “1”).

● Field Bus Communication Speed (No. 86 “FBRS”)

The communication speed is selected for the parameter No. 86.

Parameter No. 86 Set Value	Communication Speed
0 (Set in delivery)	156kbps
1	625kbps
2	2.5Mbps
3	5Mbps
4	10Mbps
Except for the above	Baud Rate Setting Error

● Network Type (No. 87 “NTYP”)
The network module type is set for the parameter No. 87. Do not change the default value.

● Filed Bus I/O Format (No. 90 “FMIO”)
The addresses in PLC are allocated based on each operation mode, in units of 16 points to the I/O bit register and I/O data register corresponding to the station Nos. set in the controller and the number of occupied stations set using the PLC's parameter.
Changing the setting for the parameter No. 90 enables the transmission and receipt of the data within 2 words, exchanging such data in units of byte within the communication domain of the PLC's bit register and I/O data register.

Parameter No. 90 Set Value	Description
0	Data exchange is not performed. The data is transmitted to PLC as they are (Refer to the Example i).
1	The host bytes are exchanged with slave bytes in the host words and slave words (Refer to the Example ii).
2	In the case of word register, the host words are exchanged with the slave words (Refer to the Example iii).
3 (Set in delivery)	The host bytes are exchanged with slave bytes in the host words and slave words. In the case of word register, further the host words are exchanged with the slave words (Refer to the Example iv).

(Example i) : In the case of the Value set to “0”:

● shows ON. ○ shows OFF.

ACON PCON Input register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

⇧

PLC: RWwnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

ACON PCON Output register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

⇩

PLC: RWrnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

(Example ii): In the case of the Value set to “1”:

● shows ON. ○ shows OFF.

ACON PCON Input register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	●	●	○	●	○	○	○	○	○	●	○	○	●	○	●	●	○	○	●	●	○	●	●	○	●	○	●	○	●	●
Data in Hexadecimal Notation	3				4				1				2				C				D				A				B			

PLC: RWwnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

ACON PCON Output register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	●	●	○	●	○	○	○	○	○	●	○	○	●	○	●	●	○	○	●	●	○	●	●	○	●	○	●	○	●	●
Data in Hexadecimal Notation	3				4				1				2				C				D				A				B			

PLC: RWrnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

(Example iii): In the case of the Value set to “2”:

● shows ON. ○ shows OFF.

ACON PCON Input register	1F	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○
Data in Hexadecimal Notation	A				B				C				D				1				2				3				4			

PLC: RWwnn	1F	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

ACON PCON Output register	1F	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○
Data in Hexadecimal Notation	A				B				C				D				1				2				3				4			

PLC: RWrnn	1F	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

(Example iv): In the case of the Value set to “3”:

● shows ON. ○ shows OFF.

ACON PCON Input register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	●	●	○	○	●	●	○	●	●	○	●	○	●	○	●	●	○	○	●	●	○	●	○	○	○	○	○	●	○	○	●	○
Data in Hexadecimal Notation	C				D				A				B				3				4				1				2			

PLC: RWwnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

ACON PCON Output register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	●	●	○	○	●	●	○	●	●	○	●	○	●	○	●	●	○	○	●	●	○	●	○	○	○	○	○	●	○	○	●	○
Data in Hexadecimal Notation	C				D				A				B				3				4				1				2			

PLC: RWrnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

3.11 Troubleshooting

3.11.1 Status LED Indication

With the Status LED (STATUS 0/1) on the front surface of the board, the CC-Link board operation status and network status can be obtained.

When any trouble occurs, confirm the current status with the Status LED illumination patterns. The communication status indications changed with the Status LED illumination patterns are described as follows.

○: Illuminating ●: OFF ◎: Flashing

STATUS 1	STATUS 0	Status Signal
○	○	Impossible condition
○	●	• An error occurs. (CRC error, station No. setting error or communication speed setting error) • Time period from power up or software reset to CC-Link initialization completion
●	○	Normal Communication Status
●	●	Power Failure: Remote station power unit breakdown or communication cable breakage
◎	○	Impossible condition
◎	●	Station No. setting or communication speed setting is changed during the communication.

3.11.2 Alarm Description and Cause/Treatment

When an alarm is issued, the completed position No. (4 bits for PM1 to PM8) shows the simplified alarm code in the Remote I/O Mode or Remote I/O Mode 2.

In the Position/Simplified Direct Value Mode, the simplified alarm code is output to RWr2.

In the Half Direct Value Mode or Full Direct Value Mode, the alarm code is output to RWr6.

1) Confirm the alarm code using the PLC's monitor function, etc., or using the status monitor, connecting the RC personal computer application software or teaching pendant.
2) Based on the read alarm code, search the alarm description list in the instruction manual for the controller.
3) Deal with it based on the description for the alarm code in question.
   For the following alarm code, deal with it according to the following table.

Code	Error Name	ID (*1)	RES (*2)	Cause/Treatment
0F2	Field Bus Module Error	05	×	Cause: The field bus module error is detected. Treatment: Confirm the parameter.
0F3	Field Bus Module Detection Error	04	×	Cause: The module can not be detected. Treatment: Turn ON the power again. If the error is not removed, contact our company.

(*1) ID → Simplified Alarm Code

(*2) RES → Alarm Reset Enable/Disable, ○: Alarm Reset Enable/ ×: Alarm Reset Disable

3.12 CE Marking

If a compliance with the CE Marking is required, please follow Overseas Standards Compliance Manual (ME0287) that is provided separately.

4. SCON-CA

4.1 Operation Modes and Functions

SCON-CA applicable to CC-Link can be operated by means of selecting one mode out of the following nine operation modes.

* Set the Station Data for the Master Station to "ver.1, Remote Device Station".

Operation Modes and Main Functions

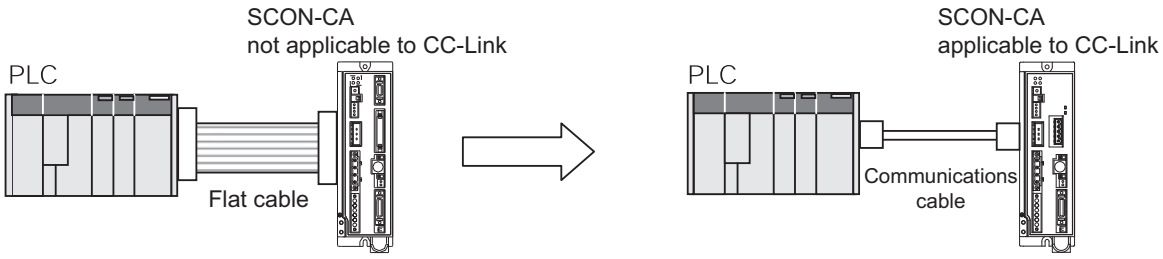
Main Function	Remote I/O Mode(Note 3)	Position / Simplified Direct Value Mode	Half Direct Value Mode	Full Direct Value Mode	Remote I/O Mode 2	Position / Simplified Direct Value Mode 2	Half Direct Value Mode 2	Remote I/O Mode 3	Half Direct Value Mode 3
No. of Occupied Stations	1 Station	1 Station	2 Stations	4 Stations	1 Station	1 Station	2 Stations	1 Station	2 Stations
Position Data Setup Operation	×	○(*1)	○	○	×	○(Note1)	○	×	○
Speed/Acceleration Direct Command	×	×	○	○	×	×	○	×	○
Pressing Operation	○	○	○	○	○	○	○	○	○
Current Position Read	×	○	○	○	○	○	○	○	○
Current Speed Read	×	×	○	○	×	×	○	×	○
Position No. Setup Operation	○	○	×	×	○	○	×	○	×
Completed Position No. Read	○	○	×	×	○	○	×	○	×
No. of Connectable Axes	64	64	—	—	64	64	—	64	—
No. of Max. Position Tables	512	768	Unused	Unused	512	768	Not Applicable	512	Not Applicable
Force Control	△(Note2)	×	×	○	△(Note2)	○	○	○	×
Vibration Control	○	○	×	○	○	○	×	○	○
Servo Gain Changeover	○	○	○	○	○	○	×	○	○

(Note 1) For the position data items except for position data, operate the system with the position No. set up.

(Note 2) It is available when the PIO pattern is set on either 6 or 7.

(Note 3) It cannot be compatible with Remote I/O Mode on SCON-C. (SCON-C: Remote I/O Station, SCON-CA: Remote Device Station)

1) Remote I/O Mode: This is the operation method using CC-Link, instead of PIO (24V I/O).
No. of Occupied Stations: One Station

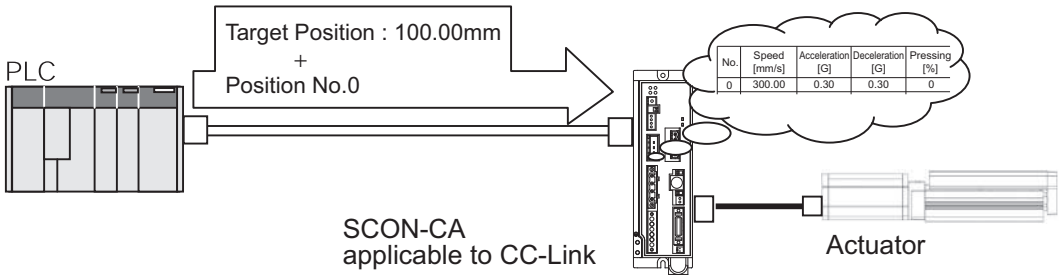


In the case of the connection using PIO

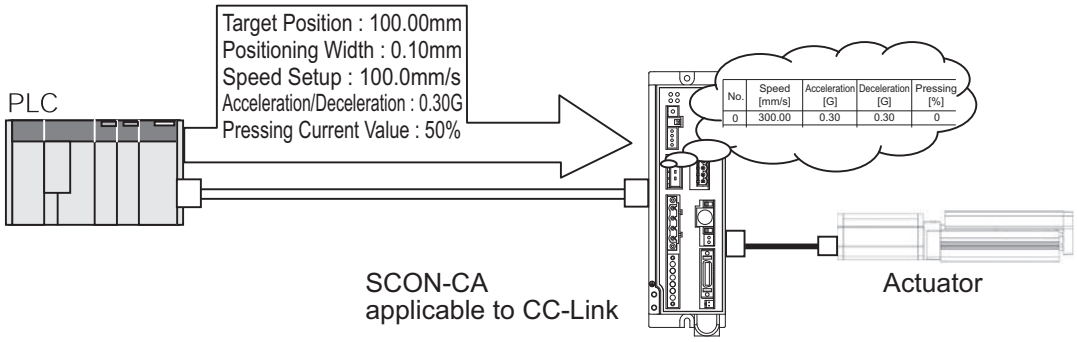
In the case of the connection using CC-Link

⚠ Caution : There is no compatibility with Remote I/O Mode on SCON-C.
(SCON-C : Remote I/O Station, SCON-CA : Remote Device Station)

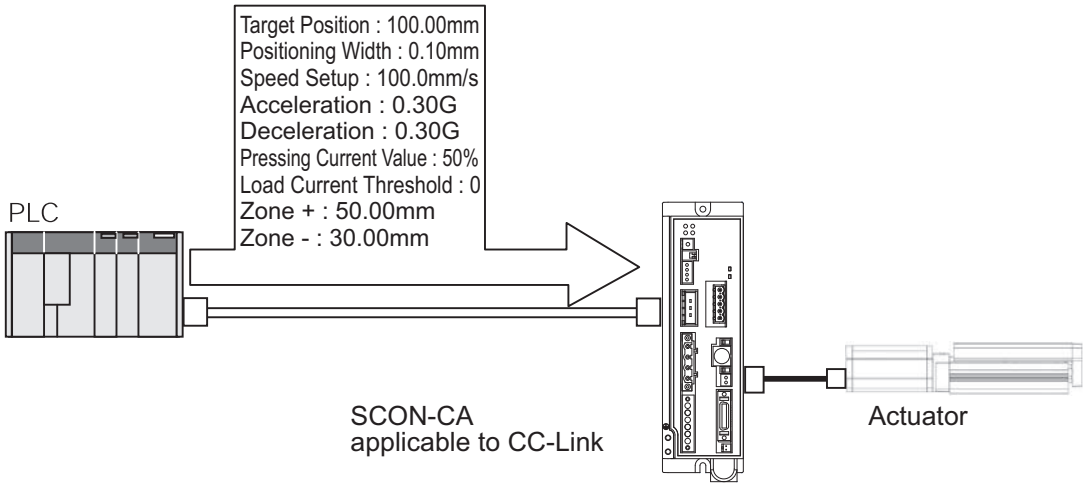
2) Position/Simplified Direct Value Mode: This is the operation method with the position No. set up.
Whether if setup the target position using a value directly by means of the change over of the control signal, or using the value registered on the position data, can be selected.
For “Speed, “Acceleration/Deceleration” and “Positioning Width”, use the values already registered on the position data. The settable No. of position data items is max 768 points.
No. of Occupied Stations: One Station



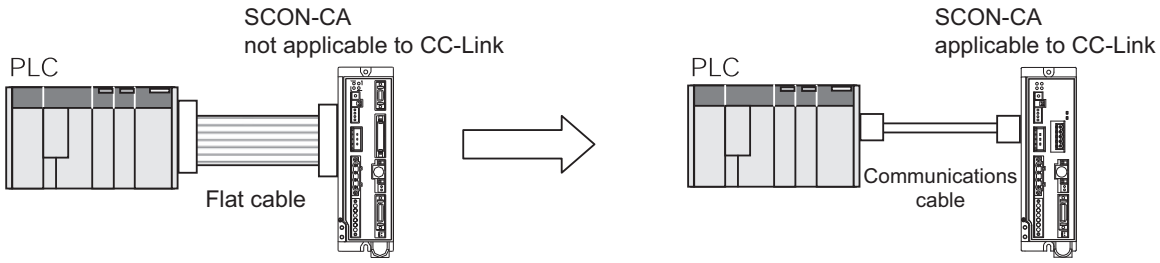
3) Half Direct Value Mode: This is the operation method with the “Speed”, “Acceleration/Deceleration”, “Pressing Current Value” set up directly using the numerical values, in addition to the “Target Position”.
No. of Occupied Stations: Two Stations



4) Full Direct Value Mode: This is the operation method with all the values ("Target Position", "Speed", "Acceleration/Deceleration", etc.) related to the position control set up directly using the numerical values.
No. of Occupied Stations: Four Stations



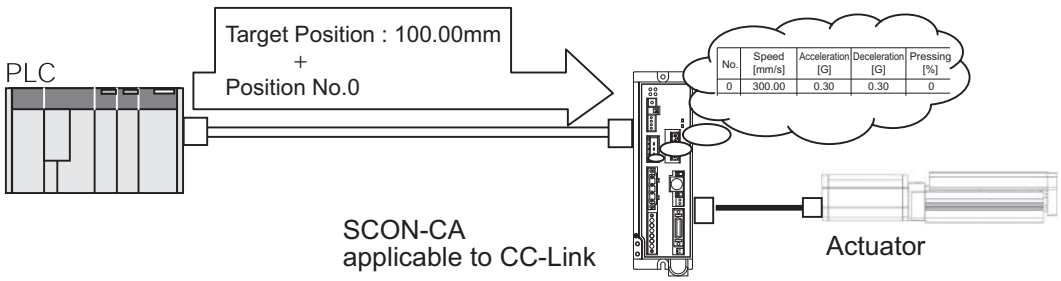
5) Remote I/O Mode 2: This is the operation method using CC-Link, instead of PIO (24V I/O).
The current position and command current value reading functions are added to the functions of (1).
No. of Occupied Stations: One Station



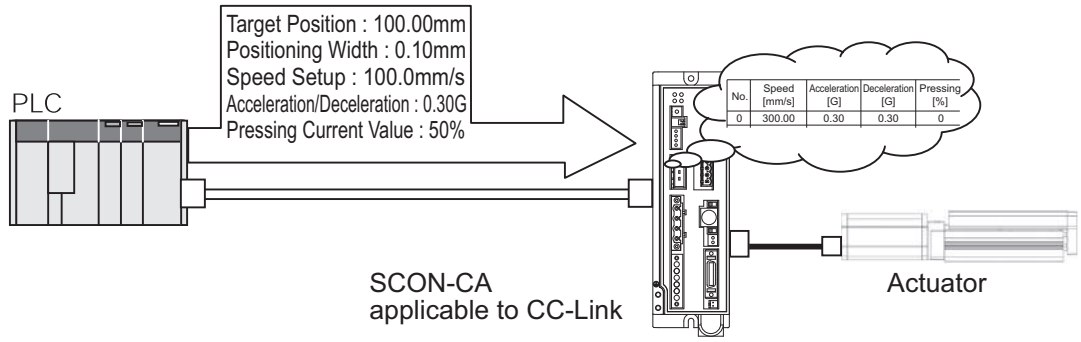
In the case of the connection using PIO

In the case of the connection using CC-Link

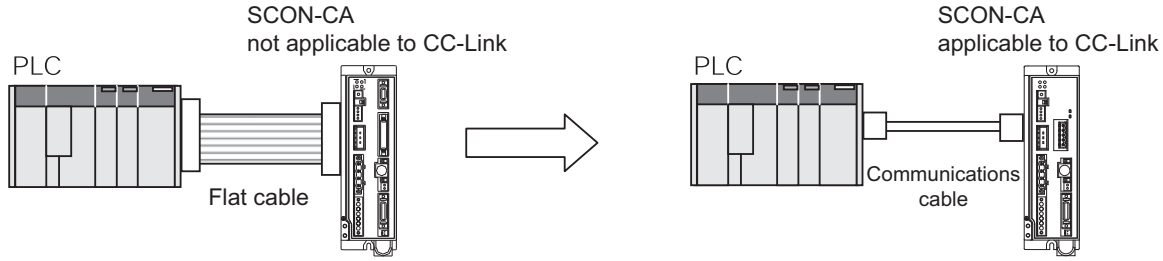
6) Position/Simplified Direct Value Mode 2: This is the operation method with the position No. set up.
This is a mode that provides the force control function instead of teaching and zone functions in 2).
No. of Occupied Stations: One Station



7) Half Direct Value Mode 2: This is the operation method with the “Speed”, “Acceleration/Deceleration”, “Pressing Current Value” set up directly using the numerical values, in addition to the “Target Position”.
This mode can read loadcell data instead of reading the command current in 3).
Also, this mode complies with the force control function.
No. of Occupied Stations: Two Stations



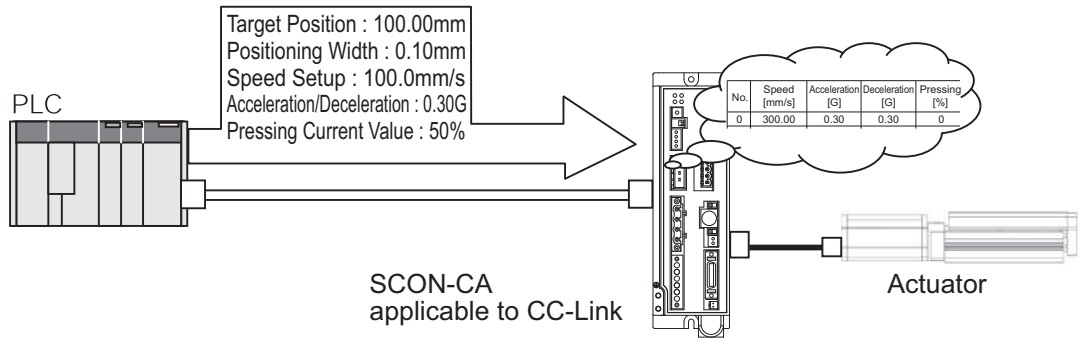
8) Remote I/O Mode 3: This is the operation method using CC-Link, instead of PIO (24V I/O).
This is a mode that the reading functions of the current position and loadcell data are added to the functions in 1).
No. of Occupied Stations: One Station



In the case of the connection using PIO

In the case of the connection using CC-Link

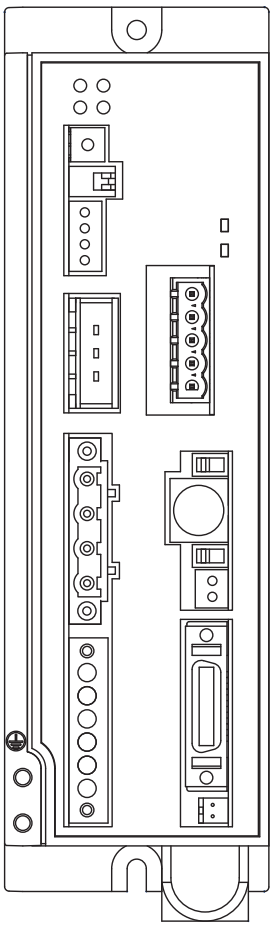
9) Half Direct Value Mode 3: This is the operation method with the “Speed”, “Acceleration/Deceleration”, “Pressing Current Value” set up directly using the numerical values, in addition to the “Target Position”.
This is a mode that complies with the anti-vibration control function instead of jog function in 3).
No. of Occupied Stations: Two Stations



4.2 Model No.

The model of SCON-CA which complies with CC-Link is shown as stated below:

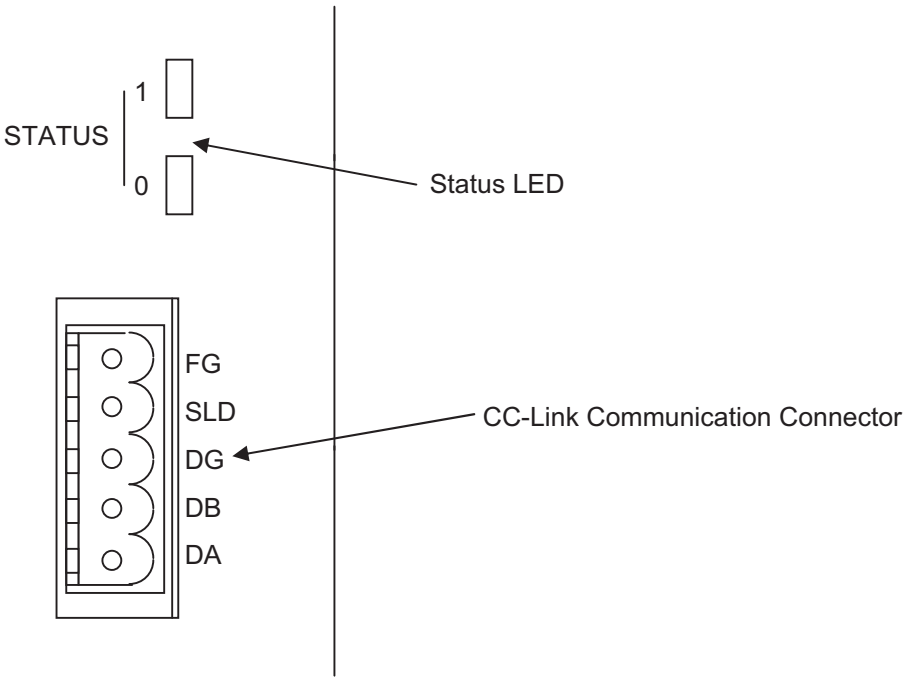
● SCON-CA-□-CC-□



4.3 CC-Link Interface

(1) Names of Each Section

The names of each section related to CC-Link are described as follows.



(2) Status LED Indication

The board operation status and network condition are obtained with the two LEDs located in the front of the controller.

LED	Color	Indication Status	Indication Description (Meaning)
STATUS1	OR	Illuminating	• An error occurs. (CRC Error/Station No. (parameters) Setting Error/Baud Rate Setting (parameters) Error) • Period between power up or software reset and the CC-Link initialization completion
		OFF	• Under Normal Communication
		Flashing	• Station No. setting or communication speed setting is changed during the communication.
STATUS0	GN	Illuminating	• Communicating normally
		OFF	• Not communicating

4.4 Operation Mode Selection (Setting)

The operation mode is set using the parameters.

Set the mode toggle switch on the front surface of the controller to “MANU” side and set the parameter No. 84 “FMOD: Field Bus Operation Mode” using the personal computer application software (V8.00.00.00 or later) (Refer to “4.10 CC-Link Related Parameters”).

Set Value	Operation Mode	Number of occupied stations
0: (Already set in system delivery)	Remote I/O Mode	1 Station
1	Position/Simplified Direct Value Mode	1 Station
2	Half Direct Value Mode	2 Stations
3	Full Direct Value Mode	4 Stations
4	Remote I/O Mode 2	1 Station
5	Position/Simplified Direct Value Mode 2	1 Station
6	Half Direct Value Mode 2	2 Stations
7	Remote I/O Mode 3	1 Station
8	Half Direct Value Mode 3	2 Stations

* Entering any value except for the ones described above will cause an “Excessive Input Value Error”.

Note: Set the Station Data for the Master Station to “ver.1 Remote Device Station”.

4.5 Station No. Setting

The Station No. is set using the parameters.

Set the parameter No. 85 “NADR: Field Bus Node Address” using the RC personal computer application software.

(Refer to “4.10 CC-Link Related Parameters”).

Settable Range: 1 to 64 (Already set in system delivery)

Note: The PLC's CC-Link head I/O address is decided depending on the master unit installation position and the number of I/O points occupied by the unit installed before it.
Following this head I/O address, the I/O addresses in PLC are allocated in order of the station No.
Also, for the details of the Station No. setting and I/O address setting in PLC, refer to the instruction manuals for the master unit and loaded PLC.

4.6 Communication Speed Setting

The communication speed is set using the parameters.

Set the parameter No. 86 “FBRS: Filed Bus Communication Speed” using the RC personal computer application software.

(Refer to “4.10 CC-Link Related Parameters”).

Set Value	Communication Speed
0: (Already set in system delivery)	156kbps
1	625kbps
2	2.5Mbps
3	5Mbps
4	10Mbps

* Entering any value except for the ones described above will cause an “Excessive Input Value Error”.

Note: After the parameter setting, turn on the power to the controller again and return the mode toggle switch on the front of the controller to “AUTO” side.
When the switch is set to “MANU”, the operation using PLC is not available.

4.7 Communication with the Master Station

The remote device station consists of 2 words for each I/O point and 4 words for the remote I/O data register per station.

Set the station data for the master station to the number of stations setup in the operation mode for each station No.

4.7.1 Each Operation Mode and Corresponding Allocated PLC Addresses

The addresses allocated for each operation mode are described as follows.

• PLC Output → SCON-CA Input (* “n” shows the head register address per each axis).

PLC address	SCON-CA DI and Input data register				
	Remote I/O mode	Position/Simplified Direct Value Mode	Half Direct Value Mode	Full Direct Value Mode	Remote I/O mode 2
	Number of occupied stations: 1 Station	Number of occupied stations: 1 Station	Number of occupied stations: 2 Stations	Number of occupied stations: 4 Stations	Number of occupied stations: 1 Station
RY n0 – nF	Port No.0 – 15	Occupied Domain	Occupied Domain	Occupied Domain	Port No.0 – 15
RY (n+1)0 – (n+1)F	System Domain	System Domain			System Domain
RY (n+2)0 – (n+2)F					
RY (n+3)0 – (n+3)F					
RY (n+4)0 – (n+4)F					
RY (n+5)0 – (n+5)F					
RY (n+6)0 – (n+6)F					
RY (n+7)0 – (n+7)F				System Domain	
RWw (n+0)	Occupied Domain	Target Position	Target Position	Target Position	Occupied Domain
RWw (n+1)					
RWw (n+2)		Command position number	Positioning Width	Positioning Width	
RWw (n+3)		Control Signal			
RWw (n+4)			Speed	Speed	
RWw (n+5)			Acceleration/ Deceleration		
RWw (n+6)			Pressing Current Limit Value	Zone Value “+”	
RWw (n+7)			Control signal		
RWw (n+8)				Zone Value “-”	
RWw (n+9)					
RWw (n+A)				Acceleration	
RWw (n+B)				Deceleration	
RWw (n+C)				Pressing Current Limit Value	
RWw (n+D)				Load Current Threshold	
RWw (n+E)				Control signal 1	
RWw (n+F)				Control signal 2	

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.

The System Domain stands for the system domain of the remote device station.

These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

• PLC Output → SCON-CA Input (* “n” shows the head register address per each axis).

PLC address	SCON-CA DI and Input data register			
	Position/Simplified Direct Value Mode 2	Half Direct Value Mode 2	Remote I/O mode 3	Half Direct Value Mode 3
	Number of occupied stations: 1 Station	Number of occupied stations: 2 Stations	Number of occupied stations: 1 Station	Number of occupied stations: 2 Stations
RY n0 – nF	Occupied Domain	Occupied Domain	Port No.0 – 15	Occupied Domain
RY (n+1)0 – (n+1)F	System Domain		System Domain	
RY (n+2)0 – (n+2)F				
RY (n+3)0 – (n+3)F		System Domain		System Domain
RY (n+4)0 – (n+4)F				
RY (n+5)0 – (n+5)F				
RY (n+6)0 – (n+6)F				
RY (n+7)0 – (n+7)F				
RWw (n+0)	Target Position	Target Position	Occupied Domain	Target Position
RWw (n+1)				
RWw (n+2)	Command position number	Positioning Width		Positioning Width
RWw (n+3)	Control Signal			
RWw (n+4)		Speed		Speed
RWw (n+5)		Acceleration/ Deceleration		Acceleration/ Deceleration
RWw (n+6)		Pressing Current Limit Value		Pressing Current Limit Value
RWw (n+7)		Control signal		Control signal
RWw (n+8)				
RWw (n+9)				
RWw (n+A)				
RWw (n+B)				
RWw (n+C)				
RWw (n+D)				
RWw (n+E)				
RWw (n+F)				

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

• SCON-CA Output → PLC Input side (* “n” shows the head register address per each axis).

PLC address	SCON-CA side DI and Input data register				
	Remote I/O mode	Position/Simplified Direct Value Mode	Half Direct Value Mode	Full Direct Value Mode	Remote I/O mode 2
	Number of occupied stations: 1 Station	Number of occupied stations: 1 Station	Number of occupied stations: 2 Stations	Number of occupied stations: 4 Stations	Number of occupied stations: 1 Station
RY n0 – nF	Port No.0 – 15	Occupied Domain	Occupied Domain	Occupied Domain	Port No.0 – 15
RY (n+1)0 – (n+1)F	System Domain	System Domain			System Domain
RY (n+2)0 – (n+2)F					
RY (n+3)0 – (n+3)F			System Domain		
RY (n+4)0 – (n+4)F					
RY (n+5)0 – (n+5)F					
RY (n+6)0 – (n+6)F					
RY (n+7)0 – (n+7)F				System Domain	
RWw (n+0)	Occupied Domain	Current Position	Current Position	Current Position	Current Position
RWw (n+1)					
RWw (n+2)		Completed Position No. (Simplified Alarm ID)	Command Current	Command Current	Command Current
RWw (n+3)		Status Signal			
RWw (n+4)			Current Speed	Current Speed	
RWw (n+5)					
RWw (n+6)			Alarm code	Alarm code	
RWw (n+7)			Status Signal	Occupied Domain	
RWw (n+8)				Force Feedback Data	
RWw (n+9)					
RWw (n+A)				Occupied Domain	
RWw (n+B)					
RWw (n+C)					
RWw (n+D)					
RWw (n+E)				Status Signal 1	
RWw (n+F)				Status Signal 2	

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

• SCON-CA Output → PLC Input side (* “n” shows the head register address per each axis).

PLC address	SCON-CA side DO and Output data register			
	Position/Simplified Direct Value Mode 2	Half Direct Value Mode 3	Remote I/O mode 2	Half Direct Value Mode 3
	Number of occupied stations: 1 Station	Number of occupied stations: 2 Stations	Number of occupied stations: 4 Stations	Number of occupied stations: 1 Station
RY n0 – nF	Occupied Domain	Occupied Domain	Port No.0 – 15	Occupied Domain
RY (n+1)0 – (n+1)F	System Domain		System Domain	
RY (n+2)0 – (n+2)F				
RY (n+3)0 – (n+3)F		System Domain		System Domain
RY (n+4)0 – (n+4)F				
RY (n+5)0 – (n+5)F				
RY (n+6)0 – (n+6)F				
RY (n+7)0 – (n+7)F				
RWw (n+0)	Current Position	Current Position	Current Position	Current Position
RWw (n+1)				
RWw (n+2)	Completed Position No. (Simplified Alarm ID)	Force Feedback Data	Force Feedback Data	Command Current
RWw (n+3)	Status Signal			
RWw (n+4)		Current Speed		Current Speed
RWw (n+5)				
RWw (n+6)		Alarm code		Alarm code
RWw (n+7)		Status Signal		Status Signal
RWw (n+8)				
RWw (n+9)				
RWw (n+A)				
RWw (n+B)				
RWw (n+C)				
RWw (n+D)				
RWw (n+E)				
RWw (n+F)				

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

4.7.2Remote I/O Mode (Remote Device Station: No. of Occupied Stations: One Station)

This is the operation mode with the position No. set up as the same as using PIO (24V I/O). Set the position data using the teaching tool such as the personal computer application software for RC. The number of operable positions varies depending on the parameter No. 25 “PIO Pattern” setting.

The I/O specifications for the PIO pattern are described as follows (Refer to instruction manual for the controller main body for more information).

Parameter No.25 Set Value	Operation Mode	I/O Specifications
0	Positioning mode	64 positioning points and 2 zone output points
1	Teaching mode	64 positioning points and 1 zone output point The positioning and jog operations are available. The current position can be written on the setup position data.
2	256 point mode	256 positioning points and 1 zone output point
3	512 point mode	512 positioning points and no zone output point
4	Electromagnetic valve mode 1	7 positioning points and 2 zone output points The direct operation command is available for each position No. The positioning completion signal is output for each position No.
5	Electromagnetic valve mode 2	3 positioning points and 2 zone output points It is operated with the Forward/Backward/Intermediate Position Commands. The positioning completion signal is output individually for each Forward End/Backward End/Intermediate Positions.
6	Force control mode 1 (requires dedicated loadcell)	32 positioning points and 1 zone output points
7	Force control mode 2 (requires dedicated loadcell)	5 positioning points and 1 zone output points The direct operation command is available for each position No. The positioning completion signal is output for each position No.

The actuator's effective main functions that can be controlled using this mode, are as shown in the following table.

Actuator Function	PIO Pattern							
	0: Positioning mode	1: Teaching mode	2: 256 point mode	3: 512 point mode	4: Electromagnetic valve mode 1	5: Electromagnetic valve mode 2	6: Force control mode 1	7: Force control mode 2
Homing	○	○	○	○	○	×	○	○
Positioning	○	○	○	○	○	○	○	○
Speed, Acceleration and Deceleration Settings	○	○	○	○	○	○	○	○
Pitch Feeding (Inching)	○	○	○	○	○	○	○	○
Pressing Operation	○	○	○	○	○	×	○	○
Speed change during the movement	○	○	○	○	×	○	○	×
Different Acceleration Speed, Operation in Deceleration	○	○	○	○	○	○	○	○
Pause	○	○	○	○	○	○(*1)	○	○
Zone Signal Output	○	○	○	×	○	○	○	○
PIO Pattern Selection (Set using the parameters)	○	○	○	○	○	○	○	○

○: Operation Available ×: Operation Unavailable

(*1) It is available when the parameter No. 27 “Movement Command Type” is set to “0”. Turning “OFF” the “Movement Command” can stop the system temporarily.

(1) PLC Address Composition (* “n” shows the head register address for each axis).

Parameter No.84	SCON-CA side DI (Port No.)	PLC side	SCON-CA side DO (Port No.)	PLC side
0	0 to 15	RY n0 to nF	0 to 15	RX n0 to nF
	System Domain	RY (n+1)0 to (n+1)F	System Domain	RX (n+1)0 to (n+1)F
	Occupied Domain	RWw (n+0)	Occupied Domain	RWr (n+0)
		RWw (n+1)		RWr (n+1)
		RWw (n+2)		RWr (n+2)
		RWw (n+3)		RWr (n+3)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signals for each axis consists of 1 word for each I/O bit register.

- The I/O bit register is controlled using the ON/OFF signal in units of bit.

PLC Output (* “n” shows the head register address per each axis).

Address	one word = 16 bits															
RY (n+0)	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Controller Input Port No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

PLC Input (* “n” shows the head register address per each axis).

Address	one word = 16 bits															
RX (n+0)	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Controller Output Port No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

(3) I/O Signal Allocation

The controller's I/O port signal varies depending on the parameter No. 25 setting.
(Refer to instruction manual for the controller main body for more information).

		Parameter No. 25 setting					
		Positioning mode		Teaching mode		256point mode	
		0		1		2	
Classification	Port No.	Signal Names	Symbol	Signal Names	Symbol	Signal Names	Symbol
PLC Output→ SCON-CA Input	0	Command position No.	PC1	Command position No.	PC1	Command position No.	PC1
	1		PC2		PC2		PC2
	2		PC4		PC4		PC4
	3		PC8		PC8		PC8
	4		PC16		PC16		PC16
	5		PC32		PC32		PC32
	6	Unavailable	—	Teaching Mode Command	MODE		PC64
	7		—	Jog/Inching selection	USL		PC128
	8		—	+ Jog	JOG+	Unavailable	—
	9	Forced brake release	BKRL	- Jog	JOG-	Forced brake release	RKRL
	10	Operation mode	RMOD	Operation mode	RMOD	Operation mode	RMOD
	11	Return to origin	HOME	Return to origin	HOME	Return to origin	HOME
	12	Pause	*STP	Pause	*STP	Pause	*STP
	13	Positioning Start	CSTR	Positioning Start/ Position Data Import Command	CSTR/ PWRT	Positioning Start	CSTR
	14	Reset	RES	Reset	RES	Reset	RES
	15	Servo ON Command	SON	Servo ON Command	SON	Servo ON Command	SON
SCON-CA Output →PLC Input	0	Completion position No.	PM1	Completion position No.	PM1	Completion position No.	PM1
	1		PM2		PM2		PM2
	2		PM4		PM4		PM4
	3		PM8		PM8		PM8
	4		PM16		PM16		PM16
	5		PM32		PM32		PM32
	6	Moving Signal	MOVE	Moving Signal	MOVE		PM64
	7	Zone 1	ZONE1	Teaching Mode Signal	MODES		PM128
	8	Position zone status	PZONE	Position zone status	PZONE	Position zone status	PZONE
	9	Operation Mode Status	RMDS	Operation Mode Status	RMDS	Operation Mode Status	RMDS
	10	Return to origin end	HEND	Return to origin end	HEND	Return to origin end	HEND
	11	Positioning end Signal	PEND	Positioning end Signal/ Position Data Import Completion	PEND/ WEND	Positioning end Signal	PEND
	12	Operation preparation end	SV	Operation preparation end	SV	Operation preparation end	SV
	13	Emergency stop	*EMGS	Emergency stop	*EMGS	Emergency stop	*EMGS
	14	Alarm	*ALM	Alarm	*ALM	Alarm	*ALM
	15	Battery Alarm	*BALM	Battery Alarm	*BALM	Battery Alarm	*BALM

The symbol with a * mark shows the ON signal in normal condition.

The signals describing as “Unavailable” are not controlled. (ON/OFF is undefined).

		Parameter No. 25 setting					
		512 point mode		Electromagnetic valve mode 1		Electromagnetic valve mode 2	
		3		4		5	
Classification	Port No.	Signal Names	Symbol	Signal Names	Symbol	Signal Names	Symbol
PLC Output→ SCON-CA Input	0	Command position No.	PC1	Start position 0	ST0	Start position 0	ST0
	1		PC2	Start position 1	ST1	Start position 1	ST1
	2		PC4	Start position 2	ST2	Start position 2	ST2
	3		PC8	Start position 3	ST3	Unavailable	—
	4		PC16	Start position 4	ST4		—
	5		PC32	Start position 5	ST5		—
	6		PC64	Start position 6	ST6		—
	7		PC128	Unavailable	—		—
	8		PC256		—		—
	9	Forced brake release	BKRL	Forced brake release	BKRL	Forced brake release	BKRL
	10	Operation mode	RMOD	Operation mode	RMOD	Operation mode	RMOD
	11	Return to origin	HOME	Return to origin	HOME	Unavailable	—
	12	Pause	*STP	Pause	*STP		—
	13	Positioning Start	CSTR	Positioning Start	—		—
	14	Reset	RES	Reset	RES	Reset	RES
	15	Servo ON Command	SON	Servo ON Command	SON	Servo ON Command	SON
SCON-CA Output →PLC Input	0	Completion position No.	PM1	Completed position 0	PE0	Retracting end movement command 0	LS0
	1		PM2	Completed position 1	PE1	Retracting end movement command 1	LS1
	2		PM4	Completed position 2	PE2	Retracting end movement command 2	LS2
	3		PM8	Completed position 3	PE3	Unavailable	—
	4		PM16	Completed position 4	PE4		—
	5		PM32	Completed position 5	PE5		—
	6		PM64	Completed position 6	PE6		—
	7		PM128	Zone 1	ZONE1	Zone 1	ZONE1
	8		PM256	Position zone status	PZONE	Position zone status	PZONE
	9	Operation Mode Status	RMDS	Operation Mode Status	RMDS	Operation Mode Status	RMDS
	10	Return to origin end	HEND	Return to origin end	HEND	Return to origin end	HEND
	11	Positioning end Signal	PEND	Positioning end Signal	PEND	Unavailable	—
	12	Operation preparation end	SV	Operation preparation end	SV	Operation preparation end	SV
	13	Emergency stop	*EMGS	Emergency stop	*EMGS	Emergency stop	*EMGS
	14	Alarm	*ALM	Alarm	*ALM	Alarm	*ALM
	15	Battery Alarm	*BALM	Battery Alarm	*BALM	Battery Alarm	*BALM

The symbol with a * mark shows the ON signal in normal condition.

The signals describing as “Unavailable” are not controlled. (ON/OFF is undefined).

		Parameter No. 25 setting			
		Force Control Mode 1		Force Control Mode 2	
		6		7	
Classification	Port No.	Signal Names	Symbol	Signal Names	Symbol
PLC Output→ SCON-CA Input	0	Command position No.	PC1	Start position 0	ST0
	1		PC2	Start position 1	ST1
	2		PC4	Start position 2	ST2
	3		PC8	Start position 3	ST3
	4		PC16	Start position 4	ST4
	5	Unavailable	—	Unavailable	—
	6		—		—
	7		—		—
	8	Loadcell Calibrarion Command	CLBR	Loadcell Calibrarion Command	CLBR
	9	Forced brake release	BKRL	Forced brake release	BKRL
	10	Operation mode	RMOD	Operation mode	RMOD
	11	Return to origin	HOME	Return to origin	HOME
	12	Pause	*STP	Pause	*STP
	13	Positioning Start	CSTR	Unavailable	—
	14	Reset	RES	Reset	RES
	15	Servo ON Command	SON	Servo ON Command	SON
SCON-CA Output →PLC Input	0	Completion position No.	PM1	Completed position 0	PE0
	1		PM2	Completed position 1	PE1
	2		PM4	Completed position 2	PE2
	3		PM8	Completed position 3	PE3
	4		PM16	Completed position 4	PE4
	5	Torque Level Status	TRQS	Torque Level Status	TRQS
	6	Load Output Judgment	LOAD	Load Output Judgment Status	LOAD
	7	Loadcell Calibration Complete	CEND	Loadcell Calibration Complete	CEND
	8	Position zone status	PZONE	Position zone status	PZONE
	9	Operation Mode Status	RMDS	Operation Mode Status	RMDS
	10	Return to origin end	HEND	Return to origin end	HEND
	11	Positioning end Signal	PEND	Positioning end Signal	PEND
	12	Operation preparation end	SV	Operation preparation end	SV
	13	Emergency stop	*EMGS	Emergency stop	*EMGS
	14	Alarm	*ALM	Alarm	*ALM
	15	Battery Alarm	*BALM	Battery Alarm	*BALM

The symbol with a * mark shows the ON signal in normal condition.

The signals describing as “Unavailable” are not controlled. (ON/OFF is undefined).

4.7.3 Position/Simplified Direct Value Mode (Remote Device Station: No. of Occupied Stations: One Station)

This is the operation mode with the position No. set up. The change over of the control signals (PMOD signals), can select whether if the target position is set directly using the value or the value registered on the position data is used.

For the speed, acceleration/deceleration and positioning width, etc., except for the target position, the values in the position table within the controller are used. Setup the position data referring the instruction manual for the controller main body.

The number of settable position data items is max. 768.

The actuator's effective main functions that can be controlled using this mode, are as shown in the following table.

Actuator Function	○:Direct Control △:Indirect Control ×:Disabled	Remarks
Homing	○	
Positioning	○	
Speed, Acceleration and Deceleration Settings	△	Position data setting is required.
Pitch Feeding (Inching)	△	
Pressing Operation	△	
Speed change during the movement	△	
Different Acceleration Speed Operation in Deceleration	△	
Pause	○	
Zone Signal Output	△	Zone is set using the position data or parameters.
PIO Pattern Selection	×	

(1) PLC Address Composition (* “n” shows the head register address for each axis).

Parameter No.84	SCON-CA side Input register	PLC side	SCON-CA side Output register	PLC side
1	Occupied Domain	RY n0 to nF	Occupied Domain	RX n0 to nF
	System Domain	RY (n+1)0 to (n+1)F	System Domain	RX (n+1)0 to (n+1)F
	Target Position	RWw (n+0)	Current Position	RWr (n+0)
		RWw (n+1)		RWr (n+1)
	Command position number	RWw (n+2)	Completed Position No. (Simplified Alarm CORD)	RWr (n+2)
	Control signal	RWw (n+3)	Status Signal	RWr (n+3)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signals for each axis consists of 4 words for each I/O bit register.

- The control signals and status signals are ON/OFF signals in units of bit.
- The target position and current position are expressed using 2-word (32 bits) binary data. The figures from –999999 to +999999 (Unit: 0.01mm) can be set in PLC. However, set the position data within the soft stroke range (0 to effective stroke length) for the actuator in question.
- The specified position No. and completed position No. are expressed using 1-word (16 bits) binary data. The figures from 0 to 767 can be set in PLC. However, set the position No. for which the operation conditions have been set in advance using the teaching tool such as the PC software.

PLC Output

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWw (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Slave Word)																

RWw (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

one word = 16 bits

RWw (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command position No.							PC512	PC256	PC128	PC64	PC32	PC16	PC8	PC4	PC2	PC1

RWw (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Control signal	BKRL	RMOD	—	—	PMOD	MODE	PWRT	JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	CSTR

PLC Input

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Completed Position No.							PM512	PM256	PM128	PM64	PM32	PM16	PM8	PM4	PM2	PM1

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Status Signal	EMGS	PWR	ZONE1	ZONE2	PZONE	MODES	WEND	RMDS	BALM	—	PSFL	SV	ALM	MOVE	HEND	PEND

(3) I/O Signal Allocation (* "ON" in the table shows the corresponding bit of "1" and "OFF" shows "0".)

Signal Type		Bit	Symbol	Description	Details
PLC Output	Target Position	32bits Data	—	32-bit Signed Integer Set the target position on the absolute coordinates. The unit is 0.01mm and settable range is between –999999 to +999999. (Example) When it is "+25.40mm", set it as "2540". If the value larger than the value (0.2mm) inside the soft limit for the parameter, the movement would be limited to the inside the soft limit (0.2mm). * When the input is performed in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (1)
	Command position number	16bits Data	PC1 to PC512	16-bit Integer For the operation, the position data is required, for which the operation conditions have been set in advance using the teaching tool such as the PC software. Set up the position No. for which the data has been input using this register. The settable range is 0 to 767. In the case that any value out of the range is set, or position No. that has not been set is specified, an alarm is output.	4.9 (1)
	Control Signal	b15	BKRL	Brake Forcible Release: Brake Release with "ON".	4.7.7 (18)
		b14	RMOD	Operation Mode: "OFF" for "AUTO" Mode, "ON" for "MANU" mode	4.7.7 (19)
		b13	—	Unavailable	—
		b12			
		b11	PMOD	Position/Simplified Direct Value Change-Over "OFF" for Position Mode, "ON" for Simplified Direct Value Mode	4.7.7 (20)
		b10	MODE	Teaching Mode Command "OFF" for Normal Mode, "ON" for Teaching Mode	4.7.7 (16)
		b9	PWRT	Position Data Import Command "ON" for Position Data Import	4.7.7 (17)
		b8	JOG+	+ Jog: "ON" for Movement in the Opposite Direction of Home	4.7.7 (13)
		b7	JOG-	- Jog: "ON" for Movement to the Home Direction	4.7.7 (13)
		b6	JVEL	Jog Speed/Inching Distance Change-Over "OFF" for using the values set for the Parameter No. 26 "Jog Speed" and Parameter No. 48 "Inching Distance" "ON" for using the values set for the Parameter No. 47 "Jog Speed 2" and Parameter No. 49 "Inching Distance 2"	4.7.7 (14)
		b5	JISL	Jog/Inching Change-Over "OFF" for Jog Operation, "ON" for Inching Operation	4.7.7 (15)
		b4	SON	Servo ON Command: "ON" for Servo ON	4.7.7 (5)
		b3	RES	Reset: "ON" for Reset Execution	4.7.7 (4)
		b2	STP	Pause: "ON" for Pause Command	4.7.7 (11)
		b1	HOME	Homing: "ON" for Homing Command	4.7.7 (6)
		b0	CSTR	Positioning Start: "ON" for Movement Command	4.7.7 (7)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Signal Type		Bit	Symbol	Description	Details
PLC Input	Current Position	32bits	—	Current Position: 32-bit Signed Integer The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm When the value is read in hexadecimal notation, the negative figure is expressed as a compliment of 2.	4.9 (1)
	Completed Position No. (Simplified Alarm CODE)	16bits	PM1 to PM512	16-bit Integer It is moved to the target position and the positioning completed position No. within the positioning width is output. In the case that the position movement has not been performed at all, or during the movement, “0” is output. When an alarm is issued (in the case that the status signal ALM is “ON”), the simplified alarm code (Refer to the instruction manual for the controller main body) is output.	4.9 (1)
	Status Signal	b15	EMGS	Emergency Stop: “ON” for Emergency Stop Status	4.7.11 (2)
		b14	PWR	Controller Ready: “ON” for Ready	4.7.11 (1)
		b13	ZONE2	Zone 2: “ON” with the current position within the zone set range	4.7.11 (12)
		b12	ZONE1	Zone 1: “ON” with the current position within the zone set range	4.7.11 (12)
		b11	PZONE	Position Zone: “ON” with the current position within the position zone set range	4.7.11 (12)
		b10	MODES	Teaching Mode Signal; “ON” during teaching mode selection	4.7.11 (16)
		b9	WEND	Position Data Import Completion: “ON” for import completion	4.7.11 (17)
		b8	RMDS	Operation Mode Status: “OFF” for currently “AUTO” mode, “ON” for currently “MANU” mode	4.7.11 (19)
		b7	BALM	Warning for Absolute Battery Voltage Drop : Turns ON at voltage drop	4.7.11 (28)
		b6	—	Unavailable	—
		b5	PSEL	Pressing and a Miss: “ON” for pressing and a miss	4.7.11 (23)
		b4	SV	Operation Ready: “ON” with Servo ON	4.7.11 (5)
		b3	ALM	Alarm: “ON” with alarm issue	4.7.11 (3)
		b2	MOVE	Under Movement Signal: “ON” during Actuator Movement	4.7.11 (9)
		b1	HEND	Homing Completion “ON” with Homing Completion	4.7.11 (6)
		b0	PEND	Positioning Completion Signal: “ON” with Positioning Completion	4.7.11 (10)

4.7.4 Half Direct Value Mode (Remote Device Station: No. of Occupied Stations: Two Stations)

This is the operation mode with the target position, positioning width, speed, acceleration/deceleration and pressing current value set up in the PLC. Set the each value in I/O data register. When the zone function is used, set it using the parameter No. 1, 2, 23 and 24.

The actuator's effective main functions that can be controlled using this mode, are as shown in the following table.

Actuator Function	○:Direct Control △:Indirect Control ×:Disabled	Remarks
Homing	○	
Positioning	○	
Speed, Acceleration and Deceleration Settings	○	
Pitch Feeding (Inching)	○	
Pressing Operation	○	
Speed change during the movement	○	
Different Acceleration Speed Operation in Deceleration	×	
Pause	○	
Zone Signal Output	△	Parameter setting is required.
PIO Pattern Selection	×	

(1) PLC Address Composition (* “n” shows the head register address for each axis).

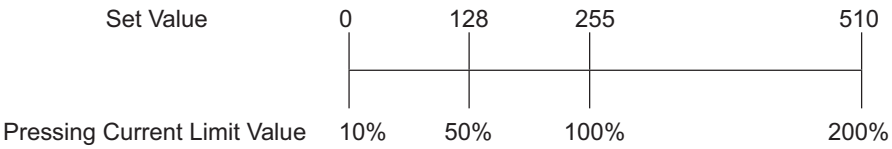
Parameter No.84	SCON-CA side Input register	PLC side	SCON-CA side Output register	PLC side
2	Occupied Domain	RY n0 to nF	Occupied Domain	RX n0 to nF
		RY (n+1)0 to (n+1)F		RX (n+1)0 to (n+1)F
		RY (n+2)0 to (n+2)F		RX (n+2)0 to (n+2)F
	System Domain	RY (n+3)0 to (n+3)F	System Domain	RX (n+3)0 to (n+3)F
	Target Position	RWw (n+0)	Current Position	RWr (n+0)
		RWw (n+1)		RWr (n+1)
	Positioning Width	RWw (n+2)	Command Current	RWr (n+2)
		RWw (n+3)		RWr (n+3)
	Speed	RWw (n+4)	Current Speed	RWr (n+4)
	Acceleration/Deceleration	RWw (n+5)		RWr (n+5)
	Pressing Current Limit Value	RWw (n+6)	Alarm code	RWr (n+6)
	Control signal	RWw (n+7)	Status Signal	RWr (n+7)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signals for each axis consists of 8 words for each I/O bit register.

- The control signals and status signals are ON/OFF signals in units of bit.
- The target position and current position are expressed using 2-word (32 bits) binary data. The figures from –999999 to +999999 (Unit: 0.01mm) can be set in PLC. However, set the position data within the soft stroke range (0 to effective stroke length) for the actuator in question.
- Set the positioning width. The positioning width is expressed using 2-word (32 bits) binary data. The figures from 1 to +999999 (Unit: 0.01mm) can be set in PLC.
- The specified speed is expressed using 1-word (16 bits) binary data. The figures from 0 to +65535 (Unit: 1.0mm/sec) can be set in PLC. Set the value that does not exceed the max. speed value for the actuator in question.
- The Acceleration/Deceleration is expressed using 1-word (16 bits) binary data. The figures from 1 to 300 (Unit: 0.01G) can be set in PLC. However, set the value that does not exceed the max. acceleration/deceleration value for the actuator in question.
- The pressing current limit value is expressed using 1-word (16 bits) binary data. The figures from 0 (0%) to 510 (200%) can be set in PLC. However, set the value within the settable range for the pressing current limit value (Refer to the catalog or instruction manual for the actuator) for the actuator in question.



- The command current is expressed using 2-word (32 bits) binary data (Unit: 1mA).
- The current speed is expressed using 2-word (32 bits) binary data (Unit: 0.01mm/sec).
- The alarm code is expressed using 1-word (16 bits) binary data.

PLC Output

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWw (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Slave Word)																

RWw (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWw (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Positioning Width (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWw (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Positioning Width (Host Word)	—	—	—	—	—	—	—	—	—	—	—	—	524,288	262,144	131,072	65,536

RWw (n+4)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Speed	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWw (n+5)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Acceleration/ Deceleration	—	—	—	—	—	—	—	256	128	64	32	16	8	4	2	1

RWw (n+6)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Pressing Current Limit Value	—	—	—	—	—	—	—	256	128	64	32	16	8	4	2	1

RWw (n+7)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Control signal	BKRL	RMOD	DIR	PUSH	GSL1	GSL0	—	JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	DSTR

PLC Input

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Host Word)	—	—	—	—	—	—	—	—	—	—	—	—	524,288	262,144	131,072	65,536

RWr (n+4)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Slave Word)																

RWr (n+5)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Host Word)																

When the Current Speed is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+6)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Alarm code																

RWr (n+7)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Status Signal	EMGS	PWR	ZONE2	ZONE1	—	—	—	RMDS	BALM	—	PSFL	SV	ALM	MOVE	HEND	PEND

(3) I/O Signal Allocation (* "ON" in the table shows the corresponding bit of "1" and "OFF" shows "0".)

Signal Type		Bit	Symbol	Description	Details
PLC Output	Target Position	32bits Data	—	32-bit Signed Integer Set the target position on the absolute coordinates. The unit is 0.01mm and settable range is between –999999 to +999999. (Example) When it is "+25.41mm", set it as "2541". If the value larger than the value (0.2mm) inside the soft limit for the parameter, the movement would be limited to the inside the soft limit (0.2mm). * When the input is performed in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (2)
	Positioning Width	32bits Data	—	32-bit Integer The unit is 0.01mm and settable range is between +1 to +999999. (Example) In the case of "25.40mm", set it as "2540". This register value has two meanings depending on the operation type. 1) In the case of positioning operation, it shows the allowable range from the target position, that is regarded as the positioning completion. 2) In the case of pressing operation, it shows the pressing width value. Specify the normal operation or pressing operation using the "PUSH" control signal setting.	4.9 (2)
	Speed	16bits Data	—	16-bit Integer Set the speed in movement. Unit is 1.0mm/sec and settable range is between 0 and 65535. (Example) In the case of "254.0mm/sec", set it as "254". When the movement command is set with the value bigger than the max. speed, an alarm is issued.	4.9 (2)
	Acceleration/ Deceleration	16bits Data	—	16-bit Integer Set the acceleration/deceleration in movement (The same value is applied both to acceleration and deceleration). The unit is 0.01G and settable range is between 1 and 300. (Example) In the case of "0.30G", set is as "30". When the movement command is set with the value of "0" or bigger than the max. acceleration/deceleration value, an alarm is issued.	4.9 (2)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

<table>
<tr><th colspan="2">Signal Type</th><th>Bit</th><th>Symbol</th><th>Description</th><th>Details</th></tr>
<tr><td rowspan="20">PLC Output</td><td>Pressing Current Limit Value</td><td>16bits Data</td><td>—</td><td>16-bit Integer
Set the current limit in pressing operation.
The settable range is between 0 (0%) and 510 (200%).
The actual settable range varies depending on each actuator.
(Refer to the catalog or instruction manual for the actuator).
When the movement command is set with the value bigger than the max. pressing current value, an alarm is issued.</td><td>4.9 (2)</td></tr>
<tr><td rowspan="19">Control signal</td><td>b15</td><td>BKRL</td><td>Brake Forcible Release: “ON” for brake release</td><td>4.7.11 (18)</td></tr>
<tr><td>b14</td><td>RMOD</td><td>Operation Mode: “OFF” for “AUTO” Mode, “ON” for “MANU” Mode</td><td>4.7.11 (19)</td></tr>
<tr><td>b13</td><td>DIR</td><td>Pressing Direction Setup
”OFF” for the direction reducing the positioning width from the target position, “ON” for the direction adding the positioning width from the target position</td><td>4.7.11 (22)</td></tr>
<tr><td>b12</td><td>PUSH</td><td>Pressing Setup: “OFF” for Positioning Operation, “ON” for Pressing Operation</td><td>4.7.11 (21)</td></tr>
<tr><td>b11</td><td>GSL1</td><td>Servo Gain Parameter Set Selection 1</td><td rowspan="2">Select the servo gain parameter set to be used
<table><tr><th>GSL1</th><th>GSL0</th><th>Functions</th></tr><tr><td>OFF</td><td>OFF</td><td>Parameter set 0 selected</td></tr><tr><td>OFF</td><td>ON</td><td>Parameter set 1 selected</td></tr><tr><td>ON</td><td>OFF</td><td>Parameter set 2 selected</td></tr><tr><td>ON</td><td>ON</td><td>Parameter set 3 selected</td></tr></table></td><td rowspan="2">4.7.11 (33)</td></tr>
<tr><td>b10</td><td>GSL0</td><td>Servo Gain Parameter Set Selection 0</td></tr>
<tr><td>b9</td><td>—</td><td colspan="2">Unavailable</td><td>—</td></tr>
<tr><td>b8</td><td>JOG+</td><td colspan="2">+ Jog: “ON” for Movement in the Opposite Direction of Home</td><td>4.7.11 (13)</td></tr>
<tr><td>b7</td><td>JOG-</td><td colspan="2">- Jog: “ON” for Movement to the Home Direction</td><td>4.7.11 (13)</td></tr>
<tr><td>b6</td><td>JVEL</td><td colspan="2">Jog Speed/Inching Distance Change-Over
“OFF” for using the values set using the Parameter No. 26 “Jog Speed” and Parameter No. 48 “Inching Distance”
“ON” for using the values set using the Parameter No. 47 “Jog Speed 2” and Parameter No. 49 “Inching Distance 2”</td><td>4.7.11 (14)</td></tr>
<tr><td>b5</td><td>JISL</td><td colspan="2">Jog/Inching Change-Over
“OFF” for Jog Operation, “ON” for Inching Operation</td><td>4.7.11 (15)</td></tr>
<tr><td>b4</td><td>SON</td><td colspan="2">Servo ON Command: “ON” for Servo ON</td><td>4.7.11 (5)</td></tr>
<tr><td>b3</td><td>RES</td><td colspan="2">Reset: “ON” for Reset Execution</td><td>4.7.11 (4)</td></tr>
<tr><td>b2</td><td>STP</td><td colspan="2">Pause: “ON” for Pause Command</td><td>4.7.11 (11)</td></tr>
<tr><td>b1</td><td>HOME</td><td colspan="2">Homing: “ON” for Homing Command</td><td>4.7.11 (6)</td></tr>
<tr><td>b0</td><td>DSTR</td><td colspan="2">Positioning Command: “ON” for Movement Command</td><td>4.7.11 (8)</td></tr>
</table>

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Signal Type		Bit	Symbol	Description	Details
PLC Input	Current Position	32bits Data	—	32-bit Signed Integer The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm * When it is read in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (2)
	Command Current	32bits Data	—	32-bit Integer It shows the current value in the current command. The unit is mA. Read Value: 000003FF$_H$ = 1023 (decimal system) = 1023mA	4.9 (2)
	Current Speed	32bits Data	—	32-bit Signed Integer It shows the current speed. Positive Figure: Under movement in the opposite direction of home Negative Figure: Under movement in the home direction The unit is 0.01mm/sec. (Example) Read Value: 000003 FF$_H$ = 1023 (decimal system) = 10.23mm/sec * When it is read in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (2)
	Alarm code	16bits Data	—	16-bit Integer When an alarm is issued, the alarm code is output. When any alarm is not issued, it is “0$_H$”. Refer to the instruction manual for the controller main body for the details of the alarms.	4.9 (2)
	Status Signal	b15	EMGS	Emergency Stop: “ON” for Emergency Stop Status	4.7.11 (2)
		b14	PWR	Controller Ready: “ON” for Ready	4.7.11 (1)
		b13	ZONE2	Zone 2: “ON” for the current position within the zone set range	4.7.11 (12)
		b12	ZONE1	Zone 1: “ON” for the current position within the zone set range	4.7.11 (12)
		b11	—	Unavailable	—
		b10			
		b9			
		b8	RMDS	Operation Mode Status: “OFF” for currently “AUTO” mode, “ON” for currently “MANU” mode	4.7.11 (19)
		b7	BALM	Warning for Absolute Battery Voltage Drop : Turns ON at voltage drop	4.7.11 (28)
		b6	—	Unavailable	—
		b5	PSEL	Pressing and a Miss: “ON” for pressing and a miss	4.7.11 (23)
		b4	SV	Operation Ready: “ON” with Servo ON	4.7.11 (5)
		b3	ALM	Alarm: “ON” with alarm issue	4.7.11 (3)
		b2	MOVE	Movement Signal: “ON” with Actuator Movement	4.7.11 (9)
		b1	HEND	Homing Completion: “ON” with Homing Completion	4.7.11 (6)
		b0	PEND	Positioning Completion Signal: “ON” with Positioning Completion	4.7.11 (10)

4.7.5 Full Direct Value Mode (Remote Device Station: No. of Occupied Stations: Four stations)

This is the operation mode with all the values (target position, speed, etc.) set up directly using values from PLC.

Set each value in the I/O data register.

The actuator's effective main functions that can be controlled using this mode, are as shown in the following table.

Actuator Function	○:Direct Control ×:Disabled
Homing	○
Positioning	○
Speed, Acceleration and Deceleration Settings	○
Pitch Feeding (Inching)	○
Pressing Operation	○
Speed change during the movement	○
Different Acceleration and Deceleration Speed	○
Operation in Deceleration	○
Pause	○
Zone Signal Output	○
PIO Pattern Selection	×

(1) PLC Address Composition (* “n” shows the head register address for each axis).

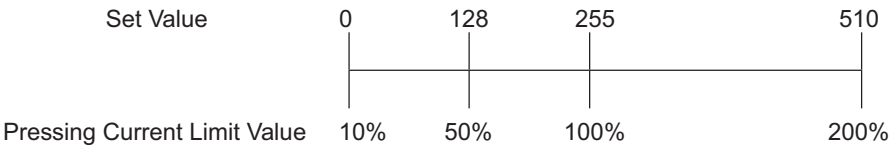
Parameter No.84	SCON-CA side Input register		PLC side	SCON-CA side Output register	PLC side
3	Occupied Domain		RY n0 to nF	Occupied Domain	RX n0 to nF
			RY (n+1)0 to (n+1)F		RX (n+1)0 to (n+1)F
			RY (n+2)0 to (n+2)F		RX (n+2)0 to (n+2)F
			RY (n+3)0 to (n+3)F		RX (n+3)0 to (n+3)F
			RY (n+4)0 to (n+4)F		RX (n+4)0 to (n+4)F
			RY (n+5)0 to (n+5)F		RX (n+5)0 to (n+5)F
			RY (n+6)0 to (n+6)F		RX (n+6)0 to (n+6)F
	System Domain		RY (n+7)0 to (n+7)F	System Domain	RX (n+7)0 to (n+7)F
	Target Position		RWw (n+0)	Current Position	RWr (n+0)
			RWw (n+1)		RWr (n+1)
	Positioning Width		RWw (n+2)	Command Current	RWr (n+2)
			RWw (n+3)		RWr (n+3)
	Speed		RWw (n+4)	Current Speed	RWr (n+4)
			RWw (n+5)		RWr (n+5)
	Zone Value “+”		RWw (n+6)	Alarm Code	RWr (n+6)
			RWw (n+7)	Occupied Domain	RWr (n+7)
	Zone Value “-”		RWw (n+8)	Force Feedback Data	RWr (n+8)
			RWw (n+9)		RWr (n+9)
	Acceleration		RWw (n+A)	Occupied Domain	RWr (n+A)
	Deceleration		RWw (n+B)		RWr (n+B)
	Pressing Current Limit Value		RWw (n+C)		RWr (n+C)
	Load Current Threshold	n+13	RWw (n+D)		RWr (n+D)
	Control Signal 1		RWw (n+E)	Status Signal 1	RWr (n+E)
	Control Signal 2		RWw (n+F)	Status Signal 2	RWr (n+F)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signals for each axis consists of 16 words for each I/O bit register.

- The control signals1, control signals2 and status signals are ON/OFF signals in units of bit.
- The target position and current position are expressed using 2-word (32 bits) binary data. The figures from –999999 to +999999 (Unit: 0.01mm) can be set in PLC. However, set the position data within the soft stroke range (0 to effective stroke length) for the actuator in question.
- Set the positioning width. The positioning width is expressed using 2-word (32 bits) binary data. The figures from 1 to +999999 (Unit: 0.01mm) can be set in PLC.
- The specified speed is expressed using 2-word (32 bits) binary data. The figures from 0 to +999999 (Unit: 0.01mm/sec) can be set in PLC. Set the value that does not exceed the max. speed value for the actuator in question.
- The Acceleration and Deceleration are expressed using 1-word (16 bits) binary data. The figures from 1 to 300 (Unit: 0.01G) can be set in PLC. However, set the value that does not exceed the max. acceleration/deceleration value for the actuator in question.
- The pressing current limit value is expressed using 1-word (16 bits) binary data. The figures from 0 (0%) to 510 (200%) can be set in PLC. However, set the value within the settable range for the pressing current limit value (Refer to the catalog or instruction manual for the actuator) for the actuator in question.



- Set the load current threshold. The load current threshold is expressed using 1-word (16 bits) binary data. The figures from 0 (0%) to 510 (200%) can be set in PLC (Refer to pressing current limit value (above figure)).
- Zone Value “+” and Zone Value “-” are expressed using 2-word (32 bits) binary data. The figures from -999999 to +999999 can be set in PLC. However make sure to set the smaller value for the Zone Value “-” than that for the Zone Value “+”.
- The command current is expressed using 2-word (32 bits) binary data (Unit: 1mA).
- The current speed is expressed using 2-word (32 bits) binary data (Unit: 0.01mm/sec).
- The alarm code is expressed using 1-word (16 bits) binary data.
- The force feedback data is expressed using 2-word (32 bits) binary data (Unit : 0.01N).

PLC Output

Address (* “n” shows the head register address per each axis).

one word = 16 bits

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
RWw (n+0) Target Position (Slave Word)																

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
RWw (n+1) Target Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
RWw (n+2) Positioning Width (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
RWw (n+3) Positioning Width (Host Word)													524,288	262,144	131,072	65,536

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
RWw (n+4) Speed (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
RWw (n+5) Speed (Host Word)													524,288	262,144	131,072	65,536

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
RWw (n+6) Zone Value “+” (Slave Word)																

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
RWw (n+7) Zone Value “+” (Host Word)																

When the zone is shown using the negative figure, it is expressed using the complement of 2.

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWw (n+8)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Zone Value “-” (Slave Word)																

RWw (n+9)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Zone Value “-” (Host Word)																

When the zone value “-” is shown using the negative figure, it is expressed using the complement of 2.

RWw (n+A)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Acceleration								256	128	64	32	16	8	4	2	1

RWw (n+B)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Deceleration								256	128	64	32	16	8	4	2	1

RWw (n+C)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Pressing Current Limit Value								256	128	64	32	16	8	4	2	1

RWw (n+D)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Load Current Threshold								256	128	64	32	16	8	4	2	1

RWw (n+E)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command position number 1			NTC1	NTC0			ASO1	ASO0	MOD1	MOD0	GSL1	GSL0	INC	DIR	PUSH	—

RWw (n+F)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command position number 2	BKRL	RMOD	—	—	—	—	CLBR	JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	DSTR

PLC Input

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Host Word)																

When the current position is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Host Word)													524,288	262,144	131,072	65,536

RWr (n+4)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Slave Word)																

RWr (n+5)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Host Word)																

When the Current Speed is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+6)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Alarm code																

RWr (n+7)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Unavailable																

RWr (n+8)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Force Feedback Data (Slave Word)																

RWr (n+9)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Force Feedback Data (Host Word)																

When the Force Feedback Data is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+A) to Rwr (n+D)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Unavailable																

RWr (n+E)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Status Signal 1															CEND	BALM

RWr (n+F)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Status Signal 2	EMGS	PWR	ZONE2	ZONE1	PZONE	LOAD	TRQS	RMDS	GHMS	PUSHS	PSFL	SV	ALM	MOVE	HEND	PEND

(3) I/O Signal Allocation (* "ON" in the table shows the corresponding bit of "1" and "OFF" shows "0".)

Address		Bit	Symbol	Functions	Details
PLC Output	Target Position	32bits Data	—	32-bit Signed Integer Set the target position on the absolute coordinates. The unit is 0.01mm and settable range is between –999999 to +999999. (Example) When it is "+25.41mm", set it as "2541". If the value larger than the value (0.2mm) inside the soft limit for the parameter, the movement would be limited to the inside the soft limit (0.2mm). * When the input is performed in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (3)
	Positioning Width	32bits Data	—	32-bit Integer The unit is 0.01mm and settable range is between +1 to +999999. (Example) In the case of "25.40mm", set it as "2540". This register value has two meanings depending on the operation type. 1) In the case of positioning operation, it shows the allowable range from the target position, that is regarded as the positioning completion. 2) In the case of pressing operation, it shows the pressing width value. Specify the normal operation or pressing operation using the "PUSH" control signal setting.	4.9 (3)
	Speed	32bits Data	—	32-bit Integer Set the speed in movement. Unit is 0.01mm/sec and settable range is between 0 and 999999. (Example) In the case of "254.1mm/sec", set it as "2541". When the movement command is set with the value bigger than the max. speed, an alarm is issued.	4.9 (3)
	Zone Value "+" Zone Value "-"	32bits Data	—	32-bit Signed Integer Apart from the zone specified using the parameter setting, the zone signal effective after the homing operation is output. When the current position is inside of this "+" Value, the status signal "PZONE" is turned "ON". (Example) When it is "+25.41mm", set it as "2541". The unit for setting is 0.01mm and settable range is between –999999 and +999999. Input the value satisfying the relationship of "Zone Value "+" > Zone Value "-"". When this function is not to be used, the same value is applied to both Zone Values. * When it is input in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (3)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

<table>
<tr><th colspan="2">Address</th><th>Bit</th><th>Symbol</th><th>Functions</th><th>Details</th></tr>
<tr><td rowspan="15">PLC Output</td><td>Acceleration</td><td>16bits Data</td><td>—</td><td rowspan="2">16-bit Integer
Set the acceleration and deceleration in the movement.
The unit is 0.01G and the settable range is from1 to 300.
(Example)
When it is 0.30G, set it as “30”.
When the movement command is issued with the value of “0” or bigger than the max. acceleration/deceleration value, an alarm is output.</td><td rowspan="2">4.9 (3)</td></tr>
<tr><td>Deceleration</td><td>16bits Data</td><td>—</td></tr>
<tr><td>Pressing Current Limit Value</td><td>16bits Data</td><td>—</td><td>16-bit Integer
Set the current limit in the pressing operation.
The settable range is between 0 (0%) and 510 (200%).
The actual settable range varies depending on each actuator.
(Refer to the catalog or instruction manual for the actuator).
When the movement command is set with the value bigger than the max. pressing current value, an alarm is issued.</td><td>4.9 (3)</td></tr>
<tr><td>Load Current Threshold</td><td>16bits Data</td><td>—</td><td>16-bit Integer
Set the current threshold in this register when whether or not the load current exceeds the threshold is judged.
The settable range is between 0 (0%) and 510 (200%).
When the judgment is not to be performed, set it to “0”.</td><td>4.9 (3)</td></tr>
<tr><td rowspan="13">Control signal 1</td><td>b15</td><td rowspan="2">—</td><td colspan="2" rowspan="2">Unavailable</td><td rowspan="2">—</td></tr>
<tr><td>b14</td></tr>
<tr><td>b13</td><td>NTC1</td><td>Anti-Vibration Control Mode Selection 1</td><td rowspan="3">Select the anti-vibration control parameter set to be used
<table><tr><th>NTC1</th><th>NTC0</th><th>Functions</th></tr><tr><td>OFF</td><td>OFF</td><td>Anti-vibration control not used</td></tr><tr><td>OFF</td><td>ON</td><td>Parameter set 1 selected</td></tr><tr><td>ON</td><td>OFF</td><td>Parameter set 2 selected</td></tr><tr><td>ON</td><td>ON</td><td>Parameter set 3 selected</td></tr></table></td><td rowspan="3">4.7.11 (33)</td></tr>
<tr><td>b12</td><td>NTC0</td><td>Anti-Vibration Control Mode Selection 0</td></tr>
<tr><td>b11</td><td rowspan="2">—</td><td colspan="2" rowspan="2">Unavailable</td><td rowspan="2">—</td></tr>
<tr><td>b10</td></tr>
<tr><td>b9</td><td>ASO1</td><td>Stop Mode 1</td><td rowspan="2">Select the stop mode for standby
<table><tr><th>ASO1</th><th>ASO0</th><th>Functions</th></tr><tr><td>OFF</td><td>OFF</td><td>Invalid (Servo is always ON)</td></tr><tr><td>OFF</td><td>ON</td><td>Servo is turned OFF after the time set in Parameter No.36 is passed.</td></tr><tr><td>ON</td><td>OFF</td><td>Servo is turned OFF after the time set in Parameter No.37 is passed.</td></tr><tr><td>ON</td><td>ON</td><td>Servo is turned OFF after the time set in Parameter No.38 is passed.</td></tr></table></td><td rowspan="2">4.7.11 (31)</td></tr>
<tr><td>b8</td><td>ASO0</td><td>Stop Mode 0</td></tr>
<tr><td>b7</td><td>MOD1</td><td colspan="2" rowspan="2">Acceleration/Deceleration Mode:
OFF/OFF for Trapezoid Pattern
OFF/ON for S-shaped Motion
ON/OFF for First-Order Lag Filter</td><td rowspan="2">4.7.11 (30)</td></tr>
<tr><td>b6</td><td>MOD0</td></tr>
</table>

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

<table>
<tr><th colspan="2">Address</th><th>Bit</th><th>Symbol</th><th>Functions</th><th>Details</th></tr>
<tr><td rowspan="28">PLC Output</td><td rowspan="8">Control signal 1</td><td>b5</td><td>GSL1</td><td>Servo Gain Parameter Set Selection 1</td><td rowspan="2">Set the parameter for servo gain switchover
<table><tr><th>GSL1</th><th>GSL0</th><th>Function</th></tr><tr><td>OFF</td><td>OFF</td><td>Parameter set 0 selected</td></tr><tr><td>OFF</td><td>ON</td><td>Parameter set 1 selected</td></tr><tr><td>ON</td><td>OFF</td><td>Parameter set 2 selected</td></tr><tr><td>ON</td><td>ON</td><td>Parameter set 3 selected</td></tr></table></td><td rowspan="2">4.7.11 (33)</td></tr>
<tr><td>b4</td><td>GSL0</td><td>Servo Gain Parameter Set Selection 0</td></tr>
<tr><td>b3</td><td>INC</td><td colspan="2">Incremental Command
“OFF” for Absolute Position Command, “ON” for Relative Position Command</td><td>4.7.11 (24)</td></tr>
<tr><td>b2</td><td>DIR</td><td colspan="2">Pressing Direction Setup:
“OFF” for the direction reducing the positioning width from the target position, “ON” for the direction adding the positioning width from the target position</td><td>4.7.11 (22)</td></tr>
<tr><td>b1</td><td>PUSH</td><td colspan="2">Pressing Setup:
“OFF” for Positioning Operation, “ON” for Pressing Operation</td><td>4.7.11 (21)</td></tr>
<tr><td>b0</td><td>—</td><td colspan="2">Unavailable</td><td>—</td></tr>
<tr><td rowspan="20">Control signal 2</td><td>b15</td><td>BKRL</td><td colspan="2">Brake Forcible Release: “ON” for brake release</td><td>4.7.11 (18)</td></tr>
<tr><td>b14</td><td>RMOD</td><td colspan="2">Operation mode:
“OFF” for Auto mode, “ON” for MANU mode</td><td>4.7.11 (19)</td></tr>
<tr><td>b13</td><td rowspan="4">—</td><td colspan="2" rowspan="4">Unavailable</td><td rowspan="4">—</td></tr>
<tr><td>b12</td></tr>
<tr><td>b11</td></tr>
<tr><td>b10</td></tr>
<tr><td>b9</td><td>CLBR</td><td colspan="2">Loadcell Calibration Command : “ON” to execute calibration</td><td>4.7.11 (32)</td></tr>
<tr><td>b8</td><td>JOG+</td><td colspan="2">+ Jog: “ON” for Movement in the Opposite Direction of Home</td><td>4.7.11 (13)</td></tr>
<tr><td>b7</td><td>JOG-</td><td colspan="2">- Jog: “ON” for Movement to the Home Direction</td><td>4.7.11 (13)</td></tr>
<tr><td>b6</td><td>JVEL</td><td colspan="2">Jog Speed/Inching Distance Change-Over:
“OFF” for using the values set using the Parameter No. 26 “Jog Speed” and Parameter No. 48 “Inching Distance”
“ON” for using the values set using the Parameter No. 47 “Jog Speed 2” and Parameter No. 49 “Inching Distance 2”</td><td>4.7.11 (14)</td></tr>
<tr><td>b5</td><td>JISL</td><td colspan="2">Jog/Inching Change-Over:
“OFF” for Jog Operation, “ON” for Inching Operation</td><td>4.7.11 (15)</td></tr>
<tr><td>b4</td><td>SON</td><td colspan="2">Servo ON Command: “ON” for Servo ON</td><td>4.7.11 (5)</td></tr>
<tr><td>b3</td><td>RES</td><td colspan="2">Reset: “ON” for Reset Execution</td><td>4.7.11 (4)</td></tr>
<tr><td>b2</td><td>STP</td><td colspan="2">Pause: “ON” for Pause Command</td><td>4.7.11 (7)</td></tr>
<tr><td>b1</td><td>HOME</td><td colspan="2">Homing: “ON” for Homing Command</td><td>4.7.11 (6)</td></tr>
<tr><td>b0</td><td>DSTR</td><td colspan="2">Positioning Start: “ON” for Movement Command</td><td>4.7.11 (8)</td></tr>
</table>

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Signal Type		Bit	Signal Name	Description	Details
PLC Input	Current Position	32bits Data	—	32-bit Signed Integer The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm * When the value is read in hexadecimal notation, the negative figure is expressed as a compliment of 2.	4.9 (3)
	Command Current	32bits Data	—	32-bit Integer It shows the current value in the current command. The unit is mA. Read Value: 000003FF$_H$ = 1023 (decimal system) = 1023mA	4.9 (3)
	Current Speed	32bits Data	—	32-bit Signed Integer It shows the current speed. Positive Figure: Under movement in the opposite direction of the home Negative Figure: Under movement in the home direction The unit is 0.01mm/sec. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm/sec * When it is read in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (3)
	Alarm code	16bits Data	—	16-bit Integer When an alarm is issued, the alarm code is output. When any alarm is not issued, it is “0”. Refer to the instruction manual for the controller main body for the details of the alarms.	4.9 (3)
	Force Feedback Data	32bits Data	—	32-bit Integer with a Symbol It displays the measured value for the current loadcell. The unit is 0.01N. * When the value is read in hexadecimal notation, the negative figure is expressed as a compliment of 2.	4.9 (3)
	Status Signal 1	b15	—	Unavailable	—
		b14	—		
		b13	—		
		b12	—		
		b11	—		
		b10	—		
		b9	—		
		b8	—		
		b7	—		
		b6	—		
		b5	—		
		b4	—		
		b3	—		
		b2	—		
		b1	CEND	Loadcell Calibration Complete : Turns ON when completed	4.7.11 (32)
		b0	PEND	Warning for Absolute Battery Voltage Drop : Turns ON at voltage drop	4.7.11 (28)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Signal Type		Bit	Signal Name	Description	Details
PLC Input	Status Signal 2	b15	EMGS	Emergency Stop: “ON” for Emergency Stop Status	4.7.11 (2)
		b14	PWR	Controller Ready: “ON” for Ready	4.7.11 (1)
		b13	ZONE2	Zone 2: “ON” with the current position within the zone set range	4.7.11 (12)
		b12	ZONE1	Zone 1: “ON” with the current position within the zone set range	4.7.11 (12)
		b11	PZONE	Position Zone: “ON” with the current position within the position zone set range	4.7.11 (12)
		b10	LOAD	Load Output : “ON” when reached and “OFF” when incomplete (Refer to instruction manual for the controller main body for more information)	4.7.11 (26)
		b9	TRQS	Torque Level : “ON” when reached and “OFF” when incomplete (Refer to instruction manual for the controller main body for more information)	4.7.11 (27)
		b8	RMDS	Operation Mode Status: “OFF” for currently “AUTO” mode, “ON” for currently “MANU” mode	4.7.11 (19)
		b7	GHMS	Under Homing Operation : This signal remains ON while home return is in progress.	4.7.11 (6)
		b6	PUSHS	Push Motion in Progress : This signal remains ON while push motion is in progress.	4.7.11 (25)
		b5	PSFL	Pressing and a Miss: “ON” for pressing and a miss	4.7.11 (23)
		b4	SV	Operation Ready: “ON” with Servo ON	4.7.11 (5)
		b3	ALM	Alarm: “ON” with alarm issue	4.7.11 (3)
		b2	MOVE	Under Movement Signal: “ON” during Actuator Movement	4.7.11 (9)
		b1	HEND	Homing Completion “ON” with Homing Completion	4.7.11 (6)
		b0	PEND	Positioning Completion Signal: “ON” with Positioning Completion	4.7.11 (10)

4.7.6 Remote I/O Mode 2 (Remote Device Station: No. of Occupied Stations: One Station)

This is the operation mode with the position No. set up as the same as using PIO (24V I/O). Set the position data using the teaching tool such as the personal computer application software for RC. The number of operable positions varies depending on the parameter No. 25 “PIO Pattern” setting.

The I/O specifications for the PIO pattern are described as follows (Refer to instruction manual for the controller main body for more information).

Parameter No. 25 Set Value	Operation Mode	I/O Specifications
0	Positioning mode	64 positioning points and 2 zone output points
1	Teaching mode	64 positioning points and 1 zone output point The positioning and jog operations are available. The current position can be written on the setup position data.
2	256 point mode	256 positioning points and 1 zone output point
3	512 point mode	512 positioning points and no zone output point
4	Electromagnetic valve mode 1	7 positioning points and 2 zone output points The direct operation command is available for each position No. The positioning completion signal is output for each position No.
5	Electromagnetic valve mode 2	3 positioning points and 2 zone output points It is operated with the Forward/Backward/Intermediate Position Commands. The positioning completion signal is output individually for each Forward End/Backward End/Intermediate Positions.
6	Force Control Mode 1 (requires dedicated loadcell)	32 positioning points and 1 zone output points
7	Force Control Mode 2 (requires dedicated loadcell)	5 positioning points and 1 zone output points The direct operation command is available for each position No. The positioning completion signal is output for each position No.

The actuator's effective main functions that can be controlled using this mode, are as shown in the following table.

Actuator Function	PIO Pattern							
	0: Positioning mode	1: Teaching mode	2: 256 point mode	3: 512 point mode	4: Electromagnetic valve mode 1	5: Electromagnetic valve mode 2	6: Force Control Mode 1	7: Force Control Mode 2
Homing	○	○	○	○	○	×	○	○
Positioning	○	○	○	○	○	○	○	○
Speed, Acceleration and Deceleration Settings	○	○	○	○	○	○	○	○
Pitch Feeding (Inching)	○	○	○	○	○	○	○	○
Pressing Operation	○	○	○	○	○	×	○	○
Speed change during the movement	○	○	○	○	×	○	○	×
Different Acceleration Speed, Operation in Deceleration	○	○	○	○	○	○	○	○
Pause	○	○	○	○	○	○(*1)	○	○
Zone Signal Output	○	○	○	×	○	○	○	○
PIO Pattern Selection (Set using the parameters)	○	○	○	○	○	○	○	○

○: Operation Available ×: Operation Unavailable

(*1) It is available when the parameter No. 27 “Movement Command Type” is set to “0”. Turning “OFF” the “Movement Command” can stop the system temporarily.

(1) PLC Address Composition (* “n” shows the head register address for each axis).

Parameter No.84	SCON-CA side DI and Input register	PLC side	SCON-CA side DO and Output register	PLC side
4	Port No. 0 to 15	RY n0 to nF	Port No. 0 to 15	RX n0 to nF
	System Domain	RY (n+1)0 to (n+1)F	System Domain	RX (n+1)0 to (n+1)F
	Occupied Domain	RWw (n+0)	Current Position	RWr (n+0)
		RWw (n+1)		RWr (n+1)
		RWw (n+2)	Command Current	RWr (n+2)
		RWw (n+3)		RWr (n+3)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signal for each axis consists of 1 word for each I/O bit register.
The I/O signal for each axis consists of 4 words for each I/O data register.

- The I/O bit register controls with the ON/OFF signal in units of bit.
- The current position is expressed using 2-word (32 bits) binary data (Unit: 0.01mm).
- The command current is expressed using 2-word (32 bits) binary data (Unit: 1mA).

PLC Output (* “n” shows the head register address per each axis).

Address	one word = 16 bits															
RY (n+0)	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Controller Input Port No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

PLC Input (* “n” shows the head register address per each axis).

Address	one word = 16 bits															
RX (n+0)	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Controller Output Port No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Address	one word = 16 bits															
RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Host Word)																

When the negative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Host Word)													524,288	262,144	131,072	65,536

(3) I/O Signal Allocation

Refer to “4.7.2 Remote I/O Mode (3) I/O Signal Allocation” for each PIO pattern signal allocation.

The signal allocation for the Command Current and Current Position, is shown in the following table.

Signal Type		Bit	Signal Name	Description	Details
PLC Input	Current Position	32bits Data	—	32-bit Signed Integer The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm * When the value is read in hexadecimal notation, the negative figure is expressed as a compliment of 2.	—
	Command Current	32bits Data	—	32-bit Integer It shows the current value in the current command. The unit is 1mA. Read Value: 000003FF$_H$ = 1023 (decimal system) = 1023mA	—

4.7.7 Position/Simplified Direct Value Mode 2 (Remote Device Station: No. of Occupied Stations: One Station)

This mode provides a method to utilize the force control (loadcell value feedback pressing) and also indicate the position number. The change over of the control signals (PMOD signals), can select whether if the target position is set directly using the value or the value registered on the position data is used.
For the speed, acceleration/deceleration and positioning width, etc., except for the target position, the values in the position table within the controller are used. Setup the position data referring the instruction manual for the controller main body.
The number of settable position data items is max. 768.
The actuator's effective main functions that can be controlled using this mode, are as shown in the following table.

Actuator Function	○:Direct Control △:Indirect Control ×:Disabled	Remarks
Homing	○	
Positioning	○	
Speed, Acceleration and Deceleration Settings	△	Position data setting is required.
Pitch Feeding (Inching)	△	
Pressing Operation	△	
Speed change during the movement	△	
Different Acceleration Speed Operation in Deceleration	△	
Pause	○	
Zone Signal Output	△	Zone is set using the position data or parameters.
PIO Pattern Selection	×	

(1) PLC Address Composition (* “n” shows the head register address for each axis).

Parameter No.84	SCON-CA side Input register	PLC side	SCON-CA side Output register	PLC side
1	Occupied Domain	RY n0 to nF	Occupied Domain	RX n0 to nF
	System Domain	RY (n+1)0 to (n+1)F	System Domain	RX (n+1)0 to (n+1)F
	Target Position	RWw (n+0)	Current Position	RWr (n+0)
		RWw (n+1)		RWr (n+1)
	Command position number	RWw (n+2)	Completed Position No. (Simplified Alarm Code)	RWr (n+2)
	Control signal	RWw (n+3)	Status Signal	RWr (n+3)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signals for each axis consists of 4 words for each I/O bit register.

- The control signals and status signals are ON/OFF signals in units of bit.
- The target position and current position are expressed using 2-word (32 bits) binary data. The figures from –999999 to +999999 (Unit: 0.01mm) can be set in PLC. However, set the position data within the soft stroke range (0 to effective stroke length) for the actuator in question.
- The specified position No. and completed position No. are expressed using 1-word (16 bits) binary data. The figures from 0 to 767 can be set in PLC. However, set the position No. for which the operation conditions have been set in advance using the teaching tool such as the PC software.

PLC Output

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWw (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Slave Word)																

RWw (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWw (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command position No.							PC512	PC256	PC128	PC64	PC32	PC16	PC8	PC4	PC2	PC1

RWw (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Control signal	BKRL	RMOD	—	—	PMOD	—	CLBR	JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	CSTR

PLC Input

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Completed Position No.	—	—	—	—	—	—	PM512	PM256	PM128	PM64	PM32	PM16	PM8	PM4	PM2	PM1

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Status Signal	EMGS	PWR	CEND	ZONE1	PZONE/ ZONE2	LOAD	TRQS	RMDS	BALM	PUSHS	PSFL	SV	ALM	MOVE	HEND	PEND

(3) I/O Signal Allocation (* "ON" in the table shows the corresponding bit of "1" and "OFF" shows "0".)

Signal Type		Bit	Symbol	Description	Details
PLC Output	Target Position	32bits Data	—	32-bit Signed Integer Set the target position on the absolute coordinates. The unit is 0.01mm and settable range is between –999999 to +999999. (Example) When it is "+25.40mm", set it as "2540". If the value larger than the value (0.2mm) inside the soft limit for the parameter, the movement would be limited to the inside the soft limit (0.2mm). * When the input is performed in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (1)
	Command position number	16bits Data	PC1 – PC512	16-bit Integer For the operation, the position data is required, for which the operation conditions have been set in advance using the teaching tool such as the PC software. Set up the position No. for which the data has been input using this register. The settable range is 0 to 767. In the case that any value out of the range is set, or position No. that has not been set is specified, an alarm is output.	4.9 (1)
	Control Signal	b15	BKRL	Brake Forcible Release: Brake Release with "ON".	4.7.11 (18)
		b14	RMOD	Operation Mode: "OFF" for "AUTO" Mode, "ON" for "MANU" mode	4.7.11 (19)
		b13	—	Unavailable	—
		b12			
		b11	PMOD	Position/Simplified Direct Value Change-Over "OFF" for Position Mode, "ON" for Simplified Direct Value Mode	4.7.11 (20)
		b10	—	Unavailable	—
		b9	CLBR	Loadcell Calibration Command : "ON" to execute calibration	4.7.11 (32)
		b8	JOG+	+ Jog: "ON" for Movement in the Opposite Direction of Home	4.7.11 (13)
		b7	JOG-	- Jog: "ON" for Movement to the Home Direction	4.7.11 (13)
		b6	JVEL	Jog Speed/Inching Distance Change-Over "OFF" for using the values set for the Parameter No. 26 "Jog Speed" and Parameter No. 48 "Inching Distance" "ON" for using the values set for the Parameter No. 47 "Jog Speed 2" and Parameter No. 49 "Inching Distance 2"	4.7.11 (14)
		b5	JISL	Jog/Inching Change-Over "OFF" for Jog Operation, "ON" for Inching Operation	4.7.11 (15)
		b4	SON	Servo ON Command: "ON" for Servo ON	4.7.11 (5)
		b3	RES	Reset: "ON" for Reset Execution	4.7.11 (4)
		b2	STP	Pause: "ON" for Pause Command	4.7.11 (7)
		b1	HOME	Homing: "ON" for Homing Command	4.7.11 (6)
		b0	CSTR	Positioning Start: "ON" for Movement Command	4.7.11 (7)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Address		Bit	Symbol	Description	Details
PLC Input	Current Position	32bits	—	Current Position: 32-bit Signed Integer The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm When the value is read in hexadecimal notation, the negative figure is expressed as a compliment of 2.	4.9 (1)
	Completed Position No. (Simplified Alarm CODE)	16bits	PM1 – PM512	16-bit Integer It is moved to the target position and the positioning completed position No. within the positioning width is output. In the case that the position movement has not been performed at all, or during the movement, “0” is output. When an alarm is issued (in the case that the status signal ALM is “ON”), the simplified alarm code (Refer to the instruction manual for the controller main body) is output.	4.9 (1)
	Status Signal	b15	EMGS	Emergency Stop: “ON” for Emergency Stop Status	4.7.11 (2)
		b14	PWR	Controller Ready: “ON” for Ready	4.7.11 (1)
		b13	CEND	Loadcell Calibration Complete : Turns ON when completed	4.7.11 (32)
		b12	ZONE1	Zone 1: “ON” with the current position within the zone set range	4.7.11 (12)
		b11	PZONE/ ZONE2	PZONE and ZONE2 can be switched in Parameter No.149. No.149 = 0 Position zone : This signal turns ON when the current position is inside the specified position zone. No.149 = 1 Zone2 : This signal turns ON when the current position is inside the specified zone.	4.7.11 (12)
		b10	LOAD	Teaching Mode Signal; “ON” during teaching mode selection	4.7.11 (26)
		b9	TRQS	Position Data Import Completion: “ON” for import completion	4.7.11 (27)
		b8	RMDS	Operation Mode Status: “OFF” for currently “AUTO” mode, “ON” for currently “MANU” mode	4.7.11 (19)
		b7	BALM	Warning for Absolute Battery Voltage Drop : Turns ON at voltage drop	4.7.11 (28)
		b6	PUSHS	Push motion in progress : “ON” for push motion in progress	4.7.11 (23)
		b5	PSFL	Pressing and a Miss: “ON” for pressing and a miss	4.7.11 (23)
		b4	SV	Operation Ready: “ON” with Servo ON	4.7.11 (5)
		b3	ALM	Alarm: “ON” with alarm issue	4.7.11 (3)
		b2	MOVE	Under Movement Signal: “ON” during Actuator Movement	4.7.11 (9)
		b1	HEND	Homing Completion “ON” with Homing Completion	4.7.11 (6)
		b0	PEND	Positioning Completion Signal: “ON” with Positioning Completion	4.7.11 (10)

4.7.8 Half Direct Value Mode 2 (Remote Device Station: No. of Occupied Stations: Two Stations)

This mode provides an operation method to utilize the force control (loadcell value feedback pressing) and also indicate the target position from PLC, positioning band width, speed, acceleration/deceleration speed and pressing current directly with inputting values.

Set the each value in I/O area. When the zone function is used, set it using the parameter Nos. 1, 2, 23 and 24.

The actuator's effective main functions that can be controlled using this mode, are as shown in the following table.

Actuator Function	○:Direct Control △:Indirect Control ×:Disabled	Remarks
Homing	○	
Positioning	○	
Speed, Acceleration and Deceleration Settings	○	
Pitch Feeding (Inching)	○	
Pressing Operation	○	
Speed change during the movement	○	
Different Acceleration Speed Operation in Deceleration	×	
Pause	○	
Zone Signal Output	△	Parameter setting is required.
PIO Pattern Selection	×	

(1) PLC Channel Composition (* “n” shows the head node address for each axis).

Parameter No.84	SCON-CA side Input register	PLC side	SCON-CA side Output register	PLC side
2	Occupied Domain	RY n0 to nF	Occupied Domain	RX n0 to nF
		RY (n+1)0 to (n+1)F		RX (n+1)0 to (n+1)F
		RY (n+2)0 to (n+2)F		RX (n+2)0 to (n+2)F
	System Domain	RY (n+3)0 to (n+3)F	System Domain	RX (n+3)0 to (n+3)F
	Target Position	RWw (n+0)	Current Position	RWr (n+0)
		RWw (n+1)		RWr (n+1)
	Positioning Width	RWw (n+2)	Force Feedback Data	RWr (n+2)
		RWw (n+3)		RWr (n+3)
	Speed	RWw (n+4)	Current Speed	RWr (n+4)
	Acceleration/Deceleration	RWw (n+5)		RWr (n+5)
	Pressing Current Limit Value	RWw (n+6)	Alarm code	RWr (n+6)
	Control signal	RWw (n+7)	Status Signal	RWr (n+7)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.

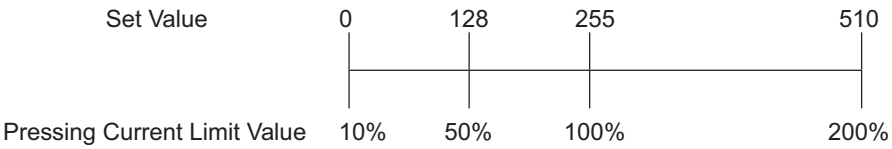
The System Domain stands for the system domain of the remote device station.

These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signals for each axis consists of 8 words for each I/O area.

- The control signals and status signals are ON/OFF signals in units of bit.
- The target position and current position are expressed using 2-word (32 bits) binary data. The figures from –999999 to +999999 (Unit: 0.01mm) can be set in PLC. However, set the position data within the soft stroke range (0 to effective stroke length) for the actuator in question.
- Set the positioning width. The positioning width is expressed using 2-word (32 bits) binary data. The figures from 1 to +999999 (Unit: 0.01mm) can be set in PLC.
- The specified speed is expressed using 1-word (16 bits) binary data. The figures from 0 to +65535 (Unit: 1.0mm/sec) can be set in PLC. Set the value that does not exceed the max. speed value for the actuator in question.
- The Acceleration/Deceleration is expressed using 1-word (16 bits) binary data. The figures from 1 to 300 (Unit: 0.01G) can be set in PLC. However, set the value that does not exceed the max. acceleration/deceleration value for the actuator in question.
- The pressing current limit value is expressed using 1-word (16 bits) binary data. The figures from 0 (0%) to 510 (200%) can be set in PLC. However, set the value within the settable range for the pressing current limit value (Refer to the catalog or instruction manual for the actuator) for the actuator in question.



- The force feedback data is expressed using 2-word (32 bits) binary data (Unit: 0.01N).
- The current speed is expressed using 2-word (32 bits) binary data (Unit: 0.01mm/sec).
- The alarm code is expressed using 1-word (16 bits) binary data.

PLC Output

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWw (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Slave Word)																

RWw (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWw (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Positioning Width (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWw (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Positioning Width (Host Word)	—	—	—	—	—	—	—	—	—	—	—	—	524,288	262,144	131,072	65,536

RWw (n+4)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Speed	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWw (n+5)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Acceleration/ Deceleration	—	—	—	—	—	—	—	256	128	64	32	16	8	4	2	1

RWw (n+6)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Pressing Current Limit Value	—	—	—	—	—	—	—	256	128	64	32	16	8	4	2	1

RWw (n+7)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Control signal	BKRL	RMOD	DIR	PUSH	—	—	CLBR	JOG+	JOG-	JVEL	JISL	SON	RES	STP	HOME	DSTR

PLC Input

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Force Feedback Data (Slave Word)																

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Force Feedback Data (Host Word)																

When the force feedback data is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+4)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Slave Word)																

RWr (n+5)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Host Word)																

When the Current Speed is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+6)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Alarm code																

RWr (n+7)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Status Signal	EMGS	PWR	ZONE2	ZONE1	—	—	CEND	RMDS	BALM	PUSHS	PSFL	SV	ALM	MOVE	HEND	PEND

(3) I/O Signal Allocation (* "ON" in the table shows the corresponding bit of "1" and "OFF" shows "0".)

Signal Type		Bit	Symbol	Description	Details
PLC Output	Target Position	32bits Data	—	32-bit Signed Integer Set the target position on the absolute coordinates. The unit is 0.01mm and settable range is between –999999 to +999999. (Example) When it is "+25.41mm", set it as "2541". If the value larger than the value (0.2mm) inside the soft limit for the parameter, the movement would be limited to the inside the soft limit (0.2mm). * When the input is performed in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (2)
	Positioning Width	32bits Data	—	32-bit Integer The unit is 0.01mm and settable range is between +1 to +999999. (Example) In the case of "25.40mm", set it as "2540". This register value has two meanings depending on the operation type. 1) In the case of positioning operation, it shows the allowable range from the target position, that is regarded as the positioning completion. 2) In the case of pressing operation, it shows the pressing width value. Specify the normal operation or pressing operation using the "PUSH" control signal setting.	4.9 (2)
	Speed	16bits Data	—	16-bit Integer Set the speed in movement. Unit is 1.0mm/sec and settable range is between 0 and 65535. (Example) In the case of "254.0mm/sec", set it as "254". When the movement command is set with the value bigger than the max. speed, an alarm is issued.	4.9 (2)
	Acceleration/ Deceleration	16bits Data	—	16-bit Integer Set the acceleration/deceleration in movement (The same value is applied both to acceleration and deceleration). The unit is 0.01G and settable range is between 1 and 300. (Example) In the case of "0.30G", set is as "30". When the movement command is set with the value of "0" or bigger than the max. acceleration/deceleration value, an alarm is issued.	4.9 (2)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Signal Type		Bit	Symbol	Description	Details
PLC Output	Pressing Current Limit Value	16bits Data	—	16-bit Integer Set the current limit in pressing operation. The settable range is between 0 (0%) and 255 (100%). The actual settable range varies depending on each actuator. (Refer to the catalog or instruction manual for the actuator). When the movement command is set with the value bigger than the max. pressing current value, an alarm is issued.	4.9 (2)
	Control signal	b15	BKRL	Brake Forcible Release: “ON” for brake release	4.7.11 (18)
		b14	RMOD	Operation Mode: “OFF” for “AUTO” Mode, “ON” for “MANU” Mode	4.7.11 (19)
		b13	DIR	Pressing Direction Setup ”OFF” for the direction reducing the positioning width from the target position, “ON” for the direction adding the positioning width from the target position	4.7.11 (22)
		b12	PUSH	Pressing Setup: “OFF” for Positioning Operation, “ON” for Pressing Operation	4.7.11 (21)
		b11 b10	—	Unavailable	—
		b9	CLBR	Loadcell Calibration Command : “ON” to execute calibration	4.7.11.(32)
		b8	JOG+	+ Jog: “ON” for Movement in the Opposite Direction of Home	4.7.11 (13)
		b7	JOG-	- Jog: “ON” for Movement to the Home Direction	4.7.11 (13)
		b6	JVEL	Jog Speed/Inching Distance Change-Over “OFF” for using the values set using the Parameter No. 26 “Jog Speed” and Parameter No. 48 “Inching Distance” “ON” for using the values set using the Parameter No. 47 “Jog Speed 2” and Parameter No. 49 “Inching Distance 2”	4.7.11 (14)
		b5	JISL	Jog/Inching Change-Over “OFF” for Jog Operation, “ON” for Inching Operation	4.7.11 (15)
		b4	SON	Servo ON Command: “ON” for Servo ON	4.7.11 (5)
		b3	RES	Reset: “ON” for Reset Execution	4.7.11 (4)
		b2	STP	Pause: “ON” for Pause Command	4.7.11 (7)
		b1	HOME	Homing: “ON” for Homing Command	4.7.11 (6)
		b0	DSTR	Positioning Command: “ON” for Movement Command	4.7.11 (8)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Signal Type		Bit	Symbol	Description	Details
PLC Input	Current Position	32bits Data	—	32-bit Signed Integer The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm * When it is read in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (2)
	Force Feedback Data	32bits Data	—	32-bit Integer It displays the measured value for the current loadcell. The unit is 0.01N. *When it is read in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (3)
	Current Speed	32bits Data	—	32-bit Signed Integer It shows the current speed. Positive Figure: Under movement in the opposite direction of home Negative Figure: Under movement in the home direction The unit is 0.01mm/sec. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm/sec * When it is read in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (2)
	Alarm code	16bits Data	—	16-bit Integer When an alarm is issued, the alarm code is output. When any alarm is not issued, it is “0$_H$”. Refer to the instruction manual for the controller main body for the details of the alarms.	4.9 (2)
	Status Signal	b15	EMGS	Emergency Stop: “ON” for Emergency Stop Status	4.7.11 (2)
		b14	PWR	Controller Ready: “ON” for Ready	4.7.11 (1)
		b13	ZONE2	Zone 2: “ON” for the current position within the zone set range	4.7.11 (12)
		b12	ZONE1	Zone 1: “ON” for the current position within the zone set range	4.7.11 (12)
		b11	—	Unavailable	—
		b10			
		b9	CEND	Loadcell Calibration Complete : Turns ON when completed	4.7.11 (32)
		b8	RMDS	Operation Mode Status: “OFF” for currently “AUTO” mode, “ON” for currently “MANU” mode	4.7.11 (19)
		b7	BALM	Warning for Absolute Battery Voltage Drop : Turns ON at voltage drop	4.7.11 (28)
		b6	PUSHS	Push motion in progress : “ON” for push motion in progress	4.7.11 (25)
		b5	PSFL	Pressing and a Miss: “ON” for pressing and a miss	4.7.11 (23)
		b4	SV	Operation Ready: “ON” with Servo ON	4.7.11 (5)
		b3	ALM	Alarm: “ON” with alarm issue	4.7.11 (3)
		b2	MOVE	Movement Signal: “ON” with Actuator Movement	4.7.11 (9)
		b1	HEND	Homing Completion “ON” with Homing Completion	4.7.11 (6)
		b0	PEND	Positioning Completion Signal: “ON” with Positioning Completion	4.7.11 (10)

4.7.9 Remote I/O Mode 3 (Remote Device Station: No. of Occupied Stations: One Station)

This mode provides a method to utilize the force control (loadcell value feedback pressing) and also indicate the position number as performed when PIO (24V input and output) is used.

Set the position data using the teaching tool such as the personal computer application software for RC. The number of operable positions varies depending on the parameter No. 25 “PIO Pattern” setting.

This mode is that the functions to read the current position and the force feedback data are added to I/O Mode contents.

The I/O specifications for the PIO pattern are described as follows (Refer to instruction manual for the controller main body for more information).

Parameter No. 25 Set Value	Operation Mode	I/O Specifications
0	Positioning mode	64 positioning points and 2 zone output points
1	Teaching mode	64 positioning points and 1 zone output point The positioning and jog operations are available. The current position can be written on the setup position data.
2	256 point mode	256 positioning points and 1 zone output point
3	512 point mode	512 positioning points and no zone output point
4	Electromagnetic valve mode 1	7 positioning points and 2 zone output points The direct operation command is available for each position No. The positioning completion signal is output for each position No.
5	Electromagnetic valve mode 2	3 positioning points and 2 zone output points It is operated with the Forward/Backward/Intermediate Position Commands. The positioning completion signal is output individually for each Forward End/Backward End/Intermediate Positions.
6	Force Control Mode 1 (requires dedicated loadcell)	32 positioning points and 1 zone output points
7	Force Control Mode 2 (requires dedicated loadcell)	5 positioning points and 1 zone output points The direct operation command is available for each position No. The positioning completion signal is output for each position No.

The actuator's effective main functions that can be controlled using this mode, are as shown in the following table.

Actuator Function	PIO Pattern							
	0: Positioning mode	1: Teaching mode	2: 256 point mode	3: 512 point mode	4: Electromagnetic valve mode 1	5: Electromagnetic valve mode 2	6: Force Control Mode 1	7: Force Control Mode 2
Homing	○	○	○	○	○	×	○	○
Positioning	○	○	○	○	○	○	○	○
Speed, Acceleration and Deceleration Settings	○	○	○	○	○	○	○	○
Pitch Feeding (Inching)	○	○	○	○	○	○	○	○
Pressing Operation	○	○	○	○	○	×	○	○
Speed change during the movement	○	○	○	○	×	○	○	×
Different Acceleration Speed, Operation in Deceleration	○	○	○	○	○	○	○	○
Pause	○	○	○	○	○	○(*1)	○	○
Zone Signal Output	○	○	○	×	○	○	○	○
PIO Pattern Selection (Set using the parameters)	○	○	○	○	○	○	○	○

○: Operation Available ×: Operation Unavailable

(*1) It is available when the parameter No. 27 “Movement Command Type” is set to “0”. Turning “OFF” the “Movement Command” can stop the system temporarily.

(1) PLC Address Composition (* “n” shows the head register address for each axis).

Parameter No.84	SCON-CA side DI and Input register	PLC side	SCON-CA side DO and Output register	PLC side
4	Port No. 0 to 15	RY n0 to nF	Port No. 0 to 15	RX n0 to nF
	System Domain	RY (n+1)0 to (n+1)F	System Domain	RX (n+1)0 to (n+1)F
	Occupied Domain	RWw (n+0)	Current Position	RWr (n+0)
		RWw (n+1)		RWr (n+1)
		RWw (n+2)	Force Feedback Data	RWr (n+2)
		RWw (n+3)		RWr (n+3)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signal for each axis consists of 1 word for each I/O bit register.
The I/O signal for each axis consists of 4 words for each I/O data register.

- The channel to be controlled with the port number is to be controlled by the ON/OFF signals in bit unit.
- The current position is expressed using 2-word (32 bits) binary data (Unit: 0.01mm).
- The force feedback data is expressed using 2-word (32 bits) binary data (Unit: 0.01N).

PLC Output (* “n” shows the head register address per each axis).

Address	one word = 16 bits															
RY (n+0)	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Controller Input Port No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

PLC Input (* “n” shows the head register address per each axis).

Address	one word = 16 bits															
RX (n+0)	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Controller Output Port No.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Host Word)																

When the current position is shown using thenegative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Force Feedback Data (Slave Word)																

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Force Feedback Data (Host Word)																

When the force feedback data is shown using thenegative figure, it is expressed using the complement of 2.

(3) I/O Signal Allocation

Refer to “4.7.2 Remote I/O Mode (3) I/O Signal Allocation” for each PIO pattern signal allocation.

The signal allocation for the Command Current and Current Position, is shown in the following table.

Signal Type		Bit	Symbol	Description	Details
PLC Input	Current Position	32bits Data	—	32-bit Signed Integer The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23 mm * When the value is read in hexadecimal notation, the negative figure is expressed as a compliment of 2.	—
	Force Feedback Data	32bits Data	—	32-bit Signed Integer It show the current value measured by loadcell. The unit is 0.01N. * When the value is read in hexadecimal notation, the negative figure is expressed as a compliment of 2.	—

4.7.10 Half Direct Value Mode 3 (Remote Device Station: No. of Occupied Stations: Two Stations)

This mode provides an operation method that the changes of the servo gain parameter during an operation and anti-vibration control parameter set are enabled in addition to the half-direct mode functions.
Set the each value in I/O area. When the zone function is used, set it using the parameter No. 1, 2, 23 and 24.
The actuator's effective main functions that can be controlled using this mode, are as shown in the following table.

Actuator Function	○:Direct Control △:Indirect Control ×:Disabled	Remarks
Homing	○	
Positioning	○	
Speed, Acceleration and Deceleration Settings	○	
Pitch Feeding (Inching)	○	
Pressing Operation	○	
Speed change during the movement	○	
Different Acceleration Speed Operation in Deceleration	×	
Pause	○	
Zone Signal Output	△	Parameter setting is required.
PIO Pattern Selection	×	

(1) PLC Address Composition (* “n” shows the head register address for each axis).

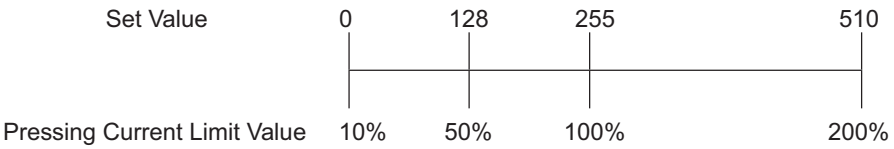
Parameter No.84	SCON-CA side Input register	PLC side	SCON-CA side Output register	PLC side
2	Occupied Domain	RY n0 to nF	Occupied Domain	RX n0 to nF
		RY (n+1)0 to (n+1)F		RX (n+1)0 to (n+1)F
		RY (n+2)0 to (n+2)F		RX (n+2)0 to (n+2)F
	System Domain	RY (n+3)0 to (n+3)F	System Domain	RX (n+3)0 to (n+3)F
	Target Position	RWw (n+0)	Current Position	RWr (n+0)
		RWw (n+1)		RWr (n+1)
	Positioning Width	RWw (n+2)	Command Current	RWr (n+2)
		RWw (n+3)		RWr (n+3)
	Speed	RWw (n+4)	Current Speed	RWr (n+4)
	Acceleration/Deceleration	RWw (n+5)		RWr (n+5)
	Pressing Current Limit Value	RWw (n+6)	Alarm code	RWr (n+6)
	Control signal	RWw (n+7)	Status Signal	RWr (n+7)

Note: The Occupied Domain stands for the domain occupied by means of the setting of the number of remote device stations.
The System Domain stands for the system domain of the remote device station.
These domains are not used for any other purpose. Also take care about duplicating the use of the data register.

(2) I/O Signal Allocation for each Axis

The I/O signals for each axis consists of 8 words for each I/O area.

- The control signals and status signals are ON/OFF signals in units of bit.
- The target position and current position are expressed using 2-word (32 bits) binary data. The figures from –999999 to +999999 (Unit: 0.01mm) can be set in PLC. However, set the position data within the soft stroke range (0 to effective stroke length) for the actuator in question.
- Set the positioning width. The positioning width is expressed using 2-word (32 bits) binary data. The figures from 1 to +999999 (Unit: 0.01mm) can be set in PLC.
- The specified speed is expressed using 1-word (16 bits) binary data. The figures from 0 to +65535 (Unit: 1.0mm/sec) can be set in PLC. Set the value that does not exceed the max. speed value for the actuator in question.
- The Acceleration/Deceleration is expressed using 1-word (16 bits) binary data. The figures from 1 to 300 (Unit: 0.01G) can be set in PLC. However, set the value that does not exceed the max. acceleration/deceleration value for the actuator in question.
- The pressing current limit value is expressed using 1-word (16 bits) binary data. The figures from 0 (0%) to 510 (200%) can be set in PLC. However, set the value within the settable range for the pressing current limit value (Refer to the catalog or instruction manual for the actuator) for the actuator in question.



- The force feedback data is expressed using 2-word (32 bits) binary data (Unit: 1mA).
- The current speed is expressed using 2-word (32 bits) binary data (Unit: 0.01mm/sec).
- The alarm code is expressed using 1-word (16 bits) binary data.

PLC Output

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWw (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Slave Word)																

RWw (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Target Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWw (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Positioning Width (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWw (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Positioning Width (Host Word)	—	—	—	—	—	—	—	—	—	—	—	—	524,288	262,144	131,072	65,536

RWw (n+4)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Speed	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWw (n+5)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Acceleration/ Deceleration	—	—	—	—	—	—	—	256	128	64	32	16	8	4	2	1

RWw (n+6)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Pressing Current Limit Value	—	—	—	—	—	—	—	256	128	64	32	16	8	4	2	1

RWw (n+7)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Control signal	BKRL	RMOD	DIR	PUSH	GSL1	GSL0	NTC1	NTC0	MOD1	MOD0	—	SON	RES	STP	HOME	DSTR

PLC Input

Address (* “n” shows the head register address per each axis).

one word = 16 bits

RWr (n+0)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Slave Word)																

RWr (n+1)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Position (Host Word)																

When the target position is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+2)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Slave Word)	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1

RWr (n+3)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Command Current (Host Word)													524,288	262,144	131,072	65,536

RWr (n+4)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Slave Word)																

RWr (n+5)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Current Speed (Host Word)																

When the Current Speed is shown using the negative figure, it is expressed using the complement of 2.

RWr (n+6)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Alarm code																

RWr (n+7)	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
Status Signal	EMGS	PWR	ZONE2	ZONE1	—	—	—	RMDS	BALM	—	PSFL	SV	ALM	MOVE	HEND	PEND

(3) I/O Signal Allocation (* "ON" in the table shows the corresponding bit of "1" and "OFF" shows "0".)

Signal Type		Bit	Symbol	Description	Details
PLC Output	Target Position	32bits Data	—	32-bit Signed Integer Set the target position on the absolute coordinates. The unit is 0.01mm and settable range is between –999999 to +999999. (Example) When it is "+25.41mm", set it as "2541". If the value larger than the value (0.2mm) inside the soft limit for the parameter, the movement would be limited to the inside the soft limit (0.2mm). * When the input is performed in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (2)
	Positioning Width	32bits Data	—	32-bit Integer The unit is 0.01mm and settable range is between +1 to +999999. (Example) In the case of "25.40mm", set it as "2540". This register value has two meanings depending on the operation type. 1) In the case of positioning operation, it shows the allowable range from the target position, that is regarded as the positioning completion. 2) In the case of pressing operation, it shows the pressing width value. Specify the normal operation or pressing operation using the "PUSH" control signal setting.	4.9 (2)
	Speed	16bits Data	—	16-bit Integer Set the speed in movement. Unit is 1.0mm/sec and settable range is between 0 and 65535. (Example) In the case of "254.0mm/sec", set it as "254". When the movement command is set with the value bigger than the max. speed, an alarm is issued.	4.9 (2)
	Acceleration/ Deceleration	16bits Data	—	16-bit Integer Set the acceleration/deceleration in movement (The same value is applied both to acceleration and deceleration). The unit is 0.01G and settable range is between 1 and 300. (Example) In the case of "0.30G", set is as "30". When the movement command is set with the value of "0" or bigger than the max. acceleration/deceleration value, an alarm is issued.	4.9 (2)

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

<table>
<tr><th colspan="2">Signal Type</th><th>Bit</th><th>Symbol</th><th>Description</th><th>Details</th></tr>
<tr><td rowspan="19">PLC Output</td><td>Pressing Current Limit Value</td><td>16bits Data</td><td>—</td><td>16-bit Integer
Set the current limit in pressing operation.
The settable range is between 0 (0%) and 510 (200%).
The actual settable range varies depending on each actuator.
(Refer to the catalog or instruction manual for the actuator).
When the movement command is set with the value bigger than the max. pressing current value, an alarm is issued.</td><td>4.9 (2)</td></tr>
<tr><td rowspan="18">Control signal</td><td>b15</td><td>BKRL</td><td>Brake Forcible Release: “ON” for brake release</td><td>4.7.11 (18)</td></tr>
<tr><td>b14</td><td>RMOD</td><td>Operation Mode: “OFF” for “AUTO” Mode, “ON” for “MANU” Mode</td><td>4.7.11 (19)</td></tr>
<tr><td>b13</td><td>DIR</td><td>Pressing Direction Setup
”OFF” for the direction reducing the positioning width from the target position, “ON” for the direction adding the positioning width from the target position</td><td>4.7.11 (22)</td></tr>
<tr><td>b12</td><td>PUSH</td><td>Pressing Setup: “OFF” for Positioning Operation, “ON” for Pressing Operation</td><td>4.7.11 (21)</td></tr>
<tr><td>b11</td><td>GSL1</td><td>Servo Gain Parameter Set Selection 1</td><td rowspan="2">Select the servo gain parameter set to be used
<table><tr><th>GSL1</th><th>GSL0</th><th>Functions</th></tr><tr><td>OFF</td><td>OFF</td><td>Parameter set 0 selected</td></tr><tr><td>OFF</td><td>ON</td><td>Parameter set 1 selected</td></tr><tr><td>ON</td><td>OFF</td><td>Parameter set 2 selected</td></tr><tr><td>ON</td><td>ON</td><td>Parameter set 3 selected</td></tr></table></td><td rowspan="2">4.7.11 (33)</td></tr>
<tr><td>b10</td><td>GSL0</td><td>Servo Gain Parameter Set Selection 0</td></tr>
<tr><td>b9</td><td>NTC1</td><td>Anti-Vibration Control Mode Selection 1</td><td rowspan="2">Select the anti-vibration control parameter set to be used
<table><tr><th>NTC1</th><th>NTC0</th><th>Functions</th></tr><tr><td>OFF</td><td>OFF</td><td>Anti-vibration control not used</td></tr><tr><td>OFF</td><td>ON</td><td>Parameter set 1 selected</td></tr><tr><td>ON</td><td>OFF</td><td>Parameter set 2 selected</td></tr><tr><td>ON</td><td>ON</td><td>Parameter set 3 selected</td></tr></table></td><td rowspan="2">4.7.11 (29)</td></tr>
<tr><td>b8</td><td>NTC0</td><td>Anti-Vibration Control Mode Selection 0</td></tr>
<tr><td>b7</td><td>MOD1</td><td rowspan="2">Acceleration/Deceleration Mode:
OFF/OFF for Trapezoid Pattern
OFF/ON for S-shaped Motion
ON/OFF for First-Order Lag Filter</td><td rowspan="2">4.7.11 (30)</td></tr>
<tr><td>b6</td><td>MOD0</td></tr>
<tr><td>b5</td><td>—</td><td>Unavailable</td><td>—</td></tr>
<tr><td>b4</td><td>SON</td><td>Servo ON Command: “ON” for Servo ON</td><td>4.7.11 (5)</td></tr>
<tr><td>b3</td><td>RES</td><td>Reset: “ON” for Reset Execution</td><td>4.7.11 (4)</td></tr>
<tr><td>b2</td><td>STP</td><td>Pause: “ON” for Pause Command</td><td>4.7.11 (7)</td></tr>
<tr><td>b1</td><td>HOME</td><td>Homing: “ON” for Homing Command</td><td>4.7.11 (6)</td></tr>
<tr><td>b0</td><td>DSTR</td><td>Positioning Command: “ON” for Movement Command</td><td>4.7.11 (8)</td></tr>
</table>

(* “ON” in the table shows the corresponding bit of “1” and “OFF” shows “0”.)

Signal Type		Bit	Symbol	Description	Details
PLC Input	Current Position	32bits Data	—	32-bit Signed Integer The unit is 0.01mm. (Example) Read Value: 000003FF$_H$ = 1023 (decimal system) = 10.23mm * When it is read in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (2)
	Command Current	32bits Data	—	32-bit Integer It shows the current value in the current command. The unit is mA. Read Value: 000003FF$_H$ = 1023 (decimal system) = 1023mA	4.9 (2)
	Current Speed	32bits Data	—	32-bit Signed Integer It shows the current speed. Positive Figure: Under movement in the opposite direction of home Negative Figure: Under movement in the home direction The unit is 0.01mm/sec. (Example) Read Value: 000003 FF$_H$ = 1023 (decimal system) = 10.23mm/sec * When it is read in hexadecimal notation, input the negative value using a compliment of 2.	4.9 (2)
	Alarm code	16bits Data	—	16-bit Integer When an alarm is issued, the alarm code is output. When any alarm is not issued, it is “0H”. Refer to the instruction manual for the controller main body for the details of the alarms.	4.9 (2)
	Status Signal	b15	EMGS	Emergency Stop: “ON” for Emergency Stop Status	4.7.11 (2)
		b14	PWR	Controller Ready: “ON” for Ready	4.7.11 (1)
		b13	ZONE2	Zone 2: “ON” for the current position within the zone set range	4.7.11 (12)
		b12	ZONE1	Zone 1: “ON” for the current position within the zone set range	4.7.11 (12)
		b11	—	Unavailable	—
		b10			
		b9			
		b8	RMDS	Operation Mode Status: “OFF” for currently “AUTO” mode, “ON” for currently “MANU” mode	4.7.11 (19)
		b7	BALM	Warning for Absolute Battery Voltage Drop : Turns ON at voltage drop	4.7.11 (28)
		b6	—	Unavailable	—
		b5	PSFL	Pressing and a Miss: “ON” for pressing and a miss	4.7.11 (23)
		b4	SV	Operation Ready: “ON” with Servo ON	4.7.11 (5)
		b3	ALM	Alarm: “ON” with alarm issue	4.7.11 (3)
		b2	MOVE	Movement Signal: “ON” with Actuator Movement	4.7.11 (9)
		b1	HEND	Homing Completion “ON” with Homing Completion	4.7.11 (6)
		b0	PEND	Positioning Completion Signal: “ON” with Positioning Completion	4.7.11 (10)

4.7.11 I/O Signal Control and Functions

* "ON" expresses the bit signal of "1" and "OFF" expresses the bit signal of "0".
The I/O control and functions used in the Position/Simplified Direct Value Mode 1 and 2, Half Direct Value Mode 1 to 3 and Full Direct Value Mode, are described as follows. For the I/O signals for the Remote I/O Mode 1 to 3, refer to the instruction manual for the controller main body.

(1) Controller Ready (PWR) PLC Input Signal

When the controller can control the system after power up, it is turned "ON".

■ Function:

Regardless of the alarm or servo conditions, when the controller initialization is completed normally after power up and the controller can control the system, it is turned "ON".

Even in the alarm condition, when the controller can control the system, it is turned "ON".

(2) Emergency Stop (EMGS) PLC Input Signal

When the controller is stopped in an emergency, it is turned "ON".

■ Function:

When the controller is stopped in an emergency (motor driving power is cut off), it is turned "ON". When the emergency stop status is cleared, it is turned "OFF".

(3) Alarm (ALM) PLC Input Signal

When any error is detected using the controller protection circuit (function), it is turned "ON".

■ Function:

When any error is detected and the protection circuit (function) is activated, this signal is turned "ON".

When the cause of the alarm is eliminated and the reset signal is turned "ON", the alarm is turned "OFF" in the case that it is the alarm with the operation cancellation level (In the case of the alarm with the cold start level, cycling the power is required).

When the alarm is detected, the Status Indicator LED (Refer to "4.3 CC-Link Interface") on the front surface of the controller illuminates in red.

(4) Reset (RES) PLC Output Signal

This signal has two functions. It can reset the controller alarm and cancel the reminder for planned movements during pause conditions.

■ Function:

1. When this signal is turned ON from OFF condition after eliminating the cause of the alarm during the alarm output, the alarm (ALM) signal can be reset (in the case of the alarm with the cold start level, cycling the power is required).
2. When this signal is turned ON from OFF condition during the pause condition, the reminder of the planned movement left can be cancelled.

(5) Servo ON Command (SON) PLC Output Signal
Operation Ready (SV) PLC Input Signal

When “SON” signal is turned “ON”, the servo-motor is turned “ON”. When the servo-motor is turned ON, the Status Indicator LED (Refer to “4.3 CC-Link Interface”) on the front surface of the controller illuminates in green.

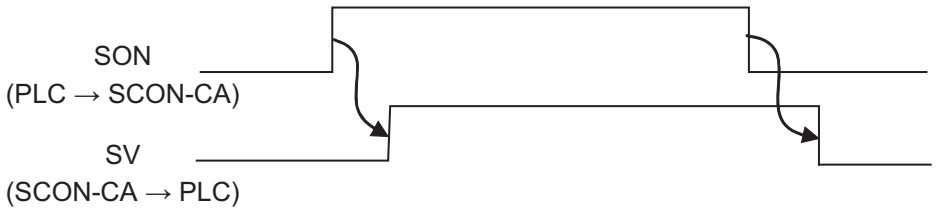
The “SV” signal is synchronized with this LED.

■ Function:

Using the “SON” signal, the turning ON/OFF of the controller is available.

While the “SV” signal is ON, the controller's servo-motor is turned “ON” and the operation becomes available.

The relationship between the “SON” signal and “SV” signal is as follows.



(6) Homing (HOME) PLC Output Signal

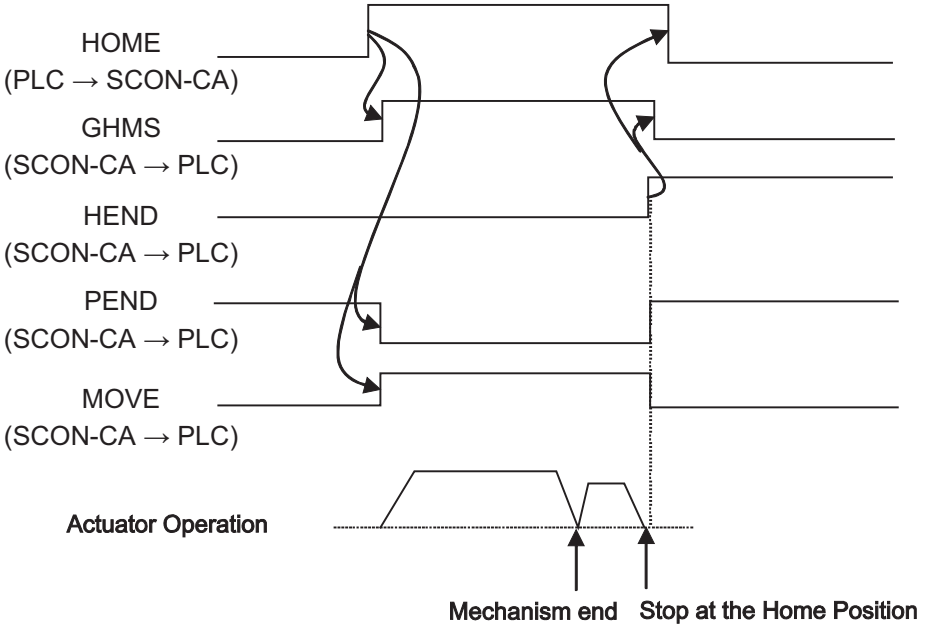
Homing Completion (HEND) PLC Input Signal

Under Homing Operation (GHMS) PLC Input Signal

When the “HOME” signal is turned “ON”, this command is processed at the startup (ON edge), and the homing operation is performed automatically. During the homing operation, the “GHMS” signal is turned “ON”.

When the “HEND” signal is turned “ON”, turn “OFF” the “HOME” signal. Once the “HEND” signal is turned “ON”, it can not be turned “OFF” until the power is turned “OFF” or the “HOME” signal is input again.

Even after the completion of the homing operation, when the “HOME” signal is turned “ON”, the homing operation can be performed.



⚠ Caution: In the Remote I/O mode1 to 3 and Position/Simplified Direct Value Mode 1 and 2, when the positioning command is issued without performing the homing operation after power up, the positioning is performed after the automatic homing operation. However, it is limited to only once after power up.

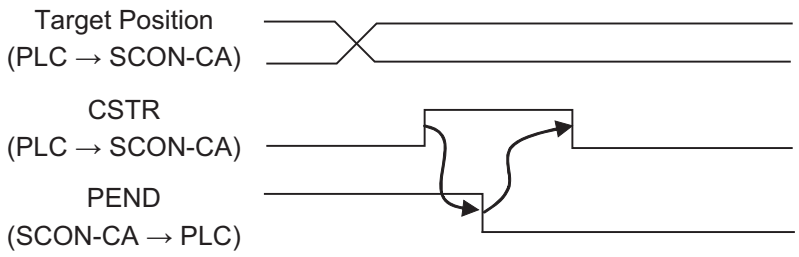
In the Half Direct Value Mode 1 to 3 and Full Direct Value Mode, when the positioning command is issued without performing the homing operation after power up, the alarm for the “Error Code 83: ALARM HOME ABS (Absolute Position Movement Command in the Homing Unfinished Condition) is issued (Operation Cancellation Level). Take the greatest care.

(7) Positioning Start (CSTR): Used in Position/Simplified Direct Value Mode 1 and 2
PLC Output Signal

This signal is processed at the startup (ON edge) and the positioning is performed to the target position with the specified position No. or set using the PLC's target position register.
Whether the target position with the specified position No. is used or the setting using the PLC's target position register is used, depends on the Control Signal b11: “Position/Simplified Direct Value Change-Over (PMOD) Signal”.

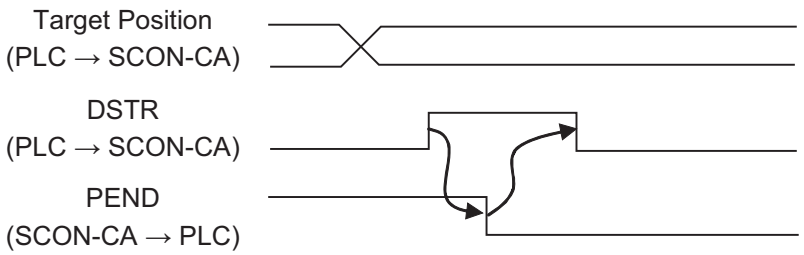
- PMOD = OFF: Target position data for the specified position No. is used.
- PMOD = ON: Value for the target position set using the PLC's target position register is used.

When this signal is issued in the condition where the homing operation has not performed at all after power up (HEND signal OFF), the positioning to the target position is performed after the homing operation is performed automatically.
Turn “OFF” this signal after confirming that the Positioning Completion Signal (PEND) signal has been turned “OFF”.



(8) Positioning Command (DSTR): Used in Half Direct Value Mode 1 to 3 or Full Direct Value Mode PLC Output Signal

This signal is processed at the startup (ON edge) and the positioning to the target position input in the PLC's target position register is performed. When this signal is issued in the condition where the homing operation has not performed at all after power up (HEND signal OFF), an alarm is issued (Operation Cancellation Level).
Turn “OFF” this signal after confirming that the Positioning Completion Signal (PEND) signal has been turned “OFF”.

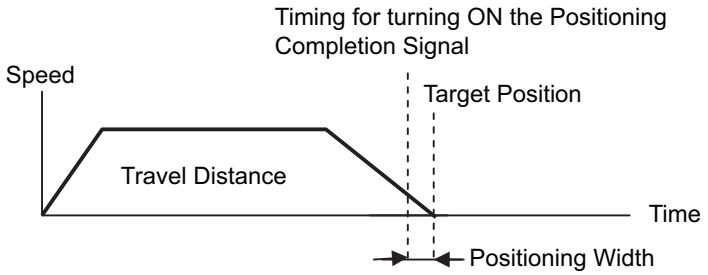


(9) Under Movement Signal (MOVE) PLC Input Signal

This signal is turned ON while the actuator's slider or rod is moving (including the pressing or jog operation after the homing operation).
After the completion of the positioning, homing or pressing operation, or during the pause condition, this signal is turned “ON”.

(10) Positioning Completion Signal (PEND) PLC Input Signal

This signal is turned “ON” when the actuator is moved to the target position and reaches the positioning width and the pressing is completed.



When the servo-motor is turned ON from OFF condition, the positioning is performed with the position set as the target position. Accordingly, this signal is turned “ON” and after that, when the positioning operation is started with the homing (HOME) signal, positioning start (CSTR) signal and positioning command (DSTR) signal, this signal is turned “OFF”.

⚠ Caution: When the servo-motor is turned OFF or stopped in an emergency while the actuator is stopped at the target position, the PEND signal is turned “OFF” temporarily.
Then, when the servo-motor is turned “ON” and the actuator is within the positioning width, the PEND signal is turned “ON” again.
When the positioning is completed with the CSTR signal or DSTR signal turned “ON”, the PEND signal is not turned “ON”.

(11) Pause (STP) PLC Output Signal

When this signal is turned “ON”, the actuator movement is decelerated and stopped. When it is turned “OFF”, the actuator movement is restarted.
The acceleration in the operation restart or the deceleration in stopping operation, is expressed as the value for the acceleration/deceleration for the position No. set using the specified position No. register in the Position/Simplified Direct Value Mode 1 and 2, and as the value set in the acceleration/deceleration register in the Half Direct Value Mode 1 to 3.
In the Full Direct Value Mode, the value is expressed as the value set in the acceleration register or deceleration register.

(12) Zone 1 (ZONE 1) PLC Input Signal

Zone 2 (ZONE 2) PLC Input Signal

Position Zone (PZONE) PLC Input Signal

These signals are turned ON when the current position of the actuator is within the set range and turned OFF when the current position is out of the set range.

1. Zone 1, Zone 2

The zone is set using the user parameters.

The Zone 1 Signal is set using the parameter No. 1 “Zone 1 “+” Side” and No. 2 “Zone 1 “-” Side”.

The Zone 2 Signal is set using the parameter No. 23 “Zone 2 “+” Side” and No. 24 “Zone 2 “-” Side”.

The Zone 1 Signal and Zone 2 Signal become effective when the homing operation is completed. After that, even during the servo OFF, it is effective.

2. Position Zone

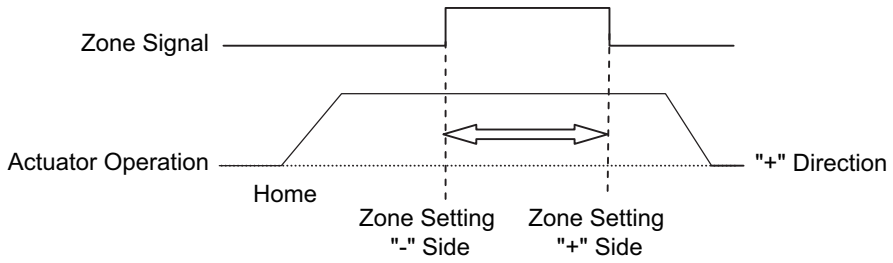
The zone is set using the position table I/O data register.

In the case of the Position/Simplified Direct Value Mode 1 and 2, the PZONE signal is set using the position table.

In the case of the Full Direct Value Mode, the PZONE signal is set using the Zone Value Register.

(*) In the Half Direct Value Mode 1 to 3, there is no PZONE signal.

The PZONE signal becomes effective with the movement command after the homing operation. After that, even during the servo OFF, it is effective.



(13) "+" Jog (JOG+) PLC Output Signal

"-" Jog (JOG-) PLC Output Signal

This signal is the command for the jog operation startup or inching operation startup.
In the case of the "+" command, the movement direction is to the opposite of the home and in the case of the "-" command, the movement direction is to the home.

1. Jog Operation

The jog operation is available when the Jog/Inching Change-Over Signal (JISL) is turned "OFF".
While the "JOG+" is turned "ON", the movement direction is to the opposite of the home and when it is turned "OFF", the actuator is decelerated and stopped.
While the "JOG-" is turned "ON", the movement direction is to the home, and when it is turned OFF, the actuator is decelerated and stopped.
The operation is performed based on the set values of the following parameters.

- The speed is based on the parameter value specified using the Jog Speed/Inching Distance Change-Over (JVEL) signal.
  JVEL Signal OFF: The speed is based on the parameter No. 26 "PIO Jog Speed" value.
  JVEL Signal ON: The speed is based on the parameter No. 47 "PIO Jog Speed 2" value.
- The Acceleration/Deceleration is based on the rated acceleration/deceleration (depending on the actuator).
- When both the JOG+ and JOG- signals are turned "ON", the actuator is decelerated and stopped.

2. Inching Operation

The inching operation is available while the JISL signal is turned "ON".
Once it is turned "ON", the actuator is moved as much as the inching distance.
When the JOG+ is turned "ON", the movement is to the opposite of the home and when the JOG- is turned "ON", the movement is to the home.

- The operation is performed based on the set values of the following parameters.
- The speed is based on the parameter value specified using the Jog Speed/Inching Distance Change-Over (JVEL) signal.
  JVEL Signal OFF : The speed is based on the parameter No. 26 "PIO Jog Speed" value.
  JVEL Signal ON : The speed is based on the parameter No. 47 "PIO Jog Speed 2" value.
- The Travel Distance is based on the set values of the following parameters.
  JVEL Signal OFF : The travel distance is based on the parameter No. 48 "PIO Inching Distance" value.
  JVEL Signal ON : The travel distance is based on the parameter No. 49 "PIO Inching Distance 2" value.
- The Acceleration/Deceleration is based on the rated acceleration/deceleration (depending on the actuator).

During the normal operation, even when the "+" Jog Signal or "-" Jog Signal is turned "ON", the normal operation is continued (The Jog signal is ignored).
In the pause condition, even when the "+" Jog Signal or "-" Jog Signal is turned "ON", the actuator is not moved.

Note: Because the software stroke limit is disabled before the homing operation, the actuator might run against the mechanism end. Take the greatest care.

(14) Jog Speed/Inching Distance Change-Over (JVEL) PLC Output Signal

This change-over signal is used for the parameters specifying the jog speed when the jog operation is selected or the inching distance when the inching operation is selected.

The relationship is as follows:

JVEL Signal	Jog Operation : JISL = OFF	Inching Operation: JISL = ON
OFF	Parameter No. 26 “Jog Speed”	Parameter No. 26 “Jog Speed” Parameter No. 48 “Inching Distance”
ON	Parameter No. 47 “Jog Speed 2”	Parameter No. 47 “Jog Speed 2” Parameter No. 49 “Inching Distance 2”

(15) Jog/Inching Change-Over (JISL) PLC Output Signal

This signal changes over the jog operation and the inching operation.

JISL = OFF: Jog Operation

JISL = ON: Inching Operation

When the JISL signal is turned “ON” (for inching operation) during the jog operation, the actuator is decelerated and performs the inching operation.

When the JISL signal is turned “OFF” (for jog operation) during the inching operation, the actuator performs the jog operation after the movement is completed.

The relationship between the JISL Signal and Jog Speed/Inching Distance Change-Over (JVEL) Signal ON/OFF is described as follows.

		Jog Operation	Inching Operation
JISL		OFF	ON
JVEL = OFF	Speed	Parameter No. 26 “Jog Speed”	Parameter No. 26 “Jog Speed”
	Travel Distance	—	Parameter No. 48 “Inching Distance”
	Acceleration/ Deceleration	Rated Value (depending on the actuator)	Rated Value (depending on the actuator)
JVEL = ON	Speed	Parameter No. 47 “Jog Speed 2”	Parameter No. 47 “Jog Speed 2”
	Travel Distance	—	Parameter No. 49 “Inching Distance 2”
	Acceleration/ Deceleration	Rated Value (depending on the actuator)	Rated Value (depending on the actuator)
Operation		When JOG+/JOG- is “ON”:	When the JOG+/JOG- startup (ON edge) is detected:

(16) Teaching Mode Command (MODE) PLC Output Signal

Teaching Mode Signal (MODES) PLC Input Signal

When the MODE signal is turned “ON”, the normal operation mode is changed to the teaching mode.
When the mode for the controllers for each actuator is changed to the teaching mode, the MODES signal is turned ON.
After confirming that the MODES signal is turned “ON” on the PLC side, start the teaching operation.

Note: In order to change the normal operation mode to the teaching mode, the following conditions are required.

- The actuator operation (motor) is stopped.
- The + JOG (JOG+) signal and – JOG (JOG-) signal are turned “OFF”.
- The Position Data Import Command (PWRT) Signal and Positioning Start (CSTR) Signal are turned “OFF”.

Note: When the PWRT signal is not turned OFF, the mode is not returned to the normal operation mode.

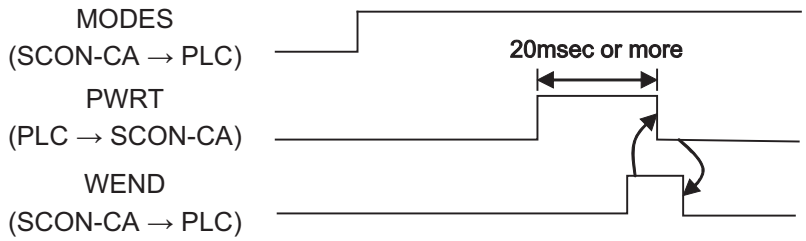
(17) Position Data Import Command (PWRT) Signal PLC Output Signal

Position Data Import Completion (WEND) Signal PLC Input Signal

The PWRT signal is available when the teaching mode signal (MODES) is turned “ON”.
Turn ON the PWRT signal (*1). Then, the current position data will be written in the position data box for the position No. set using the PLC's specified Position No. register (*2).
When the data writing is completed, the WEND signal is turned “ON”.
After the WEND signal is turned ON, turn OFF the PWRT signal in the host machine.
When the PWRT signal is turned ON before the WEND signal is turned “ON”, the WEND signal is not turned “ON”.
When the PWRT signal is turned “OFF” the WEND signal is also turned “OFF”.

(*1) Turn it ON for 20msec or more. If the time is shorter than 20msec, the writing is not completed.

(*2) When the data items except for the position have not been defined, the parameter initial values are written (Refer to the instruction manual for the controller main body).



(18) Brake Forcible Release (BKRL) Signal PLC Output Signal

Turning this signal “ON” can release the brake forcibly.

(19) Operation Mode (RMOD) PLC Output Signal

Operation Mode Status (RMDS) PLC Input Signal

The operation mode is selected with the RMOD signal and the MODE switch located on the front surface of the controller.

Also, which mode is currently set, AUTO or MANU, can be confirmed using the RMDS signal.

The operation modes with the combination of the RMOD signal and the MODE switch ON/OFF are described as follows.

	Controller MODE Switch set to “AUTO”	Controller MODE Switch set to “MANU”
RMOD Signal “OFF” (AUTO Mode Command)	AUTO Mode (RMDS = OFF)	MANU Mode (RMDS = OFF)
RMOD Signal “ON” (MANU Mode Command)	MANU Mode (RMDS = ON)	MANU Mode (RMDS = ON)

Note: In MANU mode, the startup of the operation from PLC is not available.

(20) Position/Simplified Direct Value Change-Over (PMOD) PLC Output Signal

This signal changes over the use of the value registered in the controller position table for the target position in the movement and the use of the value specified in the PLC's target position register.

PMOD = OFF : Using the value register in the Position Table

PMOD = ON : Using the value specified in the Target Position Register

(21) Pressing Setup (PUSH) PLC Output Signal

When the movement command signal is output after this signal is turned ON, the pressing operation is performed.

When this signal is set to “OFF”, the normal positioning operation is performed.

(Refer to Item (2) Operation in Half Direct Value Mode 1 to 3 in “4.9 Operation” for the setting timing for this signal).

(22) Pressing Direction Setup (DIR) PLC Output Signal

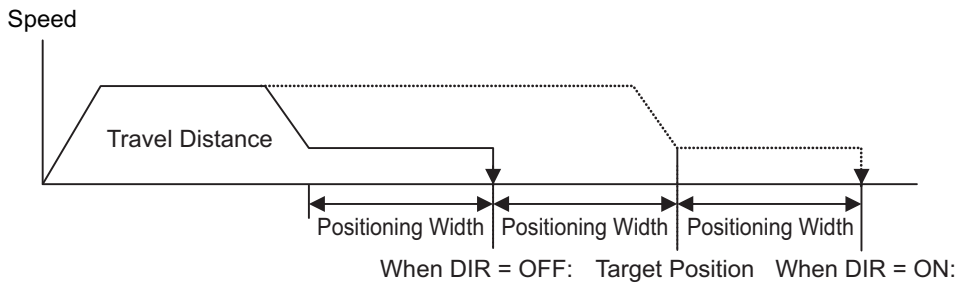
This signal specifies the pressing direction.

When this signal is turned “OFF”, the pressing operation is performed to the position expressed using the value reducing the positioning width from the target position.

When this signal is turned ON, the pressing operation is performed to the position expressed using the value adding the positioning width to the target position.

In the case of the normal pressing operation, this signal is disabled.

(Refer to Item (2) Operation in Half Direct Value Mode 1 to 3 in “4.9 Operation” for the setting timing for this signal).



(23) Pressing and a Miss (PSFL) PLC Input Signal

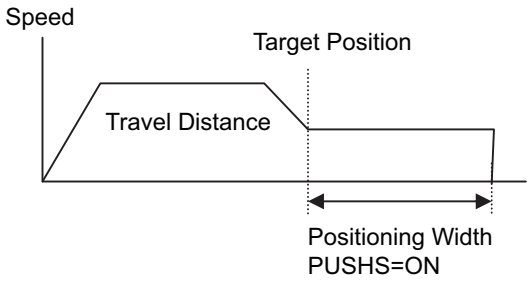
In the case that the pressing operation was performed, and the actuator moved the travel distance set in the controller position table positioning width or set using the PLC's positioning width register, but it was not pushed against the work, this signal is turned “ON”.
(Refer to Item (2) Operation in Half Direct Value Mode 1 to 3 in “4.9 Operation” for the setting timing for this signal).

(24) Incremental Command (INC) PLC Output Signal

When the movement command is issued while this signal is turned “ON”, the actuator is moved to the position expressed as the value input in the PLC's target position register based on the current position (Incremental Movement).
When this signal is turned “OFF”, the actuator is moved to the position expressed as the value set in the PLC's target position register.

(25) Under Pressing Operation (PUSHS) PLC Input Signal

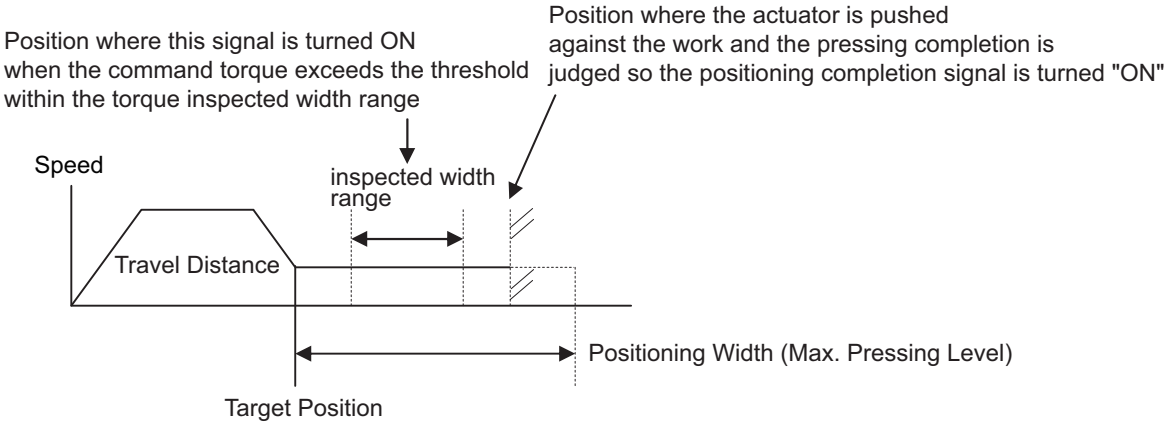
This signal is turned “ON” during the pressing operation.



This signal is turned “OFF” when the pressing and a miss signal or the next movement command signal is output, or the servo-motor is turned “OFF”.
(Refer to Item (2) Operation in Half Direct Value Mode 1 to 3 in “4.9 Operation” for the setting timing for this signal).

(26) Load Output Judgment (LOAD) PLC Input Signal

This signal is available only in the pressing operation.
When this signal is used for pressing-in purpose, it should be known whether the set load threshold is reached during the pressing operation.
The load threshold and inspected width range are set using the PLC's register. When the command torque (motor current) exceeds the threshold within the inspected width range, this signal is turned “ON”.
This signal judges the load output based on the fact that the command torque excesses the threshold for the specified time period.
This processing procedure is the same as for the pressing judgment. The judgment time period can be changed freely using the parameter No. 50 “Load Output Judgment Time Period”.
This signal is continued until the next movement command is received.

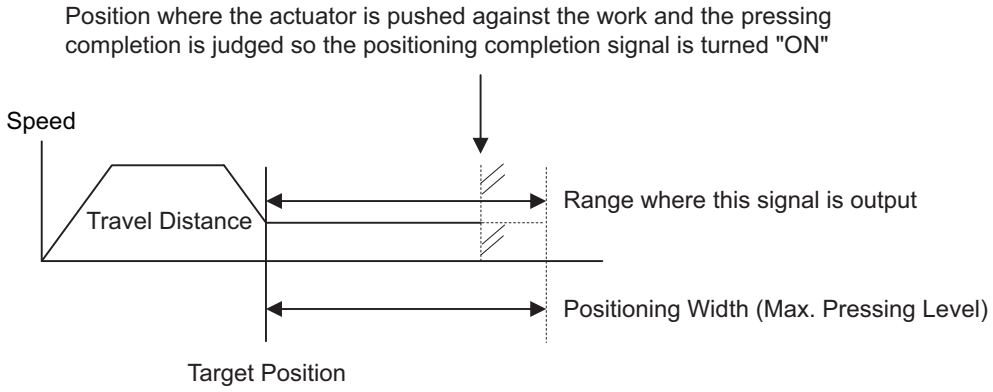


- Set the pressing speed using the parameter No. 34 “Pressing Speed”.
  When the machine is delivered, it has been individually set depending on the actuator characteristics. Set an appropriate speed considering the work material and shape.
- Set the parameter No. 50 “Load Output Judgment Time Period”.
- Set the threshold inspected width using the PLC's Zone Value + Register and Zone Value - Register.
- Set the threshold using the PLC's Load Current Threshold Register.
- Set the positioning width using the PLC's Positioning Width Register.
  Set it a bit longer from the backmost position considering the mechanical dispersion of the work.
  Refer to the instruction manual for the controller for more information.

⚠ Warning:	The actuator continues to push the work with the pressing current at the stop time decided with the current limit value. It is not the stop condition, so take the greatest care to deal with it.

(27) Torque Level (TRQS) PLC Input Signal

This signal is available only in the pressing operation.
When the motor current reaches the load threshold during the pressing operation (moving up to the positioning width), this signal is turned “ON”.
Because the current level is monitored, when the current level is changed, this signal is turned “ON”.
The speed available for the pressing varies depends on the motor and leads, it is required to adjust the parameters.



- Set the pressing speed using the parameter No. 34 “Pressing Speed”.
  When the machine is delivered, it has been individually set depending on the actuator characteristics.
  Set an appropriate speed considering the work material and shape.
- Set the parameter No. 50 “Load Output Judgment Time Period”.
- Set the threshold using the PLC's Load Current Threshold Register.
- Set the positioning width using the PLC's Positioning Width Register.
  Set it a bit longer from the backmost position considering the mechanical dispersion of the work.
  Refer to the instruction manual for the controller for more information.

⚠ Warning: The actuator continues to push the work with the pressing current at the stop time decided with the current limit value. It is not the stop condition, so take the greatest care to deal with it.

(28) Warning for Absolute Battery Voltage Drop (BALM) PLC Input Signal

The signal is OFF when the absolute battery voltage is in normal condition for the absolute type, or when the model is the incremental type.
This signal is switched on when the absolute battery voltage drops down to 3.1V. If an operation is continued till it drops down to 2.5V, the controller becomes disabled to retain the position information. (It is recommended to replace the battery immediately when this signal is switched on for the absolute type.)

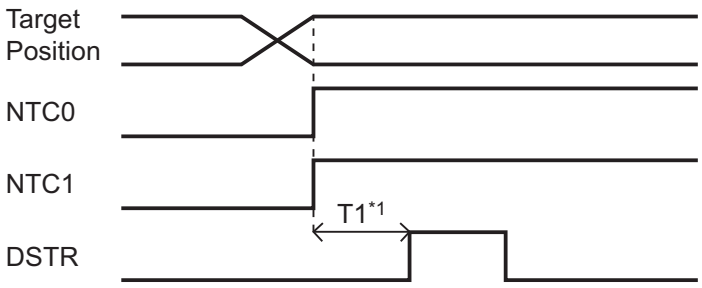
(29) Anti-Vibration Control Mode Selection 0, 1 (NTC0, NTC1) PLC Output Signal

Anti-vibration control function controls the vibration generated by the load of IAI actuator.
Measure the vibration value and input it into the parameter sets (3 types max.).
1 type is to be selected from the established parameter sets and to be combined in this signal.
Refer to the instruction manual for the controller for more information.

NTC1	NTC0	Function	Reference
OFF	OFF	Not to use Anti-vibration control	Set in delvery
OFF	ON	Parameter set 1 selected	
ON	OFF	Parameter set 2 selected	
ON	ON	Parameter set 3 selected	

Input Timing

Diagram below shows the timings to input NTC0 and NTC1 signals:



*1 T1 : 0ms or more

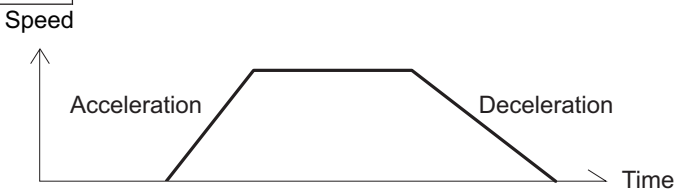
⚠ Caution: ON and OFF of NTC0 or NTC1 signals during an operation will be ignored since they are read when the movement command (DSTR) gets identified.

(30) Acceleration/Deceleration Mode (MOD1, MOD0) PLC Input Signal

This signal is used to select the acceleration/deceleration pattern characteristics. Select one of them before the actuator movement command.

MOD1	MOD0	Pattern Name	Remarks
OFF	OFF	Trapezoid Pattern	Set in delivery
OFF	ON	S-shaped Motion	
ON	OFF	First-Order Lag Filter	
ON	ON	Unavailable	

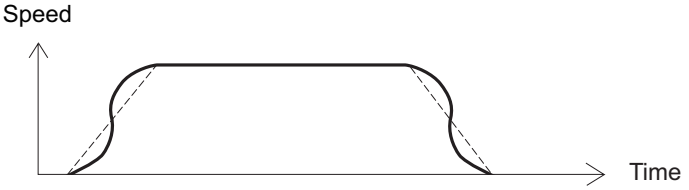
Trapezoid Pattern



* The Acceleration and Deceleration are set in the “Acceleration” and “Deceleration” data boxes on the position data.

S-shaped Motion

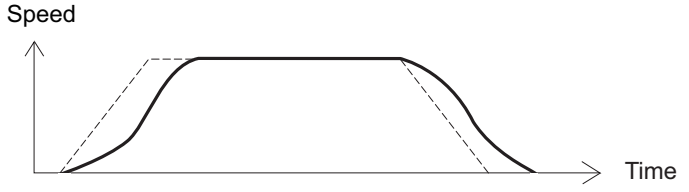
The S-shaped curve is described where at first in the acceleration, the line is gentle, but along the way, it suddenly becomes steep.
Use it in such application that setting the acceleration/deceleration rate high is desired because high tact time is required, but in the movement start or immediately before stop, low acceleration/deceleration rate is favorable.



* The S-shaped motion degree is set using the parameter No. 56 “S-Shaped Motion Ratio Setting”. The setting unit is % and setting range is from “0” to “100”.
(The above figure shows the image graph with the Parameter No. 56 set to “100”.
When it is set to “0”, the S-shaped motion is disabled.
However, the setting is not reflected on the jog operation or inching operation performed using the teaching tool such as the PC software.

First-Order Lag Filter

This describes much gentle acceleration/deceleration curve than that for the linear acceleration/deceleration (trapezoid pattern). Use it when it is not desired to give any slight vibration to the work in acceleration/deceleration operation.

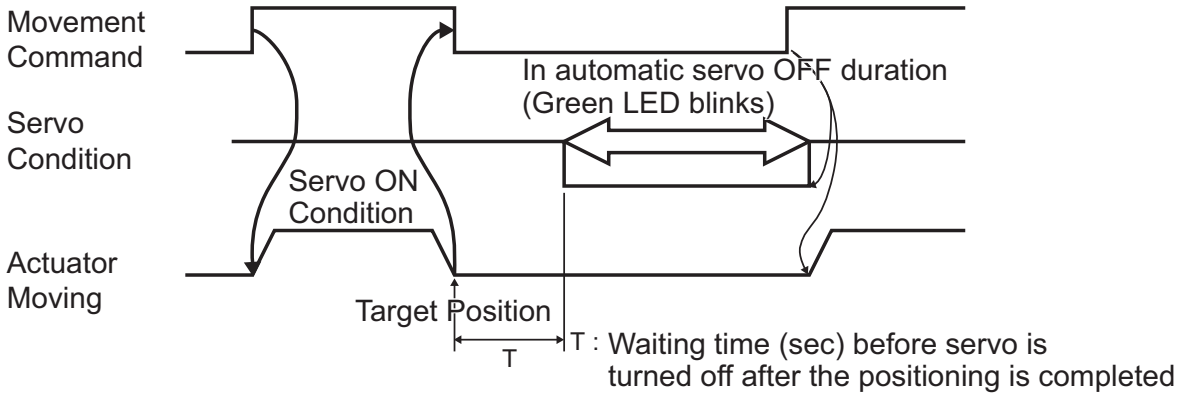


* The first-order lag degree set using the parameter No. 55 “Position Command Primary Filter Time Constant”. The minimum input unit is 0.1msec and setting range is from “0.0” to “100.0”.
When it is set to “0”, the first-order lag filter is disabled.
However, the setting is not reflected on the jog operation or inching operation performed using the teaching tool such as the PC software.

(31) Stop Mode Selection (ASO1, ASO0) PLC Output Signal

Select the stop mode for the duration before the movement to the next position after a positioning is completed.
If the duration for a stop is long, the system automatically turns the servo OFF to reduce the power consumption.
Refer to the instruction manual for the controller for more information.

ASO1	ASO0	Function	Reference
OFF	OFF	Invalid	Set in delvery
OFF	ON	Automatic Servo OFF Method Parameter No. 36 is valid for T	
ON	OFF	Automatic Servo OFF Method Parameter No. 37 is valid for T	
ON	ON	Automatic Servo OFF Method Parameter No. 38 is valid for T	



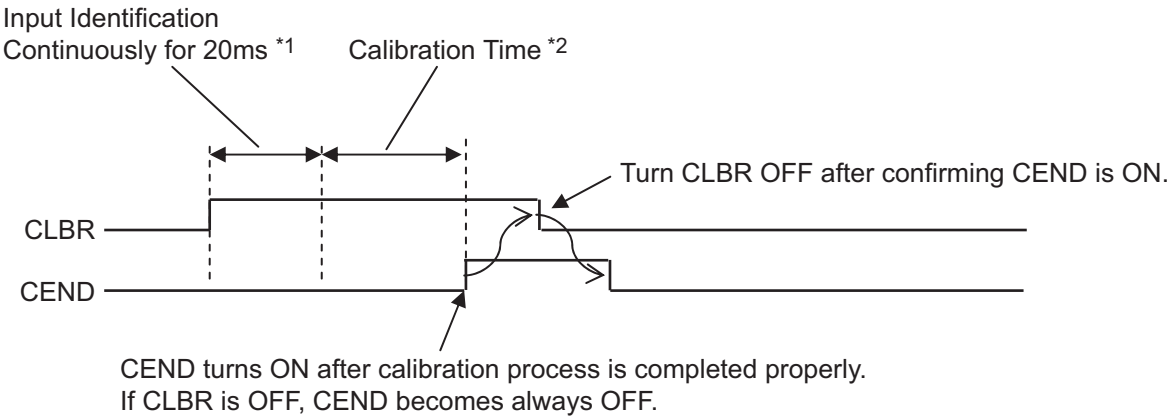
(32) Loadcell Calibration Command (CLBR) PLC Output Signal

Loadcell Calibration Complete (CEND) PLC Input Signal

Before the delivery, the loadcell is set to be turned 0N when there is no load. Execute a calibration if it is desired to set the condition with a load as the standard (0N).
Also, execute a calibration in any case that it is necessary (adjustment, inspection, etc.).

1) Stop the operation. (An error 0E1: Loadcell calibration error alarm will be generated if during axes operation, pressing or pause because a calibration cannot be executed.)
2) Turn the loadcell calibration signal (CLBR) on continuously for 20ms or more.
3) Calibration complete signal (CEND) turns ON after the calibration is complete. After confirming it, turn OFF CLBR signal.
   An error 0E1: Loadcell calibration error alarm will be generated if calibration is not completed properly.

⚠ Caution: If CLBR signal is on, the normal movement command cannot be received.



*1 If CLBR is turn OFF in this period, the calibration process cannot be performed since it is before input identification.

*2 An alarm will be generated if CLBR is turned OFF in this period

(33) Servo Gain Parameter Set Selection (GSL0, GSL1) PLC Output Signal

An operation with preset parameters at each position becomes available if 4 sets of servo gain parameters (6 sets) are registered in advance

Refer to the instruction manual for the controller for more information.

GSL1	GSL0	Function	Reference
OFF	OFF	Parameter set 0 selected	Set in delvery
OFF	ON	Parameter set 1 selected	
ON	OFF	Parameter set 2 selected	
ON	ON	Parameter set 3 selected	

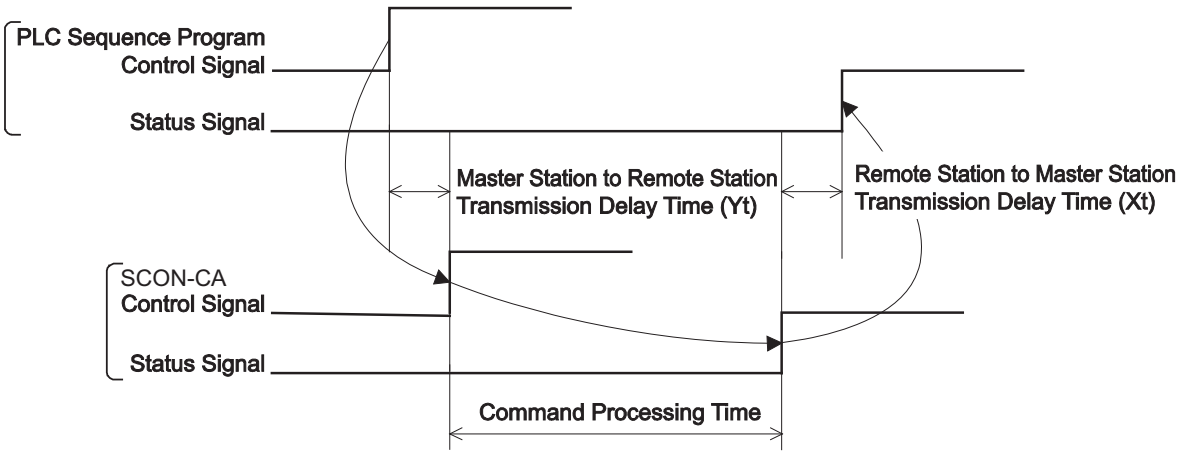
4.8 I/O Signal Timing

When any of the control signal is turned ON to perform the operation of the actuator using the PLC's sequence program, the response (status) is returned to the PLC. The maximum response time is expressed using the following formula.

Max. Response Time (msec) = Yt + Xt + 2 + Command Processing Time (Operation Time, etc.)

Yt: Master Station to Remote I/O Station Transmission Delay Time
Xt: Remote I/O Station to Master Station Transmission Delay Time
} Filed Network Transmission Delay Time

For the Master Station to Remote I/O Station Transmission Delay Time (Yt) and the Remote I/O Station to Master Station Transmission Delay Time (Xt), refer to the instruction manuals for the CC-Link Master Unit and mounted PLC.



4.9 Operation

The timings for the basic operation examples in the Position/Simplified Direct Value Mode 1 and 2, Half Direct Value Mode 1 to 3 and Full Direct Value Mode, are described.
For the Remote I/O Mode 1 to 3, refer to the instruction manual for the controller main body.
(Read from the PLC register the current position, command current or force feedback data in remote I/O modes 2 and 3 on your demands.)

(1) Operation in the Position/Simplified Direct Value Mode 1 and 2

It is operated with the position data written in the PLC's register and the speed, acceleration / deceleration, positioning width and pressing current limit value, etc. set using the position table.

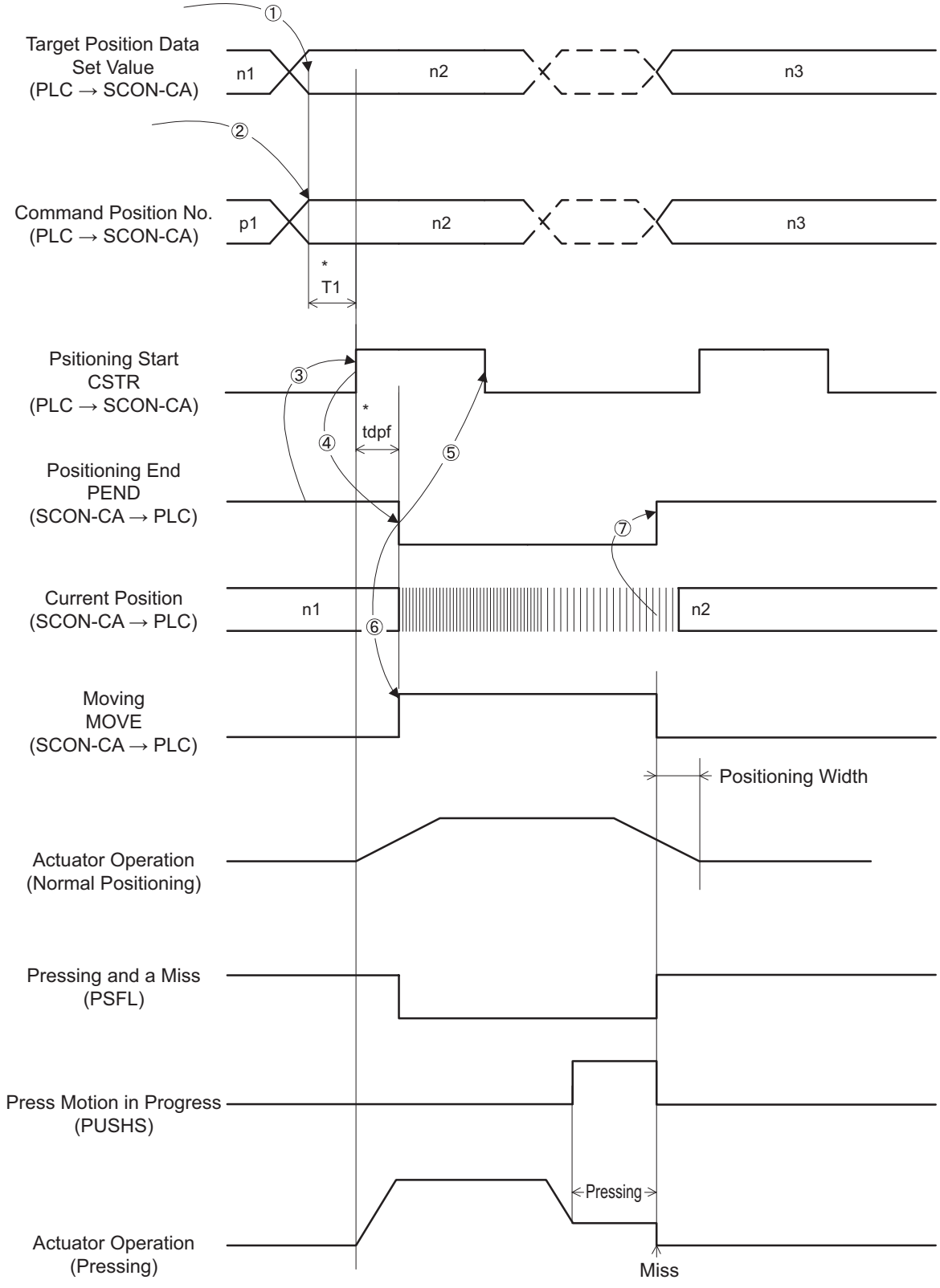
● Operation Example (General Positioning Operation)

(Preparation) Set the position data items (speed, acceleration/deceleration, positioning width, etc) except for the target position item, in the position table.
Turn ON the Position/Simplified Direct Value Change-Over Signal (PMOD).

1) Set the target position data in the target position register.
2) Set the position No. where the speed and acceleration/deceleration, etc., have been set, in the setup position No. register.
3) In the condition where the positioning completion (PEND) signal is turned “ON” or, Under Movement (MOVE) signal is turned “OFF”, turn “ON” the Positioning Start (CSTR) signal.
   The data items set in Steps 1) and 2) are read in the controller at the startup (ON edge) of the CSTR signal.
4) After the CSTR signal is turned “ON”, the PEND signal is turned OFF after tpdf.
5) After confirming that the PEND signal is turned “OFF” or MOVE signal is turned “ON”, turn “OFF” the CSTR signal. Do not change the value in the target position register until the CSRT signal is turned “OFF”.
6) At the same time when the PEND signal is turned “OFF”, the MOVE signal is turned “ON”.
7) The current position data is continuously updated. When the remaining travel distance becomes within the range of the positioning width set in the position data, and the CSTR signal is turned “OFF”, the PEND signal is turned “ON”. Then, the completed position No. is output to the completed position No. register.
   Accordingly, for the read of the completed position No. register when the positioning is completed, confirm it some time (Remaining Travel Distance Movement Time) after the PEND signal is turned “ON”.
   The current position data might be changed slightly even when the system is stopped.
8) The target position data can be changed during the actuator movement.
   In order to change the target position, change the target data and turn ON the CSTR signal after the time longer than the PLC scanning time has passed.
   Change the value for the CSTR signal after the time longer than the PLC scanning time has passed.

● Operation Example (Pressing Operation)

For the pressing operation, the current limit value is set in the pressing data box on the position data at the preparation stage.
When the positioning is performed onto the position No. for which the value is set in the pressing data box, the pressing operation is performed.



*T1 : Considering the scaning time of the host controller, set it so that “T1 ≥ 0ms”.

*Yt + Xt ≤ tdpf ≤ Yt + Xt + 3 (msec)

(2) Operation in the Half Direct Value Mode 1 to 3

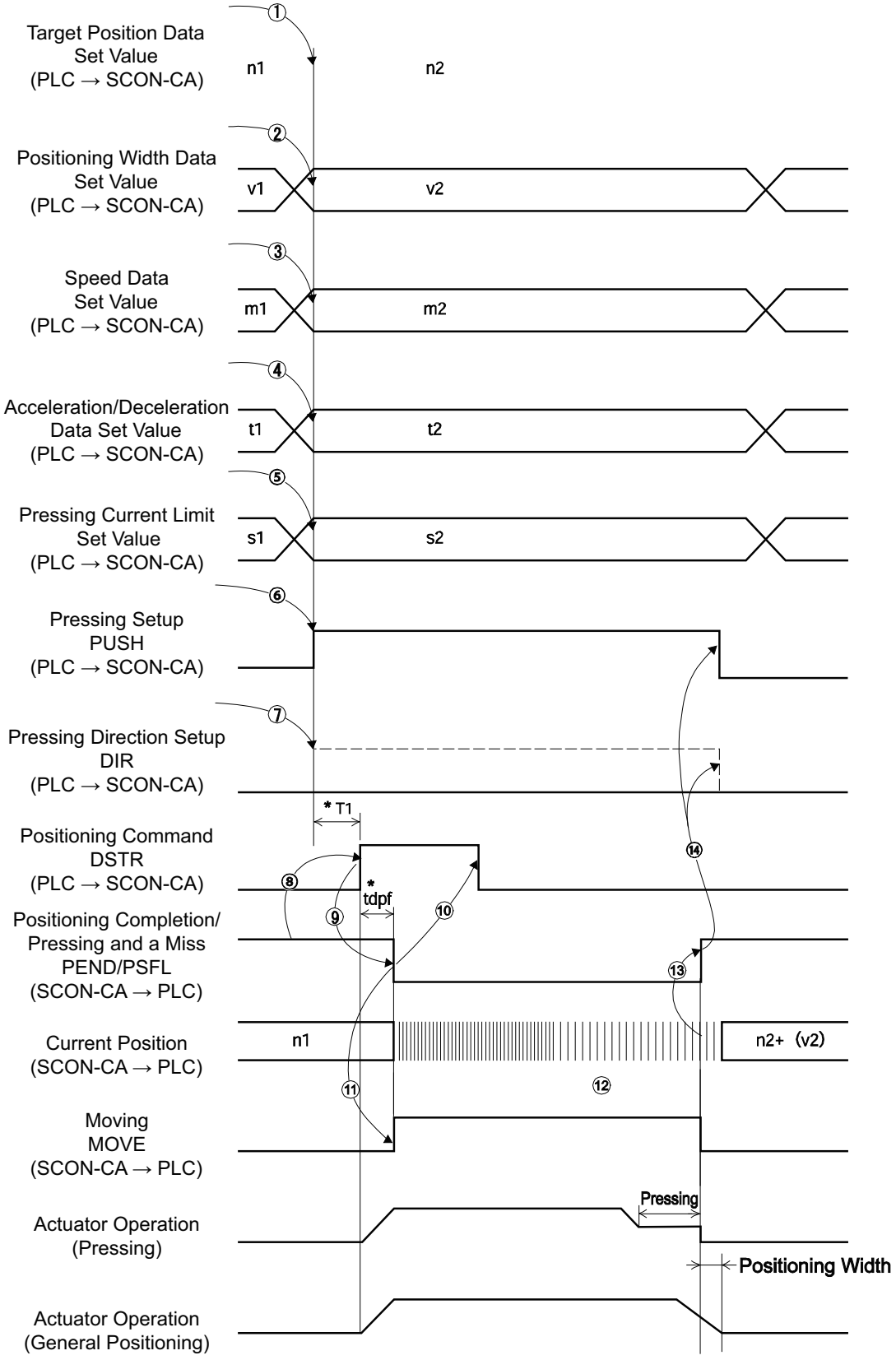
It is operated with the data set in the PLC's target position register, positioning width register, setup speed register, acceleration/deceleration register and pressing current limit setup register.

● Operation Example (Pressing Operation)

1) Set the target position data in the target position register.
2) Set the positioning width data in the positioning width register.
3) Set the speed data in the speed register.
4) Set the acceleration/deceleration data in the acceleration/deceleration register.
5) Set the pressing current limit data in the pressing current limit value register.
6) Turn “ON” the pressing setup (PUSH) signal.
7) Specify the pressing direction using the pressing direction setup (DIR) signal. (Refer to 4.7.7 (22))
8) In the condition where the positioning completion (PEND) signal is turned “ON” or under movement signal (MOVE) is turned “OFF”, turn “ON” the positioning command (DSTR) signal.
   The data items set in Steps 1) through 5) are read in the controller at the startup (ON edge) of the DSTR signal.
9) After the DSTR signal is turned “ON”, the PEND signal is turned “OFF” after tpdf.
10) After confirming that the PEND signal is turned “OFF” or the MOVE signal is turned “ON”, turn “OFF” the DSTR signal. Do not change any value in each register until the DSTR signal has been turned “OFF”.
11) At the same time when the PEND signal is turned “OFF”, the MOVE signal is turned “ON”.
12) The current position data is continuously updated.
13) When the DSTR signal is turned “OFF” and the motor current reaches the current limit value set in Step 5), the PEND signal is turned “ON” (pressing completion).
    Even when the positioning width set in Step 2) is reached, in the case that the current does not reach the motor current limit value set in Step 5), the pressing and a miss (PSFL) signal is turned “ON”. In this case, the PEND signal is not turned “ON” (pressing and a miss).
14) After the PEND signal or PSFL signal is turned “ON”, turn “OFF” the PUSH signal.

● Operation Example (General Positioning Operation)

For the general positioning operation, set the signal in Step 6) to “OFF”.
When the remaining travel distance becomes within the range of the positioning width set in the position data, and the DSTR signal is turned “OFF”, the PEND signal is turned “ON”.



*T1 : Considering the scaning time of the host controller, set it so that “T1 ≥ 0ms”.

*Yt + Xt ≤ tdpf ≤ Yt + Xt + 2 (msec)

(3) Operation in the Full Direct Value Mode

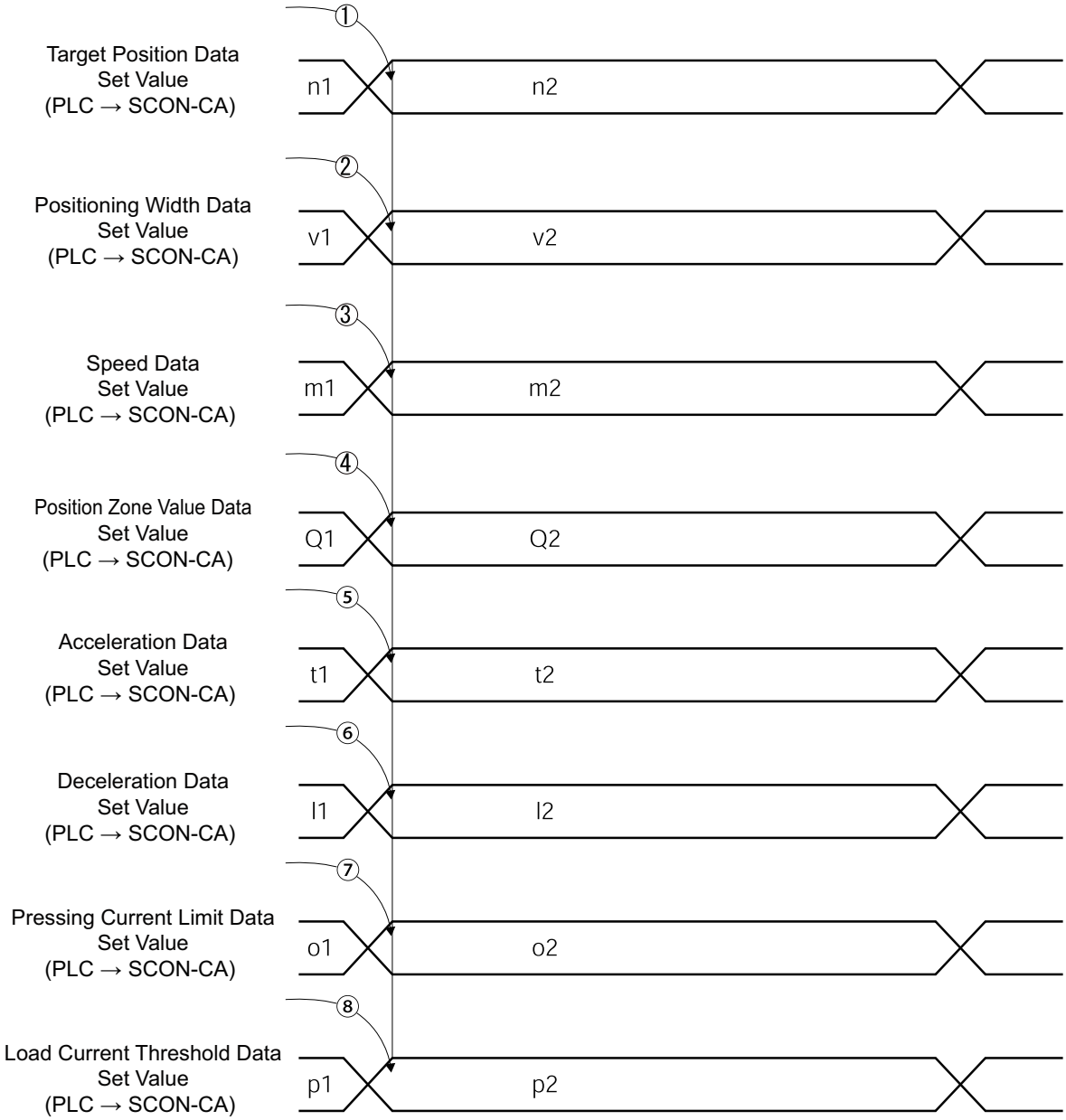
It is operated with all the required data items set in the PLC's registers including the target position register and positioning width register, etc.

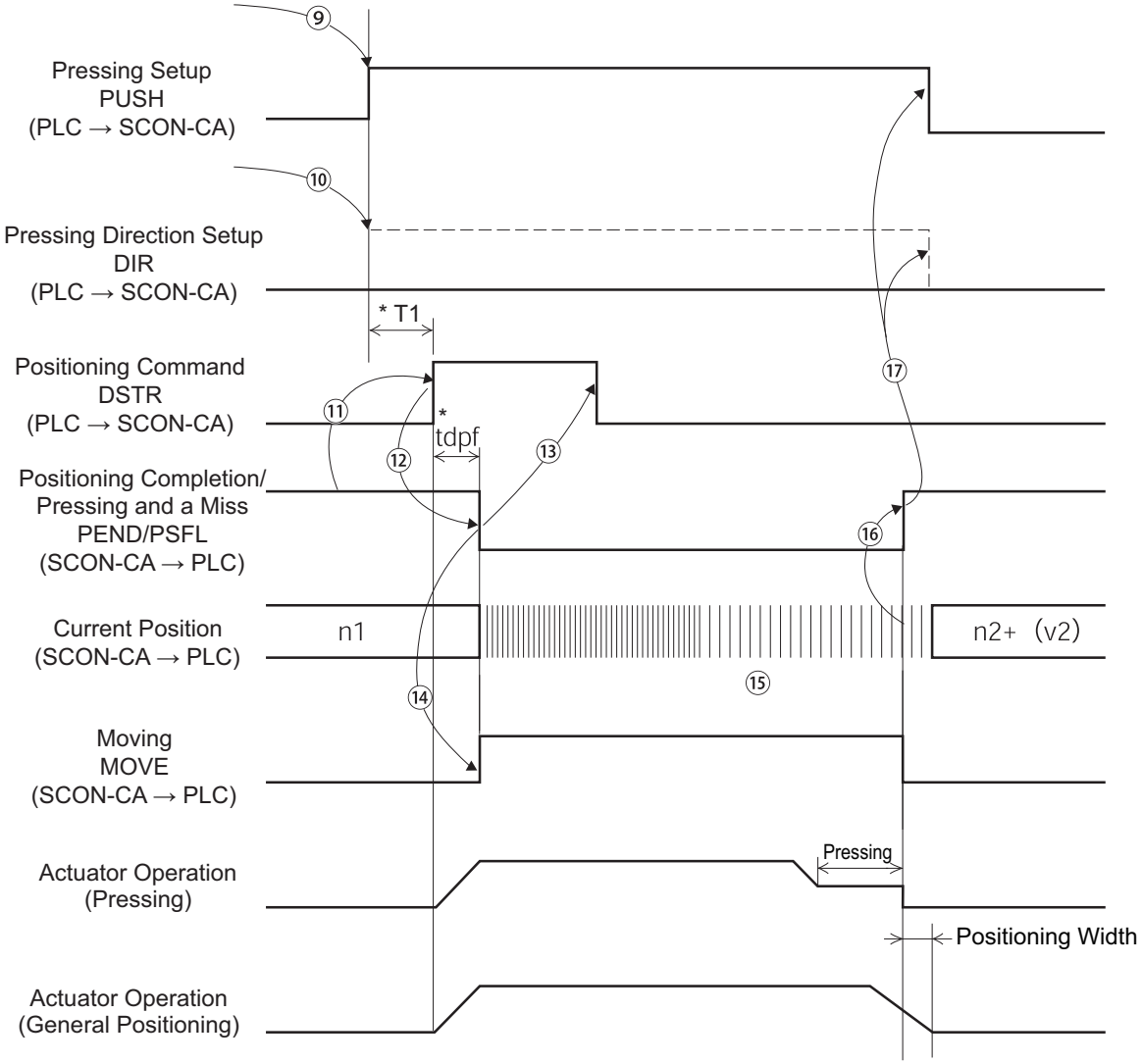
● Operation Example (Pressing Operation)

1) Set the target position data in the target position register.
2) Set the positioning width data in the positioning width register.
3) Set the speed data in the speed register.
4) Set the position zone output value data in the zone value + register or zone value - register.
5) Set the acceleration data in the acceleration register.
6) Set the deceleration data in the deceleration register.
7) Set the pressing current limit data in the pressing current limit value register.
8) Set the load current threshold data in the load current threshold setup register.
9) Turn “ON” the pressing setup (PUSH) signal.
10) Specify the pressing direction using the pressing direction setup (DIR) signal. (Refer to 4.7.7 (22))
11) In the condition where the positioning completion (PEND) signal is turned “ON” or under movement signal (MOVE) is turned “OFF”, turn “ON” the positioning command (DSTR) signal.
    The data items set in Steps 1) through 8) are read in the controller at the startup (ON edge) of the DSTR signal.
12) After the DSTR signal is turned “ON”, the PEND signal is turned “OFF” after tpdf.
13) After confirming that the PEND signal is turned “OFF” or the MOVE signal is turned “ON”, turn “OFF” the DSTR signal. Do not change any value in each register until the DSTR signal has been turned “OFF”.
14) At the same time when the PEND signal is turned “OFF”, the MOVE signal is turned “ON”.
15) The current position data is continuously updated.
16) When the DSTR signal is turned “OFF” and the motor current reaches the current limit value set in Step 7), the PEND signal is turned “ON” (pressing completion).
    Even when the positioning width set in Step 2) is reached, in the case that the current does not reach the motor current limit value set in Step 7), the pressing and a miss (PSFL) signal is turned “ON”. In this case, the PEND signal is not turned “ON” (pressing and a miss).
17) After the PEND signal or PSFL signal is turned “ON”, turn “OFF” the PUSH signal.

● Operation Example (General Positioning Operation)

For the general positioning operation, set the signal in Step 9) to “OFF”.
When the remaining travel distance becomes within the range of the positioning width set in the position data, and the DSTR signal is turned “OFF”, the PEND signal is turned “ON”.


①
Target Position Data
Set Value
(PLC → SCON-CA)
n1
n2
②
Positioning Width Data
Set Value
(PLC → SCON-CA)
v1
v2
③
Speed Data
Set Value
(PLC → SCON-CA)
m1
m2
④
Position Zone Value Data
Set Value
(PLC → SCON-CA)
Q1
Q2
⑤
Acceleration Data
Set Value
(PLC → SCON-CA)
t1
t2
⑥
Deceleration Data
Set Value
(PLC → SCON-CA)
l1
l2
⑦
Pressing Current Limit Data
Set Value
(PLC → SCON-CA)
o1
o2
⑧
Load Current Threshold Data
Set Value
(PLC → SCON-CA)
p1
p2



*T1: Considering the scanning time of the host controller, set it so that “T1 ≥ 0ms”.

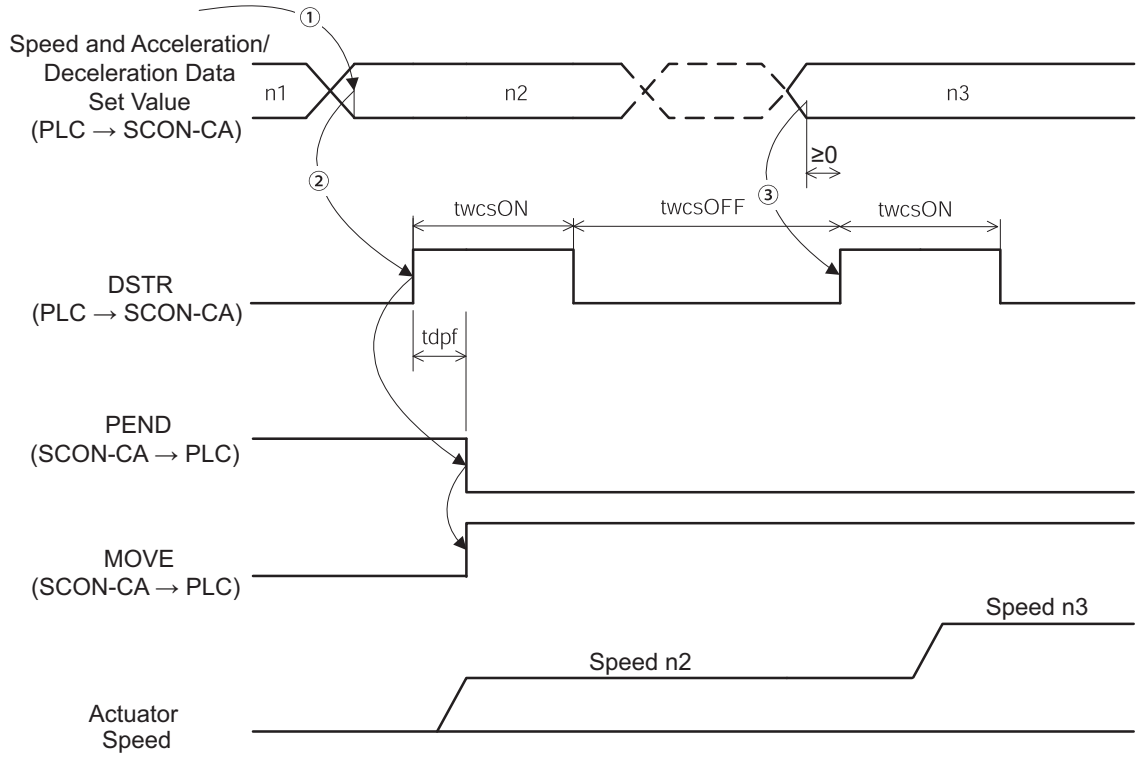
*Yt + Xt ≤ tdpf ≤ Yt + Xt + 2 (msec)

(4) Data Change during the Movement

In the Half Direct Value Mode 1 to 3 and the Full Direct Value Mode, the change of any data set using the output data register, out of the target position data, speed data, positioning width, and current limit value during the pressing, during the movement is available. After changing the data, turn “ON” the positioning command (DSTR) for more than tdpf.

Also, after turning “OFF” the DSTR, set aside some time for “twcsON + twcsOFF” or more, until the next DSTR is turned “ON”.

The example is shows as follows, where the speed and acceleration/deceleration data items have been changed.



twcsON ≥ Yt + Xt + 2 (msec)
twcsOFF ≥ Yt + Xt + 2 (msec)
*Yt + Xt ≤ tpdf ≤ Yt + Xt + 2 (msec)

⚠ Caution :
1. When the speed has not been set or it is set to “0”, the actuator is not moved, but an alarm is not issued.
2. When the speed setting is changed to “0” during the movement, the actuator is decelerated and stopped, but an alarm is not issued.
3. Even when the acceleration/deceleration data only is changed during the movement, the setting of the target position data is required.
4. Even when the target position data only is changed during the movement, the setting of the acceleration/deceleration data is required.

4.10 CC-Link Related Parameters

The parameters related to CC-Link are from No. 84 to No. 87 or No. 90.

Classification: C: External Interface Related

No	Classification	Symbol	Name	Unit	Default Value set in the Factory before Delivery
1			Refer to instruction manual for the controller for the parameters No. 1 through No. 83.		
⏐					
83					
84	C	FMOD	Field Bus Operation Mode	—	0
85	C	NADR	Field Bus Node Address	—	1
86	C	FBRS	Filed Bus Communication Speed	Mbps	0
87	C	NTYP	Network Type	—	1
90	C	CFMIO	Filed Bus I/O Format	—	3

● Filed Bus Operation Mode (No. 84 “FMOD”)

The operation mode is set using the values 0 to 8 for the parameter No. 84.

Parameter No. 84 Set Value	Mode Name	Station Data and No. of Occupied Stations	Description
0 (Set in delivery)	Remote I/O Mode	Remote Device Station: One Station	The operation is performed using the PIO (24V I/O) through the CC-Link.
1	Position/Simplified Direct Value Mode	Remote Device Station: One Station	The target position can be set directly using the value or the operation can be performed using position data value. The other values required for the operation are set on the position data.
2	Half Direct Value Mode	Remote Device Station: Two Stations	In addition to the target position, the speed, acceleration/deceleration and pressing current value are set directly using the values to perform the operation.
3	Full Direct Value Mode	Remote Device Station: Four Stations	All the values related to the position control are set using the values to perform the operation.
4	Remote I/O Mode 2	Remote Device Station: One Station	The current position and current speed reading functions are added to the functions in the remote I/O mode.
5	Position/Simplified Direct Value Mode 2	Remote Device Station: One Station	Set this parameter in a case a force control is necessary in the position/simple direct mode.
6	Half Direct Value Mode 2	Remote Device Station: Two Stations	Set this parameter in a case a force control is necessary in the half direct value mode.
7	Remote I/O Mode 3	Remote Device Station: One Station	Set this parameter in a case a force control is necessary in the remote I/O mode.
8	Half Direct Value Mode 3	Remote Device Station: Two Stations	Set this parameter in a case a switchover of servo gain or anti-vibration control parameter is necessary in the half-direct mode.

● Field Bus Node Address (No. 85 “NADR”)

The remote station No. is set for the parameter No. 85.

Setting Range: 1 to 64 (When the system is delivered it has been set to “1”).

● Field Bus Communication Speed (No. 86 “FBRS”)

The communication speed is selected for the parameter No. 86.

Parameter No. 86 Set Value	Communication Speed
0 (Set in delivery)	156kbps
1	625kbps
2	2.5Mbps
3	5Mbps
4	10Mbps
Except for the above	Baud Rate Setting Error

● Network Type (No. 87 “NTYP”)

The network module type is set for the parameter No. 87. Do not change the default value.

● Filed Bus I/O Format (No. 90 “FMIO”)

The addresses in PLC are allocated based on each operation mode, in units of 16 points to the I/O bit register and I/O data register corresponding to the station Nos. set in the controller and the number of occupied stations set using the PLC's parameter.

Changing the setting for the parameter No. 90 enables the transmission and receipt of the data within 2 words, exchanging such data in units of byte within the communication domain of the PLC's bit register and I/O data register.

Parameter No. 90 Set Value	Description
0	Data exchange is not performed. The data is transmitted to PLC as they are (Refer to the Example i).
1	The host bytes are exchanged with slave bytes in the host words and slave words (Refer to the Example ii).
2	In the case of word register, the host words are exchanged with the slave words (Refer to the Example iii).
3 (Set in delivery)	The host bytes are exchanged with slave bytes in the host words and slave words. In the case of word register, further the host words are exchanged with the slave words (Refer to the Example iv).

(Example i) : In the case of the Value set to “0”:

● shows ON. ○ shows OFF.

SCON Input register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

PLC: RWwnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

SCON Output register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

PLC: RWrnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

(Example ii): In the case of the Value set to “1”:

● shows ON. ○ shows OFF.

SCON Input register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	●	●	○	●	○	○	○	○	○	●	○	○	●	○	●	●	○	○	●	●	○	●	●	○	●	○	●	○	●	●
Data in Hexadecimal Notation	3				4				1				2				C				D				A				B			

PLC: RWwnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

SCON Output register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	●	●	○	●	○	○	○	○	○	●	○	○	●	○	●	●	○	○	●	●	○	●	●	○	●	○	●	○	●	●
Data in Hexadecimal Notation	3				4				1				2				C				D				A				B			

PLC: RWrnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

(Example iii): In the case of the Value set to “2”:

● shows ON. ○ shows OFF.

SCON Input register	1F	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○
Data in Hexadecimal Notation	A				B				C				D				1				2				3				4			

PLC: RWwnn	1F	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

SCON Output register	1F	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○
Data in Hexadecimal Notation	A				B				C				D				1				2				3				4			

PLC: RWrnn	1F	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

(Example iv): In the case of the Value set to “3”:

● shows ON. ○ shows OFF.

SCON Input register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	●	●	○	○	●	●	○	●	●	○	●	○	●	○	●	●	○	○	●	●	○	●	○	○	○	○	○	●	○	○	●	○
Data in Hexadecimal Notation	C				D				A				B				3				4				1				2			

PLC: RWwnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

SCON Output register	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	●	●	○	○	●	●	○	●	●	○	●	○	●	○	●	●	○	○	●	●	○	●	○	○	○	○	○	●	○	○	●	○
Data in Hexadecimal Notation	C				D				A				B				3				4				1				2			

PLC: RWrnn	1E	1F	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
ON/OFF	○	○	○	●	○	○	●	○	○	○	●	●	○	●	○	○	●	○	●	○	●	○	●	●	●	●	○	○	●	●	○	●
Data in Hexadecimal Notation	1				2				3				4				A				B				C				D			

4.11 Troubleshooting

4.11.1 Status LED Indication

With the Status LED (STATUS 0/1) on the front surface of the board, the CC-Link board operation status and network status can be obtained.

When any trouble occurs, confirm the current status with the Status LED illumination patterns. The communication status indications changed with the Status LED illumination patterns are described as follows.

○: Illuminating ●: OFF ◎: Flashing

STATUS 1	STATUS 0	Status Signal
○	○	Impossible condition
○	●	• An error occurs. (CRC error, station No. setting error or communication speed setting error) • Time period from power injection or software reset to CC-Link initialization completion
●	○	Normal Communication Status
●	●	Power Failure: Remote station power unit breakdown or communication cable breakage
◎	○	Impossible condition
◎	●	Station No. setting or communication speed setting is changed during the communication.

4.11.2 Alarm Description and Cause/Treatment

When an alarm is issued, the completed position No. (4 bits for PM1 to PM8) shows the simplified alarm code in the Remote I/O Mode or Remote I/O Mode 2.

In the Position/Simplified Direct Value Mode, the simplified alarm code is output to RWr2.

In the Half Direct Value Mode or Full Direct Value Mode, the alarm code is output to RWr6.

1) Confirm the alarm code using the PLC's monitor function, etc., or using the status monitor, connecting the teaching tool such as the personal computer applicable software for RC.
2) Based on the read alarm code, search the alarm description list in the instruction manual for the controller.
3) Deal with it based on the description for the alarm code in question.

For the following alarm code, deal with it according to the following table.

Code	Error Name	ID (*1)	RES (*2)	Cause/Treatment
0F2	Field Bus Module Error	05	×	Cause: The field bus module error is detected. Treatment: Confirm the parameter.
0F3	Field Bus Module Detection Error	04	×	Cause: The module can not be detected. Treatment: Turn ON the power again. If the error is not removed, contact our company.

(*1) ID → Simplified Alarm Code

(*2) RES → Alarm Reset Enable/Disable, ○: Alarm Reset Enable/ ×: Alarm Reset Disable

5. Change History

Revision Date	Revision Description
2011.11	First Edition Contents changed in Safety Guide Caution notes added for when working with two or more persons (ACON and PCON picked up from existing Instruction Manual and SCON-CA added to rearrange new Instruction Manual)

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