Cat. No. I246E-EN-01A

SCARA Robots
YRCX Series

EtherNet/IP

USER'S MANUAL

OMRON

CONTENTS

CONTENTS

CONTENTS

Important information before reading this manual

Introduction

This EtherNet/IP compatible module is an optional module that the OMRON robot controller YRCX to be connected as an EtherNet/IP system slave module.

This manual consists of an EtherNet/IP compatible module guide (explanation of wiring and communication, etc.) and a remote command guide.

For information on other devices such as connecting the master module and sequence programming, refer to the manual for the respective product.
For details on operating the robot controller and on the robot program, thoroughly read the controller user's manual and programming manual supplied with the OMRON robot controller.

Safety Precautions (Always read before starting use)

Before using this product, be sure to read this manual carefully as well as the robot controller user's manual and programming manual. Take sufficient precautions to ensure safety and handle the product correctly.
The cautions given in this manual are related to this product. Refer to the robot controller user's manual for details on the cautions to be taken with the robot controller system using this product.
The safety precautions are ranked as "WARNING" and "CAUTION" in this manual.

WARNING

FAILURE TO FOLLOW WARNING INSTRUCTIONS COULD RESULT IN SERIOUS INJURY OR DEATH TO THE OPERATOR OR PERSON SERVICING THE PRODUCT.

CAUTION

Failure to follow CAUTION instructions may result in injury to the operator or person servicing product, or damage to the product or peripheral equipment.

NOTE

Explains the key point in the operation in a simple and clear manner.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. In any case, important information that must be observed is explained.

Store this manual where it can be easily referred to, and make sure that it is delivered to the end user.

The EtherNet/IP is a protocol that is jointly controlled by ODVA (Open DeviceNet Vendor Association) and CI (ControlNet International).

■ Precautions for design

WARNING

- **REFER TO THE ETHERNET/IP SYSTEM MASTER MODULE USER'S MANUAL AND THIS MANUAL FOR DETAILS ON THE STATE OF THE ETHERNET/IP SYSTEM AND ROBOT CONTROLLER WHEN A COMMUNICATION ERROR OCCURS WITH THE ETHERNET/IP SYSTEM, ETC. CONFIGURE AN INTERLOCK CIRCUIT IN THE SEQUENCE PROGRAM SO THAT THE SYSTEM, INCLUDING THE ROBOT CONTROLLER WILL WORK SAFELY USING THE COMMUNICATION STATUS INFORMATION.**
- **THE SAFETY CONNECTOR OF THE ROBOT CONTROLLER HAS AN EMERGENCY STOP TERMINAL TO TRIGGER EMERGENCY STOP. USING THIS TERMINAL, PREPARE A PHYSICAL INTERLOCK CIRCUIT SO THAT THE SYSTEM INCLUDING THE ROBOT CONTROLLER WILL WORK SAFETY.**

CAUTION

- **The control line and communication cable must not be bound with or placed near the main circuit or power line. Separate these by at least 100mm. Failure to observe this could lead to malfunctions caused by noise.**
- **When the parallel I/O is provided on the controller, all dedicated inputs will be disabled except for the stop signal (DI06). When the parallel I/O is set invalid by an I/O parameter setting, the stop signal (DI06) will also be disabled.**

■ Precautions for installation

WARNING

- ALWAYS CRIMP, PRESS-FIT OR SOLDER THE CONNECTOR WIRE CONNECTIONS WITH THE MAKER-DESIGNATED TOOL, AND SECURELY CONNECT THE CONNECTOR TO THE MODULE.
- ALWAYS SHUT OFF ALL PHASES OF THE POWER SUPPLY EXTERNALLY BEFORE STARTING INSTALLATION OR WIRING WORK.
  FAILURE TO SHUT OFF ALL PHASES COULD LEAD TO ELECTRIC SHOCKS OR PRODUCT DAMAGE.

CAUTION

- Use the robot controller in locations that support the environmental conditions specified in this manual. Operation outside the specified environmental range may cause electrical shock, fire, malfunction or product damage or deterioration.
- Do not touch the conductive areas and the electronic components of the EtherNet/IP compatible module.
- Never directly touch the controller's interior areas.
- Accurately connect each connection cable connector to the mounting section.
  Failure to observe this could lead to malfunctions caused by a connection fault.

WARNING

ALWAYS SHUT OFF ALL PHASES OF THE POWER SUPPLY EXTERNALLY BEFORE STARTING INSTALLATION OR WIRING WORK. FAILURE TO SHUT OFF ALL PHASES COULD LEAD TO ELECTRIC SHOCKS OR PRODUCT DAMAGE.

CAUTION

- Make sure that foreign matter, such as cutting chips or wire scraps, do not enter the robot controller.
- The communication cables connected to the EtherNet/IP compatible module must be placed in a conduit or fixed with a clamp. If the cable is not placed in a conduit or fixed with a clamp, the module or cable could be damaged by the cable shifting, movement or unintentional pulling leading to malfunctioning caused by an improper cable connection.
- Do not attempt to disconnect the connector which is connected to the EtherNet/IP compatible module by pulling on the cable itself. Always grasp the connector part of the cable when disconnecting it. Pulling on the cable could damage the cable and module, possibly causing a poor contact condition which could result in malfunctions.

■ Precautions for starting and maintenance

WARNING

- DO NOT TOUCH THE TERMINALS WHILE THE POWER IS ON. FAILURE TO OBSERVE THIS COULD LEAD TO MALFUNCTIONING.
- ALWAYS SHUT OFF ALL PHASES OF THE POWER SUPPLY EXTERNALLY BEFORE PERFORMING CLEANING OR WIRING WORK. FAILURE TO SHUT OFF ALL PHASES COULD LEAD TO ELECTRIC SHOCKS, PRODUCT DAMAGE OR MALFUNCTIONING.
- NEVER DISASSEMBLE OR MODIFY ANY OF THE ROBOT CONTROLLER MODULES.
  FAILURE TO OBSERVE THIS COULD LEAD TO TROUBLE, MALFUNCTIONING, INJURIES OR FIRES.
- WHEN USING THE ROBOT CONTROLLER WITH THE ETHERNET/IP COMPATIBLE MODULE MOUNTED, ALWAYS MOUNT THE ENCLOSED FERRITE CORE FOR NOISE MEASURES ON THE POWER CABLE AS CLOSE TO THE ROBOT CONTROLLER AS POSSIBLE. FAILURE TO MOUNT THIS FERRITE CORE COULD LEAD TO MALFUNCTIONING CAUSED BY NOISE.

CAUTION

The EtherNet/IP system may not function properly if the master module and robot controller power are turned ON simultaneously. Always turn the robot controller power ON after turning ON the power for the master module ON.

■ Precautions for disposal

CAUTION

Dispose of this product as industrial waste.

Warranty

The OMRON robot and/or related product you have purchased are warranted against the defects or malfunctions as described below.

Warranty description

If a failure or breakdown occurs due to defects in materials or workmanship in the genuine parts constituting this OMRON robot and/or related product within the warranty period, then OMRON shall supply free of charge the necessary replacement/repair parts.

Warranty period

The warranty period ends 24 months after the date of manufacturing as shown on the products.

Exceptions to the warranty

This warranty will not apply in the following cases:

1. Fatigue arising due to the passage of time, natural wear and tear occurring during operation (natural fading of painted or planted surfaces, deterioration of parts subject to wear, etc.)
2. Minor natural phenomena that do not affect the capabilities of the robot and/or related product (noise from computers, motors, etc.)
3. Programs, point data and other internal data were changed or created by the user.

Failures resulting from the following causes are not covered by warranty.

1. Damage due to earthquakes, storms, floods, thunderbolt, fire or any other natural or man-made disaster.
2. Troubles caused by procedures prohibited in this manual.
3. Modifications to the robot and/or related product not approved by OMRON or OMRON sales representative.
4. Use of any other than genuine parts and specified grease and lubricant.
5. Incorrect or inadequate maintenance and inspection.
6. Repairs by other than authorized dealers.

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NONINFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUERIMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

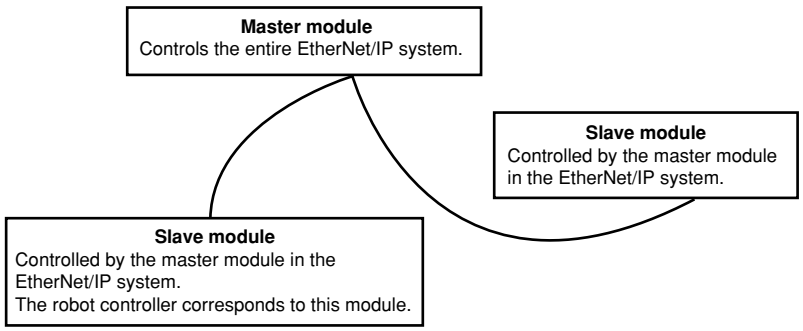
IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE OR INAPPROPIATE MODIFICATION OR REPAIR.

Chapter 1 Outline

1. Features

This EtherNet/IP is an industrial network that is combined the standard protocol TCP/IP with the higher level protocol CIP (Common Industrial Protocol).
Additionally, since the EtherNet/IP uses the standard protocol TCP/IP and Ethernet as lower level protocols, it can utilize the Ethernet technologies that are widely available in the world.
The EtherNet/IP system connects the robot controllers or distributed input/output systems with dedicated cables to control these units from the master module.
The EtherNet/IP system allows wiring to be reduced.

EtherNet/IP system



For details about other units, such as the network settings on the master module side, refer to the user's manual for relevant unit.
Additionally, for details about operation of the controller main unit and robot programming, refer to the user's manuals for controller and programming.

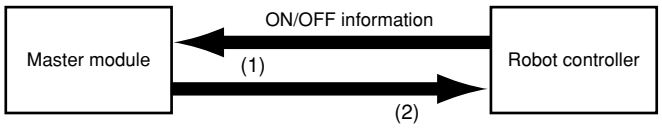
The EtherNet/IP is a protocol that is jointly controlled by ODVA (Open DeviceNet Vendor Association) and CI (ControlNet International).

NOTE
When the parallel I/O is provided on the controller, all dedicated inputs will be disabled except for the stop signal (DI06). When the parallel I/O is set invalid by an I/O parameter setting, the stop signal (DI06) will also be disabled.

2. Mechanism

This section describes the mechanism of the communication to provide an understanding of how the robot controller and master module operate via the EtherNet/IP system.

Mechanism of communication



(1) The robot controller's ON/OFF information is sent to the master module via the network.

(2) The master module's ON/OFF information is sent to the robot controller via the network.

* The robot controller monitors the ON/OFF information at a 5ms cycle.
* The ON/OFF information consists of two words each of dedicated I/O words, 14 words each of general-purpose I/O words as word information, and 16 points each of dedicated I/O points, 96 points each of general-purpose I/O points as bit information.

If the following is executed with the robot program in the robot controller, the bit information will be sent to the master module via the EtherNet/IP system by (1).

SO(20)=1

Conversely, if the following is executed with the robot program, the bit information received from the master module via the EtherNet/IP system will be monitored by (2), and the robot controller will wait for the ON information.

WAIT SI(20)=1

If the following is executed with the robot program in the robot controller, the word information will be sent to the master module via the EtherNet/IP system by (1).

SOW(2)=256

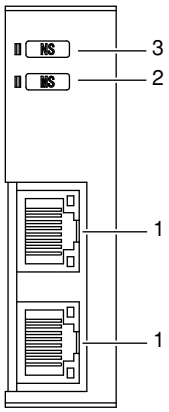
Conversely, if the following is executed with the robot program, the word information received from the master module via the EtherNet/IP system will be substituted in integer variable A% by (2).

A%=SIW(3)

3. Part names and functions

This section describes the part names and functions of the EtherNet/IP compatible module.
This module is installed in the option slot of the robot controller.

Part names



1. RJ45 connector

Connect LAN cable supporting 10Base-T or 100Base-TX.
These ports are not input or output specific. Connection to either port is possible.

2. Module Status

Indicates the status of the EtherNet/IP compatible module.

Status	Description
OFF	When power is OFF.
Lit in green	Normal connection with the master module is established.
Flashing green	Connection with the master module is not established.
Lit in red	Unrecoverable error is detected.
Flashing red	Recoverable minor error is detected.
Flashing green/red	Performing the self-test (only when the power is turned ON).

3. Network Status

Indicates the connection status versus the EtherNet/IP network.

Status	Description
OFF	Power is OFF or no IP address is found.
Lit in green	Detects the online and connects other unit.
Flashing green	Detects the online, but does not connect other unit.
Lit in red	Detects serious error, such as IP address duplication.
Flashing red	Time-out occurs during connection with other unit.
Flashing green/red	Performing the self-test (only when the power is turned ON).

4. I/O assignments of EtherNet/IP compatible module

The following describes the correspondence between the serial input/output of the robot controller and the input/output data on the EtherNet/IP. The number of bytes to be assigned to the EtherNet/IP compatible module is 48 byes for input and 48 bytes for output.

Serial output (Robot controller → Master module)				Serial input (Master module → Robot controller)			
Robot controller		Master module		Robot controller		Master module	
Port number		Address		Port number		Address	
	SOW(0)*1	m			SIW(0)*1	n	
	SOW(1)*1	m + 2			SIW(1)*1	n + 2	
SOD(2)	SOW(2)	m + 4		SID(2)	SIW(2)	n + 4	
	SOW(3)	m + 6			SIW(3)	n + 6	
SOD(4)	SOW(4)	m + 8		SID(4)	SIW(4)	n + 8	
	SOW(5)	m + 10			SIW(5)	n + 10	
SOD(6)	SOW(6)	m + 12		SID(6)	SIW(6)	n + 12	
	SOW(7)	m + 14			SIW(7)	n + 14	
SOD(8)	SOW(8)	m + 16		SID(8)	SIW(8)	n + 16	
	SOW(9)	m + 18			SIW(9)	n + 18	
SOD(10)	SOW(10)	m + 20		SID(10)	SIW(10)	n + 20	
	SOW(11)	m + 22			SIW(11)	n + 22	
SOD(12)	SOW(12)	m + 24		SID(12)	SIW(12)	n + 24	
	SOW(13)	m + 26			SIW(13)	n + 26	
SOD(14)	SOW(14)	m + 28		SID(14)	SIW(14)	n + 28	
	SOW(15)	m + 30			SIW(15)	n + 30	
SO0(7~0) *2		m + 32	7~0	SI0(7~0) *2		n + 32	7~0
SO1(7~0) *2		m + 33	7~0	SI1(7~0) *2		n + 33	7~0
SO2(7~0)		m + 34	7~0	SI2(7~0)		n + 34	7~0
SO3(7~0)		m + 35	7~0	SI3(7~0)		n + 35	7~0
SO4(7~0)		m + 36	7~0	SI4(7~0)		n + 36	7~0
SO5(7~0)		m + 37	7~0	SI5(7~0)		n + 37	7~0
SO6(7~0)		m + 38	7~0	SI6(7~0)		n + 38	7~0
SO7(7~0)		m + 39	7~0	SI7(7~0)		n + 39	7~0
SO10(7~0)		m + 40	7~0	SI10(7~0)		n + 40	7~0
SO11(7~0)		m + 41	7~0	SI11(7~0)		n + 41	7~0
SO12(7~0)		m + 42	7~0	SI12(7~0)		n + 42	7~0
SO13(7~0)		m + 43	7~0	SI13(7~0)		n + 43	7~0
SO14(7~0)		m + 44	7~0	SI14(7~0)		n + 44	7~0
SO15(7~0)		m + 45	7~0	SI15(7~0)		n + 45	7~0
Reserved area. *3		m + 46	7~0	Reserved area. *3		n + 46	7~0
Reserved area. *3		m + 47	7~0	Reserved area. *3		n + 47	7~0

m : Start address of the input area assigned to the master module
n : Start address of the output area assigned to the master module

*1: Since this port is used as dedicated command, it cannot be used as general-purpose input/output data.
*2: Since this port is used as dedicated input/output, it cannot be used as general-purpose input/output data.
*3: Reserved area. Do not use.

NOTE

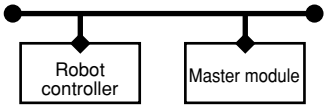
- Each address is 8-bit data.
- SOn() and SIn() are handled as unsigned 8-bit integer data.
- SOW(n) and SIW(n) are handled as unsigned 16-bit integer data.
- SOD(n) and SID(n) are handled as signed 32-bit integer data.
- The upper word and lower word of SOD(n) correspond to SOW(n + 1) and SOW(n), respectively.
- The upper word and lower word of SID(n) correspond to SIW(n + 1) and SIW(n), respectively.
- When the parallel I/O is provided on the controller, all dedicated inputs will be disabled except for the stop signal (DI06). When the parallel I/O is set invalid by an I/O parameter setting, the stop signal (DI06) will also be disabled.

5. EtherNet/IP system connection status transition and robot controller status

The EtherNet/IP system specification robot controller always starts the operation in the servo OFF state after the power has been turned ON.

1. Normal state of EtherNet/IP system connection when the robot controller power is turned ON

System connection normal state

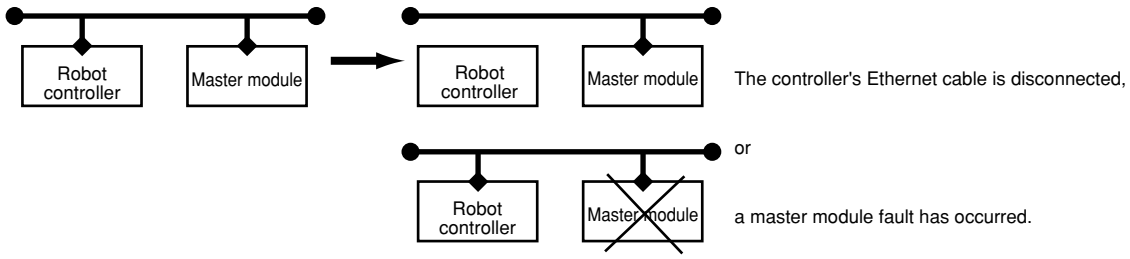


The controller status is as shown below when the system is properly connected. Communication with the host device is enabled at this time.

- The emergency stop/stop signals in the EtherNet/IP system are valid.
- The emergency stop terminal in the SAFETY connector is valid.
- When a parallel I/O is provided, the parallel I/O's stop signal is enabled unless the parallel I/O has been disabled by a parameter setting.

2. Transition from the EtherNet/IP system normal connection state to the EtherNet/IP system connection error state

System connection error state (1)



When a system connection error condition exists, the controller status is as shown below. Communication with the host device is disabled at this time.

- The emergency stop input turns off with SI (00) in the robot controller.
- The stop signal turns off with SI (06) in the robot controller.
- The emergency stop terminal in the SAFETY connector is valid.
- When a parallel I/O is provided, the parallel I/O's stop signal is enabled unless the parallel I/O has been disabled by a parameter setting.

* If the connection to the EtherNet/IP system transits from the normal state to the error state, the EtherNet/IP system connection must be restored as described above in item " 1. Normal state of EtherNet/IP system connection when the robot controller power is turned ON".

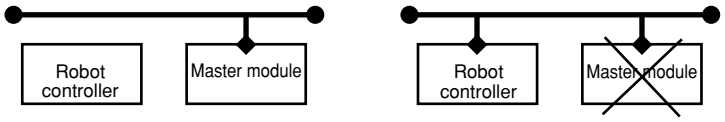
* Communication with the host device is enabled when the EtherNet/IP system connection is recovered to the normal state.

3. EtherNet/IP system connection error state when the robot controller power is turned ON

The connection error may be caused by the following:

- It is impossible to connect to the EtherNet/IP system.
- The master module is faulty.

System connection error state (2)



When a system connection error condition exists, the controller status is as shown below. Communication with the host device is disabled at this time.

- The emergency stop input turns off with SI(00) in the robot controller.
- The stop signal turns off with SI (06) in the robot controller.
- The emergency stop signal terminal in the SAFETY connector is valid.
- When a parallel I/O is provided, the parallel I/O's stop signal is enabled unless the parallel I/O has been disabled by a parameter setting.

* Communication with the host device is enabled when the EtherNet/IP system connection is recovered to the normal state.

Chapter 2 Connection

1. Setting the EtherNet/IP compatible module

The EtherNet/IP compatible module's IP address and subnet mask, etc., can be set from the programming box or from the support software.

The EtherNet/IP system parameters are shown below.

	Item name	Set value	Initial value	Remarks
1	Option board enable	0: INVALID, 1: VALID	1: VALID	Enables/disables the option board. Set to VALID in order to use the EtherNet/IP system. * After the parameter setting has been changed, the power need to be turned on again.
2	IP Address	0.0.0.0 to 255.255.255.255	0.0.0.0	Sets the IP address. * After the parameter setting has been changed, the power need to be turned on again.
3	Subnet Mask	0.0.0.0 to 255.255.255.255	0.0.0.0	Sets the subnet mask. * After the parameter setting has been changed, the power need to be turned on again.
4	Default Gateway	0.0.0.0 to 255.255.255.255	0.0.0.0	Sets the gateway. * After the parameter setting has been changed, the power need to be turned on again.
5	EtherNet/IP DHCP enabled	0: INVALID, 1: VALID	0: INVALID	Enables/disables the DHCP function. Set to VALID to assign IP addresses, etc., from the host device. * After the parameter setting has been changed, the power need to be turned on again. * When the DHCP function is INVALID, the IP address, subnet mask, and gateway set values become "0.0.0.0".

■ Setting method

NOTE

Always save the controller's internal data to an external memory such as support software, etc., before changing the controller settings.

Step 1 *Open the Parameter Edit screen.*

At the initial screen, select [EDIT], press [Enter], then select [PARAMETER].

Step 2 *Press the [F5] (OPTION) key to display the Option Parameters screen.*

Step 3 *Select the desired parameter.*

Use the cursor up/down keys to select the parameter to be edited, then press the [F1] (EDIT) key.

Step 4 *Edit the parameter.*

Enter the desired set value, then press [Enter].
The "Option board enable" parameter set values display in the order of the option slot Nos.
(1: Upper left → 2: Lower left → 3: Upper right → 4: Lower right)
Specify a setting for the slot number where the EtherNet/IP compatible module is installed.

Step 5 *Press the [ESC] key to end the editing operation.*

CAUTION

- **Do not touch the conductive areas and the electronic components of the EtherNet/IP compatible module.**
- **Do not subject the EtherNet/IP compatible module to impact shocks.**
- **Use care to keep moisture and conductive materials away from the EtherNet/IP compatible module in order to prevent module failure.**
- **The "12.551: EtherNet/IP link error" alarm displays at the programming box when the robot controller power is turned ON if there is no connection to the EtherNet/IP system, or if an EtherNet/IP system error status exists. Even if this occurs, the setting check described above can be performed.**

2. Noise measures

Because the EtherNet/IP is connected in a wide zone, from the enterprise zone to the manufacturing zone, be sure to implement adequate noise prevention measures.

2.1 LAN cable

An appropriate LAN cable that prevents noise from entering its inside must be used.

Conditions: CAT5E grade or higher
Twist-pair
Dual shielded

Recommended cables: NWSMC5E-SON-S2SB-SB-*** (Straight cable) (Manufacturer: MiSUMi)
NWSMC5E-SON-C2SB-SB-*** (Cross cable) (Manufacturer: MiSUMi)
(* shows the cable length. A desired cable length can be specified at intervals of 0.1m in a range of 0.5 to 100m.)

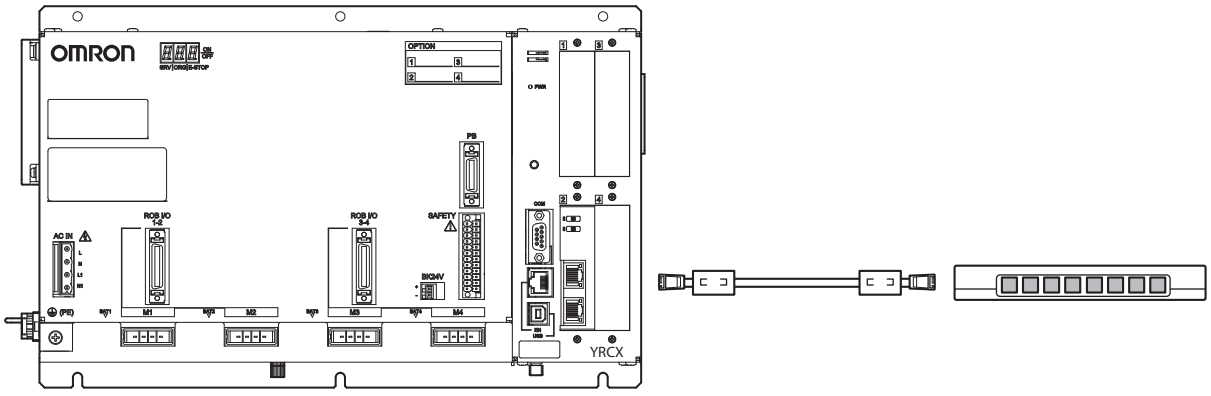
2.2 Mounting the ferrite core

Mount one ferrite core at both ends of the LAN cable.

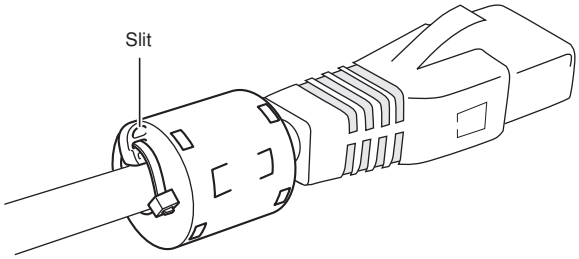
WARNING
COMPLETELY SHUT DOWN THE POWER SUPPLY TO THE INPUT POWER CABLE BEFORE STARTING THIS WORK.

Mount the ferrite core at both ends of the LAN cable as shown in the figure below.
At this time, place the ferrite core as close to the robot controller and HUB as possible.
Secure the mounted ferrite core with a cable tie, etc.

Mounting ferrite core



Securing the ferrite core



3. Connecting to the EtherNet/IP system

3.1 Connecting the LAN cable

WARNING

BEFORE CONNECTING THE CABLE, COMPLETELY SHUT DOWN THE POWER SUPPLIED TO THE ROBOT CONTROLLER.

Insert the modular jack of the LAN cable into the modular connector of the controller until a click sounds. In the same manner, connect the modular jack into the modular connector of the hub.

CAUTION

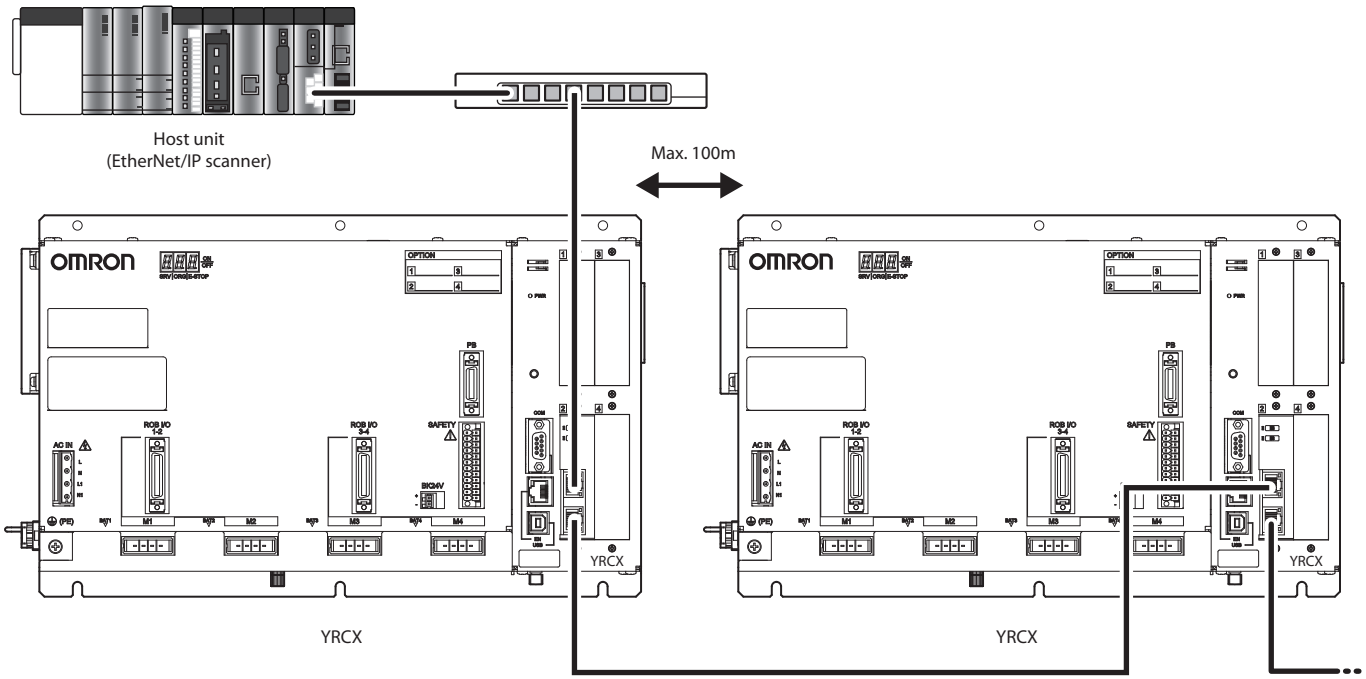
- **In the EtherNet/IP, it is recommended to use a hub that connects the chassis of the LAN connector to the PE. OMRON also conducts the functional check with the hub that connects the chassis to the PE.**
- **The maximum length of the cable between the hub and controller is 100 m.**
- **When connecting the LAN cable, be sure to thoroughly read the user's manuals for mating units, such as personal computer and master module, and peripheral units, such as hub.**

NOTE

Connecting to the mating unit through a hub is recommended. It is also possible to directly connect to the mating unit without using a hub. In this case, however, communication may fail depending on the type of the LAN adaptor on the mating unit.

3.2 Connection method

An internal 2-port switch can be installed on the EtherNet/IP unit to permit communication in either a line type or ring type topology, thereby eliminating the need for an expensive external switch.



NOTE

The EtherNet/IP unit ports are not input or output specific. Connection to either port is possible.

Chapter 3 Communication

1. State when the robot controller power is turned ON

The following conditions must be satisfied to correctly connect to the EtherNet/IP system.
- The EtherNet/IP system cable must be physically connected.
- The IP address, subnet mask, and gateway must be set correctly.
- The master module is operating correctly.

The EtherNet/IP system specification robot controller always starts the operation in the servo OFF state after the power has been turned ON.

■ When the connection to the EtherNet/IP system is correctly established.

When connected to the EtherNet/IP system correctly, the LEDs on the EtherNet/IP compatible module show the normal state.
At this time, the emergency stop signal and stop signal in the EtherNet/IP system become valid, so both signals need to be turned ON at the host device.
The emergency stop signal terminal in the SAFETY connector is always valid.
When a parallel I/O is provided, the parallel I/O's stop signal is enabled unless the parallel I/O has been disabled at the "option board ENABLE" parameter setting.

■ When the connection to the EtherNet/IP system is incorrectly established.

If connected to the EtherNet/IP system incorrectly, the following may be the cause.

- The EtherNet/IP system cable is not physically connected.
- The IP address, subnet mask, or gateway is not set correctly.
- The master module is not operating correctly.

If connected to the EtherNet/IP system incorrectly, the LEDs on the EtherNet/IP compatible module show the error state.
This also occurs when the master module is not operating correctly.
The emergency stop signal terminal in the SAFETY connector is always valid.

When a parallel I/O is provided, the parallel I/O's stop signal is enabled unless the parallel I/O has been disabled by an "option board ENABLE" parameter setting.

* For details about LED indications, see Chapter 4 "2. Meanings of LEDs on EtherNet/IP compatible module".

2. Communication with the master module

This section describes the communication with the master module using the robot program when connected to the EtherNet/IP system correctly.

2.1 Receiving data

The data in the output area of the master module is read via the serial input ports of the robot controller. The following shows the correspondence between the output area of the master module and the serial input port of the robot controller.

Address of master module output area	Serial input port No. of robot controller		Address of master module output area	Serial input port No. of robot controller
n		SIW(0)	n + 32	SI0(7~0)
n + 2		SIW(1)	n + 33	SI1(7~0)
n + 4	SID(2)	SIW(2)	n + 34	SI2(7~0)
n + 6		SIW(3)	n + 35	SI3(7~0)
n + 8	SID(4)	SIW(4)	n + 36	SI4(7~0)
n + 10		SIW(5)	n + 37	SI5(7~0)
n + 12	SID(6)	SIW(6)	n + 38	SI6(7~0)
n + 14		SIW(7)	n + 39	SI7(7~0)
n + 16	SID(8)	SIW(8)	n + 40	SI10(7~0)
n + 18		SIW(9)	n + 41	SI11(7~0)
n + 20	SID(10)	SIW(10)	n + 42	SI12(7~0)
n + 22		SIW(11)	n + 43	SI13(7~0)
n + 24	SID(12)	SIW(12)	n + 44	SI14(7~0)
n + 26		SIW(13)	n + 45	SI15(7~0)
n + 28	SID(14)	SIW(14)		
n + 30		SIW(15)		

n : Start address of the output area assigned to the master module

CAUTION

When communicating with master module, be sure to check the settings with reference to the master module's manual.

When reading the bit information from the output area of the master module with the robot controller, write the following commands in the robot program in the same manner as the DI input port.

WAIT command
Assignment statement

Example: To wait for bit 0 of the address (n + 34) to turn ON.
WAIT SI (20) = 1 ..... The robot program will wait for SI(20) to turn ON.

Example: To read the address (n + 34)0 to (n + 34) 7 data into variable A.
A = SI2 () ..... The SI2() data will be converted into a decimal value and assigned to variable A. If SI2() is 7Fh, variable A will be 127.

NOTE

The SI statement in the robot language can be defined from SI0() to SI27(), but the EtherNet/IP compatible module accepts from SI0() to SI15().

When reading the word information from the output area of the master module with the robot controller, create the robot program using the assignment statement.

Example: To read the address (n + 4) word data into variable B.
B = SIW (2) ..... The SIW(2) data will be assigned to variable B as a decimal value. If SIW(2) is 01FFh, variable B will be 511.

Example: To read the address (n + 4) and (n + 6) double word data into variable C.
C = SID (2)..... The SIW(2) and SIW(3) data will be assigned to variable C as a decimal value. If SIW(2) is 0010h and SIW(3) is 0001h, variable C will be 65552.

NOTE
The word data written with SIW(n) has the uncoded little endian format.
The double word data written with SID(n) has the coded little endian format.

2.2 Transmitting data

The serial output port data of the robot controller is transmitted to the input area of the master module. The correspondence between the serial output port of the robot controller and the input area of the master module is shown below.

Address of master module input area	Serial output port No. of robot controller		Address of master module input area	Serial output port No. of robot controller
m		SOW(0)	m + 32	SO0(7~0)
m + 2		SOW(1)	m + 33	SO1(7~0)
m + 4	SOD(2)	SOW(2)	m + 34	SO2(7~0)
m + 6		SOW(3)	m + 35	SO3(7~0)
m + 8	SOD(4)	SOW(4)	m + 36	SO4(7~0)
m + 10		SOW(5)	m + 37	SO5(7~0)
m + 12	SOD(6)	SOW(6)	m + 38	SO6(7~0)
m + 14		SOW(7)	m + 39	SO7(7~0)
m + 16	SOD(8)	SOW(8)	m + 40	SO10(7~0)
m + 18		SOW(9)	m + 41	SO11(7~0)
m + 20	SOD(10)	SOW(10)	m + 42	SO12(7~0)
m + 22		SOW(11)	m + 43	SO13(7~0)
m + 24	SOD(12)	SOW(12)	m + 44	SO14(7~0)
m + 26		SOW(13)	m + 45	SO15(7~0)
m + 28	SOD(14)	SOW(14)		
m + 30		SOW(15)		

m : Start address of the input area assigned to the master module

CAUTION

When communicating with master module, be sure to check the settings with reference to the master module's manual.

When writing the bit information of the robot controller to the input area of the master module, write the following commands in the robot program in the same manner as the DO input port.

SET/RESET command
Assignment statement
OUT command

Example: To turn the address (m + 34) 0 ON.
SET SO (20) or SO (20) = 1 ... SO (20) will turn ON.

Example: To write the variable A data to addresses (m + 34) 0 to (m + 34) 7.
SO2 () = A..... The variable A data will be converted into a binary value and assigned to SO2(). If variable A is 127, SO2() will be 7Fh.

NOTE

The SO statement in the robot language can be defined from SO2() to SO27(), but the EtherNet/IP compatible module accepts from SO2() to SO15().

When writing the word information of the robot controller to the input area of the master module, create the robot program using the assignment statement.

Example: To write 512 into addresses (m + 4) as word data.
SOW (2) = 512..... 512 is assigned to SOW(2), and then SOW(2) becomes 0200h.

Example: To write 69905 to addresses (m + 4) and (m + 6) as double word data.
SOD (2) = 69905..... 69905 is assigned to SOD(2), and then SOW(2) becomes 1111h and SOW(3) becomes 0001h.

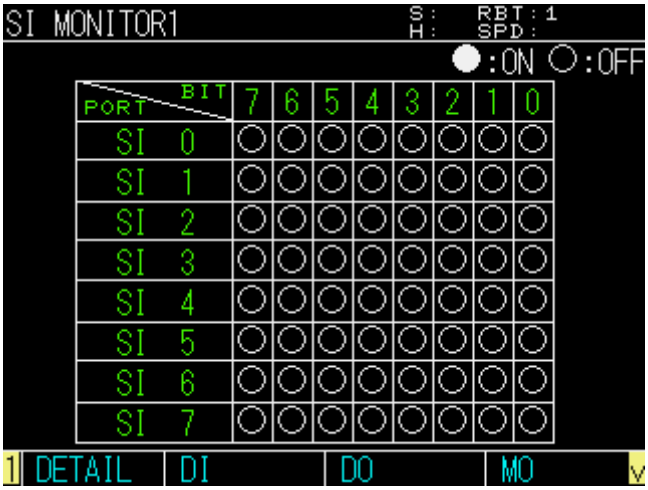
NOTE

The word data written with SOW(n) has the uncoded little endian format.
The double word data written with SOD(n) has the coded little endian format.

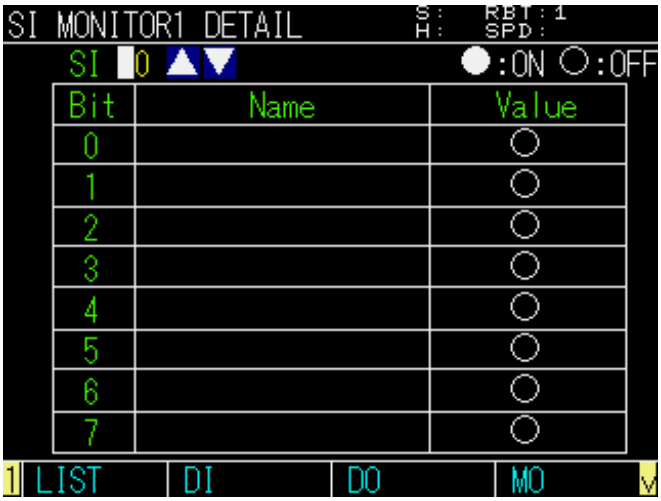
3. Referring to the communication data

The master module's ON/OFF information can be referred to with the programming box.
Note that the programming box's display update interval is longer than the EtherNet/IP data update interval.
So, if the ON/OFF interval is short, accurate information may not be displayed.

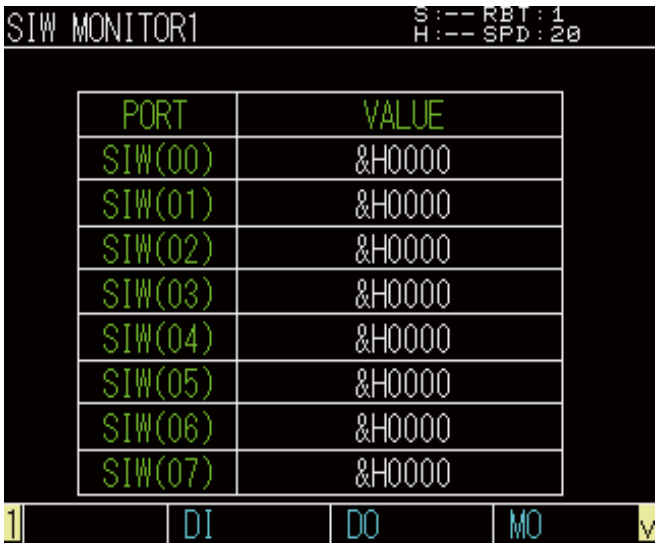
Input/output list screen



Input/output details screen



"SIW monitor" screen



* Expressed as hexadecimal values.

3.1 Input/output list display

Step 1 ***At the initial screen, select [MONITOR] → [I/O].***

The "DI Monitor 1" screen then displays.

Step 2 ***Select the input/output monitor to be displayed.***

Press the desired [F7] (SI) to [F10] (SOW) key to display the input/output monitor corresponding to each key.

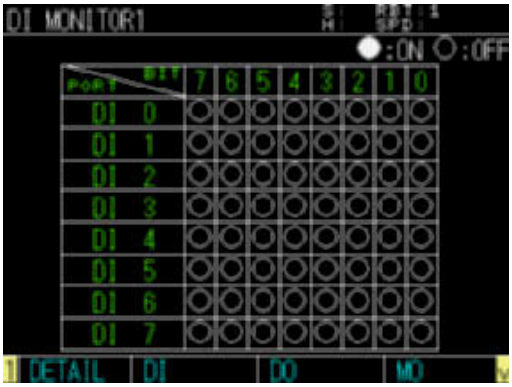
Key	Input/output
F7	SI
F8	SO
F9	SIW
F10	SOW

Step 3 ***Change the port number.***

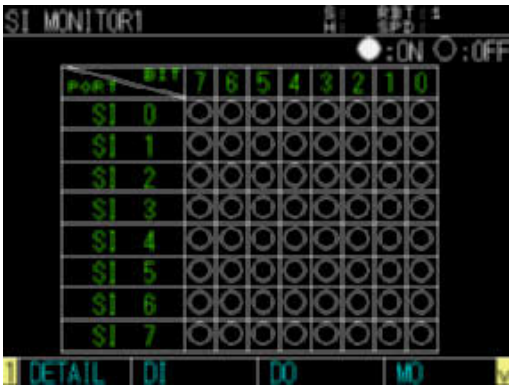
At the Monitor screen, press the [MONITOR] key to display the next port number.
If there is no next port number, the inputs/outputs change in the following order:
DI → DO → MO → LO → TO → SI → SO → SIW → SOW

Press the [ESC] key to end the monitor display.

"DI MONITOR 1" screen



"SI MONITOR 1" screen



3.2 Input/output details display

NOTE
There are no displays for SIW and SOW details.

Step 1 ***Open the Input/Output Monitor screen.***

Step 2 ***Press the [F1] (Details) key.***

The "Input/Output Details" screen then displays.

Step 3 ***Changing the port number***

- Changing the ten's digit of port number

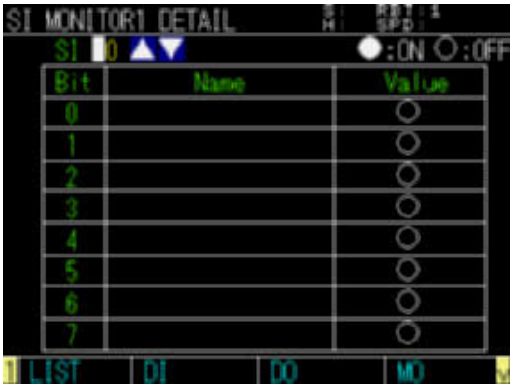
  Press the (MONITOR) key to change the DI port's ten's place (0 → 10 → 20) and display the monitor details.
  If there is no next DI port, the inputs/outputs display in the following order:
  DI → DO → MO → LO → TO → SI → SO → SIW → SOW

- Changing the one's digit of port number

  Use the cursor up/down keys to select the desired port number, then press (Enter). The port number can then be changed.

Press the [ESC] key to end the monitor display.

"SI MONITOR 1 DETAIL" screen



3.3 Switching the output status

Step 1 ***Displaying the output monitor details.***

Display the output list where the output status is to be switched, then press the [F1] (Details) key.
The output details then display.

Step 2 ***Specify the port number***

At the Output Monitor Details screen, use the cursor up/down keys to select the desired port number, then press [Enter] to change the port number.
Or, press the [MONITOR] key to change the port number.

Step 3 ***Switch the output status.***

Use the cursor keys to select the ON or OFF setting for the bit number which changes the output status, then press [Enter] to switch that output status.

Press the [ESC] key to end the monitor display.

"SO MONITOR 1 DETAIL" screen

Chapter 4 Troubleshooting

1. Check items before starting up the EtherNet/IP system

Check the following items before starting up the EtherNet/IP system.

	Check item	Check
1	Is the robot controller set to the EtherNet/IP system specifications? (Refer to Chapter 2 "1. Setting the EtherNet/IP compatible module")	
2	Are the IP address, subnet mask, and gateway of the EtherNet/IP compatible module are set correctly? (Refer to Chapter 2 "1. Setting the EtherNet/IP compatible module")	
3	Are the ferrite cores connected to the power input cable to the robot controller? (Refer to Chapter 2 "2.2 Mounting the ferrite core")	
4	Is the EtherNet/IP system cable connected to the EtherNet/IP compatible module securely? (Refer to Chapter 2 "3. Connecting to the EtherNet/IP system")	
5	Was the line test from the master module correct? (Refer to the user's manual for master module.)	

NOTE

When the parallel I/O is provided on the controller, all dedicated inputs will be disabled except for the stop signal (DI06). When the parallel I/O is set invalid by an I/O parameter setting, the stop signal (DI06) will also be disabled.

2. Meanings of LEDs on EtherNet/IP compatible module

The LEDs on the EtherNet/IP compatible module express the controller and network statuses. Use these LEDs for confirmation purposes if an error occurs.

■ Module Status

Indicates the status of the EtherNet/IP compatible module.

Status	Description
OFF	When power is OFF.
Lit in green	Normal connection with the master module is established.
Flashing green	Connection with the master module is not established.
Lit in red	Unrecoverable error is detected.
Flashing red	Recoverable minor error is detected.
Flashing green/red	Performing the self-test (only when the power is turned ON).

■ Network Status

Indicates the connection status versus the EtherNet/IP network.

Status	Description
OFF	Power is OFF or no IP address is found.
Lit in green	Detects the online and connects other unit.
Flashing green	Detects the online, but does not connect other unit.
Lit in red	Detects serious error, such as IP address duplication.
Flashing red	Time-out occurs during connection with other unit.
Flashing green/red	Performing the self-test (only when the power is turned ON).

3. Troubleshooting

If a connection problem versus the robot controller occurs when starting or running the EtherNet/IP system, check the following items in their given order.

■ Robot controller front panel "PWR" LED and the 7-segment LED confirmation

Confirmation contents	The "PWR" LED is OFF.
Cause	The power is not supplied to the robot controller.
Corrective measures	Measure the voltage at the AC power input terminal of the power connector with a multi-meter to check that the operating power voltage is supplied.

* For details about the power supply voltage for the robot controller, refer to the user's manual for robot controller.

Confirmation contents	An alarm code is indicated at the 7-segment LED.
Cause	An alarm has been activated in the robot controller.
Corrective measures	• Check the alarm message displayed on the programming box. • Take corrective measures while referring to the troubleshooting stated in the user's manual for robot controller.

* Refer to the robot controller use's manual for alarm details.

■ Programming box error display confirmation

Confirmation contents	At the programming box's Diagnosis screen ([System] → [Check]), verify that the "12.551: EtherNet/IP link error", etc., is displayed. (If multiple alarms have occurred simultaneously, the Ethernet/IP related alarm may not display.)
Cause	An EtherNet/IP system connection related alarm has occurred.
Corrective measures	• Check the alarm message displayed on the programming box. • Check the alarm history with the programming box. The alarm history can be checked from the programming box's "Alarm History" screen ([System] → [History]). • Take corrective measures while referring to the troubleshooting stated in the user's manual for robot controller. • Check for a disconnected or incorrectly connected EtherNet/IP system cable. • Check the EtherNet/IP compatible module's IP address, subnet mask, and gateway settings. • Check to see if the master module is running.

* Refer to the robot controller use's manual for alarm details.

■ EtherNet/IP compatible module LED confirmation

Confirmation contents	Check that the LED indication on the EtherNet/IP compatible module is not as follows: Module Status: Green ON Network Status: Green ON
Cause	An EtherNet/IP system connection related alarm has occurred. (For LED indication details, see Chapter 4 "2. Meanings of LEDs on EtherNet/IP compatible module".)
Corrective measures	• Check to see if the LAN cable is disconnected or connected incorrectly. • Check whether the LAN cable is run close to the main circuit or power cable or whether or not it is bundled. • Check that the ferrite core is connected to the power supply cable of the robot controller. • Check the IP address, subnet mask, and gateway settings of the EtherNet/IP compatible module. • Check that the master module is operating correctly.

■ Confirmation from master module

Confirmation contents	Use the connection setting function or connection check function of the master module to check that the robot controller is connected to the EtherNet/IP system correctly.
Cause	• The signal has noise. • The cable is broken. • The IP address, subnet mask, and gateway settings are incorrect.
Corrective measures	• Replace the cable. • Change the cable running route to lay it away from the noise source, such as power cable. • Check the IP address, subnet mask, and gateway settings.

NOTE

For details about connection setting function, refer to the user's manual for master module.
Furthermore, for details about IP address and other settings, contact the system administrator.

4. Error messages relating to EtherNet/IP

This section describes alarm messages relating to EtherNet/IP compatible modules. For other alarms, refer to the user's manual for robot controller.
When an alarm occurs, the relevant alarm message displays at the programming box.

12.100 : EtherNet/IP DHCP enabled

Code : &H000C &H0064

Meaning/Cause	The communication parameter's DHCP setting was changed from DISABLE to ENABLE.
Action	This is a message-only alarm that requires no corrective action.

12.400 : Stop input on

Code : &H000C &H0190

Meaning/Cause	a. Program execution or axis movement was attempted in the stop status. b. Robot was put in the stop status during program execution or axis movement.
Action	1. Cancel the stop, and then execute the program or move the axis.

12.551 : EtherNet/IP link error

Code : &H000C &H0227

Meaning/Cause	a. Error in cable for EtherNet/IP system. b. Communication setting of the EtherNet/IP system is incorrect. c. Master module power is turned off, has stopped operating or is damaged. d. Breakdown in EtherNet/IP compatible unit.
Action	1. Check for a break, misconnection or wiring error in EtherNet/IP cable, and check the specifications (cable length, etc.). 2. Check the communication settings. 3. Check to see if the master module operates correctly. 4. Replace the EtherNet/IP compatible module.

12.552 : EtherNet/IP overtime error

Code : &H000C &H0228

Meaning/Cause	a. Communication error occurred by noise, etc. in the EtherNet/IP system. b. Master module power is turned off or has stopped operating.
Action	1. Take the noise preventive actions for the cable and controller of the EtherNet/IP system. 2. Check that the master module operates correctly. 3. Check the EtherNet/IP system's cable connection.

12.600 : Emergency stop on

Code : &H000C &H0258

Meaning/Cause	a. The emergency stop button was pressed at the programming box. b. Emergency stop terminals on SAFETY connector are open (emergency stop status). c. The programming box or terminator is not connected to the PB connector. d. SAFETY connector is not connected. e. SI(00) is not ON. f. Error in the connection to the master module.
Action	1. Release the emergency stop button on the programming box. 2. Close the emergency stop terminals on SAFETY connector. 3. Connect the programming box or the terminator to the PB connector. 4. Attach the SAFETY connector. 5. Set SI(00) to ON. 6. Correct the connection to the master module.

12.762 : EtherNet/IP initialize error

Code : &H000C &H02FA

Meaning/Cause	EtherNet/IP option board initializing failed.
Action	Contact your distributor with details on this problem.

12.763 : EtherNet/IP parameter mismatch

Code : &H000C &H02FB

Meaning/Cause	A mismatch exist between the parameter settings in the controller and those at the option board.
Action	The EtherNet/IP option parameters will be initialized.

12.900 : Incorrect option setting

Code : &H000C &H0384

Meaning/Cause	a. Error in the ID setting on the option module. b. Option modules that cannot be mixed were installed. c. Cannot identify the installed option module.
Action	1. Check the ID settings on the option module. 2. Install the correct option module. 3. Replace the option module. 4. Replace the controller.

12.904 : SIO option board initialize error

Code : &H000C &H0338

Meaning/Cause	SIO option board initializing failed.
Action	Contact your distributor with details on this problem.

Chapter 5 Specifications

1. Profile

■ Bit input/output

Slave → Master				Master → Slave			
Address	Bit	Signal name		Address	Bit	Signal name	
m + 32	0	SO(00)	Emergency stop status output	n + 32	0	SI(00)	Emergency stop input
	1	SO(01)	CPU_OK status output		1	SI(01)	Servo ON input
	2	SO(02)	Servo ON status output		2		Reserved area. *1
	3	SO(03)	Alarm status output		3		
	4	SO(04)	MP RDY status output		4		
	5		Reserved area. *1		5		
	6				6	SI(06)	Stop input
	7				7		Reserved area. *1
m + 33	0	SO(10)	AUTO mode status output	n + 33	0	SI(10)	Sequence control input
	1	SO(11)	Return-to-origin complete status output		1		Reserved area. *1
	2	SO(12)	Sequence program execution status output		2	SI(12)	Auto operation start
	3	SO(13)	Robot program running output		3		Reserved area. *1
	4	SO(14)	Program reset status output		4	SI(14)	Return-to-origin input (incremental type axis)
	5	SO(15)	Warning output		5	SI(15)	Program reset input
	6		Reserved area. *1		6	SI(16)	Alarm reset input
	7				7	SI(17)	Return-to-origin input (absolute type axis)
m + 34	0~7	SO(20) ~ SO(27)	General-purpose output	n + 34	0~7	SI(20) ~ SI(27)	General-purpose input
m + 35	0~7	SO(30) ~ SO(37)	General-purpose output	n + 35	0~7	SI(30) ~ SI(37)	General-purpose input
m + 36	0~7	SO(40) ~ SO(47)	General-purpose output	n + 36	0~7	SI(40) ~ SI(47)	General-purpose input
m + 37	0~7	SO(50) ~ SO(57)	General-purpose output	n + 37	0~7	SI(50) ~ SI(57)	General-purpose input
m + 38	0~7	SO(60) ~ SO(67)	General-purpose output	n + 38	0~7	SI(60) ~ SI(67)	General-purpose input
m + 39	0~7	SO(70) ~ SO(77)	General-purpose output	n + 39	0~7	SI(70) ~ SI(77)	General-purpose input
m + 40	0~7	SO(100) ~ SO(107)	General-purpose output	n + 40	0~7	SI(100) ~ SI(107)	General-purpose input
m + 41	0~7	SO(110) ~ SO(117)	General-purpose output	n + 41	0~7	SI(110) ~ SI(117)	General-purpose input
m + 42	0~7	SO(120) ~ SO(127)	General-purpose output	n + 42	0~7	SI(120) ~ SI(127)	General-purpose input
m + 43	0~7	SO(130) ~ SO(137)	General-purpose output	n + 43	0~7	SI(130) ~ SI(137)	General-purpose input
m + 44	0~7	SO(140) ~ SO(147)	General-purpose output	n + 44	0~7	SI(140) ~ SI(147)	General-purpose input
m + 45	0~7	SO(150) ~ SO(157)	General-purpose output	n + 45	0~7	SI(150) ~ SI(157)	General-purpose input
m + 46	0~7		Reserved area. *1	n + 46	0~7		Reserved area. *1
m + 47	0~7		Reserved area. *1	n + 47	0~7		Reserved area. *1

m : Start address of the input area assigned to the master module
n : Start address of the output area assigned to the master module

* Used to perform a return-to-origin at dedicated "absolute type axes" or at dual "absolute & incremental type axes", depending on the parameter (DI17) setting.

*1: Reserved area. Do not use.

WARNING

- ALTHOUGH THE EMERGENCY STOP INPUT "SI (00)" PERFORMS A FUNCTION WHICH TURNS THE SERVO OFF AND STOPS ROBOT OPERATION, DO NOT RELY SOLELY ON THIS INPUT FOR SAFETY PURPOSES.
- TO STOP THE ROBOT (SERVO OFF) FOR SAFETY PURPOSES, BE SURE TO INSTALL A HARD-WIRED SAFETY CIRCUIT WHICH USES A SAFETY CONNECTOR WITH AN EMERGENCY STOP CONTACT. IN ADDITION, THE ETHERNET/IP COMPATIBLE MODULE'S EMERGENCY STOP INPUT MUST ALSO BE TURNED OFF.

■ Word input/output

Slave → Master				Master → Slave			
Address	Name			Address	Name		
m		SOW(0)	Dedicated output	n		SIW(0)	Dedicated input
m + 2		SOW(1)	Dedicated output	n + 2		SIW(1)	Dedicated input
m + 4	SOD(2)	SOW(2)	General-purpose output	n + 4	SID(2)	SIW(2)	General-purpose input
m + 6		SOW(3)	General-purpose output	n + 6		SIW(3)	General-purpose input
m + 8	SOD(4)	SOW(4)	General-purpose output	n + 8	SID(4)	SIW(4)	General-purpose input
m + 10		SOW(5)	General-purpose output	n + 10		SIW(5)	General-purpose input
m + 12	SOD(6)	SOW(6)	General-purpose output	n + 12	SID(6)	SIW(6)	General-purpose input
m + 14		SOW(7)	General-purpose output	n + 14		SIW(7)	General-purpose input
m + 16	SOD(8)	SOW(8)	General-purpose output	n + 16	SID(8)	SIW(8)	General-purpose input
m + 18		SOW(9)	General-purpose output	n + 18		SIW(9)	General-purpose input
m + 20	SOD(10)	SOW(10)	General-purpose output	n + 20	SID(10)	SIW(10)	General-purpose input
m + 22		SOW(11)	General-purpose output	n + 22		SIW(11)	General-purpose input
m + 24	SOD(12)	SOW(12)	General-purpose output	n + 24	SID(12)	SIW(12)	General-purpose input
m + 26		SOW(13)	General-purpose output	n + 26		SIW(13)	General-purpose input
m + 28	SOD(14)	SOW(14)	General-purpose output	n + 28	SID(14)	SIW(14)	General-purpose input
m + 30		SOW(15)	General-purpose output	n + 30		SIW(15)	General-purpose input

m : Start address of the input area assigned to the master module
n : Start address of the output area assigned to the master module

2. Details of input/output signals

■ Bit output

Address	Signal name		Description
(m + 32)0	SO(00)	Emergency stop status output	Turns ON when the robot controller is in the emergency stop state.
(m + 32)1	SO(01)	CPU_OK status output	Turns ON when the robot controller is in the normal state.
(m + 32)2	SO(02)	Servo ON status output	Turns ON when the motor power of the robot controller is ON.
(m + 32)3	SO(03)	Alarm status output	Switches ON when a serious robot controller error has occurred.
(m + 32)4	SO(04)	MP RDY status output	Switches ON when main power is supplied from the robot controller, and when servo ON operation is enabled by the servo ON input signal. Switches OFF when a serious robot controller error occurs.
(m + 33)0	SO(10)	AUTO mode status output	Turns ON when the AUTO mode is selected. Turns OFF when other mode is selected.
(m + 33)1	SO(11)	Return-to-origin complete status output	Turns ON when the robot has completed the return-to-origin.
(m + 33)2	SO(12)	Sequence program execution status output	Turns ON while the sequence program is being executed.
(m + 33)3	SO(13)	Robot program running output	Turns ON while the robot program is being executed.
(m + 33)4	SO(14)	Program reset status output	Turns ON when the robot program has been reset. Turns OFF when the robot program starts.
(m + 33)5	SO(15)	Warning output	Switches ON when a robot controller warning status occurs.
(m + 34)0 ~ (m + 34)7	SO(20) ~ SO(27)	General-purpose output	General-purpose output turns ON/OFF when the value is assigned to the SO port, or SET/RESET command or OUT command is executed.
~	~	~	
(m + 44)0 ~ (m + 44)7	SO(150) ~ SO(157)	General-purpose output	

m : Start address of the input area assigned to the master module

NOTE

When the area check output function is used, the area check outputs can be assigned to SO(20) ~ SO(157).

Bit input

Address	Signal name		Description
(n + 32)0	SI(00)	Emergency stop input	Turn OFF to put the controller in the emergency stop state. Keeps turned ON during normal operation.
(n + 32)1	SI(01)	Servo ON input	Turn ON to cancel the emergency stop state and put the robot servomotor in the ON state. The servo ON is executed when this signal is switched from OFF to ON. It is necessary that the emergency stop input SI(00) is in the ON state and all emergency stop states (emergency stop terminal in the SAFETY connector, etc.) on the robot controller are cancelled.
(n + 32)6	SI(06)	Stop input	Turn OFF to stop the robot program currently being executed. To execute the program, keep this signal turned ON.
(n + 33)0	SI(10)	Sequence control input	Turn ON to execute the sequence program in the robot controller. The sequence program is executed when this signal is in the ON state.
(n + 33)2	SI(12)	Auto operation start	Turn ON to execute the robot program. The robot program is executed when this signal is switched from OFF to ON.
(n + 33)4	SI(14)	Return-to-origin input (incremental type axis)	Turn ON to perform the return-to-origin of the incremental type axis or semi-absolute type axis. When this signal is switched from OFF to ON, the incremental type axis performs the return-to-origin and the semi-absolute type axis performs the absolute search operation. This signal is intended for axes whose return-to-origin method is the sensor or stroke end method.
(n + 33)5	SI(15)	Program reset input	Turn ON to reset the robot program. The program is reset when this signal is switched from OFF to ON. It is necessary that the robot controller is in the AUTO mode.
(n + 33)6	SI(16)	Alarm reset input	Turn ON to perform an alarm reset. The alarm reset occurs when this signal switches from OFF to ON. A power restart is required for alarms which are not cleared (reset) by this signal.
(n + 33)7	SI(17)	Return-to-origin input (absolute type axis)	Used to perform a return-to-origin at dedicated "absolute type axes" or at dual "absolute / incremental type axes", depending on the parameter (DI17 mode) setting. • When set at "ABS"; Turn ON to perform return-to-origin for an absolute type axis. The return-to-origin occurs when this signal is switched from OFF to ON. The axis whose return-to-origin method is the mark method does not perform the return-to-origin. Additionally, if the axis whose return-to-origin method is the mark method does not complete the return-to-origin, the return-to-origin is not executed using the dedicated input. • When set at "ABS/ORG"; When only the absolute type axis is present, the return-to-origin is performed for the absolute type axis. The return-to-origin occurs when this signal is switched from OFF to ON. When only incremental and semi-absolute type axes are present, the return-to-origin is performed for those two axis types. When this signal is switched from OFF to ON, the incremental type axis performs a return-to-origin and the semi-absolute type axis performs an absolute search operation. When the absolute type axis, incremental type axis, and semi-absolute type axis are mixed, the incremental type axis and semi-absolute type axis perform the return-to-origin after the absolute type axis has performed the return-to-origin.
(n + 34)0 ~ (n + 34)7	SI(20) ~ SI(27)	General-purpose input	Refers to the SI port value, executes the WAIT command, and uses the ON/OFF state of the general-purpose input.
~	~	~	
(n + 35)0 ~ (n + 35)7	SI(150) ~ SI(157)	General-purpose input	

n : Start address of the output area assigned to the master module

NOTE

- When the YRCX is used with a robot whose axis configuration includes the absolute type, incremental type, and semi-absolute type axes and SI(17) is used for " both the absolute and incremental axes return-to-origin", the return-to-origin is performed for the absolute type axis each time the return-to-origin is performed for the incremental type or semi-absolute type axis.

So, when the robot axis configuration includes the absolute type, incremental type, and semi-absolute type axes, it is recommended to perform the absolute type axis return-to-origin with SI(17) and incremental type axes return-to-origin with SI(14).

Word input

Address	Name			Description
n		SIW(0)	Dedicated input	Used as the remote command area.
n + 2		SIW(1)		Used as the command data area of the remote command.
n + 4	SID(2)	SIW(2)	General-purpose input	Used to input the word or double word data from the SIW or SID port. Or, used as the command data area of the remote command.
n + 6		SIW(3)		
n + 8	SID(4)	SIW(4)		
n + 10		SIW(5)		
n + 12	SID(6)	SIW(6)		
n + 14		SIW(7)		
n + 16	SID(8)	SIW(8)		
n + 18		SIW(9)		
n + 20	SID(10)	SIW(10)		
n + 22		SIW(11)		
n + 24	SID(12)	SIW(12)		
n + 26		SIW(13)		
n + 28	SID(14)	SIW(14)		
n + 30		SIW(15)		

n : Start address of the output area assigned to the master module

Word output

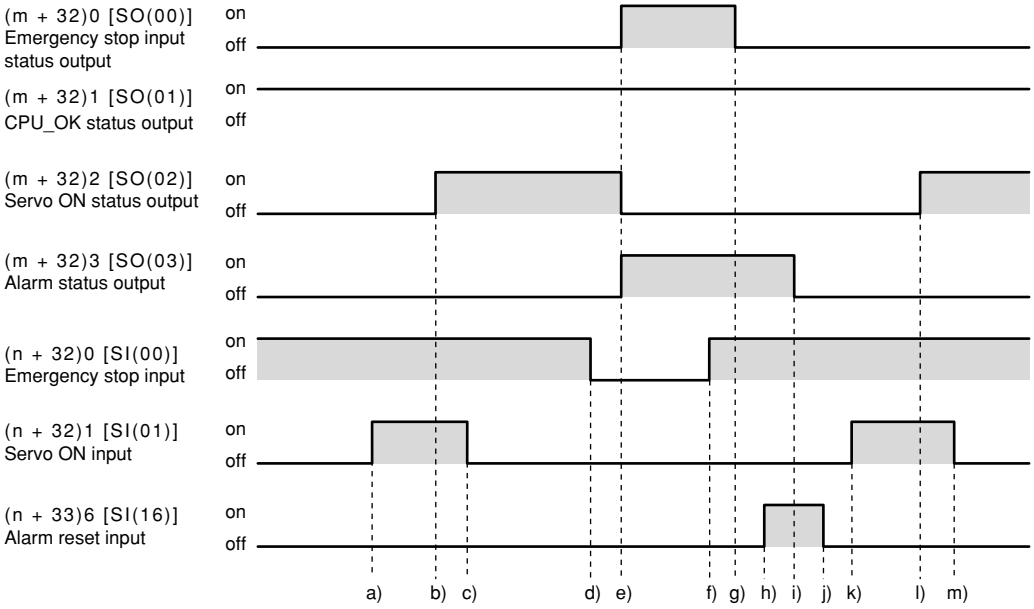
Address	Name			Description
m		SOW(0)	Dedicated output	Used as the status area of the remote command.
m + 2		SOW(1)		Used as the error code area of the remote command.
m + 4	SOD(2)	SOW(2)	General-purpose output	Used to output the word or double word data from the SOW or SOD port. Or, used as the response area of the remote command.
m + 6		SOW(3)		
m + 8	SOD(4)	SOW(4)		
m + 10		SOW(5)		
m + 12	SOD(6)	SOW(6)		
m + 14		SOW(7)		
m + 16	SOD(8)	SOW(8)		
m + 18		SOW(9)		
m + 20	SOD(10)	SOW(10)		
m + 22		SOW(11)		
m + 24	SOD(12)	SOW(12)		
m + 26		SOW(13)		
m + 28	SOD(14)	SOW(14)		
m + 30		SOW(15)		

m : Start address of the input area assigned to the master module

3. Dedicated input/output signal timing chart

3.1 Servo ON and emergency stop

The EtherNet/IP system specification robot controller always begins operation in a servo OFF condition following a power ON.
The timing chart for servo ON processing following a power ON is shown below.



CAUTION

- **Provide an interval of 100ms or more when turning the dedicated input from the master module to the controller ON and OFF. If the interval is too short, the dedicated input may not be recognized. (This also applies to the interval for the same dedicated inputs or different dedicated inputs.)**
- **Use this also if there is a dedicated output in response to the dedicated input from the master module to the controller.**

■ Initial servo ON process after power ON

a) Servo ON input ON is input
b) If not in the emergency stop state, output servo ON status ON is output
c) After confirming that servo ON status output is ON, servo ON input OFF is input

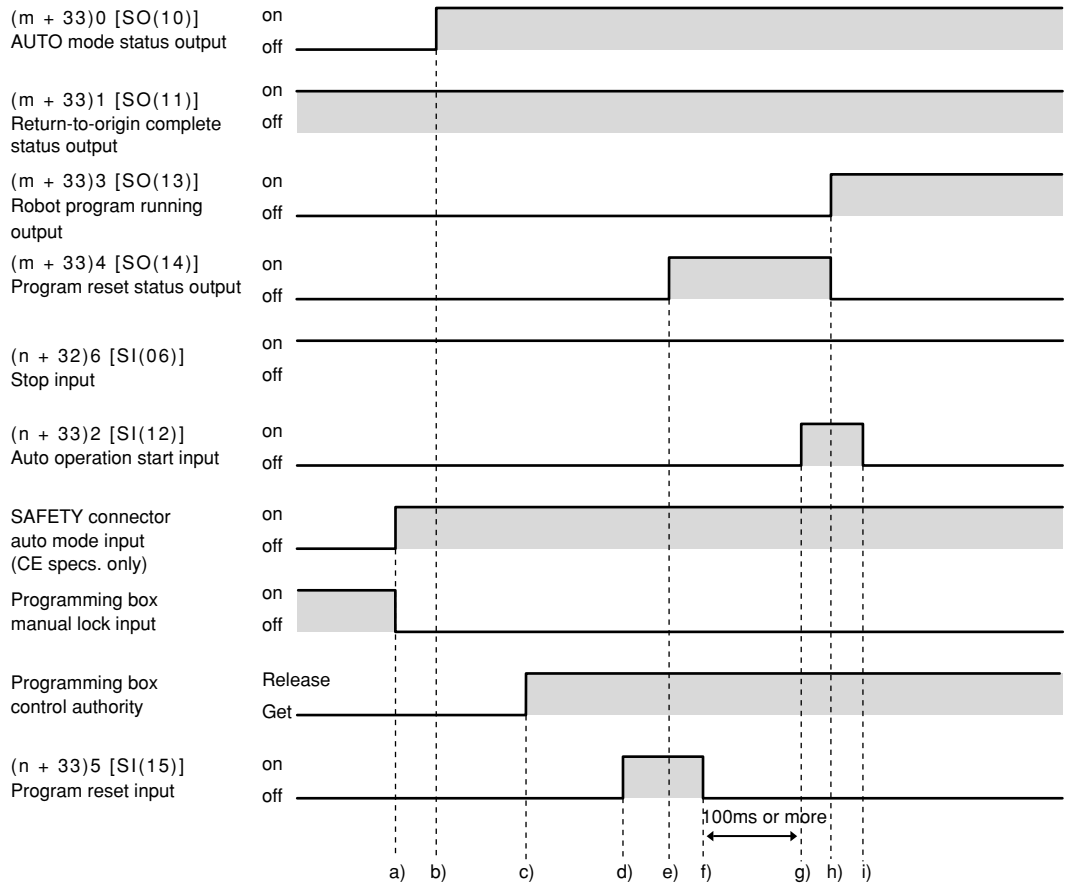
■ Shift to emergency stop

d) Emergency stop input OFF is input
e) Emergency stop input status ON and alarm status output ON are output
Servo ON status output OFF is output

■ Servo ON process from emergency stop status

f) Emergency stop input ON is input
g) Emergency stop input status output OFF is output
h) Alarm reset input's ON input
i) Alarm status output OFF is output
j) The alarm reset input's OFF input occurs after confirming that the alarm status output is OFF
k) Servo ON input ON is input
l) Servo ON status output ON is output
m) After confirming that servo ON status output is ON, servo ON input OFF is input

3.2 AUTO mode changeover, program reset and program execution



CAUTION

- **Provide an interval of 100ms or more when turning the dedicated input from the master module to the controller ON and OFF. If the interval is too short, the dedicated input may not be recognized. (This also applies to the interval for the same dedicated inputs or different dedicated inputs.)**
- **Use this also if there is a dedicated output in response to the dedicated input from the master module to the controller.**

■ AUTO mode changeover process

a) SAFETY connector's auto mode input ON is input, programming box's manual lock input OFF is input

b) AUTO mode status output ON is output

c) Programming box control authority CANCEL

■ Program reset process

d) Program reset input ON is input

e) Program reset status output ON is output

f) After confirming that the program reset status output is ON, the program reset input OFF is input

■ Program execution process

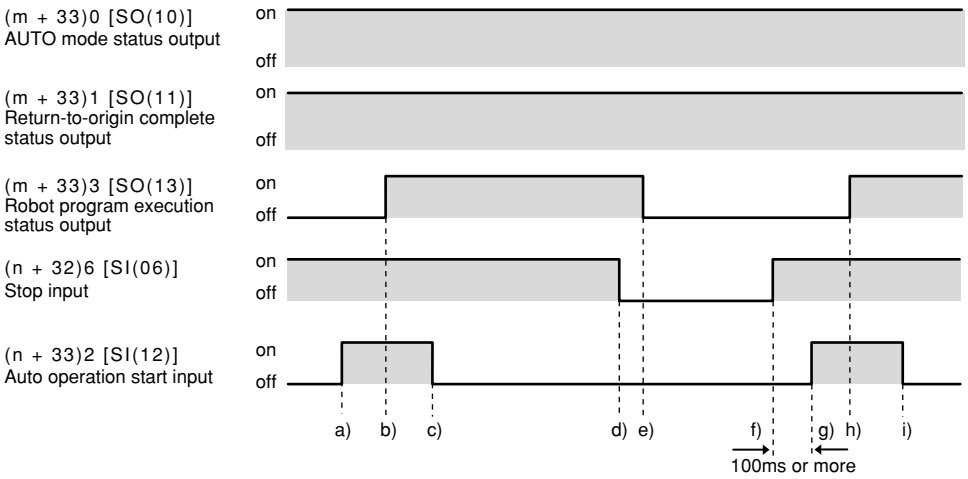
g) Auto operation start input ON is input

h) Program reset status output OFF is output, "robot program running" output ON is output

i) After confirming that the robot program running output is ON, auto operation start input OFF is input.

* The program cannot be executed if the emergency stop and stop input are OFF.

3.3 Stopping operation by a program stop



CAUTION

- **Provide an interval of 100ms or more when turning the dedicated input from the master module to the controller ON and OFF. If the interval is too short, the dedicated input may not be recognized. (This also applies to the interval for the same dedicated inputs or different dedicated inputs.)**
- **Use this also if there is a dedicated output in response to the dedicated input from the master module to the controller.**

■ Program execution process

a) Auto operation start input ON is input

b) Robot program running output ON is output

c) After confirming that the robot program running output is ON, auto operation start input OFF is input

■ Program stop process using stop input

d) Stop input OFF is input

e) Robot program running output OFF is output

■ Program execution after stopping program with stop input

f) Stop input ON is input

g) Auto operation start input ON is input

h) Robot program running output ON is output

i) After confirming that the "robot program running" output is ON, auto start input OFF is input

* The program also stops at transitions to an emergency stop status. At this point, the alarm status output ON is output, and servo ON status output OFF is output. To re-execute the program, an alarm reset or servo ON processing are required.

4. EtherNet/IP compatible module specifications

Spec. Item \ Model	EtherNet/IP compatible module		
Controller model	YRCX		
Network specifications	Conforms to Ethernet (IEEE 802.3).		
Applicable EtherNet/IP specifications	Volume 1 : Common Industrial protocol (CIPTM) Edition 3.14 Volume 2 : EtherNet/IP Adaptation of CIP Edition 1.15		
Device type	Generic Device (Device No. 43)		
Data size	48 bytes each for input/output		
Transmission speed	10 Mbps/100 Mbps		
Connector specifications	RJ-45 connector (8-pole modular connector) 2 ports		
Cable specifications	Refer to “2.1. LAN cable” in Chapter 2 of this guide.		
Max. cable length	100 m		
EtherNet/IP input/output points	Input (48 bytes in total)	byte 0-3 byte 4-31	Dedicated word input : 2 words General purpose word input : 14 words
		byte 32-33 byte 34-47	Dedicated bit input : 16 points General-purpose bit input : 96 points
	Output (48 bytes in total)	byte 0-3 byte 4-31	Dedicated word output : 2 words General-purpose word output : 14 words
		byte 32-33 byte 34-47	Dedicated bit output : 16 points General-purpose bit output : 96 points
Settings, such as IP address	The settings are made with the programming box or the support software (via a COM port or telnet).		
Monitor LEDs	Network Status, Module Status		

* Controller’s I/O update intervals are 5 ms at shortest, but actual I/O update intervals may vary depending on the update time for the master module.

CAUTION

- **For the names and contents of the word and bit input/output signals, refer to the tables shown in the sections, "Profile" and "Details of input/output signals".**
- **The specifications and appearance are subject to change without prior notice due to continual improvement.**

Chapter 6 Appendix

1. Definitions of terms

EtherNet/IP (Ethernet/Industrial Protocol)

This EtherNet/IP is a communication protocol that CIP (Common Industrial Protocol) is mounted on the Ethernet and TCP/IP.
The EtherNet/IP is jointly controlled by ODVA (Open DeviceNet Vendor Association) and CI (ControlNet International).

CIP (Common Industrial Protocol)

This CIP is a protocol for the application layer that does not depend on the physical layer used for the EtherNet/IP or DeviceNet.
The CIP provides the standard object that can access to data and includes functions necessary for industrial network units.

TCP/IP (Transmission Control Protocol / Internet Protocol)

This TCP/IP is a standard protocol for the Internet communication. The TCP/IP is a generic name of multiple protocol groups that use the TCP and IP protocols as a core. All computers and personal computers that can access to the Internet use the TCP/IP protocol.

Ethernet

This Ethernet is a kind of standard for the hardware related to the network system.
The Ethernet is a network that was invented by Xerox in the U.S.A. in the early 1970s. Presently, the Ethernet is national-standardized as IEEE802.3. The specifications are classified into 10BASE-2, 10BASE-5, and 10BASE-T by the transmission cable type. The maximum cable length or the maximum number of connections may vary depending on the specifications. The EtherNet/IP compatible module for the YRCX uses the 100BASE-TX specifications.
Protocols generally used for the Ethernet are NetBEUI and IPX/SPX in addition to the TCP/IP protocol.
Additionally, the features of the Ethernet are that the CSMA/CD method is used for the data transmission method.

CSMA/CD (Carrier Sense Multiple Access with Collision Detection)

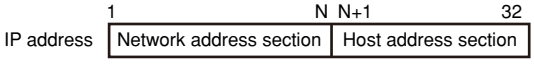
This CSMA/CD is a signal transmission method that the data transmission method called "CSMA" is combined with the transmission troubleshooting method called "CD".
Since the CSMA commonly uses multiple units connected to the network with one transmission cable, it checks the network working status to confirm the transmission ready status before transmitting the data.
Therefore, many units can be connected to the Ethernet that uses the CSMA/CD method, but the real time transmission is not guaranteed since the transmission waiting or re-transmission occurs.

IP address

The IP address is a unique number assigned to each device to identify that device on the network and prevent the same number from being used by different devices. (More accurately, an IP address is assigned to each network interface, since once device may sometimes be installed with multiple network interfaces.) In a TCP/IP protocol, the data transmit source and destination are specified by this IP address. Because the IP address is a 32-bit (4 bytes) numerical value, it is divided into 1 byte sections with "period" breakpoints, and is expressed as a decimal value for easier recognition by humans. An IP address of 0xC0A80002, for example, is normally expressed as 192.168.0.2.

The IP address is actually comprised of 2 address sections. One section is the network address. The network address is the address of the network itself. The other section is the host address section. The host address is an address for identifying each device on that network. The IP address, as shown below, uses the first through the Nth bits as the network address, and the N + 1 bit through 32nd bit as the host address. (The value of N is determined by the subnet mask.)

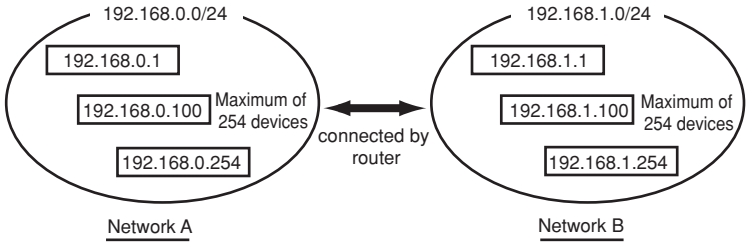
IP address (1)



In an IP address of 192.168.0.2, for example, if the N value (network length) is 24 bits, then the network address section is 192.168.0, and the host address section is 2. Generally, in a network address, the host address section is 0 and the network length is listed behind the address. In the above example, this would be shown as 192.168.0.0/24.

One network can be connected with as many devices as there are addresses to identify them. However, host address bits having all zeroes (0), or all ones (1) are reserved and so cannot be used. In the above example, though the host address can identify 256 devices, the numbers 0 and 255 cannot be used so the maximum number of devices that can actually be connected is 254.

IP address (2)



Any company (organization) can freely select a host address but when connecting their network to the Internet, that company (organization) cannot select the network address on their own.
An application to acquire a network address must be made to the NIC (in Japan, JPNIC).
If connecting one's network to the Internet is not necessary, then any company can freely select a network address, as well as a host address.
If there is no need to connect to the Internet, then use of the following addresses is allowed.

10.0.0.0 through 10.255.255.255 (1 unit of class A)
172.16.0.0 through 172.31.255.255 (16 units of class B)
192.168.0.0 through 192.168.255.255 (255 units of class C)

An address acquired by making application to NIC on the other hand is referred to as a global address.

Subnet mask

The subnet mask is used to separate the IP address into a network address section and a host address section. The network address bit is set to 1, and the host address bit is set to 0. The subnet mask, just like the IP address is expressed as a decimal number of 32 bits (4 bytes) with each byte separated by a period (or four sets of numbers separated by periods). So if the subnet mask is 255.255.255.0, then the network address section is 24 bits.

A company (organization) is generally assigned only one network address when applying to the NIC for an IP address. The company making the application falls within one of classes A, B or C depending on the scale of the company. Class B for example, has a network length of 16 bits and can be assigned a network allowing connection of up to 65533 devices. However, unless changes are made, this network cannot efficiently perform the required managing and processing tasks. So such a network is normally set with subnet masks to divide it into an appropriate number of smaller networks. When a class B network for example, is set with a subnet mask of 255.255.255.0, a total of 256 settings can be made allowing up to 254 devices to be connected.

HUB

A HUB is a device used for connecting devices such as PCs by way of a 10BASE-T network. The HUB has multiple ports that allow connecting modular jacks and twisted pair cables fitted with these modular jacks connect to the HUB from each device.
The HUB may have different type connectors depending on whether the HUB is for 10BASE-2 or 10BASE-5. Various types of networks can be constructed by means of these HUBs.

Router

The router is a device for mutually connecting networks together. The router sends data with an external destination from an internal network to an external network, and sends data received from an external network, to an internal network. Designated data is discarded in a filtering process to ensure network safety.
The router IP address is set as the gateway address in each network device. This setting allows data to be correctly sent and received by each device on the network.

SAFETY connector

This SAFETY connector is a controller connector that connects the emergency stop input and auto mode input.

Bit information

This bit information can be handled by the EtherNet/IP compatible module.

Word information

This word information can be handled by the EtherNet/IP compatible module.

Little endian

This little endian is a method that substitutes the LSB into the memory at low-order address and refers to the LSB when the word information data is handed as double word data.
For example, when the value "00012345h" is substituted into SOD (2), "2345h" is substituted into SOW (2) of the first word and "0001h" into SOW (3) of the second word.

2. EDS files

The EDS file is an Electronic Data Sheet with a format based on the EtherNet/IP specifications.
This file contains information required for connecting with the host device (the master module, etc.).
The EDS file is read to the host device's configurator tool in order to enable recognition of product information and identify items where settings are possible.

Remote command guide

Remote command guide

Remote command guide

Remote command guide

1. Remote command format

Using the EtherNet/IP compatible module allows issuing commands directly from the master module (programmable logic controller).

1.1 Remote command specifications

Functions such as shown below are assigned to each address.

Output (remote → master)			Input (remote ← master)	
Address	Contents		Address	Contents
m	Status		n	Execute command code
	Normal end	Abnormal end		
m + 2	Response	Alarm group number	n + 2	Command data
m + 4		Alarm category number	n + 4	
m + 6		Not used	n + 6	
to			to	
m + 30			n + 30	

m : Start address of the input area assigned to the master module
n : Start address of the output area assigned to the master module

NOTE

Remote commands must be held until the status changes to a normal end (0x0200) or an abnormal end (0x4000). If a remote command is changed before the status changes to an end, the status of the remote command executed will not be reflected.

- Remote commands are run by assigning the command codes to the "n", and command data to the n + 2 to n + 30. When the controller receives the remote command, it starts the processing and sends the status (results) and its other information to the master module by way of the "m" and m + 2 to m + 30. When the remote command ends, assign the status reset command (0x0000 (hexadecimal)) to the "n" to clear the status. The remote command can be run when in command ready status (0x0000 (hexadecimal)).
- Command data to be added to remote commands differs according to the particular remote command. For details, Refer to "4. Remote command description" in this guide. Command data must always be entered before trying to set the remote command.
- Contents of the remote command response sent as the remote command results differ according to the particular remote command. For details, Refer to "4. Remote command description" in this guide.
- Data is set in binary code. When setting two pieces of 8-bit data such as character code data, set the upper bit data into the higher address. If the data size is greater than 16 bits, set the upper bit data into the higher address. (little endian)
  For example, to set "12" in n + 8, enter 0x3231 (hexadecimal)
  (character code: "1" = 0x31, "2" = 0x32)
  For example, to set 0x01234567 (hexadecimal) (=19,088,743) in the n + 8 and n + 10 registers, set 0x0123 (hexadecimal) in n + 10 and set 0x4567 (hexadecimal) in n + 8.
- The status code is sent to "m" when the remote command ends correctly.
- When the remote command ends incorrectly, an alarm group number is sent to m + 2 and alarm category number is sent to m + 4 as a response. See the troubleshooting section of the robot controller user's manual for description of the alarm group number and alarm category number.
  For example, when 0x0002 (hexadecimal) was set in m + 2 and 0x014E (hexadecimal) was set in m + 4, this shows that a "soft limit over" alarm has occurred.

1.2 Remote status

The controller starts processing when the remote command is received and sends the status (results) to the master module by way of "m".

■ Remote status list

Status contents				Meaning
m	m + 2	m + 4	From m + 6	
0x0000	0x0000			Command ready status
0x0100	0x0000			Command run status
0x0200	Response data			Normal end status
0x4000	Alarm group number	Alarm category number	0x0000	Abnormal end status

m : Start address of the input area assigned to the master module

NOTE

Remote commands must be held until the status changes to a normal end (0x0200) or an abnormal end (0x4000). If a remote command is changed before the status changes to an end, the status of the remote command executed will not be reflected.

■ Code 0x0000 .....Command ready status

Indicates a state where remote command is not being run and a new remote command can be received. Remote status must always be set to command ready status (0x0000) in order to execute a remote command. To change the remote status to command ready status (0x0000), run the status reset command (0x0000).

■ Code 0x0100 ..... Command run status

Indicates a state where the controller has received a remote command and is in command run status.
In some cases the command run status (0x0100) might not be sent to the master module due to problems caused by a short remote command execution time versus the controller scan time (5 ms).

■ Code 0x0200 ..... Normal end status

Indicates a state where the remote command was run correctly.
Category 5 (key operation command) indicates command was received as a key operation command. The actual key operation sometimes might be in progress.

■ Code 0x4000 .....Abnormal end status

Indicates remote command ended abnormally.
Alarm group number and alarm category number that occurred are sent to m + 2 and m + 4.

- **Alarm group number m + 2**

  Indicates the cause of end abnormally as the alarm group number.

- **Alarm category number m + 4**

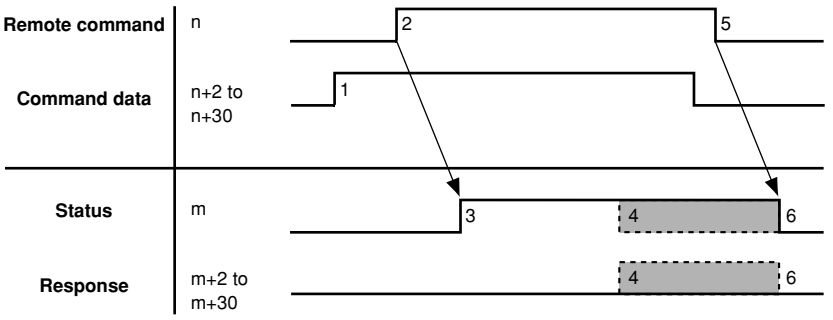
  Indicates the cause of end abnormally as the alarm category number.

* For example, 0x000C is set in m+2 as the alarm group number and 0x0258 is set in m+4 as the alarm category number when the remote command was interrupted by an emergency stop input.

* For information on the alarm, refer to the troubleshooting section of the robot controller user's manual.

2. Sending and receiving remote commands

Sending and receiving remote commands



m : Start address of the input area assigned to the master module
n : Start address of the output area assigned to the master module
("m" indicates the data direction from remote to master, and "n" the data direction from master to remote.)

NOTE

Remote commands must be held until the status changes to a normal end (0x0200) or an abnormal end (0x4000). If a remote command is changed before the status changes to an end, the status of the remote command executed will not be reflected.

1. Command data setting
2. Remote command setting
3. Status shifts to command run status (0x0100).
   (If the command is quickly executed, status may sometimes shift to normal end status (0x0200) without changing to command run status (0x0100).)
4. Shifts to response change and normal end status (0x0200) or to abnormal end status (0x4000).
5. Status reset command (0x0000) setting
6. Status and response shifts to command ready status.

Example: Typical transmit/receive when running a PTP movement command (all axes, program speed 50%) to point 19 is shown below.

1. To run the PTP movement command for the designated point, enter the value in the registers shown below.
   n + 2: command flag (0x0004 = speed setting)
   n + 6: speed setting (0x0032 = 50%)
   n + 8: point setting (0x0013 = point 19)
2. Enter the PTP movement command (0x0001) for the designated point into the "n".
3. The robot controller receives the remote command and starts running it if the command code and command data can be executed. Status now shifts to command run status (0x0100). The robot moves to the position designated as point 19 at the program speed (50% of normal speed). If the command cannot be executed, status shifts to abnormal end status (0x4000) and the m + 2 and m + 4 values change to alarm codes.
4. When finished executing the remote command, status changes to normal end status (0x0200). Response information is changed at the same time if present.
5. The current remote command has now finished, so set the status reset command (0x0000) in "n" in order to issue the next command.
6. The status and response shift to command ready status (0x0000).

3. Remote command & remote status tables

Remote commands and remote status codes are shown in hexadecimal notation.

■ Remote Command

Command contents		Meaning
Category	n	
Special	0x0000	Status reset command
1	0xR0nn	Movement command and associated command
2	0xR1nn	Definition and reference command
3	0xR2nn	Arithmetic command
4	0x03nn	I/O port command
5	0x04nn	Program operation setting command
6	0xR5nn	Data handling command
7	0x06nn	Utility mode setting operation command

n : Start address of the output area assigned to the master module
("n" indicates the data direction from master to remote.)

* nn is determined by the particular remote command.
* "R" indicates the number of the robot in question (0~4).

■ Remote Status

Status contents				Meaning
m	m + 2	m + 4	From m + 6	
0x0000	0x0000			Command ready status
0x0100	0x0000 or response data			Command run status
0x0200	Response data			Normal end status
0x4000	Alarm group number	Alarm category number	0x0000	Abnormal end status

m : Start address of the input area assigned to the master module
("m" indicates the data direction from remote to master.)

Remote command restrictions:

- All remote commands are disabled when dedicated inputs have been disabled by a safety setting.
- Only the following remote commands are enabled when the programming box has control authority.

Command contents	Command code n
Status reset command	0x0000
Point data reference	0x0101
Point comment data reference	0x0105
Pallet data reference	0x0109
Shift data reference	0x010D
Hand data reference	0x0111
Static variable referencing	0x0214
Parameter referencing	0xR224
Input/output port referencing	0x0304
Version information reference	0x0501
System configuration referencing	0xR502
Servo status reference	0xR503
Current position reference (pulse units)	0xR505
Current position reference (millimeter units)	0xR506
Task status reference	0x0507
Task execution reference	0x0508
Message reference	0x0509
Speed status reference	0xR50A
Arm designation status reference	0xR50B
Arm status reference	0xR50C
Return-to-origin status reference	0xR50F
Current torque value (percentage of max. torque) reference	0xR510
In-controller date reference	0x0511
In-controller time reference	0x0512
Option slot module information referencing	0x0513
Inching movement amount referencing	0xR514
Remote command latest alarm referencing	0x0515
Current torque value (percentage of rated torque) reference	0x0516

* "R" indicates the number of the robot in question (0~4).

NOTE

For details regarding safety settings and programming box control authority, refer to the robot controller user's manual.

Category 1

No.	Command contents			Command code n
1-1	MOVE command	PTP point designation		0xR001
		Arch designation		0xR002
		Linear interpolation		0xR003
		Circular interpolation		0xR004
		Direct PTP designation	Millimeter units	0xR006
			Pulse units	0xR007
1-2	MOVEI command	PTP point designation		0xR009
		Linear interpolation		0xR00A
		Direct PTP designation	Millimeter units	0xR00E
			Pulse units	0xR00F
1-3	DRIVE command	Point designation		0xR010
		Direct designation	Millimeter units	0xR012
			Pulse units	0xR013
1-4	DRIVEI command	Point designation		0xR014
		Direct designation	Millimeter units	0xR016
			Pulse units	0xR017
1-5	Pallet command	PTP designation		0xR018
		Arch designation		0xR019
1-6	Jog movement command	Pulse units		0xR020
		Cartesian coordinate system units		0xR021
		Tool coordinate system		0xR022
1-7	Inching movement command	Pulse units		0xR024
		Cartesian coordinate system units		0xR025
		Tool coordinate system		0xR026
1-8	Inching movement amount setting command			0xR027
1-9	Point teaching command			0xR028
1-10	Absolute reset movement command			0xR030
1-11	Absolute reset command			0xR031
1-12	Return-to-origin command	Robot units		0xR032
		Axis units		0xR033
1-13	Servo command	On designation		0xR034
		Off designation		0xR035
		Free designation		0xR036
1-14	Manual movement speed change command			0xR038
1-15	Automatic movement speed change command			0xR039
1-16	Program movement speed change command			0xR03A
1-17	Shift designation change command			0xR03B
1-18	Hand designation change command			0xR03C
1-19	Arm designation change command			0xR03D
1-20	Motor power command	OFF		0x0041
		ON		0x0042
		PWR		0x0043
1-21	MOVET command	PTP point designation		0xR044
		Linear interpolation		0xR045
1-22	Max. torque command value change command			0xR048
1-23	PUSH operation command	Point designation		0xR04B
		Direct designation	Millimeter units	0xR04C
			Pulse units	0xR04D

* "R" indicates the number of the robot in question (0~4).
* The 1-3 DRIVE movement command, the 1-4 DRIVEI movement command, and the 1-23 PUSH operation command are valid only for 1 axis unit.

Category 2

No.	Command contents		Command code n
2-1	Point-related command	Point data definition	0x0100
		Point data reference	0x0101
2-2	Point comment-related command	Point comment data definition	0x0104
		Point comment data reference	0x0105
2-3	Pallet-related command	Pallet data definition	0x0108
		Pallet data reference	0x0109
2-4	Shift-related command	Shift data definition	0x010C
		Shift data reference	0x010D
2-5	Hand-related command	Hand data definition	0xR110
		Hand data reference	0x0111

* "R" indicates the number of the robot in question (0~4).

Category 3

No.	Command contents			Command code n
3-1	Static variable-related commands	Assignment	Value	0x0200
			Variable	0x0201
		Addition	Value	0x0204
			Variable	0x0205
		Subtraction	Value	0x0208
			Variable	0x0209
		Multiplication	Value	0x020C
			Variable	0x020D
		Division	Value	0x0210
			Variable	0x0211
		Reference	Variable	0x0214
3-2	Parameter-related command	Assignment		0xR220
		Reference		0xR224
3-3	Point-related command	Point assignment		0x0230
		Addition		0x0234
		Subtraction		0x0235
		Pallet point assignment		0x0238
		Point element assignmen	Pulse units input format	0x0240
			Millimeter units input format	0x0241
		Shift element assignment	Millimeter units input format	0x0245

* "R" indicates the number of the robot in question (0~4).

Category 4

No.	Command contents			Command code n
4-1	I/O port-related commands	Assignment	Port units	0x0300
			Bit units	0x0301
		Reference	Port units	0x0304

Category 5

No.	Command contents		Command code n
5-1	Execution program designation		0x0401
5-2	Program execution	Program execution	0x0402
		Program step execution	0x0403
		Program skip execution	0x0404
		Program next execution	0x0405
5-3	Program reset		0x0406
5-4	Program execution information reference		0x0408

Category 6

No.	Command contents		Command code n
6-1	Version information reference		0x0501
6-2	System configuration referencing		0xR502
6-3	Servo status reference		0xR503
6-4	Current position reference	Pulse units	0xR505
		Millimeter units	0xR506
6-5	Task status reference		0x0507
6-6	Task execution reference		0x0508
6-7	Message reference		0x0509
6-8	Speed status reference		0xR50A
6-9	Arm designation status reference		0xR50B
6-10	Arm status reference		0xR50C
6-11	Return-to-origin status reference		0xR50F
6-12	Current torque value (percentage of max. torque) reference		0xR510
6-13	In-controller date reference		0x0511
6-14	In-controller time reference		0x0512
6-15	Option slot module information referencing		0x0513
6-16	Inching movement amount referencing		0xR514
6-17	Remote command latest alarm referencing		0x0515
6-18	Current torque value (percentage of rated torque) reference		0x0516

* "R" indicates the number of the robot in question (0~4).

Category 7

No.	Command contents	Command code n
7-1	In-controller date setting operation	0x0602
7-2	In-controller time setting operation	0x0603
7-3	Alarm reset command	0x0604

4. Remote command description

4.1 Status reset command

This command is executed to set the status to command ready status (0x0000).
Remote commands cannot be executed unless in command ready status (0x0000). Therefore, this command must be executed to execute the next remote command after executing the remote command.

■ Command

Address	Contents	Value
n	Command code	0x0000
n + 2	Not used	0x0000
to		
n + 30		

■ Status

Address	Contents	Value
m	Status code	0x0000
m + 2	Response	
to		
m + 30		

4.2 Category 1 remote commands

These are remote commands mainly for movement commands.

No.	Command contents			Command code n
1-1	MOVE command	PTP point designation		0xR001
		Arch designation		0xR002
		Linear interpolation		0xR003
		Circular interpolation		0xR004
		Direct PTP designation	Millimeter units	0xR006
			Pulse units	0xR007
1-2	MOVEI command	PTP point designation		0xR009
		Linear interpolation		0xR00A
		Direct PTP designation	Millimeter units	0xR00E
			Pulse units	0xR00F
1-3	DRIVE command	Point designation		0xR010
		Direct designation	Millimeter units	0xR012
			Pulse units	0xR013
1-4	DRIVEI command	Point designation		0xR014
		Direct designation	Millimeter units	0xR016
			Pulse units	0xR017
1-5	Pallet command	PTP designation		0xR018
		Arch designation		0xR019
1-6	Jog movement command	Pulse units		0xR020
		Cartesian coordinate system units		0xR021
		Tool coordinate system		0xR022
1-7	Inching movement command	Pulse units		0xR024
		Cartesian coordinate system units		0xR025
		Tool coordinate system		0xR026
1-8	Inching movement amount setting command			0xR027
1-9	Point teaching command			0xR028
1-10	Absolute reset movement command			0xR030
1-11	Absolute reset command			0xR031
1-12	Return-to-origin command	Robot units		0xR032
		Axis units		0xR033
1-13	Servo command	On designation		0xR034
		Off designation		0xR035
		Free designation		0xR036
1-14	Manual movement speed change command			0xR038
1-15	Automatic movement speed change command			0xR039
1-16	Program movement speed change command			0xR03A
1-17	Shift designation change command			0xR03B
1-18	Hand designation change command			0xR03C
1-19	Arm designation change command			0xR03D
1-20	Motor power command	OFF		0x0042
		ON		0x0043
		PWR		0xR044
1-21	MOVET command	PTP point designation		0xR044
		Linear interpolation		0xR045
1-22	Max. torque command value change command			0xR048
1-23	PUSH operation command	Point designation		0xR04B
		Direct designation	Millimeter units	0xR04C
			Pulse units	0xR04D

* "R" indicates the number of the robot in question (0~4).
* The 1-3 DRIVE movement command, the 1-4 DRIVEI movement command, and the 1-23 PUSH operation command are valid only for 1 axis unit.

4.2.1 MOVE command

Execute this command group to move the robot to an absolute position.

● PTP designation

This command moves the robot to a target position in PTP motion by specifying the point number.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR001
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Axis designation flag	a
		bit 2 – bit 1	Speed designation flag	bb
		bit 4 – bit 3	(0: Fixed)	0
		bit 5	Acceleration designation flag	d
		bit 6	Deceleration designation flag	e
		bit 13 – bit 7	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Point numbe			0xpppp
n + 10	Not used			0x0000
to				
n + 18				
n + 20	Acceleration designation			0xrrrr
n + 22	Deceleration designation			0xrrrr
n + 24	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : Specify in 1 bit whether all axes are designated.

Value	Meaning
0	All axes are specified.
1	One or more axes are specified.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

d : Specify in 1 bit whether to set acceleration.

Value	Meaning
0	Acceleration is not specified.
1	Acceleration is specified.

e : Specify in 1 bit whether to set deceleration.

Value	Meaning
0	Deceleration is not specified.
1	Deceleration is specified.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits. Valid when axis designation flag is 1.

ssss : Specify the speed in 16 bits.

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

rrrr : Specify the acceleration and deceleration in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVE command with PTP designation as shown at right, when moving all axes of the Robot 1 to point number 100 at 50% speed and with the current position being output in pulse units.

Address	Value
n	0x0001
n + 2	0x4004
n + 4	0x0000
n + 6	0x0032
n + 8	0x0064
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when the axis current positions are as follows:

Axis 1 = 123456

Axis 2 = -123

Other axes = 0

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0xE240
m + 10	0x0001
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Arch designation

This command moves the robot to a target position in arch motion by specifying the point number, arch axis and arch data.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR002
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Axis designation flag	a
		bit 2 – bit 1	Speed designation flag	bb
		bit 3	(0: Fixed)	0
		bit 4	Arch data unit flag	d
		bit 13 – bit 5	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0xuutt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 7 – bit 6	(0: Fixed)	
	Arch designation axis	bit 8	Axis 1	
		bit 9	Axis 2	
		bit 10	Axis 3	
		bit 11	Axis 4	
		bit 12	Axis 5	
		bit 13	Axis 6	
		bit 15 – bit 14	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Point number			0xpppp
n + 10	Not used			0x0000
n + 12				
n + 14				
n + 16	Arch position data			0xqqqqqqqq
n + 18				
n + 20	Arch start position data			0xqqqqqqqq
n + 22				
n + 24	Arch end position data			0xqqqqqqqq
n + 26				
n + 28	Not used			0x0000
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : Specify in 1 bit how to designate axis.

Value	Meaning
0	All axes are specified.
1	One or more axes are specified.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

d : Specify the arch data units in 1 bit.

Value	Meaning
0	Pulse units
1	Millimeter units

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Valid when axis designation flag is 1.

uu : Specify the arch motion axis in bit pattern using upper 8 bits.
Specified arch axis is one axis only.

ssss : Specify the speed in 16 bits.

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

qqqqqqqq : Specify the arch position data and the arch start or end position data in 32 bits. (little endian)
Data should be integers when units are in pulses.
Data should be integers (x1000) when units are in millimeters.

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVE command with arch designation as shown at right, when moving all axes of the Robot 1 to point number 100 at 50% speed by way of a Z-axis arch position of 1.000mm, and with the current position being output in millimeter units.

Address	Value
n	0x0002
n + 2	0x8014
n + 4	0x0400
n + 6	0x0032
n + 8	0x0064
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x03E8
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 5.000

Axis 4 = 9.023

Other axes = 0.000

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0x233F
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Linear interpolation

This command moves the robot to a target position by linear interpolation by specifying the point number.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR003
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(0: Fixed)	a
		bit 2 – bit 1	Speed designation flag	bb
		bit 4 – bit 3	(0: Fixed)	0
		bit 5	Acceleration designation flag	d
		bit 6	Deceleration designation flag	e
		bit 13 – bit 7	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Point number			0xpppp
n + 10	Not used			0x0000
to				
n + 18				
n + 20	Acceleration designation			0xrrrr
n + 22	Deceleration designation			0xrrrr
n + 24	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : Specify in 1 bit how to designate axis.

Value	Meaning
0	All axes are specified.
1	One or more axes are specified.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100
11	Speed is specified in mm/s.	For SCARA robots: 1 to 1000 For all other robots: 1 to 750

d : Specify in 1 bit whether to set acceleration.

Value	Meaning
0	Acceleration is not specified.
1	Acceleration is specified.

tt : Specify the axis to move in bit pattern using lower 8 bits.
Valid when axis designation flag is 1.

e : Specify in 1 bit whether to set deceleration.

Value	Meaning
0	Deceleration is not specified.
1	Deceleration is specified.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

ssss : Specify the speed in 16 bits.

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

rrrr : Specify the acceleration and deceleration in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVE command with linear interpolation as shown at right, when moving all axes of the Robot 1 to point number 100 at a speed of 200 mm/s and at 50% acceleration, and with the current position being output in millimeters.

Address	Value
n	0x0003
n + 2	0x8026
n + 4	0x0000
n + 6	0x00C8
n + 8	0x0064
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0032
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 5.000

Axis 4 = 9.023

Other axes = 0.000

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0x233F
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Circular interpolation

This command moves the robot to a target position by circular interpolation by specifying two point numbers.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR004
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(0: Fixed)	0
		bit 2 – bit 1	Speed designation flag	bb
		bit 4 – bit 3	(0: Fixed)	0
		bit 5	Acceleration designation flag	d
		bit 6	Deceleration designation flag	e
		bit 13 – bit 7	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Not used			0x0000
n + 6	Specified speed			0xssss
n + 8	First point number			0xpppp
n + 10	Second point number			0xpppp
n + 12	Not used			0x0000
to				
n + 18				
n + 20	Acceleration designation			0xrrrr
n + 22	Deceleration designation			0xrrrr
n + 24	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100
11	Speed is specified in mm/s.	For SCARA robots: 1 to 1000 For all other robots: 1 to 750

d : Specify in 1 bit whether to set acceleration.

Value	Meaning
0	Acceleration is not specified.
1	Acceleration is specified.

e : Specifies in 1 bit whether to set deceleration.

Value	Meaning
0	Deceleration is not specified.
1	Deceleration is specified.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

ssss : Specify the speed in 16 bits.

pppp : Specify the first and second point numbers in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

rrrr : Specify the acceleration and deceleration in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVE command with circular interpolation as shown at right, when moving all axes of the Robot 1 to point numbers 100 and 101 at 20% speed and 50% deceleration, and with the current position being output in millimeters.

Address	Value
n	0x0004
n + 2	0x8044
n + 4	0x0000
n + 6	0x0014
n + 8	0x0064
n + 10	0x0065
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0032
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 5.000

Axis 4 = 9.023

Other axes = 0.000

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0x233F
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Direct PTP designation (millimeter units)

This command moves the robot to a target position in PTP motion by directly specifying the data in millimeters.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR006
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Axis designation flag	a
		bit 2 – bit 1	Speed designation flag	bb
		bit 4 – bit 3	Hand system	cc
		bit 13 – bit 5	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Axis-1 data			0xpppppppp
n + 10				
n + 12	Axis-2 data			0xpppppppp
n + 14				
n + 16	Axis-3 data			0xpppppppp
n + 18				
n + 20	Axis-4 data			0xpppppppp
n + 22				
n + 24	Axis-5 data			0xpppppppp
n + 26				
n + 28	Axis-6 data			0xpppppppp
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : Specify in 1 bit whether all axes are designated.

Value	Meaning
0	All axes are specified.
1	One or more axes are specified.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

cc : Specify the hand system in 2 bits.
Only for SCARA robot settings in millimeters.

Value	Meaning
01	Specifies a right-handed system.
10	Specifies a left-handed system.
Other	No hand system is specified.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Valid when axis designation flag is 1.

ssss : Specify the speed in 16 bits.

pppppppp : Specify the target position data for each axis in 32 bits. (little endian)
Data should be integers (x1000) in millimeter units.

CAUTION

• Even if movement is specified only for Axis 4 on a SCARA robot, the 1 and 2 axes also move simultaneously to the target position.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVE command with direct PTP designation (millimeter units) as shown at right, when moving all axes of the Robot 1 to the following points at 50% speed, and with the current position being output in millimeters.

Axis 1 = 10.000

Axis 2 = -20.000

Axis 3 = 5.000

Axis 4 = -18.000

Other axes = 0.000

Address	Value
n	0x0006
n + 2	0x8004
n + 4	0x0000
n + 6	0x0032
n + 8	0x2710
n + 10	0x0000
n + 12	0xB1E0
n + 14	0xFFFF
n + 16	0x1388
n + 18	0x0000
n + 20	0xB9B0
n + 22	0xFFFF
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x2710
m + 10	0x0000
m + 12	0xB1E0
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0xB9B0
m + 22	0xFFFF
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Direct PTP designation (pulse units)

This command moves the robot to a target position in PTP motion by directly specifying the data in pulses.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR007
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Axis designation flag	a
		bit 2 – bit 1	Speed designation flag	bb
		bit 13 – bit 3	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Axis-1 data			0xpppppppp
n + 10				
n + 12	Axis-2 data			0xpppppppp
n + 14				
n + 16	Axis-3 data			0xpppppppp
n + 18				
n + 20	Axis-4 data			0xpppppppp
n + 22				
n + 24	Axis-5 data			0xpppppppp
n + 26				
n + 28	Axis-6 data			0xpppppppp
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : Specify in 1 bit whether all axes are designated.

Value	Meaning
0	All axes are specified.
1	One or more axes are specified.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Valid when axis designation flag is 1.

ssss : Specify the speed in 16 bits.

pppppppp : Specify the target position data for each axis in 32 bits. (little endian)
Data should be integers in pulse units.

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVE command with direct designation PTP (pulse units) as shown at right, when moving all axes of the Robot 1 to the following points at 50% speed, and with the current position being output in pulses.

Axis 1 = 100000

Axis 2 = -200000

Axis 3 = 50000

Axis 4 = -180000

Other axes = 0

Address	Value
n	0x0007
n + 2	0x4004
n + 4	0x0000
n + 6	0x0032
n + 8	0x86A0
n + 10	0x0001
n + 12	0xF2C0
n + 14	0xFFFC
n + 16	0xC350
n + 18	0x0000
n + 20	0x40E0
n + 22	0xFFFD
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x86A0
m + 10	0x0001
m + 12	0xF2C0
m + 14	0xFFFC
m + 16	0xC350
m + 18	0x0000
m + 20	0x40E0
m + 22	0xFFFD
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.2.2 MOVEI command

Execute this command group to move the robot to a relative position.

● PTP designation

This command moves the robot a specified distance in PTP motion by specifying the point number.

NOTE
- If the MOVEI command is interrupted and then re-executed, the resumed motion that occurs either to the original target position or to a new target position referenced to the current position can be selected by the "MOVEI/DRIVEI start position" setting of controller parameters.
- The other parameters default "MOVEI/DRIVEI start position" setting is Keep (motion to the original target position when MOVEI is interrupted and then re-executed).

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR009
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Axis designation flag	a
		bit 2 – bit 1	Speed designation flag	bb
		bit 14 – bit 3	(0: Fixed)	0
		bit 5	Acceleration designation flag	d
		bit 6	Deceleration designation flag	e
		bit 13 – bit 7	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Point number			0xpppp
n + 10	Not used			0x0000
to				
n + 18				
n + 20	Acceleration designation			0xrrrr
n + 22	Deceleration designation			0xrrrr
n + 24	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : Specify in 1 bit whether all axes are designated.

Value	Meaning
0	All axes are specified.
1	One or more axes are specified.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

d : Specify in 1 bit whether to set acceleration.

Value	Meaning
0	Acceleration is not specified.
1	Acceleration is specified.

e : Specifies in 1 bit whether to set deceleration.

Value	Meaning
0	Deceleration is not specified.
1	Deceleration is specified.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Valid when axis designation flag is 1.

ssss : Specify the movement speed in 16 bits.

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

rrrr : Specify the acceleration and deceleration in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVEI command with PTP designation as shown at right, when moving all axes of the Robot 1 a distance specified by point number 100 at 50% speed, and with the current position being output in pulses.

Address	Value
n	0x0009
n + 2	0x4004
n + 4	0x0000
n + 6	0x0032
n + 8	0x0064
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 123456

Axis 2 = -123

Other axes = 0

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0xE240
m + 10	0x0001
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Linear interpolation

This command moves the robot a specified distance in linear interpolation motion by specifying the point number.

NOTE

- If the MOVEI command is interrupted and then re-executed, the resumed motion that occurs either to the original target position or to a new target position referenced to the current position can be selected by the "MOVEI/DRIVEI start position" setting of controller parameters.
- The other parameters default "MOVEI/DRIVEI start position" setting is Keep (motion to the original target position when MOVEI is interrupted and then re-executed).

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR00A
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Axis designation flag	a
		bit 2 – bit 1	Speed designation flag	bb
		bit 4 – bit 3	(0: Fixed)	0
		bit 5	Acceleration designation flag	d
		bit 6	Deceleration designation flag	e
		bit 13 – bit 7	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Point number			0xpppp
n + 10	Not used			0x0000
to				
n + 18				
n + 20	Acceleration designation			0xrrrr
n + 22	Deceleration designation			0xrrrr
n + 24	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : Specify in 1 bit how to designate axis.

Value	Meaning
0	All axes are specified.
1	One or more axes are specified.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100
11	Speed is specified in mm/s.	For SCARA robots: 1 to 1000 For all other robots: 1 to 750

d : Specify in 1 bit whether to set acceleration.

Value	Meaning
0	Acceleration is not specified.
1	Acceleration is specified.

tt : Specify the axis to move in bit pattern using lower 8 bits.
Valid when axis designation flag is 1.

e : Specify in 1 bit whether to set deceleration.

Value	Meaning
0	Deceleration is not specified.
1	Deceleration is specified.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Valid when axis designation flag is 1.

uu : Specify the arch motion axis in bit pattern using upper 8 bits.
Specified arch axis is one axis only.

ssss : Specify the speed in 16 bits.

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

rrrr : Specify the acceleration and deceleration in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVEI command with linear interpolation as shown at right, when moving all axes of the Robot 1 the distance specified by point number 100 at a speed of 200 mm/s and at 50% acceleration, and with the current position being output in millimeters.

Address	Value
n	0x000A
n + 2	0x8026
n + 4	0x0000
n + 6	0x00C8
n + 8	0x0064
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0032
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 5.000

Axis 4 = 9.023

Other axes = 0.000

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0x233F
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Direct PTP designation (millimeter units)

This command moves the robot a specified distance in PTP motion by directly specifying the data in millimeters.

NOTE
- If the MOVEI command is interrupted and then re-executed, the resumed motion that occurs either to the original target position or to a new target position referenced to the current position can be selected by the "MOVEI/DRIVEI start position" setting of controller parameters.
- The other parameters default "MOVEI/DRIVEI start position" setting is Keep (motion to the original target position when MOVEI is interrupted and then re-executed).

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR00E
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Axis designation flag	a
		bit 2 – bit 1	Speed designation flag	bb
		bit 4 – bit 3	Hand system	cc
		bit 13 – bit 5	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Axis-1 data			0xpppppppp
n + 10				
n + 12	Axis-2 data			0xpppppppp
n + 14				
n + 16	Axis-3 data			0xpppppppp
n + 18				
n + 20	Axis-4 data			0xpppppppp
n + 22				
n + 24	Axis-5 data			0xpppppppp
n + 26				
n + 28	Axis-6 data			0xpppppppp
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : Specify in 1 bit whether all axes are designated.

Value	Meaning
0	All axes are specified.
1	One or more axes are specified.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

cc : Specify the hand system in 2 bits.
Only for SCARA robot settings in millimeters.

Value	Meaning
01	Specifies a right-handed system.
10	Specifies a left-handed system.
Other	No hand system is specified.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Valid when axis designation flag is 1.

ssss : Specify the speed in 16 bits.

pppppppp : Specify the target movement distance data for each axis in 32 bits. (little endian)
Data should be integers (x1000) in millimeter units.

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVEI command with direct PTP designation (millimeter units) as shown at right, when moving all axes of the Robot 1 a distance specified by the following points from "0.000" mm positions at 50% speed, and with the current position being output in millimeters.

Axis 1 = 10.000

Axis 2 = -20.000

Axis 3 = 5.000

Axis 4 = -18.000

Other axes = 0.000

Address	Value
n	0x000E
n + 2	0x8004
n + 4	0x0000
n + 6	0x0032
n + 8	0x2710
n + 10	0x0000
n + 12	0xB1E0
n + 14	0xFFFF
n + 16	0x1388
n + 18	0x0000
n + 20	0xB9B0
n + 22	0xFFFF
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 5.000

Axis 4 = 9.023

Other axes = 0.000

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x2710
m + 10	0x0000
m + 12	0xB1E0
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0xB9B0
m + 22	0xFFFF
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Direct PTP designation (pulse units)

This command moves the robot a specified distance in PTP motion by directly specifying the data in pulses.

NOTE

- If the MOVEI command is interrupted and then re-executed, the resumed motion that occurs either to the original target position or to a new target position referenced to the current position can be selected by the "MOVEI/DRIVEI start position" setting of controller parameters.
- The other parameters default "MOVEI/DRIVEI start position" setting is Keep (motion to the original target position when MOVEI is interrupted and then re-executed).

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR00F
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Axis designation flag	a
		bit 2 – bit 1	Speed designation flag	bb
		bit 13 – bit 3	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Axis-1 data			0xpppppppp
n + 10				
n + 12	Axis-2 data			0xpppppppp
n + 14				
n + 16	Axis-3 data			0xpppppppp
n + 18				
n + 20	Axis-4 data			0xpppppppp
n + 22				
n + 24	Axis-5 data			0xpppppppp
n + 26				
n + 28	Axis-6 data			0xpppppppp
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : Specify in 1 bit whether all axes are designated.

Value	Meaning
0	All axes are specified.
1	One or more axes are specified.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Valid when axis designation flag is 1.

ssss : Specify the speed in 16 bits.

pppppppp : Specify the target movement distance data for each axis in 32 bits. (little endian)
Data should be integers in pulse units.

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVEI command with direct PTP designation (pulse units) as shown at right, when moving all axes of the Robot 1 a distance specified by the following points from "0" pulse positions at 50% speed, and with the current position being output.

Axis 1 = 100000

Axis 2 = -200000

Axis 3 = 50000

Axis 4 = -180000

Other axes = 0

Address	Value
n	0x000F
n + 2	0x4004
n + 4	0x0000
n + 6	0x0032
n + 8	0x86A0
n + 10	0x0001
n + 12	0xF2C0
n + 14	0xFFFC
n + 16	0xC350
n + 18	0x0000
n + 20	0x40E0
n + 22	0xFFFD
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x86A0
m + 10	0x0001
m + 12	0xF2C0
m + 14	0xFFFC
m + 16	0xC350
m + 18	0x0000
m + 20	0x40E0
m + 22	0xFFFD
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.2.3 DRIVE command

Execute this command group to move the specified axis of the robot to an absolute position. Valid only for a single axis.

● Point designation

This command moves the specified axis of the robot to a target position in PTP motion by specifying the point number.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR010
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(1:Fixed)	1
		bit 2 – bit 1	Speed designation flag	bb
		bit 13 – bit 3	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Point number			0xpppp
n + 10	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Only one axis can be specified.

ssss : Specify the movement speed in 16 bits.

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the DRIVE command with point designation as shown at right, to move axis 3 of the Robot 1 to point number 100 at 50% speed and with the current position being output in pulses units.

Address	Value
n	0x0010
n + 2	0x4005
n + 4	0x0004
n + 6	0x0032
n + 8	0x0064
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 123456

Axis 2 = -123

Other axes = 0

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0xE240
m + 10	0x0001
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Direct designation (millimeter units)

This command moves the specified axis of the robot to a target position in PTP motion by directly specifying the data in millimeters.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR012
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(1: Fixed)	1
		bit 2 – bit 1	Speed designation flag	bb
		bit 13 – bit 3	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Movement data			0xpppppppp
n + 10				
n + 12	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Only one axis can be specified.

ssss : Specify the movement speed in 16 bits.

pppppppp : Specify target position data for specified axis in 32 bits. (little endian)
Data should be integers (x 1000) in millimeter units.

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the DRIVE command with direct designation (millimeter units) as shown at right, to move axis 3 of the Robot 1 to a position of "5.000" mm at 50% speed, and with the current position being output in millimeters.

Address	Value
n	0x0012
n + 2	0x8005
n + 4	0x0004
n + 6	0x0032
n + 8	0x1388
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 10.000

Axis 2 = -20.000

Axis 3 = 5.000

Axis 4 = -18.000

Other axes = 0.000

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x2710
m + 10	0x0000
m + 12	0xB1E0
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0xB9B0
m + 22	0xFFFF
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Direct designation (pulse units)

This command moves the specified axis of the robot to a target position in PTP motion by directly specifying the data in pulses.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR013
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(1: Fixed)	1
		bit 2 – bit 1	Speed designation flag	bb
		bit 13 – bit 3	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Movement data			0xpppppppp
n + 10				
n + 12	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Only one axis can be specified.

ssss : Specify the movement speed in 16 bits.

pppppppp : Specify the target position data for specified axis in 32 bits. (little endian)
Data should be integers in pulse units.

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the DRIVE command with direct designation (pulse units) as shown at right, to move axis 3 of the Robot 1 to a position of "5000" pulses at 50% speed, and with the current position being output in pulses.

Address	Value
n	0x0013
n + 2	0x4005
n + 4	0x0004
n + 6	0x0032
n + 8	0x1388
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 10000

Axis 2 = -20000

Axis 3 = 5000

Axis 4 = -18000

Other axes = 0

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x2710
m + 10	0x0000
m + 12	0xB1E0
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0xB9B0
m + 22	0xFFFF
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.2.4 DRIVEI command

Execute this command group to move the specified axis of the robot to a relative position. Valid only for a single axis.

● Point designation

This command moves the specified axis of the robot in PTP motion a distance by specifying the point number.

NOTE
- If the DRIVEI command is interrupted and then re-executed, the resumed motion that occurs either to the original target position or to a new target position referenced to the current position can be selected by the "MOVEI/DRIVEI start position" setting of controller parameters.
- The other parameters default "MOVEI/DRIVEI start position" setting is Keep (motion to the original target position when DRIVEI is interrupted and then re-executed).

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR014
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(1: Fixed)	1
		bit 2 – bit 1	Speed designation flag	bb
		bit 13 – bit 3	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Point number			0xpppp
n + 10	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Only one axis can be specified.

ssss : Specify the movement speed in 16 bits.

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the DRIVEI command with point designation as shown at right, to move axis 3 of the Robot 1 a distance specified by point number 100 at 50% speed, and with the current position being output in pulses.

Address	Value
n	0x0014
n + 2	0x4005
n + 4	0x0004
n + 6	0x0032
n + 8	0x0064
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 123456

Axis 2 = -123

Other axes = 0

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0xE240
m + 10	0x0001
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Direct designation (millimeter units)

This command moves the specified axis of the robot in PTP motion a distance by directly specifying the data in millimeters.

NOTE

- If the DRIVEI command is interrupted and then re-executed, the resumed motion that occurs either to the original target position or to a new target position referenced to the current position can be selected by the "MOVEI/DRIVEI start position" setting of controller parameters.
- The other parameters default "MOVEI/DRIVEI start position" setting is Keep (motion to the original target position when DRIVEI is interrupted and then re-executed).

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR016
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(1: Fixed)	1
		bit 2 – bit 1	Speed designation flag	bb
		bit 13 – bit 3	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Movement data			0xpppppppp
n + 10				
n + 12	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Only one axis can be specified.

ssss : Specify the speed in 16 bits.

pppppppp : Specify the target movement distance data for specified axis in 32 bits. (little endian)
Data should be integers (x1000) in millimeter units.

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the DRIVEI command with direct designation (millimeter units) as shown at right, to move axis 3 a distance equal to "5.000"mm from "0.000" mm position at 50% speed, and with the current position being output in millimeters.

Address	Value
n	0x0016
n + 2	0x8005
n + 4	0x0004
n + 6	0x0032
n + 8	0x1388
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 10.000

Axis 2 = -20.000

Axis 3 = 5.000

Axis 4 = -18.000

Other axes = 0.000

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x2710
m + 10	0x0000
m + 12	0xB1E0
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0xB9B0
m + 22	0xFFFF
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Direct designation (pulse units)

This command moves the specified axis of the robot in PTP motion a distance by directly specifying the data in pulses.

NOTE

- If the DRIVEI command is interrupted and then re-executed, the resumed motion that occurs either to the original target position or to a new target position referenced to the current position can be selected by the "MOVEI/DRIVEI start position" setting of other parameters. For details, refer to the controller user's manual.
- The other parameters default "MOVEI/DRIVEI start position" setting is Keep (motion to the original target position when DRIVEI is interrupted and then re-executed).

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR017
	Robot designation	bit 15 – bit 12	Robot number	
n + 1	Command flag	bit 0	(1: Fixed)	1
		bit 2 – bit 1	Speed designation flag	bb
		bit 13 – bit 3	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 2	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 3	Specified speed			0xssss
n + 8	Movement data			0xpppppppp
n + 10				
n + 12	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Only one axis can be specified.

ssss : Specify the movement speed in 16 bits.

pppppppp : Specify the target movement distance data for specified axis in 32 bits. (little endian)
Data should be integers in pulse units.

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the DRIVEI command with direct designation (pulse units) as shown at right, to move axis 3 a distance equal to "5000" pulses from "0" pulse position at 50% speed, and with the current position being output in pulses.

Address	Value
n	0x0017
n + 2	0x4005
n + 4	0x0004
n + 6	0x0032
n + 8	0x1388
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 10000

Axis 2 = -20000

Axis 3 = 5000

Axis 4 = -18000

Other axes = 0

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x2710
m + 10	0x0000
m + 12	0xB1E0
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0xB9B0
m + 22	0xFFFF
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.2.5 Pallet movement command

Execute this command group to move the robot to work positions on a pallet.

● PTP designation

This command moves the robot to a target position in PTP motion by specifying the pallet number and work position number.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR018
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(0: Fixed)	0
		bit 2 – bit 1	Speed designation flag	bb
		bit 4 – bit 3	(0: Fixed)	0
		bit 5	Acceleration designation flag	d
		bit 6	Deceleration designation flag	e
		bit 13 – bit 7	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Not used			0x0000
n + 6	Specified speed			0xssss
n + 8	Pallet number			0xpppp
n + 10	Work position number			0xwwww
n + 12	Not used			0x0000
to				
n + 18				
n + 20	Acceleration designation			0xrrrr
n + 22	Deceleration designation			0xrrrr
n + 24	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

d : Specify in 1 bit whether to set acceleration.

Value	Meaning
0	Acceleration is not specified.
1	Acceleration is specified.

e : Specify in 1 bit whether to set deceleration.

Value	Meaning
0	Deceleration is not specified.
1	Deceleration is specified.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

ssss : Specify the movement speed in 16 bits.

pppp : Specify the pallet number in 16 bits.
Specified range: 0 (=0x0000) to 39 (=0x0027)

wwww : Specify the work position number in 16 bits.
Specified range: 1 (=0x0001) to 32767 (=0x7FFF)

rrrr : Specify the acceleration and deceleration in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the PMOVE command with PTP designation as shown at right, when moving the Robot 1 to work position number 21 on pallet number 1 at 70% speed, and with the current position being output in millimeters.

Address	Value
n	0x0018
n + 2	0x8004
n + 4	0x0000
n + 6	0x0046
n + 8	0x0001
n + 10	0x0015
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 2.000

Other axes = 0.000

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x07D0
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Arch designation

This command moves the robot to a target position in arch motion by specifying the pallet number, work position number, arch axis and arch data.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR019
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(0: Fixed)	0
		bit 2 – bit 1	Speed designation flag	bb
		bit 3	(0: Fixed)	0
		bit 4	Arch data unit flag	d
		bit 13 – bit 5	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Arch designation axis	bit 7 – bit 0	(0: Fixed)	0xuu00
		bit 8	Axis 1	
		bit 9	Axis 2	
		bit 10	Axis 3	
		bit 11	Axis 4	
		bit 12	Axis 5	
		bit 13	Axis 6	
		bit 15 – bit 14	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Pallet number			0xpppp
n + 10	Work position number			0xwwww
n + 12	Not used			0x0000
n + 14				
n + 16	Arch position data			0xqqqqqqqq
n + 18				
n + 20	Arch start position data			0xqqqqqqqq
n + 22				
n + 24	Arch end position data			0xqqqqqqqq
n + 26				
n + 28	Not used			0x0000
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

d : Specify the arch data units in 1 bit.

Value	Meaning
0	Pulse units
1	Millimeter units

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

uu : Specify the arch motion axis in bit pattern using upper 8 bits.
Specified arch axis is one axis only.

ssss : Specify the speed in 16 bits.

pppp : Specify the pallet number in 16 bits.
Specified range: 0 (=0x0000) to 39 (=0x0027)

wwww : Specify the work position number in 16 bits.
Specified range: 1 (=0x0001) to 32767 (=0x7FFF)

qqqqqqqq : Specify the arch position data and the arch start or end position data in 32 bits. (little endian)
Data should be integers when units are in pulses.
Data should be integers (x1000) when units are in millimeters.

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the PMOVE command with arch designation as shown at right, when moving the Robot 1 to work position number 32 on pallet number 10 at 70% speed by way of a Z-axis arch position of 1.000mm, and with the current position being output in millimeters.

Address	Value
	0x0019
	0x8014
	0x0400
	0x0046
	0x000A
	0x0020
	0x0000
	0x0000
	0x03E8
	0x0000
	0x0000
	0x0000
	0x0000
	0x0000
	0x0000
	0x0000

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 5.000

Axis 4 = 9.023

Other axes = 0.000

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0x233F
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.2.6 Jog movement command

● Pulse unit system jog movement

Execute this command to move the robot in jog mode. It performs PTP movement in axis units.
The movement speed is determined by the manual movement speed.

To stop the jog command, set the dedicated input of the stop signal (SI06) to OFF.
Abnormal end status (0x4000) appears as the status code and the alarm code indicates that the robot has stopped by the stop input (m + 2: 0x000C, m + 4: 0x0190).
After confirming that movement has stopped, set the dedicated input of the interlock signal to ON.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR020
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 13 – bit 0	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Axis to move and direction	bit 0	Axis 1	tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 6	(0: Fixed)	0
		bit 7	Direction	d
		bit 15 – bit 8	(0: Fixed)	0
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in 0 to 5 bits.
Only one axis can be specified.

d : Specify the movement direction in 1 bit.

Value	Meaning
0	+ direction
1	– direction

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end (When jog movement is stopped by a stop input)

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0x000C
m + 4	Alarm category number	0x0190
m + 6	Not used	0x0000
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end (other cases)

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the pulse unit system jog command as shown at right, to move axis 1 of the Robot 1 in the minus (-) direction, and with the current position being output in pulses.

Address	Value
n	0x0020
n + 2	0x4000
n + 4	0x0081
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right, after robot movement with the jog command is stopped by the stop signal with:

Axis 1 = 12345

Axis 2 = -123

Axis 3 = 2000

Other axes = 0

Address	Value
m	0x4000
m + 2	0x000C
m + 4	0x0190
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x07D0
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Cartesian coordinate system jog movement

Execute this command to move the robot in jog mode. It performs linear interpolation movement of Cartesian coordinates. The movement speed is determined by the manual movement speed.

To stop the jog command, set the dedicated input of the stop signal (SI06) to OFF.
Abnormal end status (0x4000) appears as the status code and the alarm code indicates that the robot has stopped by the stop input (m + 2: 0x000C, m + 4: 0x0190).
After confirming that movement has stopped, set the dedicated input of the interlock signal to ON.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR021
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 13 – bit 0	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Axis to move and direction	bit 0	Axis 1	tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 6	(0: Fixed)	0
		bit 7	Direction	d
		bit 15 – bit 8	(0: Fixed)	0
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in 0 to 5 bits.
Only one axis can be specified.

d : Specify the movement direction in 1 bit.

Value	Meaning
0	+ direction
1	– direction

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end (When jog movement is stopped by a stop input)

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0x000C
m + 4	Alarm category number	0x0190
m + 6	Not used	0x0000
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end (other cases)

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the Cartesian coordinate system jog movement as shown at right, to move axis 1 of the Robot 1 in the minus (-) direction, and with the current position being output in millimeters.

Address	Value
n	0x0021
n + 2	0x8000
n + 4	0x0081
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right, after robot movement with the jog command is stopped by the stop signal with:

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 2.000

Other axes = 0.000

Address	Value
m	0x4000
m + 2	0x000C
m + 4	0x0190
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x07D0
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Tool coordinate system jog movement

Execute this command to move the robot in jog mode. It performs linear interpolation movement of the tool coordinate system's Cartesian coordinates.
The movement speed is determined by the manual movement speed.

To stop the jog command, set the dedicated input of the stop signal (SI06) to OFF.
Abnormal end status (0x4000) appears as the status code and the alarm code indicates that the robot has stopped by the stop input (m + 2: 0x000C, m + 4: 0x0190).
After confirming that movement has stopped, set the dedicated input of the interlock signal to ON.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR022
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 13 – bit 0	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Axis to move and direction	bit 0	Axis 1	tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 6	(0: Fixed)	0
		bit 7	Direction	d
		bit 15 – bit 8	(0: Fixed)	0
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in 0 to 5 bits.
Only one axis can be specified.

d : Specify the movement direction in 1 bit.

Value	Meaning
0	+ direction
1	– direction

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end (When jog movement is stopped by a stop input)

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0x000C
m + 4	Alarm category number	0x0190
m + 6	Not used	0x0000
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end (other cases)

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the tool coordinate system jog movement as shown at right, to move axis 1 of the Robot 1 in the minus (-) direction, and with the current position being output in millimeters.

Address	Value
n	0x0022
n + 2	0x8000
n + 4	0x0081
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right, after robot movement with the jog command is stopped by the stop signal with:

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 2.000

Other axes = 0.000

Address	Value
m	0x4000
m + 2	0x000C
m + 4	0x0190
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x07D0
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.2.7 Inching movement command

● Pulse unit system inching movement

Execute this command to move the robot by inching.
Inching movement distance is determined by the inching amount setting command.
It performs movement according to the pulse amount specified for the movement axis.
A movement amount setting of "100" results in a movement amount of 100 pulses.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR024
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 13 – bit 0	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Axis to move and direction	bit 0	Axis 1	tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 6	(0: Fixed)	0
		bit 7	Direction	d
		bit 15 – bit 8	(0: Fixed)	0
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in 0 to 5 bits.
Only one axis can be specified.

d : Specify the movement direction in 1 bit.

Value	Meaning
0	+ direction
1	- direction

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the pulse unit system inching command as shown at right, to move axis 2 of the Robot 1 in the plus (+) direction, and with the current position being output in pulses. An inching amount setting of "50" results in a movement amount of 50 pulses.

Address	Value
n	0x0024
n + 2	0x4000
n + 4	0x0002
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right, after executing the pulse unit system inching command and then stopping point movement with:

Axis 1 = 12345

Axis 2 = -123

Axis 3 = 2000

Other axes = 0

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x07D0
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Cartesian coordinate system inching movement

Execute this command to move the robot by inching. Inching movement distance is determined by the inching amount setting command.
It performs linear interpolation movement in accordance with the specified movement amount, using Cartesian coordinates.
A movement amount setting of "100" results in a movement amount of 0.1mm.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR025
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 13 – bit 0	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Axis to move and direction	bit 0	Axis 1	tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 6	(0: Fixed)	0
		bit 7	Direction	d
		bit 15 – bit 8	(0: Fixed)	0
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in 0 to 5 bits.
Only one axis can be specified.

d : Specify the movement direction in 1 bit.

Value	Meaning
0	+ direction
1	- direction

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the Cartesian coordinate system inching command as shown at right, to move axis 2 of the Robot 1 in the plus (+) direction, and with the current position being output in millimeters. An inching amount setting of "50" results in a movement amount of 0.050mm.

Address	Value
n	0x0025
n + 2	0x8000
n + 4	0x0002
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right, after executing the Cartesian coordinate system inching command and then stopping point movement with:

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 2.000

Other axes = 0.000

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x07D0
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Tool coordinate system inching movement

Execute this command to move the robot by inching.
Inching movement distance is determined by the inching amount setting command.
It performs linear interpolation movement in accordance to the movement amount specified for the movement axis, using the tool coordinate system's Cartesian coordinates.
A movement amount setting of "100" results in a movement amount of 0.1mm.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR026
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 13 – bit 0	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Axis to move and direction	bit 0	Axis 1	tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 6	(0: Fixed)	0
		bit 7	Direction	d
		bit 15 – bit 8	(0: Fixed)	0
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in 0 to 5 bits.
Only one axis can be specified.

d : Specify the movement direction in 1 bit.

Value	Meaning
0	+ direction
1	- direction

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the tool coordinate system inching command as shown at right, to move axis 2 of the Robot 1 in the plus (+) direction, and with the current position being output in millimeters. An inching amount setting of "50" results in a movement amount of 0.050mm.

Address	Value
n	0x0026
n + 2	0x8000
n + 4	0x0002
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right, after executing the tool coordinate system inching command and then stopping point movement with:

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 2.000

Other axes = 0.000

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x07D0
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.2.8 Inching movement amount setting command

This command sets the movement amount for inching movement operations.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR027
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Inching movement amount			0xdddd
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

dddd : Sets the movement amount. 1 (=0x0001) to 10000 (=0x2710)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the inching movement amount setting command to specify an inching movement amount of "100" for the Robot 1.

Address	Value
n	0x0027
n + 2	0x0000
n + 4	0x0064
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.9 Point teaching command

Execute this command to teach the current robot position to the specified point number.
Point data units of this command are linked to the controller's point display unit.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR028
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Point number			0xpppp
n + 6	Point unit			0xaaaa
n + 8	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

pppp : Specify the point number in 16 bits.
Specified range: 0 (= 0x0000) to 29999 (=0x752F)

aaaa : Specifies the point unit system.

Value	Meaning
0	Pulse units
1	Millimeter units

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the point teaching command as shown at right, to teach the Robot 1 current position to point number 4000 in pulse units.

Address	Value
n	0x0028
n + 2	0x0000
n + 4	0x0FA0
n + 6	0x0000
n + 8	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.10 Absolute reset movement command

When absolute reset of the specified axis uses the mark method, this command moves the axis to the nearest position where absolute reset can be executed. Positions capable of absolute reset are located at every 1/4 rotation of the motor.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR030
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Specified axis to move	bit 0	Axis 1	tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 6	(0: Fixed)	0
		bit 7	Direction	d
		bit 15–bit 8	(0: Fixed)	0
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

tt : Specify the axis to perform the return-to-origin in 0 to 5 bits.
Only one axis can be specified.

d : Specify the movement direction in 1 bit.

Value	Meaning
0	+ direction
1	- direction

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the absolute reset movement command as shown at right to move Axis 2 of the Robot 1 in the minus (-) direction to a position capable of absolute reset.

Address	Value
n	0x0030
n + 2	0x0000
n + 4	0x0082
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
	0x0200
	0x0000
4	0x0000
6	0x0000
	0x0000

4.2.11 Absolute reset command

Execute this command to perform absolute reset at a mark type axis. The specified axis must be at a position where an absolute reset is possible. This command can be used only for a mark type axis.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR031
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

tt : Specify the axis to perform absolute reset in 0 to 5 bits.
Only one axis can be specified.
An error occurs if no axis has been specified.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to perform absolute reset on axis 2 of the Robot 1.

Address	Value
n	0x0031
n + 2	0x0000
n + 4	0x0002
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.12 Return-to-origin command

● Return-to-origin in robot units

This command executes return-to-origin in robot units.
When this command is executed on an incremental and absolute type axes, the axis moves to its origin.
When executed on a semi-absolute type axis, an absolute search is performed on that axis.
If no particular robot has been specified, a return-to-origin will be performed at all robots.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR032
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(0: Fixed)	0
		bit 1	Incremental type axis designation flag	a
		bit 2	Absolute type axis designation flag	b
		bit 3	"Return-to-origin incomplete" axis designation flag	c
		bit 15 – bit 4	(0: Fixed)	0
n + 4	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If no particular robot number has been specified (=0), the operation is performed at all robots.

a, b, c : Specifies the details (in 1 bit) of the axis performed the return-to-origin.

Value	Meaning
0	Details absent
1	Details present

* Only one designation can be enabled. If no details at all a, b, c value, a return-to-origin will be performed at all axes.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaabb
m + 4	Alarm category number	0xccdd
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to perform return-to-origin on all axes of the Robot 1.

Address	Value
n	0x0032
n + 2	0x0000
n + 4	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

● Return-to-origin in axis units

This command executes return-to-origin in axis units.
When this command is executed on an incremental and absolute type axes, the axis moves to its origin.
When executed on a semi-absolute mode axis, an absolute search is performed on that axis.
If no particular robot is specified, a return-to-origin will be performed at the specified axis of Robot 1.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR033
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

tt : Specify the axis to perform the return-to-origin in 0 to 5 bits.
Only one axis can be specified.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaabb
m + 4	Alarm category number	0xccdd
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to perform return-to-origin on axis 1 of the Robot 1.

Address	Value
n	0x0033
n + 2	0x0000
n + 4	0x0001
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.13 Servo command

Execute this command group to operate the robot servo status.

Servo ON :

Execute this command to turn the servo on at a specified axis. All the robot servos are turned on if no axis is specified.

Servo OFF :

Execute this command to turn the servo off at a specified axis. All the robot servos are turned off if no axis is specified.

Servo Free :

Execute this command to turn off the mechanical brake and dynamic brake after turning off the servo of a specified axis. All the robot servos are turned free if no axis is specified.

■ Command

Address	Contents				Value
n	Command code	Servo ON	bit 11 – bit 0		0xR034
	Robot designation		bit 16 – bit 12	Robot number	
	Command code	Servo OFF	bit 11 – bit 0		0xR035
	Robot designation		bit 16 – bit 12	Robot number	
	Command code	Servo Free	bit 11 – bit 0		0xR036
	Robot designation		bit 16 – bit 12	Robot number	
n + 2	Not used				0x0000
n + 4	Specified axis	bit 0	Axis 1		0x00tt
		bit 1	Axis 2		
		bit 2	Axis 3		
		bit 3	Axis 4		
		bit 4	Axis 5		
		bit 5	Axis 6		
		bit 15 – bit 6	(0: Fixed)		
n + 6	Not used				0x0000
to					
n + 30					

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

tt : Specify the axis to occur servo control in 0 to 5 bits.
All axes are processed if no axis is specified.
Only one axis can be specified.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the servo command as shown at right, to free the servo status at axis 4 of the Robot 1.

Address	Value
n	0x0036
n + 2	0x0000
n + 4	0x0008
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.14 Manual movement speed change command

Execute this command to change the robot's manual movement speed.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR038
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Specified speed			0xssss
n + 6	Not used			0x0000
to				
n + 30				

ssss : Specify the manual movement speed in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the manual movement speed change command as shown at right, to set the manual movement speed of the Robot 1 to 20%.

Address	Value
n	0x0038
n + 2	0x0000
n + 4	0x0014
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.15 Automatic movement speed change command

Execute this command to change the robot's automatic movement speed.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR039
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Specified speed			0xssss
n + 6	Not used			0x0000
to				
n + 30				

ssss : Specify the automatic movement speed in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the automatic movement speed change command as shown at right, to set the automatic movement speed of the Robot 1 to 80%.

Address	Value
n	0x0039
n + 2	0x0000
n + 4	0x0050
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.16 Program movement speed change command

Execute this command to change the program movement speed.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR03A
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Specified speed			0xssss
n + 6	Not used			0x0000
to				
n + 30				

ssss : Specify the program speed in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the program movement speed change command as shown at right, to set the program movement speed for the Robot 1 to 80%.

Address	Value
n	0x003A
n + 2	0x0000
n + 4	0x0050
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.17 Shift designation change command

Execute this command to change the selected shift to a specified shift number.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR03B
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Specified shift number			0xssss
n + 6	Not used			0x0000
to				
n + 30				

ssss : Specify the shift number in 16 bits.
Specified range: 0 (=0x0000) to 39 (=0x0027)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the shift designation change command as shown at right, to set the shift number of the Robot 1 to shift 4.

Address	Value
n	0x003B
n + 2	0x0000
n + 4	0x0004
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.18 Hand designation change command

Execute this command to change the selected hand to a specified hand number.

Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR03C
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Specified hand number			0xssss
n + 6	Not used			0x0000
to				
n + 30				

ssss : Specify the hand number in 16 bits.
Specified range: 0 (=0x0000) to 31 (=0x001F)

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the hand designation change command as shown at right, to set the hand number of the Robot 1 to hand 1.

Address	Value
n	0x003C
n + 2	0x0000
n + 4	0x0001
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.19 Arm designation change command

Execute this command to change the arm designation status. This command is valid only when SCARA robot is specified.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR03D
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Status of specified arm			0xssss
n + 6	Not used			0x0000
to				
n + 30				

ssss : Specify the arm designation status in 16 bits.

Value	Meaning
0x0000	Right-handed system
0x0001	Left-handed system

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the arm designation change command as shown at right, to set the arm designation status of the Robot 1 to the right-handed system.

Address	Value
n	0x003D
n + 2	0x0000
n + 4	0x0000
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.20 Motor power command

Execute this command to turn the motor power ON and OFF. All the system servos are also turned ON and OFF at this time. Axis designations are not possible with this command.

■ Command

Address	Contents			Value
n	Command code	OFF	bit 15 – bit 0	0x0041
	Command code	ON	bit 15 – bit 0	0x0042
	Command code	PWR	bit 15 – bit 0	0x0043
n + 2	Not used			0x0000
to				
n + 30				

OFF : Turns the motor power OFF. All system servos are also turned OFF at this time, and the dynamic brake is applied and locked at axes which are equipped with a brake.

ON : Turns the motor power ON. All system servos are also turned ON at this time.

PWR : Turns only the motor power ON.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the motor power command to turn the system power and the servos ON.

Address	Value
n	0x0042
n + 2	0x0000
n + 4	0x0000
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.21 MOVET movement command

Execute this command group to allow the robot to move to an absolute position in the tool coordinates.

● PTP point designation

This command designates a point number which allows the robot to perform PTP movement to a target position in the tool coordinates.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR044
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Axis designation flag	a
		bit 2 – bit 1	Speed designation flag	bb
		bit 4 – bit 3	(0: Fixed)	0
		bit 5	Acceleration designation flag	d
		bit 6	Deceleration designation flag	e
		bit 13 – bit 7	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Point number			0xpppp
n + 10	Not used			0x0000
to				
n + 18				
n + 20	Acceleration designation			0xrrrr
n + 22	Deceleration designation			0xrrrr
n + 24	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : Specify in 1 bit whether all axes are designated.

Value	Meaning
0	All axes are specified.
1	One or more axes are specified.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

d : Specify in 1 bit whether to set acceleration.

Value	Meaning
0	Acceleration is not specified.
1	Acceleration is specified.

e : Specifies in 1 bit whether to set deceleration.

Value	Meaning
0	Deceleration is not specified.
1	Deceleration is specified.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Valid when axis designation flag is 1.

ssss : Specify the movement speed in 16 bits.

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

rrrr : Specify the acceleration and deceleration in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVET command with PTP designation as shown at right, when moving all the axes of the Robot 1 to point number 100 at 50% speed, and with the current position being output in pulses.

Address	Value
n	0x0044
n + 2	0x4004
n + 4	0x0000
n + 6	0x0032
n + 8	0x0064
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 123456

Axis 2 = -123

Other axes = 0

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0xE240
m + 10	0x0001
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Linear interpolation

This command designates a point number which allows the robot to perform linear interpolation movement to a target position in the tool coordinates.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR045
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Axis designation flag	a
		bit 2 – bit 1	Speed designation flag	bb
		bit 4 – bit 3	(0: Fixed)	0
		bit 5	Acceleration designation flag	d
		bit 6	Deceleration designation flag	e
		bit 13 – bit 7	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Point number			0xpppp
n + 10	Not used			0x0000
to				
n + 18				
n + 20	Acceleration designation			0xrrrr
n + 22	Deceleration designation			0xrrrr
n + 24	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : Specify in 1 bit whether all axes are designated.

Value	Meaning
0	All axes are specified.
1	One or more axes are specified.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100
11	Speed is specified in mm/s.	For SCARA robots: 1 to 1000 For all other robots: 1 to 750

d : Specify in 1 bit whether to set acceleration.

Value	Meaning
0	Acceleration is not specified.
1	Acceleration is specified.

e : Specifies in 1 bit whether to set deceleration.

Value	Meaning
0	Deceleration is not specified.
1	Deceleration is specified.

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Specify the axis to move in bit pattern using lower 8 bits.
Valid when axis designation flag is 1.

ssss : Specify the movement speed in 16 bits.

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

rrrr : Specify the acceleration and deceleration in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the MOVET command with linear interpolation as shown at right, when moving all axes of the Robot 1 to point number 100 at a speed of 200 mm/s and at 50% acceleration, and with the current position being output in millimeters.

Address	Value
n	0x0045
n + 2	0x8026
n + 4	0x0000
n + 6	0x00C8
n + 8	0x0064
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0032
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 5.000

Axis 4 = 9.023

Other axes = 0.000

Values are expressed as shown at right.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0x233F
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.2.22 Torque control command information

● Max. torque command value change command

This command changes the maximum torque command value at a specified axis. The changed torque becomes effective at the next movement command (MOVE or DRIVE, etc.). The parameter value is not changed by this command.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR048
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Torque designation axis	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Designated torque			0xdddd
n + 8	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

tt : Specifies (by lower 8 bits) the axis where the torque value is to be changed.
Only one axis can be specified.

dddd : Specifies (by 16 bits) the designated torque value.
Specified range: 1 (=0x0001) to 100 (=0x0064)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the max. torque command value change command to change the max. torque command value for Axis 1 of the Robot 1 to 50%.

Address	Value
n	0x0048
n + 2	0x0000
n + 4	0x0001
n + 6	0x0032
n + 8	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.2.23 PUSH operation command

Execute this command group to perform a push operation at the specified robot axis.
This command can only be executed for one axis.

● Point designation

This command designates a point number which allows the specified robot axis to perform a PTP operation to a target position.

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR04B
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(1: Fixed)	1
		bit 2 – bit 1	Speed designation flag	bb
		bit 6 – bit 3	(0: Fixed)	0
		bit 7	Push force designation flag	h
		bit 8	Push time-period designation flag	i
		bit 13 – bit 9	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Point number			0xpppp
n + 10	Not used			0x0000
to				
n + 14				
n + 16	Push force designation			0xffff
n + 18	Push time-period designation			0xjjjj
n + 20	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

h : Enables/disables (by 1 bit) the push force designation.

Value	Meaning
0	Push force designation absent
1	Push force designation present

i : Enables/disables (by 1 bit) the push time-period designation.

Value	Meaning
0	Push time-period designation absent
1	Push time-period designation present

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Designates (by lower 8 bits) the axis to be moved.
Valid when axis designation flag is 1.

ssss : Specify the movement speed in 16 bits.

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

ffff : Designates (by 16 bits) the push force (units: %).
Specified range: -1000 (=0xFC18) to 1000 (=0x03E8)
* A value within the rated torque range of -1000% to 1000% can be specified.

jjjj : Designates (by 16 bits) the push time-period (units: ms).
Specified range: 1 (=0x0001) to 32767 (=0x7FFF)

Status

Normal end

Address	Contents			Value
m	Status code			0x0200
m + 2	Not used			0x0000
m + 4				
m + 6	PUSH command completion conditions	bit 0	Push completion result	p
		bit 15 – bit 1	(0: Fixed)	0
m + 8	Axis-1 data			0xbbbbbbbb
m + 10				
m + 12	Axis-2 data			0xbbbbbbbb
m + 14				
m + 16	Axis-3 data			0xbbbbbbbb
m + 18				
m + 20	Axis-4 data			0xbbbbbbbb
m + 22				
m + 24	Axis-5 data			0xbbbbbbbb
m + 26				
m + 28	Axis-6 data			0xbbbbbbbb
m + 30				

p : Indicates the push completion result.
0: Push ended in a status other than time-out.
1: Push completed at time-out (push completed).

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the PUSH operation command to move Axis 3 of the Robot 1 to point 100 at 50% speed with a push force of 100, a push time-period of 100, and with the current position being output in millimeters.

Address	Value
n	0x004B
n + 2	0x8185
n + 4	0x0004
n + 6	0x0032
n + 8	0x0064
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0032
n + 18	0x0032
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when the push operation ends normally at time-out, with the axis current positions as follows:

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 2.000

Other axes = 0.000

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0001
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x07D0
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Direct designation (millimeter units)

This command moves the specified axis of the robot to a target position in PTP motion by directly specifying the data in millimeters.

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR04C
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(1: Fixed)	1
		bit 2 – bit 1	Speed designation flag	bb
		bit 6 – bit 3	(0: Fixed)	0
		bit 7	Push force designation flag	h
		bit 8	Push time-period designation flag	i
		bit 13 – bit 9	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Movement data			0xpppppppp
n + 10				
n + 12	Not used			0x0000
n + 14				
n + 16	Push force designation			0xffff
n + 18	Push time-period designation			0xjjjj
n + 20	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

h : Enables/disables (by 1 bit) the push force designation.

Value	Meaning
0	Push force designation absent
1	Push force designation present

i : Enables/disables (by 1 bit) the push time-period designation.

Value	Meaning
0	Push time-period designation absent
1	Push time-period designation present

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Designates (by lower 8 bits) the axis to be moved.
Valid when axis designation flag is 1.

ssss : Specify the movement speed in 16 bits.

pppppppp : Specify the target movement distance data for each axis in 32 bits. (little endian)
Data should be integers (x 1000) in millimeter units.

ffff : Designates (by 16 bits) the push force (units: %).
Specified range: -1000 (=0xFC18) to 1000 (=0x03E8)
* A value within the rated torque range of -1000% to 1000% can be specified.

jjjj : Designates (by 16 bits) the push time-period (units: ms).
Specified range: 1 (=0x0001) to 32767 (=0x7FFF)

Status

Normal end

Address	Contents			Value
m	Status code			0x0200
m + 2	Not used			0x0000
m + 4				
m + 6	PUSH command completion conditions	bit 0	Push completion result	p
		bit 15 – bit 1	(0: Fixed)	0
m + 8	Axis-1 data			0xbbbbbbbb
m + 10				
m + 12	Axis-2 data			0xbbbbbbbb
m + 14				
m + 16	Axis-3 data			0xbbbbbbbb
m + 18				
m + 20	Axis-4 data			0xbbbbbbbb
m + 22				
m + 24	Axis-5 data			0xbbbbbbbb
m + 26				
m + 28	Axis-6 data			0xbbbbbbbb
m + 30				

p : Indicates the push completion result.
0: Push ended in a status other than time-out.
1: Push completed at time-out (push completed).

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the PUSH operation command as shown at right, to move Axis 3 of the Robot 1 to position 100.00 at 50% speed with a push force of 100, a push time-period of 100, and with the current position being output in millimeters.

Address	Value
n	0x004C
n + 2	0x8185
n + 4	0x0004
n + 6	0x0032
n + 8	0x2710
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0032
n + 18	0x0032
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when the push operation ends normally at time-out, with the axis current positions as follows:

Axis 1 = 12.345

Axis 2 = -0.123

Axis 3 = 9.000

Other axes = 0.000

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0001
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x2328
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Direct designation (pulse units)

This command moves the specified axis of the robot to a target position in PTP motion by directly specifying the data in pulses.

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR04D
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	(1: Fixed)	1
		bit 2 – bit 1	Speed designation flag	bb
		bit 6 – bit 3	(0: Fixed)	0
		bit 7	Push force designation flag	h
		bit 8	Push time-period designation flag	i
		bit 13 – bit 9	(0: Fixed)	0
		bit 14	Current position output designation flag (Pulse units)	p
		bit 15	Current position output designation flag (Millimeter units)	m
n + 4	Specified axis to move	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Specified speed			0xssss
n + 8	Movement data			0xpppppppp
n + 10				
n + 12	Not used			0x0000
n + 14				
n + 16	Push force designation			0xffff
n + 18	Push time-period designation			0xjjjj
n + 20	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

bb : Specify the speed setting method in 2 bits.
When specifying the robot speed directly, the desired speed is entered as a percentage of the robot's max. speed. (The 0.01% to 100.00% setting is assigned by a setting value multiplied by 100.)

Value	Meaning	Reference range
00	Speed is not specified.	-
01	Direct speed is specified.	1 to 10000
10	Speed is set in %.	1 to 100

h : Enables/disables (by 1 bit) the push force designation.

Value	Meaning
0	Push force designation absent
1	Push force designation present

i : Enables/disables (by 1 bit) the push time-period designation.

Value	Meaning
0	Push time-period designation absent
1	Push time-period designation present

p, m : Specify in 1 bit whether to output current position.

Value	Meaning
0	No output.
1	Output.

* The "pulse units" and "millimeter units" current position output designation flags cannot be designated at the same time. Doing so will result in the "4.2 Input format error".

tt : Designates (by lower 8 bits) the axis to be moved.
Valid when axis designation flag is 1.

ssss : Specify the movement speed in 16 bits.

pppppppp : Specify the target movement distance data for each axis in 32 bits. (little endian)
Data should be integers in pulse units.

ffff : Designates (by 16 bits) the push force (units: %).
Specified range: -1000 (=0xFC18) to 1000 (=0x03E8)
* A value within the rated torque range of -1000% to 1000% can be specified.

jjjj : Designates (by 16 bits) the push time-period (units: ms).
Specified range: 1 (=0x0001) to 32767 (=0x7FFF)

Status

Normal end

Address	Contents			Value
m	Status code			0x0200
m + 2	Not used			0x0000
m + 4				
m + 6	PUSH command completion conditions	bit 0	Push completion result	p
		bit 15 – bit 1	(0: Fixed)	0
m + 8	Axis-1 data			0xbbbbbbbb
m + 10				
m + 12	Axis-2 data			0xbbbbbbbb
m + 14				
m + 16	Axis-3 data			0xbbbbbbbb
m + 18				
m + 20	Axis-4 data			0xbbbbbbbb
m + 22				
m + 24	Axis-5 data			0xbbbbbbbb
m + 26				
m + 28	Axis-6 data			0xbbbbbbbb
m + 30				

p : Indicates the push completion result.
0: Push ended in a status other than time-out.
1: Push completed at time-out (push completed).

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers when point display units are in pulses.
Data is shown in integers (x1000) when point display units are in millimeters.
The point units system conforms to the unit system which has been specified for the current position output flag.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify the PUSH operation command as shown at right, to move Axis 3 of the Robot 1 to position 10000 at 50% speed with a push force of 100, a push time-period of 100, and with the current position being output in pulses.

Address	Value
n	0x004D
n + 2	0x4185
n + 4	0x0004
n + 6	0x0032
n + 8	0x2710
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0032
n + 18	0x0032
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when the push operation ends normally at time-out, with the axis current positions as follows:

Axis 1 = 12345

Axis 2 = -123

Axis 3 = 9000

Other axes = 0

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0001
m + 8	0x3039
m + 10	0x0000
m + 12	0xFF85
m + 14	0xFFFF
m + 16	0x2328
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.3 Category 2 remote commands

Category 2 remote commands are used to define or obtain point data.
A command list is given below.

No.	Command contents		Command code n
2-1	Point-related commands	Point data definition	0x0100
		Point data reference	0x0101
2-2	Point comment-related commands	Point comment data definition	0x0104
		Point comment data reference	0x0105
2-3	Pallet-related command	Pallet data definition	0x0108
		Pallet data reference	0x0109
2-4	Shift-related command	Shift data definition	0x010C
		Shift data reference	0x010D
2-5	Hand-related command	Hand data definition	0xR110
		Hand data reference	0xR111

4.3.1 Point-related command

Execute this command to define or obtain point data.

● Point data definition

This command defines point data by specifying the point number and position data on each axis.

■ Command

Address	Contents			Value
n	Command code			0x0100
n + 2	Command flag	bit 0	Point unit	u
		bit 2 – bit 1	Hand system	tt
		bit 15 – bit 3	(0: Fixed)	0
n + 4	Point number			0xssss
n + 6	Not used			0x0000
n + 8	Axis-1 data			0xbbbbbbbb
n + 10				
n + 12	Axis-2 data			0xbbbbbbbb
n + 14				
n + 16	Axis-3 data			0xbbbbbbbb
n + 18				
n + 20	Axis-4 data			0xbbbbbbbb
n + 22				
n + 24	Axis-5 data			0xbbbbbbbb
n + 26				
n + 28	Axis-6 data			0xbbbbbbbb
n + 30				

u : Specify the point data unit in 1 bit.

Value	Meaning
0	Pulse units
1	Millimeter units

tt : Specify in 2 bits the hand system to be defined.
Valid only when SCARA robot is specified and units are in millimeters.

Value	Meaning
01	Right-handed system is defined.
10	Left-handed system is defined.
Other	No hand system is defined.

ssss : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

bbbbbbbb : Specify the point data in 32 bits. (little endian)
Data should be integers when units are in pulses.
Data should be integers (x1000) when units are in millimeters.

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the point data definition command as shown at right, to create the following point data in pulse units.

Point number = 100

Axis 1 = 10000

Axis 2 = -20000

Axis 3 = 5000

Axis 4 = -18000

Other axes = 0

Address	Value
n	0x0100
n + 2	0x0000
n + 4	0x0064
n + 6	0x0000
n + 8	0x2710
n + 10	0x0000
n + 12	0xB1E0
n + 14	0xFFFF
n + 16	0x1388
n + 18	0x0000
n + 20	0xB9B0
n + 22	0xFFFF
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Point data reference

Use this command to find and obtain point data by specifying the point number.

■ Command

Address	Contents	Value
n	Command code	0x0101
n + 2	Not used	0x0000
n + 4	Point number	0xssss
n + 6	Not used	0x0000
to		
n + 30		

ssss : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

■ Status

Normal end

Address	Contents			Value
m	Status code			0x0200
m + 2	Not used			0x0000
m + 4	Point number			0xssss
m + 6	Point flag	bit 0	Point unit	u
		bit 2 – bit 1	Hand system	tt
		bit 15 – bit 3	(0: Fixed)	0
m + 8	Axis-1 data			0xbbbbbbbb
m + 10				
m + 12	Axis-2 data			0xbbbbbbbb
m + 14				
m + 16	Axis-3 data			0xbbbbbbbb
m + 18				
m + 20	Axis-4 data			0xbbbbbbbb
m + 22				
m + 24	Axis-5 data			0xbbbbbbbb
m + 26				
m + 28	Axis-6 data			0xbbbbbbbb
m + 30				

ssss : Shows the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

u : Shows the point data unit in 1 bit.

Value	Meaning
0	Pulse units
1	Millimeter units

tt : Shows in 2 bits the hand system to define point data.
Valid only when SCARA robot is specified and units are in millimeters.

Value	Meaning
00	No hand system is defined.
01	Right-handed system is defined.
10	Left-handed system is defined.

bbbbbbb : Shows the point data in 32 bits. (little endian)
Data is shown in integers when units are in pulses.
Data is shown in integers (x1000) when units are in millimeters.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the point data reference command as shown at right, to search and obtain point data at point number 50.

Address	Value
n	0x0101
n + 2	0x0000
n + 4	0x0032
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly to obtain the following point data.

Point number = 50

Axis 1 = 10.000

Axis 2 = -20.000

Axis 3 = 5.000

Axis 4 = -18.000

Other axes = 0.000

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0032
m + 6	0x0001
m + 8	0x2710
m + 10	0x0000
m + 12	0xB1E0
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0xB9B0
m + 22	0xFFFF
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.3.2 Point comment-related command

Execute this command to define or obtain point comment data.

● Point comment data definition

Use this command to define point comment data by specifying the point number and point comment data.

■ Command

Address	Contents	Value
n	Command code	0x0104
n + 2	Not used	0x0000
n + 4	Point number	0xssss
n + 6	Not used	0x0000
n + 8	Comment data	0xbbbb
n + 10		0xbbbb
n + 12		0xbbbb
n + 14		0xbbbb
n + 16		0xbbbb
n + 18		0xbbbb
n + 20		0xbbbb
n + 22		0xbbbb
n + 24	Not used	0x0000
to		
n + 30		

ssss : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

bb : Specify 1 byte comment data in 8 bits. (little endian)
Specified range: " "(=0x20) to "~ "(=0x7E)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the point comment data definition command as shown at right, to create the following point comment data.

Point number = 100

Comment data = "WAIT ORG"

(character code : "W" = 0x57
"A" = 0x41
" I " = 0x49
"T" = 0x54
" " = 0x20
"O" = 0x4F
"R" = 0x52
"G" = 0x47)

Address	Value
n	0x0104
n + 2	0x0000
n + 4	0x0064
n + 6	0x0000
n + 8	0x4157
n + 10	0x5449
n + 12	0x4F20
n + 14	0x4752
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Point comment data reference

Use this command to search and obtain point comment data by specifying the point number.

■ Command

Address	Contents	Value
n	Command code	0x0105
n + 2	Not used	0x0000
n + 4	Point number	0xssss
n + 6	Not used	0x0000
to		
n + 30		

ssss : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Point number	0xssss
m + 6	Not used	0x0000
m + 8	Comment data	0xbbbb
m + 10		0xbbbb
m + 12		0xbbbb
m + 14		0xbbbb
m + 16		0xbbbb
m + 18		0xbbbb
m + 20		0xbbbb
m + 22		0xbbbb
m + 24	Not used	0x0000
to		
m + 30		

ssss : Shows the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

bb : Shows the 1 byte comment data in 8 bits. (little endian)

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the point comment data reference command as shown at right, to obtain point comment data at point number 50.

Address	Value
n	0x0105
n + 2	0x0000
n + 4	0x0032
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly to obtain the following point data.

Point number = 50

Comment data = "WAIT ORG"

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0032
m + 6	0x0000
m + 8	0x4157
m + 10	0x5449
m + 12	0x4F20
m + 14	0x4752
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.3.3 Pallet-related command

Execute this command to define or obtain pallet data.

● Pallet data definition

This command defines the pallet data by specifying the pallet number, the number of pallets (Nx, Ny, Nz), and the first point number.

NOTE
Point data used for pallet movement is determined by the pallet number. Refer to the robot controller user's manual or robot programming manual for detailed information.

■ Command

Address	Contents	Value
n	Command code	0x0108
n + 2	Not used	0x0000
n + 4	Pallet number	0xssss
n + 6	Number of pallets in X direction (Nx)	0xaaaa
n + 8	Number of pallets in Y direction (Ny)	0xaaaa
n + 10	Number of pallets in Z direction (Nz)	0xaaaa
n + 12	First point number	0xpppp
n + 14	Not used	0x0000
to		
n + 30		

ssss : Specify the pallet number in 16 bits.
Pallet number specified range: 0 (=0x0000) to 39 (=0x0027)

aaaa : Specify the number of pallets (positive integer) in 16 bits.
Specified range: 0 (=0x0000) to 32767 (=0x7FFF)
The value of "Nx*Ny*Nz" should be within a 1 to 32767 range.

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29995 (=0x752B)
The pallet definition coordinate data is saved at the point data area for 5 points, beginning with the data for the specified point.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the pallet data definition command as shown at right, to create the following pallet.

Pallet number = 10
Nx = 10
Ny = 15
Nz = 1
First point number = 100

Address	Value
n	0x0108
n + 2	0x0000
n + 4	0x000A
n + 6	0x000A
n + 8	0x000F
n + 10	0x0001
n + 12	0x0064
n + 14	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
to	
m + 30	

● Pallet data reference

Use this command to obtain pallet data by specifying the pallet number.

■ Command

Address	Contents	Value
n	Command code	0x0109
n + 2	Not used	0x0000
n + 4	Pallet number	0xssss
n + 6	Not used	0x0000
to		
n + 30		

ssss : Specify the pallet number in 16 bits.
Specified range: 0 (=0x0000) to 39 (=0x0027)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Pallet number	0xssss
m + 6	Number of pallets in X direction (Nx)	0xaaaa
m + 8	Number of pallets in Y direction (Ny)	0xaaaa
m + 10	Number of pallets in Z direction (Nz)	0xaaaa
m + 12	First point number	0xpppp
m + 14	Not used	0x0000
to		
m + 30		

ssss : Shows the pallet number in 16 bits.
aaaa : Shows the number of pallets in 16 bits.
pppp : Indicates the first point number in 16 bits.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the pallet data reference command as shown at right, to obtain pallet data at pallet number 10.

Address	Value
n	0x0109
n + 2	0x0000
n + 4	0x000A
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly to obtain the following pallet data.

Pallet number = 10

Nx = 10

Ny = 15

Nz = 1

First point number = 100

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x000A
m + 6	0x000A
m + 8	0x000F
m + 10	0x0001
m + 12	0x0064
m + 14	0x0000
to	
m + 30	

4.3.4 Shift-related command

Execute this command to define or obtain shift data.

● Shift data definition

Use this command to define shift data by specifying the shift number and shift data.

■ Command

Address	Contents	Value
n	Command code	0x010C
n + 2	Not used	0x0000
n + 4	Shift number	0xssss
n + 6	Not used	0x0000
n + 8	Axis-1 data	0xbbbbbbbb
n + 10		
n + 12	Axis-2 data	0xbbbbbbbb
n + 14		
n + 16	Axis-3 data	0xbbbbbbbb
n + 18		
n + 20	Axis-4 data	0xbbbbbbbb
n + 22		
n + 24	Not used	0x0000
to		
n + 30		

ssss : Specify the shift number in 16 bits.
Specified range: 0 (=0x0000) to 39 (=0x0027)

bbbbbbbb : Specify the shift data in 32 bits. (little endian)
Data should by integers (x1000).

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the shift data definition command as shown at right, to create the following shift data.

Shift number = 5

Axis 1 = 10.000

Axis 2 = -20.000

Axis 3 = 5.000

Axis 4 = -18.000

Address	Value
n	0x010C
n + 2	0x0000
n + 4	0x0005
n + 6	0x0000
n + 8	0x2710
n + 10	0x0000
n + 12	0xB1E0
n + 14	0xFFFF
n + 16	0x1388
n + 18	0x0000
n + 20	0xB9B0
n + 22	0xFFFF
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Shift data reference

Use this command to search and obtain shift data by specifying the shift number.

■ Command

Address	Contents	Value
n	Command code	0x010D
n + 2	Not used	0x0000
n + 4	Shift number	0xssss
n + 6	Not used	0x0000
to		
n + 30		

ssss : Specify the shift number in 16 bits.
Specified range: 0 (=0x0000) to 39 (=0x0027)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Shift number	0xssss
m + 6	Not used	0x0000
m + 8	Data 1	0xbbbbbbbb
m + 10		
m + 12	Data 2	0xbbbbbbbb
m + 14		
m + 16	Data 3	0xbbbbbbbb
m + 18		
m + 20	Data 4	0xbbbbbbbb
m + 22		
m + 24	Not used	0x0000
to		
m + 30		

ssss : Shows the shift number in 16 bits.

bbbbbbbb : Shows the shift data in 32 bits. (little endian)
Data is show in integers (x1000).

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the shift data reference command as shown at right, to obtain shift data at shift number 5.

Address	Value
n	0x010D
n + 2	0x0000
n + 4	0x0005
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly to obtain the following shift data.

Shift number = 5

Axis 1 = 10.000

Axis 2 = -20.000

Axis 3 = 5.000

Axis 4 = -18.000

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0005
m + 6	0x0000
m + 8	0x2710
m + 10	0x0000
m + 12	0xB1E0
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0xB9B0
m + 22	0xFFFF
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.3.5 Hand-related command

Execute this command to define or obtain hand data.

● Hand data definition

Use this command to define hand data by specifying the hand number and each data.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR110
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Hand number			0xssss
n + 6	Not used			0x0000
n + 8	Data 1			0xbbbbbbbb
n + 10				
n + 12	Data 2			0xbbbbbbbb
n + 14				
n + 16	Data 3			0xbbbbbbbb
n + 18				
n + 20	Data 4			0xbbbbbbbb
n + 22				
n + 24	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

ssss : Specify the hand number in 16 bits.
Hand number setting range : 0 (0x0000) to 31 (=0x001F)

bbbbbbbb : When SCARA robot is specified and data 4 is 0:
- Data 1 : Specify the integer in 32 bits. (little endian)
- Data 2 and 3 : Specify the integer (x1000) in 32 bits. (little endian)
- Data 4 : When hand is installed to R-axis =1, other cases =0

In other cases
- Data 1 to 3 : Specify the integer (x1000) in 32 bits. (little endian)
- Data 4 : When hand is installed to R-axis =1, other cases =0

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the hand data definition command as shown at right, to create hand data.

Hand number = 1

Data 1 = 10.000

Data 2 = -2.000

Data 3 = 5.000

Data 4 = 0

Address	Value
n	0x0110
n + 2	0x0000
n + 4	0x0001
n + 6	0x0000
n + 8	0x2710
n + 10	0x0000
n + 12	0xF830
n + 14	0xFFFF
n + 16	0x1388
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

● Hand data reference

Use this command to obtain hand data by specifying the hand number.

■ Commands

Address	Contents			Value
n	Command code	bit 11 – bit 0		0x0111
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Hand number			0xssss
n + 6	Not used			0x0000
to				
n + 30				

ssss : Specify the hand number in 16 bits.
Hand number setting range : 0 (0x0000) to 31 (=0x001F)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Hand number	0xssss
m + 6	Not used	0xrrrr
m + 8	Data 1	0xbbbbbbbb
m + 10		
m + 12	Data 2	0xbbbbbbbb
m + 14		
m + 16	Data 3	0xbbbbbbbb
m + 18		
m + 20	Data 4	0xbbbbbbbb
m + 22		
m + 24	Not used	0x0000
to		
m + 30		

ssss : Shows the hand number in 16 bits.

rrrr : Indicates the robot number in 16 bits.

bbbbbbbb : When SCARA robot is specified and data 4 is 0.

Data 1 : Shows the integer in 32 bits. (little endian)
Data 2 and 3 : Shows the integer (x1000) in 32 bits. (little endian)
Data 4 : When hand is installed to R-axis =1, other cases =0

In other cases

Data 1 to 3 : Shows the integer (x1000) in 32 bits. (little endian)
Data 4 : When hand is installed to R-axis =1, other cases =0

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the hand data reference command as shown at right, to obtain hand data.

Address	Value
n	0x0111
n + 2	0x0000
n + 4	0x0001
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly to obtain the following hand data.

Hand number = 1

Data 1 = 10.000

Data 2 = -2.000

Data 3 = 5.000

Data 4 = 0

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0001
m + 6	0x0001
m + 8	0x2710
m + 10	0x0000
m + 12	0xF830
m + 14	0xFFFF
m + 16	0x1388
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.4 Category 3 remote commands

Category 3 remote commands are arithmetic commands. A command list is given below.

No.	Command contents			Command code n
3-1	Static variable-related commands	Assignment	Value	0x0200
			Variable	0x0201
		Addition	Value	0x0204
			Variable	0x0205
		Subtraction	Value	0x0208
			Variable	0x0209
		Multiplication	Value	0x020C
			Variable	0x020D
		Division	Value	0x0210
			Variable	0x0211
		Reference	Variable	0x0214
3-2	Parameter-related command	Assignment		0xR220
		Reference		0xR224
3-3	Point-related command	Point assignment		0x0230
		Addition		0x0234
		Subtraction		0x0235
		Pallet point assignment		0x0238
		Point element assignment	Pulse units input format	0x0240
			Millimeter units input format	0x0241
		Shift element assignment	Millimeter units input format	0x0245

4.4.1 Static variable-related command

Execute this command to assign a numerical value to a static variable for four arithmetic operations or reference.

● Assigning a numerical value to a static variable

This command assigns a numerical value to a static variable (SGIn or SGRn) by specifying the destination variable number and the numerical value.

Variable number 1 = numerical value

CAUTION

- **A real number is assigned when a real variable was used.**
- **Due to cancellation of significant digits when using real number data for assignment reference, the assigned data might sometimes differ from the reference data.**

■ Command

Address	Contents	Value
n	Command code	0x0200
n + 2	Not used	0x0000
n + 4	Variable number 1 (Variable number at assignment destination)	0xssss
n + 6	Not used	0x0000
n + 8	Numerical data	0xbbbbbbbb
n + 10		
n + 12	Not used	0x0000
to		
n + 30		

ssss : Specify variable number 1 in 16 bits.
Specified range for integer variable : 0 (0x0000) to 31 (=0x001F)
Specified range for real variable : 256 (=0x0100) to 287 (=0x011F)

Integer variable	Variable number	Real variable	Variable number
SGI0	0 (=0x0000)	SGR0	256 (=0x0100)
SGI1	1 (=0x0001)	SGR1	257 (=0x0101)
:	:	:	:
SGI31	31 (=0x001F)	SGR31	287 (=0x011F)

bbbbbbbb : Specify the integer in 32 bits. (little endian)
Specify a signed integer value when assigning to an integer variable.
Specify a single-precision real number when assigning to a real variable.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to assign numerical data to variable number 1.

Variable number 1 = 1

Numerical data = 10000

Address	Value
n	0x0200
n + 2	0x0000
n + 4	0x0001
n + 6	0x0000
n + 8	0x2710
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

● Assigning a variable to a static variable

This command assigns a numerical value to a static variable (SGIn or SGRn) by designating the source variable number and destination variable number.

Variable number 1 = Variable number 2

■ Command

Address	Contents	Value
n	Command code	0x0201
n + 2	Not used	0x0000
n + 4	Variable number 1 (Variable number at assignment destination)	0xssss
n + 6	Not used	0x0000
n + 8	Variable number 2 (Variable number at assignment source)	0xssss
n + 10	Not used	0x0000
to		
n + 30		

ssss : Specify variable numbers 1 and 2 in 16 bits.
Specified range for integer variable : 0 (0x0000) to 31 (=0x001F)
Specified range for real variable : 256 (=0x0100) to 287 (=0x011F)

Integer variable	Variable number	Real variable	Variable number
SGI0	0 (=0x0000)	SGR0	256 (=0x0100)
SGI1	1 (=0x0001)	SGR1	257 (=0x0101)
:	:	:	:
SGI31	31 (=0x001F)	SGR31	287 (=0x011F)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to assign numerical data of variable number 2 to variable number 1.

Variable number 1 = 1

Variable number 2 = 2

Address	Value
n	0x0201
n + 2	0x0000
n + 4	0x0001
n + 6	0x0000
n + 8	0x0002
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Arithmetic operation using numerical data on static variable

This command performs four arithmetic operations by specifying variable number 1 and a numerical value. Results are stored in a static variable (SGIn or SGRn) specified by variable number 1.

Variable number 1 = Variable number 1 (operator) numerical value

■ Command

Address	Contents		Value
n	Command code	Addition	0x0204
		Subtraction	0x0208
		Multiplication	0x020C
		Division	0x0210
n + 2	Not used		0x0000
n + 4	Variable number 1 (Variable number at addition destination)		0xssss
n + 6	Not used		0x0000
n + 8	Numerical data		0xbbbbbbbb
n + 10			
n + 12	Not used		0x0000
to			
n + 30			

ssss : Specify variable number 1 in 16 bits.
Specified range for integer variable : 0 (0x0000) to 31 (=0x001F)
Specified range for real variable : 256 (=0x0100) to 287 (=0x011F)

Integer variable	Variable number	Real variable	Variable number
SGI0	0 (=0x0000)	SGR0	256 (=0x0100)
SGI1	1 (=0x0001)	SGR1	257 (=0x0101)
:	:	:	:
SGI31	31 (=0x001F)	SGR31	287 (=0x011F)

bbbbbbbb : Specify the integer in 32 bits. (little endian)
Specify a signed integer value when assigning to an integer variable.
Specify a single-precision real number when assigning to a real variable.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command to assign numerical data to a static variable as shown at right.

Variable number 1 = 1

Numerical data = 10000

Address	Value
n	0x0204
n + 2	0x0000
n + 4	0x0001
n + 6	0x0000
n + 8	0x2710
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Arithmetic operation using variable on static variable

This command performs four arithmetic operations by specifying variable numbers 1 and 2. Results are stored in a static variable (SGIn or SGRn) specified by variable number 1.

Variable number 1 = Variable number 1 (operator) variable number 2

■ Command

Address	Contents		Value
n	Command code	Addition	0x0205
		Subtraction	0x0209
		Multiplication	0x020D
		Division	0x0211
n + 2	Not used		0x0000
n + 4	Variable number 1 (Variable number at arithmetic operation destination)		0xssss
n + 6	Not used		0x0000
n + 8	Variable number 2 (Variable number at arithmetic operation source)		0xssss
n + 10	Not used		0x0000
to			
n + 30			

ssss : Specify variable numbers 1 and 2 in 16 bits.
Specified range for integer variable : 0 (0x0000) to 31 (=0x001F)
Specified range for real variable : 256 (=0x0100) to 287 (=0x011F)

Integer variable	Variable number	Real variable	Variable number
SGI0	0 (=0x0000)	SGR0	256 (=0x0100)
SGI1	1 (=0x0001)	SGR1	257 (=0x0101)
:	:	:	:
SGI31	31 (=0x001F)	SGR31	287 (=0x011F)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this arithmetic operation command to multiply static variables as shown at right.

Variable number 1 = 1

Variable number 2 = 2

Address	Value
n	0x020D
n + 2	0x0000
n + 4	0x0001
n + 6	0x0000
n + 8	0x0002
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Static variable value reference

Use this command to search and obtain the value stored in a static variable (SGIn or SGRn) by specifying the variable number.

■ Command

Address	Contents	Value
n	Command code	0x0214
n + 2	Not used	0x0000
n + 4	Variable number	0xssss
n + 6	Not used	0x0000
to		
n + 30		

ssss : Specify variable number in 16 bits.
Specified range for integer variable : 0 (0x0000) to 31 (=0x001F)
Specified range for real variable : 256 (=0x0100) to 287 (=0x011F)

Integer variable	Variable number	Real variable	Variable number
SGI0	0 (=0x0000)	SGR0	256 (=0x0100)
SGI1	1 (=0x0001)	SGR1	257 (=0x0101)
:	:	:	:
SGI31	31 (=0x001F)	SGR31	287 (=0x011F)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Variable number	0xssss
m + 6	Not used	0x0000
m + 8	Value of variable	0xbbbbbbbb
m + 10		
m + 12	Not used	0x0000
to		
m + 30		

ssss : Specify variable number in 16 bits.
Specified range for integer variable : 0 (0x0000) to 31 (=0x001F)
Specified range for real variable : 256 (=0x0100) to 287 (=0x011F)

bbbbbbbb : Shows the numerical value in 32 bits. (little endian)
Specify a signed integer value when assigning to an integer variable.
Specify a single-precision real number when assigning to a real variable.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to obtain the numerical value of variable number 5.

Address	Value
n	0x0214
n + 2	0x0000
n + 4	0x0005
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly to obtain the following variable.

Variable number = 5

Value = 50

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0005
m + 6	0x0000
m + 8	0x0032
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.4.2 Parameter-related command

Execute this command to assign a value to a parameter or obtain a parameter.

● Assigning a value to a parameter

This command assigns a numerical value to a specified parameter by specifying the parameter number, axis and numerical value.

Robot parameter		Parameter number	Assignment range
WEIGHT	Robot payload (kg)	1 (=0x0001)	0 to maximum payload
WEIGHTG	Robot payload (g)	2 (=0x0002)	0 to maximum payload

Axis parameter		Parameter number	Assignment range
ACCEL	Acceleration coefficient	257 (=0x0101)	1 to 100
DECEL	Deceleration ratio	258 (=0x0102)	1 to 100
TOLE	Tolerance (pulses)	259 (=0x0103)	1 to 16384
OUTPOS	OUT effective position (pulses)	260 (=0x0104)	1 to 9999999
AXWGHT	Axis payload (kg)	262 (=0x0106)	0 to maximum payload
ARCHP1	Arch start position (pulse)	264 (=0x0108)	1 to 9999999
ARCHP2	Arch end position (pulse)	265 (=0x0109)	1 to 9999999
PSHFRC	Push force	266 (=0x010A)	-1000 to 1000
PSHTIME	Push time-period	267 (=0x010B)	1 to 32767
PSHMTD	Push method	268 (=0x010C)	0: DISABLE, 1: ENABLE
PSHJGSP	Push judgment speed ratio	269 (=0x010D)	0: DISABLE, 1 to 100
PSHSPD	Push speed ratio	270 (=0x010E)	1 to 100

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR220
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Parameter number			0xssss
n + 6	Specified axis	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 8	Numerical data			0xbbbbbbbb
n + 10				
n + 12	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

ssss : Specify the parameter number in 16 bits.

tt : Specify the axis number in bit pattern using lower 8 bits.
Only one axis can be specified.
Specify "0" for robot parameters.

bbbbbbbb : Specify the integer in 32 bits. (little endian)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to assign a numerical value to the tolerance for Axis 3 of the Robot 1.

Parameter number = 259

Specified axis = 3

Numerical data = 1000

Address	Value
n	0x0220
n + 2	0x0000
n + 4	0x0103
n + 6	0x0004
n + 8	0x03E8
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

● Parameter value reference

Use this command to search and obtain parameter setting data by specifying the parameter number.

Robot parameter		Parameter number	Reference range
WEIGHT	Robot payload (kg)	1 (=0x0001)	0 to maximum payload
WEIGHTG	Robot payload (g)	2 (=0x0002)	0 to maximum payload

Axis parameter		Parameter number	Reference range
ACCEL	Acceleration coefficient	257 (=0x0101)	1 to 100
DECEL	Deceleration ratio	258 (=0x0102)	1 to 100
TOLE	Tolerance (pulses)	259 (=0x0103)	1 to 16384
OUTPOS	OUT effective position (pulses)	260 (=0x0104)	1 to 9999999
AXWGHT	Axis payload (kg)	262 (=0x0106)	0 to maximum payload
ARCHP1	Arch start position (pulse)	264 (=0x0108)	1 to 9999999
ARCHP2	Arch end position (pulse)	265 (=0x0109)	1 to 9999999
PSHFRC	Push force	266 (=0x010A)	-1000 to 1000
PSHTIME	Push time-period	267 (=0x010B)	1 to 32767
PSHMTD	Push method	268 (=0x010C)	0: DISABLE, 1: ENABLE
PSHJGSP	Push judgment speed ratio	269 (=0x010D)	0: DISABLE, 1 to 100
PSHSPD	Push speed ratio	270 (=0x010E)	1 to 100

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR224
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Parameter number			0xssss
n + 6	Specified axis	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 8	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

ssss : Specify the parameter number in 16 bits.

tt : Specify the axis number in bit pattern using lower 8 bits.
Only one axis can be specified.
Specify "0" for robot parameters.

Status

Normal end

Address	Contents			Value
m	Status code			0x0200
m + 2	Not used			0x0000
m + 4	Parameter number			0xssss
m + 6	Specified axis	bit 0	Axis 1	0x00tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
m + 8	Numerical data			0xbbbbbbbb
m + 10				
m + 12	Not used			0x0000
to				
m + 30				

ssss : Specify the parameter number in 16 bits.

tt : Specify the axis number in bit pattern using lower 8 bits.
Only one axis can be specified.
Specify "0" for robot parameters.

bbbbbbbb : Specify the integer in 32 bits. (little endian)

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to obtain the OUT effective position of axis 1 of the Robot 1.

Parameter number = 260

Specified axis = 1

Address	Value
n	0x0224
n + 2	0x0000
n + 4	0x0104
n + 6	0x0001
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly to obtain the following parameter.

Parameter number = 260

Specified axis = 1

Numerical data = 131071

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0104
m + 6	0x0001
m + 8	0xFFFF
m + 10	0x0001
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.4.3 Point-related command

Execute this command to assign a point to a parameter or obtain a parameter.

● Assigning a point to a parameter

This command assigns a numerical value to a specified parameter by specifying the parameter number, axis and numerical value.

Point number 1 = Point number 2

■ Command

Address	Contents	Value
n	Command code	0x0230
n + 2	Not used	0x0000
n + 4	Point number 1 (Point number at assignment destination)	0xssss
n + 6	Point number 2 (Point number at assignment source)	0xssss
n + 8	Not used	0x0000
to		
n + 30		

ssss : Specify the point number in 16 bits.
Specified range: 0 (= 0x0000) to 29999 (=0x752F)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to assign a point to the specified point.

Point number 1 = 1

Point number 2 = 100

Address	Value
n	0x0230
n + 2	0x0000
n + 4	0x0001
n + 6	0x0064
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Point addition/subtraction

This command adds and subtracts points by specifying point number 1 and point number 2.
Point number 1 = Point number 1 (operator) point number 2

■ Command

Address	Contents		Value
n	Command code	Addition	0x0234
		Subtraction	0x0235
n + 2	Not used		0x0000
n + 4	Point number 1 (Point number at operation destination)		0xssss
n + 6	Point number 2 (Point number at operation source)		0xssss
n + 8	Not used		0x0000
to			
n + 30			

ssss : Specify the point number in 16 bits.
Specified range: 0 (= 0x0000) to 29999 (=0x752F)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the point addition command as shown at right, to add point number 2 to point number 1.

Point number 1 = 1

Point number 2 = 100

Address	Value
n	0x0234
n + 2	0x0000
n + 4	0x0001
n + 6	0x0064
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Assigning a pallet point

This command assigns a pallet point to the destination point number by specifying a pallet number and work position number.

Pallet point number = Pallet point (pallet number, work position number)

NOTE
- The target pallet must be defined.
- The maximum value of work position number is determined by the target pallet definition.

■ Command

Address	Contents	Value
n	Command code	0x0238
n + 2	Not used	0x0000
n + 4	Point number (Point number at assignment destination)	0xssss
n + 6	Pallet number	0xaaaa
n + 8	Work position number	0xbbbb
n + 10	Not used	0x0000
to		
n + 30		

ssss : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 29999 (=0x752F)

aaaa : Specify the pallet number in 16 bits.
Specified range: 0 (=0x0000) to 39 (=0x0027)

bbbb : Specify the work position number in 16 bits.
Specified range: 1 (=0x0001) to 32767 (=0x7FFF)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to assign a pallet point to the following point.

Point number = 100

Pallet number = 2

Work position number = 133

Address	Value
n	0x0238
n + 2	0x0000
n + 4	0x0064
n + 6	0x0002
n + 8	0x0085
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.4.4 Element assignment command

Execute this command to assign a number to a point or shift element.

● Assigning to a point element

This command assigns a numerical value to a point element by specifying the point number, data number and numerical value.

LOC [data number] (point number) = numerical value

NOTE

When 1000 is specified in the "pulse" units input format as a numerical value, 1000 is assigned.
When 1000 is specified in the "millimeter" units input format as a numerical value, 1.000 is assigned.
Use the proper input format according to the point data format of the assignment destination.

■ Command

Address	Contents			Value
n	Command code		"Pulse" units input format	0x0240
			"Millimeter" units input format	0x0241
n + 2	Not used			0x0000
n + 4	Point number (Point number at assignment destination)			0xssss
n + 6	Data number designation	bit 0	Data 1	0x00tt
		bit 1	Data 2	
		bit 2	Data 3	
		bit 3	Data 4	
		bit 4	Data 5	
		bit 5	Data 6	
		bit 15 – bit 6	(0: Fixed)	
n + 8	Numerical value			0xbbbbbbbb
n + 10				
n + 12	Not used			0x0000
to				
n + 30				

ssss : Specify the point number in 16 bits.
Specified range: 0 (0x0000) to 29999 (=0x752F)

tt : Specify the data number in bit pattern using lower 6 bits.

bbbbbbbb : Specify the integer in 32 bits. (little endian)
Specify data in integers when using "pulse" units input format.
Specify data in integers (x1000) when using "millimeter" units input format.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to assign a numerical value to part of the following point.

Point number = 1

Data number designation = 4

Numerical value = 1.000

Address	Value
n	0x0241
n + 2	0x0000
n + 4	0x0001
n + 6	0x0008
n + 8	0x03E8
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

● Assigning to a shift element

This command assigns a numerical value to a shift element by specifying the shift number, data number and numerical value.

LOC [data number] (shift number) = numerical value

■ Command

Address	Contents			Value
n	Command code			0x0245
n + 2	Not used			0x0000
n + 4	Shift number (Shift number at assignment destination)			0xssss
n + 6	Data number designation	bit 0	Data 1	0x00tt
		bit 1	Data 2	
		bit 2	Data 3	
		bit 3	Data 4	
		bit 15 – bit 4	(0: Fixed)	
n + 8	Numerical value			0xbbbbbbbb
n + 10				
n + 12	Not used			0x0000
to				
n + 30				

ssss : Specify the shift number in 16 bits.
Specified range: 0 (0x0000) to 39 (=0x0027)

tt : Specify the data number in bit pattern using lower 4 bits.

bbbbbbbb : Specify the integer (x1000) in 32 bits. (little endian)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to assign a real number value to part of the following shift.

Shift number = 1

Data number designation = 2

Numerical value = 1.000

Address	Value
n	0x0245
n + 2	0x0000
n + 4	0x0001
n + 6	0x0002
n + 8	0x03E8
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.5 Category 4 remote commands

Category 4 remote commands are I/O port commands. A command list is given below.

No.	Command contents			Command code n
4-1	I/O port command	Assignment	port units	0x0300
		Assignment	bit units	0x0301
		Reference	port units	0x0304

n : Start address of the output area assigned to the master module
("n" indicates the data direction from master to remote.)

4.5.1 I/O port commands

Use these commands to assign a value to an I/O port or obtain the contents of a specified I/O port.

● Assigning a numerical value to an I/O port

This command assigns a bit pattern to a port number by specifying the destination port number and bit pattern.

■ Command

Address	Contents			Value
n	Command code		Port units	0x0300
			Bit units	0x0301
n + 2	Not used			0x0000
n + 4	Port number	bit 3 – bit 0	Bit number	g
		bit 7 – bit 4	Units of port number	r
		bit 11 – bit 8	Tens of port number	q
		bit 15 – bit 12	Specified port type	p
n + 6	Assignment bit pattern			0x00bb
n + 8	Not used			0x0000
to				
n + 30				

g : Specify the bit number in 4 bits.
Specified range: 0 to 7

r, q : Specify the place of each port number in 4 bits.

p : Specify the port type in 4 bits.
When in port units, specify 0 in the bit number.

Designated port type	Bit pattern	Specified range of port number
DO	0001	2 to 7,10 to 17,20 to 27
MO	0010	2 to 7,10 to 17,20 to 27
LO	0011	0 to 1
TO	0100	0
SO	0110	2 to 7,10 to 17,20 to 27

bb : Specify the bit pattern in 8 bits.
When in bit units, use 0 or 1 to specify the bit pattern.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to output a numerical value to the following output port.

Output port = DO12 ()

Numerical data = 7

Address	Value
n	0x0300
n + 2	0x0000
n + 4	0x1120
n + 6	0x0007
n + 8	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
to	
m + 30	

Example:

Use this command as shown at right, to output a numerical value to the following output port.

Output port = DO (21)

Numerical data = 1

Address	Value
n	0x0301
n + 2	0x0000
n + 4	0x1021
n + 6	0x0001
n + 8	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
to	
m + 30	

● I/O port reference

Use this command to obtain the contents of a port number by specifying the port number.

■ Command

Address	Contents			Value
n	Command code		Port units	0x0304
n + 2	Not used			0x0000
n + 4	Port number	bit 3 – bit 0	(0: Fixed)	0
		bit 7 – bit 4	Units of port number	r
		bit 11 – bit 8	Tens of port number	q
		bit 15 – bit 12	Specified port type	p
n + 6	Not used			0x0000
to				
n + 30				

r, q : Specify the place of each port number in 4 bits.

p : Specify the port type in 4 bits.

Designated port type	Bit pattern	Specified range of port number
DI	0000	0 to 7,10 to 17,20 to 27
DO	0001	0 to 7,10 to 17,20 to 27
MO	0010	0 to 7,10 to 17,20 to 27
LO	0011	0 to 1
TO	0100	0
SI	0101	0 to 7,10 to 17,20 to 27
SO	0110	0 to 7,10 to 17,20 to 27

■ Status

Normal end

Address	Contents			Value
m	Status code			0x0200
m + 2	Not used			0x0000
m + 4	Port number	bit 3 – bit 0	Not used	0
		bit 7 – bit 4	Units of port number	r
		bit 11 – bit 8	Tens of port number	q
		bit 15 – bit 12	Specified port type	p
m + 6	Bit pattern			0x00bb
m + 8	Not used			0x0000
to				
m + 30				

r, q : Shows the place of each port number in 4 bits.

p : Shows the port type in 4 bits.

bb : Shows the bit pattern in 8 bits.
When in bit units, 0 or 1 is used to show the bit pattern.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to obtain the following port data.

Output port = DO12 ()

Address	Value
n	0x0304
n + 2	0x0000
n + 4	0x1120
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Output port = DO12 ()

Numerical data = 7

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x1120
m + 6	0x0007
m + 8	0x0000
to	
m + 30	

Example:

Use this command as shown at right, to output a numerical value to the following port data.

Input port = DI2 ()

Address	Value
n	0x0304
n + 2	0x0000
n + 4	0x0020
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Input port = DI2 ()

Numerical data = 127

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0020
m + 6	0x007F
m + 8	0x0000
to	
m + 30	

4.6 Category 5 remote commands

Category 5 remote commands are program operation setting commands. A command list is given below.

No.	Command contents		Command code n
5-1	Execution program designation		0x0401
5-2	Program execution	Program execution	0x0402
		Program step execution	0x0403
		Program skip execution	0x0404
		Program next execution	0x0405
5-3	Program reset		0x0406
5-4	Program execution information reference		0x0408

* Check the robot program running status output signal (SO13) to verify a program execution command has been run.
* Check the program reset status output signal (SO14) to verify the program reset command has been run.

4.6.1 Execution program designation

Use this command to register in a task in order to execute a robot program.

■ Command

Address	Contents			Value
n	Command code			0x0401
n + 2	Command flag	bit 2 – bit 0	Designation method selection	sss
		bit 15 – bit 3	(0: Fixed)	0
n + 4	Program number			0xnnnn
n + 6	Registered task number			0xtttt
n + 8	Task priority ranking			0xpppp
n + 10	Not used			0x00000
n + 12	Program name			0xbbbb
to				
n + 26				
n + 28	Not used			0x0000
n + 30				

sss : Specify (by 3 bits) the program selection method.

Value	Meaning
001	Program number
100	Program name
Other	Designation method error

nnnn : Specify (by 16 bits) the program number.
1 (=0x0001) to 100 (=0x0064)

tttt : Specifies (by 16 bits) the task number where the program is registered.
If "0" is specified as the task number, the program is registered at the lowest vacant task number.
0 (=0x0000) to 16 (=0x0010)

pppp : Specifies (by 16 bits) the task priority ranking.
1 (=0x0001) to 64 (=0x0040)

bb : Specify the 1-byte program name in 8 bits. (little endian)
Specify a program name with letters (uppercase), numbers and underscores (_).
When the program name is shorter than **16 characters**, use a space.
(For programs with more than 16 characters, a search for the entered character string occurs.
When multiple programs exist with different names subsequent to the 16th character, the lowest of those program numbers is registered.)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to specify program number 1, task number 1, and a priority ranking of 47.

Address	Value
n	0x0401
n + 2	0x0001
n + 4	0x0001
n + 6	0x0001
n + 8	0x002F
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.6.2 Program execution

These commands execute robot program operations.

Command	Meaning
Program execution	Starts automatic operation of a robot program. Performs the same processing as the RUN key on the programming box and auto operation start input (SI12). Use the program in-progress status output signal (SO13) to verify the program is in progress.
Program step execution	Executes one line in the robot program. Enters the subroutine when a GOSUB statement is used. Performs the same processing as STEP execution which is performed from the programming box.
Program skip execution	Skips one line in the program. Performs the same processing as SKIP execution which is performed from the programming box.
Program next execution	Executes one line in the robot program. Executes the entire subroutine when a GOSUB statement is used. Performs the same processing as NEXT execution which is performed from the programming box.

■ Command

Address	Contents			Value
n	Command code	Program execution		0x0402
		Program step execution		0x0403
		Program skip execution		0x0404
		Program next execution		0x0405
n + 2	Command flag	bit 2 – bit 0	Designation method selection	sss
		bit 15 – bit 3	(0: Fixed)	0
n + 4	Program number			0xnnnn
n + 6	Operation task number			0xtttt
n + 8	Not used			0x0000
n + 10				
n + 12	Program name			0xbbbb
to				
n + 26				
n + 28	Not used			0x0000
n + 30				

sss : Specify (by 3 bits) the program selection method.

Value	Meaning
000	All operation-enabled programs (enabled only when using the program RUN command)
001	Program number
010	Operation task number
100	Program name
Other	Designation method error

nnnn : Specify (by 16 bits) the program number.
1 (=0x0001) to 100 (=0x0064)

tttt : Specifies (by 16 bits) the task number which operates the program.
1 (=0x0001) to 16 (=0x0010)

bb : Specify the 1-byte program name in 8 bits. (little endian)
Specify a program name with letters (uppercase), numbers and underscores (_).
When the program name is shorter than **16 characters**, use a space.
(For programs with more than 16 characters, a search for the entered character string occurs.
When multiple programs exist with different names subsequent to the 16th character, the lowest of those program numbers is registered.)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use these commands to execute Program 1 as Task 1 as shown at right.

Address	Value
n	0x0402
n + 2	0x0001
n + 4	0x0001
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.6.3 Program reset

This command resets the robot program.
Check the program reset status output signal (SO14) to verify all the programs have been reset.
Check the program execution line reference command to see if "1" is indicated there to verify individual programs has been reset.

■ Command

Address	Contents			Value
n	Command code			0x0406
n + 2	Command flag	bit 2 – bit 0	Designation method selection	sss
		bit 15 – bit 3	(0: Fixed)	0
n + 4	Program number			0xnnnn
n + 6	Operation task number			0xtttt
n + 8	Not used			0x0000
n + 10				
n + 12	Program name			0xbbbb
to				
n + 26				
n + 28	Not used			0x0000
n + 30				

sss : Specify (by 3 bits) the program selection method.

Value	Meaning
000	All operation-enabled programs
001	Program number
010	Operation task number
100	Program name
Other	Designation method error

nnnn : Specify (by 16 bits) the program number.
1 (=0x0001) to 100 (=0x0064)

tttt : Specifies (by 16 bits) the task number which resets the program.
1 (=0x0001) to 16 (=0x0010)

bb : Specify the 1-byte program name in 8 bits. (little endian)
Specify a program name with letters (uppercase), numbers and underscores (_).
When the program name is shorter than **16 characters**, use a space.
(For programs with more than 16 characters, a search for the entered character string occurs. When multiple programs exist with different names subsequent to the 16th character, the lowest of those program numbers is registered.)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command to reset the program named "ABC_DE" as shown at right.

Address	Value
n	0x0406
n + 2	0x0100
n + 4	0x0000
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x4241
n + 14	0x5F43
n + 16	0x4544
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.6.4 Program execution information reference

Execute this command to acquire information on program execution, when the robot program is stopped.

■ Command

Address	Contents			Value
n	Command code			0x0408
n + 2	Command flag	bit 2 – bit 0	Designation method selection	sss
		bit 15 – bit 3	(0: Fixed)	0
n + 4	Program number			0xnnnn
n + 6	Operation task number			0xtttt
n + 8	Not used			0x0000
n + 10				
n + 12	Program name			0xbbbb
to				
n + 26				
n + 28	Not used			0x0000
n + 30				

sss : Specify (by 3 bits) the program selection method.

Value	Meaning
001	Program number
010	Operation task number
100	Program name
Other	Designation method error

nnnn : Specify (by 16 bits) the program number.
1 (=0x0001) to 100 (=0x0064)

tttt : Specifies (by 16 bits) the task number.
1 (=0x0001) to 16 (=0x0010)

bb : Specify the 1-byte program name in 8 bits. (little endian)
Specify a program name with letters (uppercase), numbers and underscores (_).
When the program name is shorter than **16 characters**, use a space.
(For programs with more than 16 characters, a search for the entered character string occurs. When multiple programs exist with different names subsequent to the 16th character, the lowest of those program numbers is registered.)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Program number	0xpppp
m + 6	Operation task number	0xtttt
m + 8	Execution line number	0xllll
m + 10	Task priority ranking	0xpppp
m + 12	Program name	0xbbbb
to		
m + 26		
m + 28	Not used	0x0000
m + 30		

pppp : Indicates the program number. 1 (=0x0001) to 100 (=0x0064)

tttt : Indicates the operation task number. 1 (=0x0001) to 16 (=0x0010)

llll : Indicates the current program's execution line number (1~). A value + 10000 is shown when COMMON program is running.

pppp : Indicates the current task priority rankings 1 (=0x0001) to 64 (=0x0040).

bb : Shows the 1-byte program name in 8 bits. (little endian).
Program names are shown with letters (uppercase), numbers and underscores (_).
Spaces are used to fill out the last part of program names which have fewer than 16 characters.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command to acquire program execution information as shown at right.

Address	Value
n	0x0408
n + 2	0x0001
n + 4	0x0001
n + 6	0x0000
n + 8	0x0000
n + 10	0x0000
n + 12	0x0000
n + 14	0x0000
n + 16	0x0000
n + 18	0x0000
n + 20	0x0000
n + 22	0x0000
n + 24	0x0000
n + 26	0x0000
n + 28	0x0000
n + 30	0x0000

Values are expressed as shown at right when executed correctly to switch to the following program task.

Program number = 1

Program name = "ABCDEFGH"

Task number = 2

Execution number = 101

Task priority = 32

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0001
m + 6	0x0002
m + 8	0x0065
m + 10	0x0020
m + 12	0x4241
m + 14	0x4443
m + 16	0x4645
m + 18	0x4847
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.7 Category 6 remote commands

Category 6 remote commands are data handling commands.
A command list is given below.

No.	Command contents		Command code n
6-1	Version information reference		0x0501
6-2	Controller configuration reference		0xR502
6-3	Servo status reference		0xR503
6-4	Current position reference	Pulse units	0xR505
		Millimeter units	0xR506
6-5	Task status reference		0x0507
6-6	Task execution reference		0x0508
6-7	Message reference		0x0509
6-8	Speed status reference		0xR50A
6-9	Arm designation status reference		0xR50B
6-10	Arch arm status reference		0xR50C
6-11	Return-to-origin status reference		0xR50F
6-12	Current torque value (percentage of max. torque) reference		0xR510
6-13	In-controller date reference		0x0511
6-14	In-controller time reference		0x0512
6-15	Option slot module information referencing		0x0513
6-16	Inching movement amount referencing		0xR514
6-17	Remote command latest alarm referencing		0x0515
6-18	Current torque value (percentage of rated torque) reference		0x0516

* "R" indicates the number of the robot in question (0~4).

4.7.1 Version information reference

This command displays the software version used in the controller.

■ Command

Address	Contents	Value
n	Command code	0x0501
n + 2	Not used	0x0000
to		
n + 30		

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Host software version	0xaabb
m + 6	Host software revision	0xcccc
m + 8	Driver FPGA version	0xdddd
m + 10	Axis-1 driver software version	0xeeff
m + 12	Axis-2 driver software version	0xeeff
m + 14	Axis-3 driver software version	0xeeff
m + 16	Axis-4 driver software version	0xeeff
m + 18	Not used	0x0000
to		
m + 30		

aabb : Shows the controller's host software version in upper 8 bits and lower 8 bits.
cccc : Shows the controller's host softwar revision in 16 bits.
dddd : Indicates (by 16 bits) the driver FPGA version.
eeff : Shows the controller's driver software version in uper 8 bits and lower 8 bits.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number
bbbb : Indicates the alarm category number

Example:

Use this command to obtain a software version as shown at right.

Address	Value
n	0x0501
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Host software version : V1.08

Host software revision : R0048

Driver FPGA version : V1.001

Axis-1 driver software version : V1.01

Axis-2 driver software version : V1.01

Axis-3 driver softwre version : V1.01

Axis-4 driver software version : V1.01

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0108
m + 6	0x0030
m + 8	0x1001
m + 10	0x0101
m + 12	0x0101
m + 14	0x0101
m + 16	0x0101
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.7.2 System configuration referencing

This command acquires the configuration of the specified robot.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR502
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Robot number	0xaaaa
m + 6	Not used	0x0000
m + 8	Axis-1 robot number	0xaaaa
m + 10	Axis-2 robot number	0xaaaa
m + 12	Axis-3 robot number	0xaaaa
m + 14	Axis-4 robot number	0xaaaa
m + 16	Axis-5 robot number	0xaaaa
m + 18	Axis-6 robot number	0xaaaa
m + 20	Not used	0x0000
to		
m + 30		

aaaa : Showsthe robot number.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use the system configuration reference command as shown at right, to obtain the configuration of the Robot 1.

Address	Value
n	0x0502
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Robot number : 2000 (R6YXGL250)

Axis-1 robot number : 2000 (R6YXGL250)

Axis-2 robot number : 2000 (R6YXGL250)

Axis-3 robot number : 2000 (R6YXGL250)

Axis-4 robot number : 2000 (R6YXGL250)

Axis-5 robot number : 0 (no axis)

Axis-6 robot number : 0 (no axis)

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x07D0
m + 6	0x0000
m + 8	0x07D0
m + 10	0x07D0
m + 12	0x07D0
m + 14	0x07D0
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.7.3 Servo status reference

Execute this command to acquire information on servo status.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR503
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Axis-1 information	0xaaaa
m + 6	Axis-2 information	0xaaaa
m + 8	Axis-3 information	0xaaaa
m + 10	Axis-4 information	0xaaaa
m + 12	Axis-5 information	0xaaaa
m + 14	Axis-6 information	0xaaaa
m + 16	Not used	0x0000
to		
m + 30		

aaaa : Shows the servo status of each axis.

Value	Contents
0	Servo OFF + mechanical brake ON (Brake)
1	Servo ON (Servo)
2	Servo OFF + mechanical brake OFF (Free)
9	No axis

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command to acquire a servo status as shown at right.

Address	Value
n	0x0503
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Axis 1 : 1 (Servo ON)

Axis 2 : 1 (Servo ON)

Axis 3 : 2 (Servo Free)

Axis 4 : 1 (Servo ON)

Axis 5 : 9 (no axis)

Axis 6 : 9 (no axis)

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0001
m + 6	0x0001
m + 8	0x0002
m + 10	0x0001
m + 12	0x0009
m + 14	0x0009
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.7.4 Current position reference

● Pulse units designation

Use this command to obtain the robot current position data in pulse units.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR505
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Continuous output mode	a
		bit15 – bit 1	Not used	0
n + 4	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : ENABLES/DISABLES the continuous output mode.

Value	Meaning
0	DISABLE
1	ENABLE

When enabled, a stop occurs at the status initializing command (=0x0000).

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers.

Continuous output mode

Address	Contents	Value
m	Status code	0x0100
m + 2	Not used	0x0000
m + 4		
m + 6		
m + 8	Axis-1 data	0xbbbbbbbb
m + 10		
m + 12	Axis-2 data	0xbbbbbbbb
m + 14		
m + 16	Axis-3 data	0xbbbbbbbb
m + 18		
m + 20	Axis-4 data	0xbbbbbbbb
m + 22		
m + 24	Axis-5 data	0xbbbbbbbb
m + 26		
m + 28	Axis-6 data	0xbbbbbbbb
m + 30		

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to obtain the Robot 1 current position data in pulse units designation.

Address	Value
n	0x0505
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Axis 1 = 20001

Axis 3 = -12345

Other axes = 0

Address	Value
	0x0200
	0x0000
	0x0000
	0x0000
	0x4E21
	0x0000
	0x0000
	0x0000
	0xCFC7
	0xFFFF
	0x0000
	0x0000
	0x0000
	0x0000
	0x0000
	0x0000

● Millimeter units designation

Use this command to obtain the robot current position data in millimeter units.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR506
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Command flag	bit 0	Continuous output mode	a
		bit 15 – bit 1	Not used	0
n + 4	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

a : ENABLES/DISABLES the continuous output mode.

Value	Meaning
0	DISABLE
1	ENABLE

When enabled, a stop occurs at the status initializing command (=0x0000).

■ Status

Normal end

Address	Contents			Value
m	Status code			0x0200
m + 2	Not used			0x0000
m + 4				
m + 6	Point flag	bit 0	Not used	0
		bit 2 – bit 1	Hand system	tt
		bit 15 – bit 3	Not used	0
m + 8	Axis-1 data			0xbbbbbbbb
m + 10				
m + 12	Axis-2 data			0xbbbbbbbb
m + 14				
m + 16	Axis-3 data			0xbbbbbbbb
m + 18				
m + 20	Axis-4 data			0xbbbbbbbb
m + 22				
m + 24	Axis-5 data			0xbbbbbbbb
m + 26				
m + 28	Axis-6 data			0xbbbbbbbb
m + 30				

tt : Shows in 2 bits the hand system.
Valid only for a SCARA robot is specified.

Value	Meaning
01	Right-handed is specified.
10	Left-handed is specified.

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers (x1000).

Continuous output mode

Address	Contents			Value
m	Status code			0x0100
m + 2	Not used			0x0000
m + 4				
m + 6	Point flag	bit 0	Not used	0
		bit 2 – bit 1	Hand system	tt
		bit 15 – bit 3	Not used	0
m + 8	Axis-1 data			0xbbbbbbbb
m + 10				
m + 12	Axis-2 data			0xbbbbbbbb
m + 14				
m + 16	Axis-3 data			0xbbbbbbbb
m + 18				
m + 20	Axis-4 data			0xbbbbbbbb
m + 22				
m + 24	Axis-5 data			0xbbbbbbbb
m + 26				
m + 28	Axis-6 data			0xbbbbbbbb
m + 30				

tt : Shows in 2 bits the hand system.
Valid only for a SCARA robot is specified.

Value	Meaning
01	Right-handed is specified.
10	Left-handed is specified.

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers (x1000).

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to obtain the Robot 1 current position data in millimeter units.

Address	Value
n	0x0506
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly to obtain the following positions in millimeter units.

Axis 1 = 20.001

Axis 3 = -12.345

Other axes = 0.000

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0001
m + 8	0x4E21
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0xCFC7
m + 18	0xFFFF
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.7.5 Task status reference

Execute this command to acquire task execution status.

■ Command

Address	Contents	Value
n	Command code	0x0507
n + 2	Not used	0x0000
n + 4	Status acquisition task range designation	0xaaaa
n + 6	Not used	0x0000
to		
n + 30		

aaaa : Specifies the status acquisition task range.

Value	Meaning
0	Tasks 1 to 8
1	Tasks 9 to 16

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Execution status of task 1 (9)	0xaaaa
m + 6	Execution status of task 2 (10)	0xaaaa
m + 8	Execution status of task 3 (11)	0xaaaa
m + 10	Execution status of task 4 (12)	0xaaaa
m + 12	Execution status of task 5 (13)	0xaaaa
m + 14	Execution status of task 6 (14)	0xaaaa
m + 16	Execution status of task 7 (15)	0xaaaa
m + 18	Execution status of task 8 (16)	0xaaaa
m + 20	Not used	0x0000
to		
m + 30		

aaaa : Shows the execution status of each task.

Value	Meaning
0	Stop status
1	Execution status
2	Suspend status
3	Standby status
9	No task

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to obtain the execution status of tasks 1~8.

Address	Value
n	0x0507
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Task 1 : 1 (Execution status)

Task 2 : 1 (Execution status)

Task 3 : 9 (no task)

Task 4 : 9 (no task)

Task 5 : 2 (Suspend status)

Task 6 : 9 (no task)

Task 7 : 9 (no task)

Task 8 : 9 (no task)

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0001
m + 6	0x0001
m + 8	0x0009
m + 10	0x0009
m + 12	0x0002
m + 14	0x0009
m + 16	0x0009
m + 18	0x0009
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.7.6 Task execution line reference

Execute this command to acquire information on task execution line.

■ Command

Address	Contents	Value
n	Command code	0x0508
n + 2	Not used	0x0000
n + 4	Execution line acquisition task range designation	0xaaaa
n + 6	Not used	0x0000
to		
n + 30		

aaaa : Specifies the status acquisition task range.

Value	Meaning
0	Tasks 1 to 8
1	Tasks 9 to 16

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Execution line of task 1 (9)	0xaaaa
m + 6	Execution line of task 2 (10)	0xaaaa
m + 8	Execution line of task 3 (11)	0xaaaa
m + 10	Execution line of task 4 (12)	0xaaaa
m + 12	Execution line of task 5 (13)	0xaaaa
m + 14	Execution line of task 6 (14)	0xaaaa
m + 16	Execution line of task 7 (15)	0xaaaa
m + 18	Execution line of task 8 (16)	0xaaaa
m + 20	Not used	0x0000
to		
m + 30		

aaaa : Shows the execution line of each task.
When no task exists, the value is 0.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to obtain the execution lines of tasks 1~8.

Address	Value
n	0x0508
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Task 1 : Execution on first line

Task 2 : Execution on 19th line

Task 3 : no task

Task 4 : no task

Task 5 : Execution on 99th line

Task 6 : no task

Task 7 : no task

Task 8 : no task

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0001
m + 6	0x0013
m + 8	0x0000
m + 10	0x0000
m + 12	0x0063
m + 14	0x0000
m + 16	0x0000
m + 18	0x0000
m + 20	0x0000
m + 22	0x0000
m + 24	0x0000
m + 26	0x0000
m + 28	0x0000
m + 30	0x0000

4.7.7 Message reference

Execute this command to acquire alarm message information.

■ Command

Address	Contents	Value
n	Command code	0x0509
n + 2	Not used	0x0000
n + 4	Alarm acquisition number	0xaaaa
n + 6	Not used	0x0000
to		
n + 30		

aaaa : Specifies the alarm acquisition number.

Value	Contents
1 to 500	Message number saved in the alarm history

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Additional information 1	0xccdd
m + 8	Additional information 2	0xeeff
m + 10	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

ccdd : Indicates additional information 1 for the alarm occurrence location.

cc: Category No.	Contents
00	Robot ID
01	Controller ID
02	Task number

dd: number	Contents
00	No type (for task No. only)
From 01	Robot No. or controller No.

eeff : Indicates additional information 2 for the alarm occurrence location.

ee: Category No.	Contents
00	All robots or all controllers
01	Axis number ID
02	Motor number ID
03	Option slot number ID
04	Program task number ID

ff : number	Contents
00	No number
From 01	One of the following numbers is used: Motor number, axis number, option slot number, program task number

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to acquire the 10th message in the alarm history.

Address	Value
n	0x0509
n + 2	0x0000
n + 4	0x000A
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.
(12.551: C1O1 EtherNet/IP link error)

Address	Value
m	0x0200
m + 2	0x000C
m + 4	0x0227
m + 6	0x0101
m + 8	0x0301
m + 10	0x0000
to	
m + 30	

4.7.8 Speed status reference

Execute this command to acquire information on current speed status.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR50A
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

■ Status

Normal end

Address	Contents		Value
m	Status code		0x0200
m + 2	Not used		0x0000
m + 4	Speed of specified robot	AUTO mode speed	0xaaaa
m + 6		MANUAL mode speed	0xaaaa
m + 8		Program movement speed	0xaaaa
m + 10	Not used		0x0000
to			
m + 30			

aaaa : Shows the speed setting (1 to 100).
Shows "0" when no robot axis is specified.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number
bbbb : Indicates the alarm category number

Example:

Use the speed status reference command as shown at right, to acquire the speed status of the Robot 1.

Address	Value
n	0x050A
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Robot 1's auto movement speed : 50%
Robot 1's manual movement speed : 50%
Robot 1's program movement speed : 50%

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0032
m + 6	0x0032
m + 8	0x0032
m + 10	0x0000
to	
m + 30	

4.7.9 Arm designation status reference

Execute this command to acquire information on currently designated arm.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR50B
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Status of specified robot	0xaaaa
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Shows the arm designation status.
Shows "0" when no robot axis is specified.

Value	Meaning
0	Right-handed system status
1	Left-handed system status
9	Robots other than SCARA robot

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to acquire the status of Robot 1's currently specified arm.

Address	Value
n	0x050B
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Robot 1 : 1 (Left-handed system status)

Address	Value
	0x0000

4.7.10 Arm status reference

Execute this command to acquire information on arm.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR50C
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Main robot status	0xaaaa
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Shows the arm designation status.
Shows "0" when no robot axis is specified.

Value	Meaning
0	Right-handed system status
1	Left-handed system status
9	Robots other than SCARA robot

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command as shown at right, to acquire the status of arm.

Address	Value
n	0x050C
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Robot 1 : 1 (Left-handed system status)

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0001
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.7.11 Return-to-origin status reference

Execute this command to acquire information on the return-to-origin status.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR50F
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Motor type designation		bit 2 – bit 0	mmm
			bit 15 – bit 3	0
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), the return-to-origin status is acquired for the entire system.

mmm : Specifies the motor type.
This command is enabled only when the robot number is other than "0".

Bit Pattern	Corresponding Axis
001	Incremental type axis
010	Absolute type axis
Other than shown above	All axis types

■ Status

Normal end (When the robot designation is "0")

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Entire system's return-to-origin status	0xaaaa
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Show the return-to-origin status for the entire system.

Value	Meaning
0	Return-to-origin incomplete
1	Return-to-origin complete

Normal end (When the robot designation is "0")

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Axis-1 information	0xaaaa
m + 6	Axis-2 information	0xaaaa
m + 8	Axis-3 information	0xaaaa
m + 10	Axis-4 information	0xaaaa
m + 12	Axis-5 information	0xaaaa
m + 14	Axis-6 information	0xaaaa
m + 16	Not used	0x0000
to		
m + 30		

aaaa : Shows the return-to-origin status of each axis.

Value	Meaning
0	Return-to-origin incomplete
1	Return-to-origin complete
9	Not applicable

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command to obtain the return-to-origin status of all the Robot 1 axes as shown at right.

Address	Value
n	0x150F
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Axis 1 : 1 (Return-to-origin complete)

Axis 2 : 1 (Return-to-origin complete)

Axis 3 : 0 (Return-to-origin incomplete)

Axis 4 : 1 (Return-to-origin complete)

Axis 5 : 9 (no axis)

Axis 6 : 9 (no axis)

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0001
m + 6	0x0001
m + 8	0x0000
m + 10	0x0001
m + 12	0x0009
m + 14	0x0009
m + 16	0x0000
to	
m + 30	

4.7.12 Current torque value (percentage of max. torque) reference

This command is used to obtain the current torque value of the specified axis relative to its maximum torque value.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR510
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Axis for which the current torque value is obtained	bit 0	Axis 1	tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

tt : The axis to be referenced is specified from bits 0 to 5.
If not specified, the information is acquired for all axes.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Axis 1 current torque value	0xaaaa
m + 6	Axis 2 current torque value	0xaaaa
m + 8	Axis 3 current torque value	0xaaaa
m + 10	Axis 4 current torque value	0xaaaa
m + 12	Axis 5 current torque value	0xaaaa
m + 14	Axis 6 current torque value	0xaaaa
m + 16	Not used	0x0000
to		
m + 30		

aaaa : Indicates the current torque value (-100 to 100).
The value is "0" for axes which are not connected.
The value represents the ratio of the current torque value to the maximum torque value. Plus/minus signs indicate the direction.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify a command as shown at right to use the current torque value (percentage of max. torque) acquisition command to obtain the current torque value for Axis No.3 of Robot 1.

Address	Value
n	0x0510
n + 2	0x0000
n + 4	0x0004
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Robot 1, Axis 3: 20

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0014
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
to	
m + 30	

4.7.13 In-controller date reference

Execute this command to acquire the date inside the controller.

■ Command

Address	Contents	Value
n	Command code	0x0511
n + 2	Not used	0x0000
to		
n + 30		

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Date (Year)	0xyyyy
m + 6	Date (Month)	0xmmmm
m + 8	Date (Day)	0xdddd
m + 10	Not used	0x0000
to		
m + 30		

yyyy : Shows the year. (Lower two digits of Christian year) 0 (=0x00) to 63 (=0x99)
mmmm : Shows the month. 1 (=0x01) to 12 (=0x0C)
dddd : Shows the day. 1 (=0x01) to 31 (=0x1F)

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number
bbbb : Indicates the alarm category number

Example:

Use this command to obtain the controller's internal date as shown at right.

n	0x0511
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Date (Year) : 14
Date (Month) : 1
Date (Day) : 1

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x000E
m + 6	0x0001
m + 8	0x0001
m + 10	0x0000
to	
m + 30	

4.7.14 In-controller time reference

Execute this command to acquire the time inside the controller.

Command

Address	Contents	Value
n	Command code	0x0512
n + 2	Not used	0x0000
to		
n + 30		

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Time (Hour)	0xhhhh
m + 6	Time (Minute)	0xmmmm
m + 8	Time (Second)	0xssss
m + 10	Not used	0x0000
to		
m + 30		

hhhh : Shows the hour. 0 (=0x00) to 23 (=0x17)

mmmm : Shows the minute. 0 (=0x00) to 59 (=0x3B)

ssss : Shows the second. 0 (=0x00) to 59 (=0x3B)

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command to obtain the controller's internal time as shown at right.

Address	Value
n	0x0512
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Time (Hour) : 10

Time (Minute) : 59

Time (Second) : 59

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x000A
m + 6	0x003B
m + 8	0x003B
m + 10	0x0000
to	
m + 30	

4.7.15 Option slot module information referencing

Execute this command to acquire module information in the controller's optional slot.

■ Command

Address	Contents	Value
n	Command code	0x0513
n + 2	Not used	0x0000
n + 4	Controller designation	0xaaaa
n + 6	Not used	0x0000
to		
n + 30		

aaaa : Specifies the No. of the controller which is to acquire information.

Value	Meaning
1 to 4	Controller No.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Unit number of option slot No. 1	0xaaaa
m + 6	Unit number of option slot No. 2	0xaaaa
m + 8	Unit number of option slot No. 3	0xaaaa
m + 10	Unit number of option slot No. 4	0xaaaa
m + 12	Not used	0x0000
to		
m + 30		

aaaa : Indicates the option slot's module number.

Value	Meaning
0x0000	None
0x0100	DIO unit (NPN specs. dedicated input)
0x0101	DIO unit (NPN specs. general-purpose input)
0x0200	DIO unit (PNP specs. dedicated input)
0x0201	DIO unit (PNP specs. general-purpose input)
0x0301	PROFIBUS unit
0x0400	DeviceNet unit
0x0401	EtherNet/IP unit

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command to obtain information regarding the option slot module at Controller 1 as shown at right.

Address	Value
n	0x0513
n + 2	0x0000
n + 4	0x0001
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Option slot 1 : 0x0401
(EtherNet/IP unit)

Option slot 2 : 0x0101
(DIO unit (NPN specs. general-purpose input)

Option slot 3 : 0x0000 (None)

Option slot 4 : 0x0000 (None)

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0401
m + 6	0x0101
m + 8	0x0000
m + 10	0x0000
m + 12	0x0000
to	
m + 30	

4.7.16 Inching movement amount referencing

Execute this command to acquire the movement amount during inching movement operations.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR514
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Inching movement	0xdddd
m + 6	Not used	0x0000
to		
m + 30		

dddd : Indicates the movement amount. 1 (=0x0001) to 10000 (=0x2710)

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command to obtain the inching movement amount of the Robot 1 as shown at right.

Address	Value
n	0x0514
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Robot 1 inching movement amount: 100

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0064
m + 6	0x0000
to	
m + 30	

4.7.17 Remote command latest alarm referencing

This command refers the most recent alarm information which occurred during remote command execution.

■ Command

Address	Contents	Value
n	Command code	0x0515
n + 2	Not used	0x0000
to		
n + 30		

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Additional information 1	0xccdd
m + 8	Additional information 2	0xeeff
m + 10	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

ccdd : Indicates additional information 1 for the alarm occurrence location.

cc: Category No.	Contents
00	Robot ID
01	Controller ID
02	Task number

dd: number	Contents
00	No type (for task No. only)
From 01	Robot No. or controller No.

eeff : Indicates additional information 2 for the alarm occurrence location.

ee: Category No.	Contents
00	All robots or all controllers
01	Axis number ID
02	Motor number ID
03	Option slot number ID
04	Program task number ID

ff : number	Contents
00	No number
From 01	One of the following numbers is used: Motor number, axis number, option slot number, program task number

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command to obtain the latest alarm as shown at right.

Address	Value
n	0x0515
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

(2:334 : R1A1 : Over soft limit)

Address	Value
m	0x0200
m + 2	0x0002
m + 4	0x014E
m + 6	0x0001
m + 8	0x0101
m + 10	0x0000
to	
m + 30	

4.7.18 Current torque value (percentage of rated torque) reference

This command is used to obtain the current torque value of the specified axis relative to its rated torque value.

■ Command

Address	Contents			Value
n	Command code	bit 11 – bit 0		0xR516
	Robot designation	bit 15 – bit 12	Robot number	
n + 2	Not used			0x0000
n + 4	Axis for which the current torque value is obtained	bit 0	Axis 1	tt
		bit 1	Axis 2	
		bit 2	Axis 3	
		bit 3	Axis 4	
		bit 4	Axis 5	
		bit 5	Axis 6	
		bit 15 – bit 6	(0: Fixed)	
n + 6	Not used			0x0000
to				
n + 30				

R : Designates the robot number (0~4).
If "0" is set (no robot number designated), Robot 1 will be selected.

tt : The axis to be referenced is specified from bits 0 to 5.
If not specified, the information is acquired for all axes.

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
m + 4	Axis 1 current torque value	0xaaaa
m + 6	Axis 2 current torque value	0xaaaa
m + 8	Axis 3 current torque value	0xaaaa
m + 10	Axis 4 current torque value	0xaaaa
m + 12	Axis 5 current torque value	0xaaaa
m + 14	Axis 6 current torque value	0xaaaa
m + 16	Not used	0x0000
to		
m + 30		

aaaa : Indicates the current torque value (-1000 to 1000).
The value is "0" for axes which are not connected.
The value represents the ratio of the current torque value to the rated torque value. Plus/minus signs indicate the direction.

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Specify a command as shown at right to use the current torque value (percentage of rated torque) acquisition command to obtain the current torque value for Axis No.3 of Robot 1.

Address	Value
n	0x0516
n + 2	0x0000
n + 4	0x0004
n + 6	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Robot 1, Axis 3: 100

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0064
m + 10	0x0000
m + 12	0x0000
m + 14	0x0000
m + 16	0x0000
to	
m + 30	

4.8 Category 7 remote commands

Category 7 remote commands are used to set the utility mode.
A command list is given below.

No.	Command contents	Command code n
7-1	In-controller date setting operation	0x0602
7-2	In-controller time setting operation	0x0603
7-3	Alarm reset command	0x0604

4.8.1 In-controller date setting operation

This command sets the date inside the controller.

■ Command

Address	Contents	Value
n	Command code	0x0602
n + 2	Not used	0x0000
n + 4	Date setting (year)	0xyyyy
n + 6	Date setting (month)	0xmmmm
n + 8	Date setting (day)	0xdddd
n + 10	Not used	0x0000
to		
n + 30		

yyyy : Shows the year. (Lower two digits of Christian year) 0 (=0x00) to 63 (=0x99)
mmmm : Shows the month. 1 (=0x01) to 12 (=0x0C)
dddd : Shows the day. 1 (=0x01) to 31 (=0x1F)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number
bbbb : Indicates the alarm category number

Example:

Use this command to set the controller's internal date as shown below.

Date (Year) : 14

Date (Month) : 2

Date (Day) : 2

Address	Value
n	0x0602
n + 2	0x0000
n + 4	0x000E
n + 6	0x0002
n + 8	0x0002
n + 10	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.8.2 In-controller time setting operation

This command sets the time inside the controller.

■ Command

Address	Contents	Value
n	Command code	0x0603
n + 2	Not used	0x0000
n + 4	Time setting (hour)	0xhhhh
n + 6	Time setting (minute)	0xmmmm
n + 8	Time setting (second)	0xssss
n + 10	Not used	0x0000
to		
n + 30		

hhhh : Shows the hour. 0 (=0x00) to 23 (=0x17)

mmmm : Shows the minute. 0 (=0x00) to 59 (=0x3B)

ssss : Shows the second. 0 (=0x00) to 59 (=0x3B)

■ Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command to set the controller's internal time as shown below.

Time (Hour) : 8

Time (Minute) : 45

Time (Second) : 0

Address	Value
n	0x0603
n + 2	0x0000
n + 4	0x0008
n + 6	0x002D
n + 8	0x0000
n + 10	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

4.8.3 Alarm reset command

This command resets the controller's internal alarm.

Command

Address	Contents	Value
n	Command code	0x0604
n + 2	Not used	0x0000
to		
n + 30		

Status

Normal end

Address	Contents	Value
m	Status code	0x0200
m + 2	Not used	0x0000
to		
m + 30		

Abnormal end

Address	Contents	Value
m	Status code	0x4000
m + 2	Alarm group number	0xaaaa
m + 4	Alarm category number	0xbbbb
m + 6	Not used	0x0000
to		
m + 30		

aaaa : Indicates the alarm group number

bbbb : Indicates the alarm category number

Example:

Use this command to reset the controller's internal alarm as shown at right.

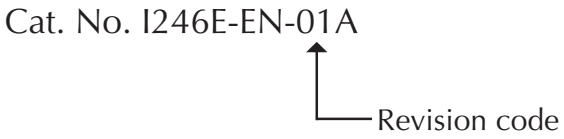
Address	Value
n	0x0604
n + 2	0x0000
to	
n + 30	

Values are expressed as shown at right when executed correctly.

Address	Value
m	0x0200
m + 2	0x0000
m + 4	0x0000
m + 6	0x0000
m + 8	0x0000
to	
m + 30	

Revision history

A manual revision code appears as a suffix to the catalog number on the front cover manual.



The following table outlines the changes made to the manual during each revision.

Revision code	Date	Description
01	July 2016	Original production
01A	April 2020	The WEIGHTG command was added to the 'Parameter-related command' section. The section 'Setting the EtherNet/IP compatible module' was updated.

OMRON

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Note: Specifications subject to change without notice.

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