

YAMAHA NETWORK BOARD RCX series

CC-Link

Command Reference Manual

ENGLISH 

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Introduction

Thank you for purchasing the CC-Link compatible module. This CC-Link compatible module is an option module that enables connection of the YAMAHA robot controller RCX series as a CC-Link system remote device station. The robot controller explained in this manual refers to the RCX series.

This manual describes the remote commands used with the CC-Link compatible module. For details on wiring and setting the CC-Link compatible module, refer to the CC-Link user's manual for the RCX series. For information on other devices such as connecting the master station PLC and sequence programming, refer to the manual for the respective product. Refer to the manual enclosed with the YAMAHA controller for details on operating the robot controller and on the robot program.

Applicable controllers: RCX240, RCX141, RCX142, RCX40, RCX221 and RCX222

Model names as used in this manual include the following controllers.

| | |
|---------|--|
| RCX240: | Includes RCX240, RCX141, RCX142 and RCX40 (4-axis controllers) |
| RCX14x: | Includes RCX141, RCX142 and RCX40 (4-axis controllers excluding RCX240)* |
| RCX22x: | Includes RCX221 and RCX222 (2-axis controllers) |

* Here, "RCX14x" does not include RCX240 and is used when there is a difference between the RCX240 and other 4-axis controllers due to differences in software versions.

Safety Precautions (Always read before starting use)

Before using this product, be sure to read this manual carefully as well as the CC-Link user's manual, 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.

CC-Link is a registered trademark of CC-Link partner association.

The CC-Link compatible module provided with a  label is compatible with CC-Link Ver. 1.10.

[Precautions for design]

**WARNING**

- REFER TO THE CC-LINK SYSTEM MASTER MODULE USER'S MANUAL AND THIS MANUAL FOR DETAILS ON THE STATE OF THE CC-LINK SYSTEM AND ROBOT CONTROLLER WHEN A COMMUNICATION ERROR OCCURS WITH THE CC-LINK 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 SAFELY.

**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.
- The dedicated input of STD.DIO connector provided on the RCX240 controllers will be disabled except for an interlock signal (DI 11). When the external 24V monitor control setting of system parameters is set invalid, the interlock signal (DI 11) will also be disabled. On the RCX22x, the dedicated input of STD.DIO connector will be disabled, but the interlock signal (DI 11) in SAFETY connector enabled.

[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 within the environment specifications given in the manual. Use in an environment outside the environment specification range could lead to electric shocks, fires, malfunctioning, product damage or deterioration.
- Install the CC-Link compatible module into the robot controller, and securely fix with screws.
- Never directly touch the conductive sections or electronic parts other than the rotary switch on the CC-Link compatible module.
- Never directly touch the conductive sections or electric parts inside the controller.
- Accurately connect each connection cable connector to the mounting section. Failure to observe this could lead to malfunctions caused by a connection fault.

[Precautions for wiring]

**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.
 - ALWAYS INSTALL THE TERMINAL COVERS ENCLOSED WITH THE PRODUCT BEFORE TURNING ON THE POWER OR OPERATING THE PRODUCT AFTER INSTALLATION OR WIRING WORK. FAILURE TO INSTALL THE TERMINAL COVER COULD LEAD TO MALFUNCTIONS.
-

**CAUTION**

-
- Tighten the terminal screws within the specified torque range. A loose terminal screw could lead to short-circuiting or malfunctioning. If the terminal screw is too tight, short-circuiting or malfunctioning could occur due to screw damage.
 - Make sure that foreign matter, such as cutting chips or wire scraps, do not enter the robot controller.
 - The communication cables connected to the CC-Link 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 disconnect the communication cable connected to the CC-Link compatible module by pulling on the cable section. Loosen the screws on the connector, and then disconnect the cable. Pulling on the cable fixed with screws could lead to module or cable damage, or malfunctioning caused by an improper cable connection.
-

[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 CLEANING OR TIGHTENING THE TERMINAL SCREWS. FAILURE TO SHUT OFF ALL PHASES COULD LEAD TO ELECTRIC SHOCKS, PRODUCT DAMAGE OR MALFUNCTIONING. A LOOSE SCREW COULD LEAD TO DROPPING, SHORT-CIRCUITING OR MALFUNCTIONING. IF THE SCREW IS TOO TIGHT, SHORT-CIRCUITING OR MALFUNCTIONING COULD OCCUR DUE TO SCREW DAMAGE.
- NEVER DISASSEMBLE OR MODIFY ANY OF THE ROBOT CONTROLLER MODULES. FAILURE TO OBSERVE THIS COULD LEAD TO TROUBLE, MALFUNCTIONING, INJURIES OR FIRES.
- ALWAYS SHUT OFF ALL PHASES OF THE POWER SUPPLY EXTERNALLY BEFORE INSTALLING OR REMOVING THE CC-LINK COMPATIBLE MODULE. FAILURE TO SHUT OFF ALL PHASES COULD LEAD TO ROBOT CONTROLLER TROUBLE OR MALFUNCTIONING.
- WHEN USING THE ROBOT CONTROLLER WITH THE CC-LINK 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**

If the master station PLC and robot controller are simultaneously turned on, the CC-Link system may not operate correctly. Always first turn on the master PLC before turning on the robot controller.

[Precautions for disposal]**CAUTION**

Dispose of this product as industrial waste.

This manual does not guarantee the implementation of industrial rights or other rights, and does not authorize the implementation rights. YAMAHA shall not be held liable for any problems regarding industrial rights that occur through the use of the contents given in this manual.

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MEMO

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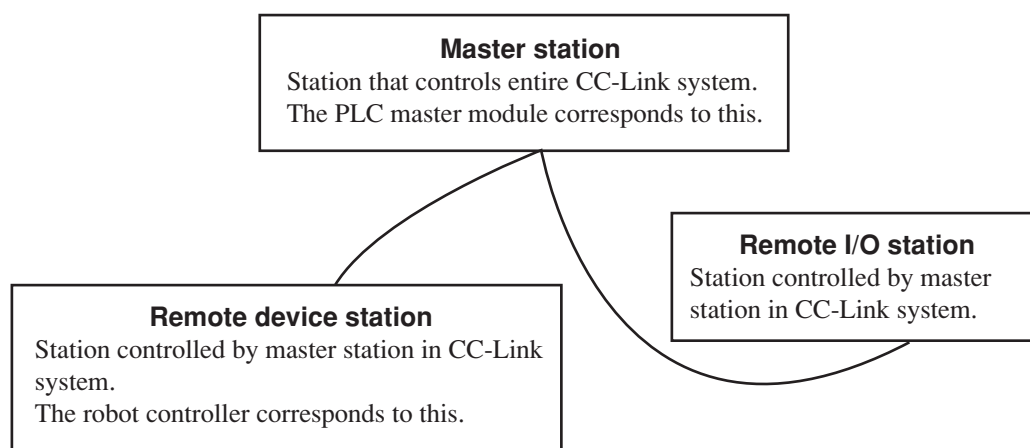
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1. Features

CC-Link is the abbreviation of Control & Communication Link. The CC-Link system connects the robot controller and dispersed input/output modules with dedicated cables, and controls these modules from the master station PLC. The CC-Link system allows wiring to be reduced.



CC-Link is a registered trademark of CC-Link partner association. The CC-Link compatible module provided with a **CC-Link** label is compatible with CC-Link Ver. 1.10.



NOTE

The dedicated input of STD.DIO connector provided on the RCX240 controllers will be disabled except for an interlock signal (DI 11). When the external 24V monitor control setting of system parameters is set invalid, the interlock signal (DI 11) will also be disabled. On the RCX22x, the dedicated input of STD.DIO connector will be disabled, but the interlock signal (DI 11) in SAFETY connector enabled.

[Wiring saving]

One dedicated cable (4-wire) is used to connect the robot controller and PLC. This allows the entire system wiring to be reduced.

[Emulated serialization on parallel DIO]

By making the robot controller's internal settings without using a robot program, the various I/O devices, such as the sensors and relays mounted on the robot controller's parallel I/O can be controlled from the PLC as if they were CC-Link system I/O devices.



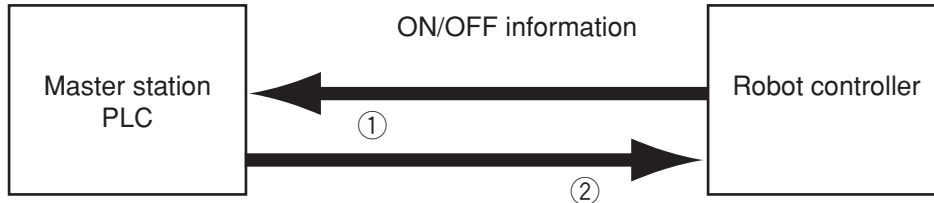
CAUTION

An emergency stop terminal for hardwire is provided in SAFETY connector on the robot controller.

In the case of the RCX240, when the CC-Link system is used while STD. DIO is not used (external DC 24V power supply is not used), the external DC 24V monitor control setting of system parameters must be set invalid. If it is left valid, the STD. DIO interlock signal is enabled causing an error in the robot operation commands.

2. Mechanism

The mechanism of communication is explained in this section to provide an understanding of how the robot controller and PLC operate via the CC-Link system.



- ① The robot controller's ON/OFF information is sent to the master station PLC via the network (CC-Link system cable).
- ② The master station PLC's ON/OFF information is set to the robot controller via the network (CC-Link system cable).

- * **The robot controller monitors the ON/OFF information at a 10ms cycle.**
- * **The ON/OFF information consists of 16 points each of dedicated I/O points and 96 points each of general-purpose I/O points. The word information consists of 2 words each of dedicated I/O points and 14 words each of general-purpose I/O points.**

If the following is executed with the robot program in the robot controller, the bit information will be sent to the master station PLC via the CC-Link system by ①.

SO (20) = 1

Conversely, if the following is executed with the robot program, the bit information received from the master station PLC via the CC-Link system will be monitored by ②, and 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 station PLC via the CC-Link system by ①.

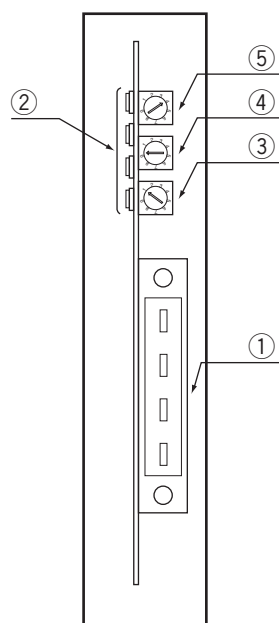
SOW (2)=256

Conversely, if the following is executed with the robot program, the word information received from the master station via the CC-Link system will be monitored by ② will be assigned to an integer A%.

A%=SIW (3)

3. Names of each part on the CC-Link compatible module

The part names of the CC-Link compatible module installed in the robot controller are described in this section. The CC-Link compatible module is installed into an optional slot in the robot controller.



Front of the unit

① **CC-Link system cable terminals**

These terminals are used to connect the CC-Link system cable. Each of the four terminals has a meaning, so do not make miswiring. These terminals are "DA", "DB", "DG" and "SLD" from the top.

② **Transmission monitor LED**

The status in the CC-Link system is indicated with ON, OFF and flickering status of four LEDs. These terminals are "RUN", "ERRL", "SD" and "RD" from the top.

③ **Station No. setting switch (LSB: 1st digit)**

This is the rotary switch for setting the robot controller station No. in the CC-Link system. The 1st digit of the station No. is set with this switch.

④ **Station No. setting switch (MSB: 2nd digit)**

This is the rotary switch for setting the robot controller station No. in the CC-Link system. The 2nd digit of the station No. is set with this switch.

⑤ **Communication speed switch (BPS)**

This is the rotary switch for setting the CC-Link system's communication speed.

4. Assignment of CC-Link compatible I/O

The I/O expressions used in the robot controller's program language and the I/O expressions for the remote device stations differ. The correspondence is shown below.

| Output from robot controller | | | Input to robot controller | | |
|------------------------------|----------|-----------------------|---------------------------|----------|-----------------------|
| Program language | | Remote device station | Program language | | Remote device station |
| | SOW(0)*3 | RWr0 | | SIW(0)*3 | RWw0 |
| | SOW(1)*3 | RWr1 | | SIW(1)*3 | RWw1 |
| SOD(2) | SOW(2) | RWr2 | SID(2) | SIW(2) | RWw2 |
| | SOW(3) | RWr3 | | SIW(3) | RWw3 |
| SOD(4) | SOW(4) | RWr4 | SID(4) | SIW(4) | RWw4 |
| | SOW(5) | RWr5 | | SIW(5) | RWw5 |
| SOD(6) | SOW(6) | RWr6 | SID(6) | SIW(6) | RWw6 |
| | SOW(7) | RWr7 | | SIW(7) | RWw7 |
| SOD(8) | SOW(8) | RWr8 | SID(8) | SIW(8) | RWw8 |
| | SOW(9) | RWr9 | | SIW(9) | RWw9 |
| SOD(10) | SOW(10) | RWrA | SID(10) | SIW(10) | RWwA |
| | SOW(11) | RWrB | | SIW(11) | RWwB |
| SOD(12) | SOW(12) | RWrC | SID(12) | SIW(12) | RWwC |
| | SOW(13) | RWrD | | SIW(13) | RWwD |
| SOD(14) | SOW(14) | RWrE | SID(14) | SIW(14) | RWwE |
| | SOW(15) | RWrF | | SIW(15) | RWwF |
| SO0(7~0)*1 | | RXn7~RXn0 | SI0(7~0)*1 | | RYn7~RYn0 |
| SO1(7~0)*1 | | RXnF~RXn8 | SI1(7~0)*1 | | RYnF~RYn8 |
| SO2(7~0) | | RX(n+1)7~RX(n+1)0 | SI2(7~0) | | RY(n+1)7~RY(n+1)0 |
| SO3(7~0) | | RX(n+1)F~RX(n+1)8 | SI3(7~0) | | RY(n+1)F~RY(n+1)8 |
| SO4(7~0) | | RX(n+2)7~RX(n+2)0 | SI4(7~0) | | RY(n+2)7~RY(n+2)0 |
| SO5(7~0) | | RX(n+2)F~RX(n+2)8 | SI5(7~0) | | RY(n+2)F~RY(n+2)8 |
| SO6(7~0) | | RX(n+3)7~RX(n+3)0 | SI6(7~0) | | RY(n+3)7~RY(n+3)0 |
| SO7(7~0) | | RX(n+3)F~RX(n+3)8 | SI7(7~0) | | RY(n+3)F~RY(n+3)8 |
| SO10(7~0) | | RX(n+4)7~RX(n+4)0 | SI10(7~0) | | RY(n+4)7~RY(n+4)0 |
| SO11(7~0) | | RX(n+4)F~RX(n+4)8 | SI11(7~0) | | RY(n+4)F~RY(n+4)8 |
| SO12(7~0) | | RX(n+5)7~RX(n+5)0 | SI12(7~0) | | RY(n+5)7~RY(n+5)0 |
| SO13(7~0) | | RX(n+5)F~RX(n+5)8 | SI13(7~0) | | RY(n+5)F~RY(n+5)8 |
| SO14(7~0) | | RX(n+6)7~RX(n+6)0 | SI14(7~0) | | RY(n+6)7~RY(n+6)0 |
| SO15(7~0) | | RX(n+6)F~RX(n+6)8 | SI15(7~0) | | RY(n+6)F~RY(n+6)8 |
| ----- | | RX(n+7)F~RX(n+7)0*2 | ----- | | RY(n+7)F~RY(n+7)0*2 |

n: Address assigned to master module with station No setting
 $n = (\text{station No.} - 1) \times 2$

Caution)

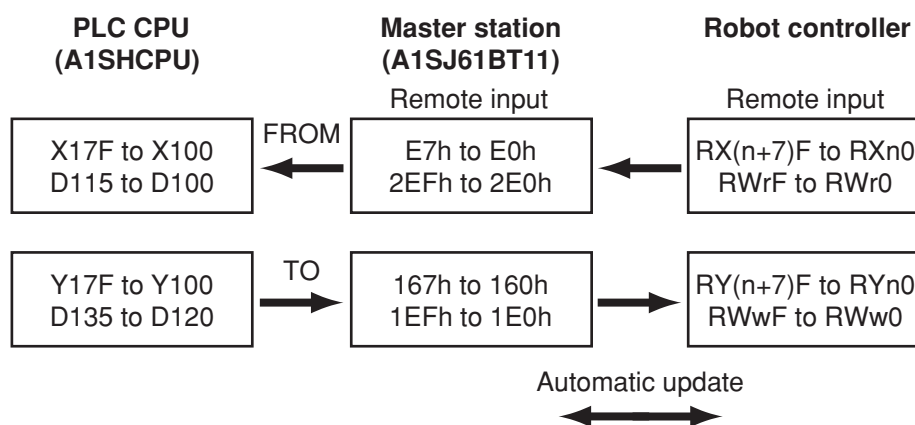
- *1: Has a meaning in the robot controller's internal process as a dedicated input/output. This cannot be used as a general-purpose input/output in the robot program.
- *2: This area is reserved for the CC-Link system.
- *3: Has a meaning in the robot controller's internal process as a dedicated command area. This cannot be used as a general-purpose input/output in the robot program.



NOTE

- SIW(n) and SOW(n) are handled as numerical data of word with no sign.
- SID(n) and SOD(n) are handled as numerical data of double words with a sign.
- The dedicated input of STD.DIO connector provided on the RCX240 controllers will be disabled except for an interlock signal (DI 11). When the external 24V monitor control setting of system parameters is set invalid, the interlock signal (DI 11) will also be disabled. On the RCX22x, the dedicated input of STD.DIO connector will be disabled, but the interlock signal (DI 11) in SAFETY connector enabled.

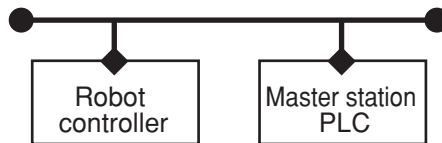
An example of the flow of the I/O information in the robot controller (remote device station) is shown below. The buffer memory in the master station used to store the I/O information, etc., differs according to the PLC type and station No., etc. Refer to the PLC Manual for details.



5. Shift of CC-Link system connection status and robot controller status

Always start the CC-Link system specification robot controller in the servo OFF state after the power is turned ON.

① Normal state of CC-Link system connection when robot controller power is turned ON

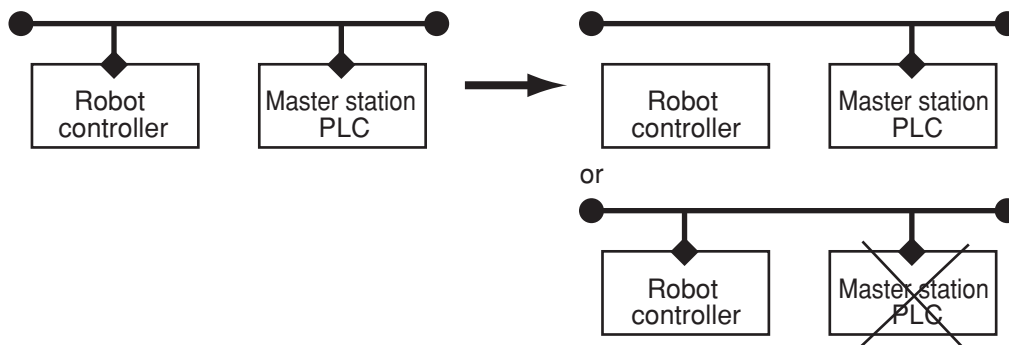


- Emergency stop/interlock signal in CC-Link system are valid.
- When SAFE mode is enabled, service mode input signal is made valid with SI (02) in the CC-Link system.
- Emergency stop terminal in SAFETY connector is valid.
- Interlock signal in STD. DIO connector is valid unless the external 24V monitor control setting of system parameters is set invalid. (RCX240)
- Interlock signal in SAFETY connector is valid. (RCX22x)
- When the external 24V monitor control setting of system parameters is left valid while SAFE mode is enabled, service mode input signal is made valid with DI (02) in SAFETY connector. (RCX240)
- When SAFE mode is enabled, service mode input signal is made valid with DI (02) in SAFETY connector. (RCX22x)

* The signals in the CC-Link system are sent and received.

* Always initialize with the master station PLC when connecting to the CC-Link system.

② Shift from CC-Link system normal connection state to CC-Link system erroneous connection state

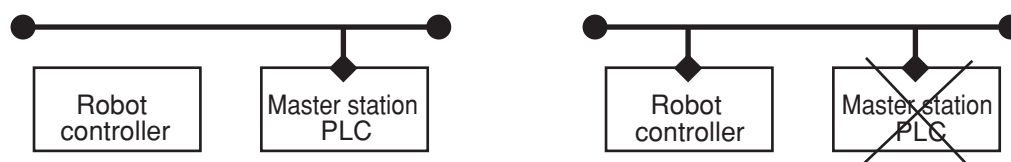


- Emergency stop input turns off with SI (00) in the robot controller.
- Service mode input turns off with SI (02) in the robot controller.
- Emergency stop terminal in SAFETY connector is valid.

- Interlock signal in STD. DIO connector is valid when the external 24V monitor control setting of system parameters is left valid. (RCX240)
 - Interlock signal in SAFETY connector is valid. (RCX22x)
 - When the external 24V monitor control setting of system parameters is left valid while SAFE mode is enabled, service mode input signal is made valid with DI (02) in SAFETY connector. (RCX240)
 - When SAFE mode is enabled, service mode input signal is made valid with DI (02) in SAFETY connector. (RCX22x)
- * The signals in the CC-Link system are not sent or received.
- * The "CC-Link Communication Error" is added to the error history in the robot controller.
- * If the connection to the CC-Link system shifts from the normal state to the erroneous state, the CC-Link system connection must be returned to the normal state.
- * The CC-Link system will return when the CC-Link system connection is recovered to the normal state.

③ CC-Link system erroneous connection state due to following factors when robot controller power is turned ON

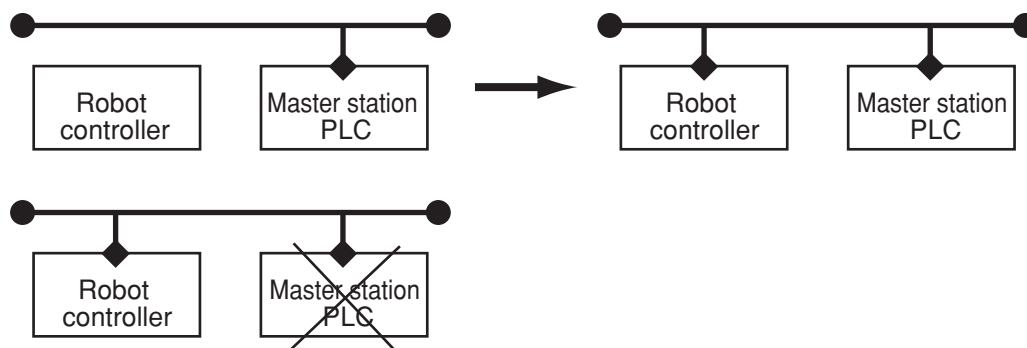
- Connection to CC-Link system not possible
- Error in master station PLC



- Emergency stop/interlock signals in CC-Link system are invalid.
 - When SAFE mode is enabled, service mode input signal is made valid with SI (02) in the CC-Link system.
 - Emergency stop terminal in SAFETY connector is valid.
 - Interlock signal in STD. DIO connector is valid when the external 24V monitor control setting of system parameters is left valid. (RCX240)
 - Interlock signal in SAFETY connector is valid. (RCX22x)
 - When the external 24V monitor control setting of system parameters is left valid while SAFE mode is enabled, service mode input signal is made valid with DI (02) in SAFETY connector. (RCX240)
 - When SAFE mode is enabled, service mode input signal is made valid with DI (02) in SAFETY connector. (RCX22x)
- * The signals on the CC-Link system cannot be exchanged.
- * As opposed to the state given in ②, in this state, the emergency stop state by SI (00) is not attained in the controller, so the robot can be operated from the programming box. (The robot controller can be started independently when setting up the system, etc.)

- * Service mode input signal cannot be invalidated with SI (02) when SAFE mode is enabled, so change the service mode parameter setting in SYSTEM > PARAM mode. In this case, take full precautions to prevent improper settings that might lead to a hazardous situation.
- * When the connection to the CC-Link system is correctly recovered, the system will automatically return to the CC-Link system.
- * The "CC-Link Communication Error" is added to the error history in the robot controller.
(A wait state occurs for a maximum of 2.5 seconds to check the communication status.)

④ **Transmission from CC-Link system erroneous connection state to CC-Link correct connection state when robot controller power is turned ON**



- CC-Link system emergency stop/interlock signals change to valid state.
 - Emergency stop terminal in SAFETY connector is valid.
 - Interlock signal in STD. DIO connector is valid when the external 24V monitor control setting of system parameters is left valid. (RCX240)
 - Interlock signal in SAFETY connector is valid. (RCX22x)
 - When the external 24V monitor control setting of system parameters is left valid while SAFE mode is enabled, service mode input signal is made valid with DI (02) in SAFETY connector. (RCX240)
 - When SAFE mode is enabled, service mode input signal is made valid with DI (02) in SAFETY connector. (RCX22x)
- * The signals in the CC-Link system can be sent and received.
 - * When the connection to the CC-Link system shifts to the normal state, the initialization process must be carried out with the master station PLC when connecting to the CC-Link system.
 - * When service mode parameter setting in SYSTEM > PARAM mode has been changed while SAFE mode is enabled, make the service mode parameter setting again. In this case, take full precautions to prevent improper settings that might lead to a hazardous situation.
 - * The CC-Link system will return when the CC-Link system connection is recovered to the normal state.

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1. Remote command format

Using the CC-Link compatible module allows issuing commands directly from the PLC (programmable logic controller). Commands such as MOVE commands can now be run that were impossible to execute up until now without using the robot program or RS-232C port.



CAUTION

- Remote commands are compatible with the RCX40 with software version 8.15 onwards.
- To use remote commands, the "Remote cmd / IO cmd (SI05)" parameter in SYSTEM > PARAM > OP.BRD mode must be set to "VALID" in advance. Refer to the CC-Link user's manual and controller user's manual for more details.

1.1 Remote command specifications

Functions such as shown below are assigned to each remote register.

| Output (remote → master) | | | Input (remote ← master) | |
|--------------------------|------------|------------------------|-------------------------|----------------------|
| Address | Contents | | Address | Contents |
| RWrn | Status | | RWwn | Execute command code |
| | Normal end | Abnormal end | | |
| RWrn+1 | Response | Error code | RWwn+1 | Command data |
| RWrn+2 | | Additional information | RWwn+2 | |
| RWrn+3 | | | RWwn+3 | |
| to | | | to | |
| RWrn+15 | | | RWwn+15 | |

n : Implemented by PLC



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 RWwn, and command data to the RWwn+m. When the controller receives the remote command, it starts the processing and sends the status (results) and its other information to the PLC by way of the RWrn and RWrn+m. When the remote command ends, assign the status reset command (0x0000 (hexadecimal)) to the RWwn 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. See the detailed information available on the remote commands. 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. See the detailed information available on the remote commands.

- 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 RWwn+4, enter 0x3231 (hexadecimal)
(character code: "1" = 0x31, "2" = 0x32)

For example, to set 0x01234567 (hexadecimal) (=19,088,743) in the RWwn+4 and RWwn+5 registers, set 0x0123 (hexadecimal) in RWwn+5 and set 0x4567 (hexadecimal) in RWwn+4.

- The status code is sent to RWrn when the remote command ends correctly.
- When the remote command ends incorrectly, an error code is sent to RWrn+1 and additional information is sent to RWrn+2 as a response. The error group number is displayed in the upper 8 bits of the error code and the error category number is displayed in the lower 8 bits. The additional information section appears in the upper 8 bits of additional information and a detail value for the additional information appears in the lower 8 bits. See the troubleshooting section of the robot controller user's manual for description of the error group number and error category number.

For example, when 0x0201 (hexadecimal) was set in RWrn+1, this shows that a "soft limit over" error has occurred. When 0x0001 (hexadecimal) is set in RWrn+2, it indicates that Axis 1 of the controller is selected.

1.2 Remote status

The controller starts processing when the remote command is received and sends the status (results) to the PLC by way of RWrn.

■ Remote status list

| Status contents | | | | Meaning |
|-----------------|------------|------------------------|-------------|----------------------|
| RWrn | RWrn+1 | RWrn+2 | From RWrn+3 | |
| 0x0000 | | 0x0000 | | Command ready status |
| 0x0100 | | 0x0000 | | Command run status |
| 0x0200 | | Response data | | Normal end status |
| 0x4000 | Error code | Additional information | 0x0000 | Abnormal end status |



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 PLC due to problems caused by a short remote command execution time versus the controller scan time (10 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.
Error number and error additional information on the error that occurred are sent to RWrn+1 and RWrn+2.
 - **Error code RWrn+1**
Shows the error code for error causing command to end abnormally.
Upper 8 bits show the group number and lower 8 bits show the category number.
 - **Additional information RWrn+2**
Shows additional information if present in error code, such as axis number causing error.
Upper 8 bits show the section number of additional information and lower 8 bits show a detail value.

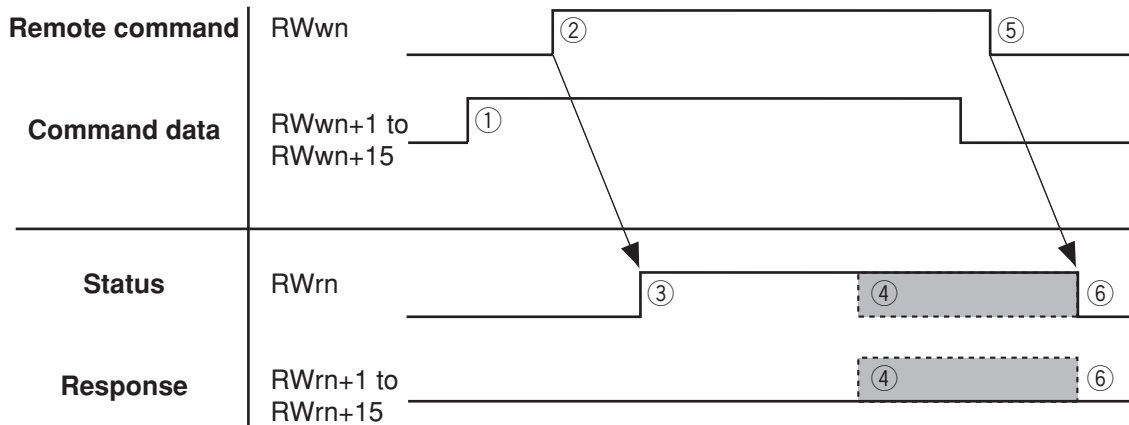
| Section No. | Contents |
|-------------|----------------------|
| 0 | Actual axis d |
| 1 | Axis-d of main robot |
| 2 | Axis-d of sub robot |
| 4 | Main robot |
| 5 | Sub robot |
| 9 | d task |

Here, d shows a detail value for the additional information.

- * For example, 0x0C02 is set in RWrn+1 as the error code when the remote command was interrupted by an interlock signal.
- * For information on the error code, refer to the error message section of the robot controller user's manual.

2. Sending and receiving remote commands

Remote register transmit and receive is performed as follows.



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.
RWwn+1 : command flag (0x0004 = speed setting)
RWwn+3 : speed setting (0x0032=50%)
RWwn+4 : point setting (0x0013= point 19)
- ② Enter the PTP movement command (0x0001) for the designated point into the RWwn.

- 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 RWrn+1 changes to an error code.
- 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 RWwn 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 | RWnn | |
| Special | 0x0000 | Status reset command |
| | 0x8000 | Main robot current position reference command |
| | 0x4000 | Sub robot current position reference command |
| 1 | 0x00nn | Movement command and associated command (including commands supported with IO command) |
| 2 | 0x01nn | Definition and reference command |
| 3 | 0x02nn | Arithmetic command |
| 4 | 0x03nn | I/O port command |
| 5 | 0x04nn | Key operation command |
| 6 | 0x05nn | Data handling command |

* nn is determined by the particular remote command.

■ Remote Status

| Status contents | | | | Meaning |
|-----------------|-------------------------|------------------------|------------|----------------------|
| RWn | RWn+1 | RWn+2 | From RWn+3 | |
| 0x0000 | 0x0000 | | | Command ready status |
| 0x0100 | 0x0000 or response data | | | Command run status |
| 0x0200 | Response data | | | Normal end status |
| 0x4000 | Error code | Additional information | 0x0000 | Abnormal end status |

■ Category 1

| No. | Command contents | | Command code (RWwn) | | |
|-------------|--|------------------------|---------------------|-----------|--------|
| | | | Main robot | Sub robot | |
| 1-1 | MOVE command | PTP point designation | | 0x0001 | 0x0081 |
| | | Arch designation | | 0x0002 | 0x0082 |
| | | Linear interpolation | | 0x0003 | 0x0083 |
| | | Circular interpolation | | 0x0004 | 0x0084 |
| | | Direct PTP designation | Millimeter units | 0x0006 | 0x0086 |
| Pulse units | 0x0007 | | 0x0087 | | |
| 1-2 | MOVEI command | PTP point designation | | 0x0009 | 0x0089 |
| | | Direct PTP designation | Millimeter units | 0x000E | 0x008E |
| | | | Pulse units | 0x000F | 0x008F |
| 1-3 | DRIVE command | Point designation | | 0x0010 | 0x0090 |
| | | Direct designation | Millimeter units | 0x0012 | 0x0092 |
| | | | Pulse units | 0x0013 | 0x0093 |
| 1-4 | DRIVEI command | Point designation | | 0x0014 | 0x0094 |
| | | Direct designation | Millimeter units | 0x0016 | 0x0096 |
| | | | Pulse units | 0x0017 | 0x0097 |
| 1-5 | Pallet command | PTP designation | | 0x0018 | 0x0098 |
| | | Arch designation | | 0x0019 | 0x0099 |
| 1-6 | Jog movement command | | | 0x0020 | 0x00A0 |
| 1-7 | Inching movement command | | | 0x0024 | 0x00A4 |
| 1-8 | Point teaching command | | | 0x0028 | 0x00A8 |
| 1-9 | Absolute reset movement command | | | 0x0030 | 0x00B0 |
| 1-10 | Absolute reset command | | | 0x0031 | 0x00B1 |
| 1-11 | Return-to-origin command | | | 0x0032 | 0x00B2 |
| 1-12 | Servo command | On designation | | 0x0034 | 0x00B4 |
| | | Off designation | | 0x0035 | 0x00B5 |
| | | Free designation | | 0x0036 | 0x00B6 |
| | | Power-on designation | | 0x0037 | |
| 1-13 | Manual speed change command | | | 0x0038 | 0x00B8 |
| 1-14 | Automatic speed change command | | | 0x0039 | 0x00B9 |
| 1-15 | Program speed change command | | | 0x003A | 0x00BA |
| 1-16 | Shift designation change command | | | 0x003B | 0x00BB |
| 1-17 | Hand designation change command | | | 0x003C | 0x00BC |
| 1-18 | Arm designation change command | | | 0x003D | 0x00BD |
| 1-19 | Point display unit designation command | | | 0x003E | |

- * The DRIVE command (1-3) and DRIVEI command (1-4) are only valid for a single axis.
- * The movement methods on the jog movement command (1-6) and inching movement command (1-7) will differ according to the point units that were specified.
- * Point units for the point teaching command (1-8) will differ according to the point units that were specified.
- * If no axis is specified, the absolute reset command (1-10) is executed on all axes (main robot + sub robot) in either case of command code 0x0031 or 0x00B1.
- * If no axis is specified, the return-to-origin command (1-11) is executed on all axes (main robot + sub robot) in either case of command code 0x0032 or 0x00B2.
- * The point display unit designation command (1-19) is for use on the controller.



NOTE

- In the MOVE command, linear interpolation (0x0083) and circular interpolation (0x0084) for sub robot are only available on the following software versions.
RCX14x: Ver. 8.64 onwards RCX22x: Ver. 9.11 onwards RCX240: all versions
- On controllers whose software version is earlier than 8.45 (RCX14x), the return-to-origin command is always executed on all axes (main robot + sub robot) and command code 0x0032 can only be used.

3. Remote command & remote status tables

■ Category 2

| No. | Command contents | | Command code (RWwn) | |
|-----|-------------------------------|-------------------------------|---------------------|--------|
| 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 | Main robot | 0x0110 |
| | | | Sub robot | 0x0190 |
| | | Hand data reference | 0x0111 | |

■ Category 3

| No. | Command contents | | Command code (RWwn) | |
|-----------|----------------------------------|--------------------------|---------------------|--------|
| 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 | Main robot | 0x0220 |
| | | | Sub robot | 0x02A0 |
| | | Reference | Main robot | 0x0224 |
| | | | Sub robot | 0x02A4 |
| 3-3 | Point-related command | Point assignment | | 0x0230 |
| | | Addition | | 0x0234 |
| | | Subtraction | | 0x0235 |
| | | Pallet point assignment | | 0x0238 |
| 3-4 | Element assignment | Point element assignment | "x1" input format | 0x0240 |
| | | | "x100" input format | 0x0241 |
| | | Shift element assignment | "x100" input format | 0x0245 |

■ Category 4

| No. | Command contents | | Command code (RWwn) | |
|-----|---------------------------|------------|---------------------|--------|
| 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 (RWwn) |
|-----|---|------------------------|---------------------|
| 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 task switching | | 0x0407 |
| 5-5 | Program execution information reference | | 0x0408 |

■ Category 6

| No. | Command contents | | Command code (RWwn) | |
|------|------------------------------------|------------------|---------------------|--------|
| 6-1 | Version information reference | | 0x0501 | |
| 6-2 | Controller configuration reference | | 0x0502 | |
| 6-3 | Servo status reference | | 0x0503 | |
| 6-4 | Absolute reset status reference | | 0x0504 | |
| 6-5 | Current position reference | Pulse units | Main robot | 0x0505 |
| | | | Sub robot | 0x0585 |
| | | Millimeter units | Main robot | 0x0506 |
| | | | Sub robot | 0x0586 |
| 6-6 | Task status reference | | 0x0507 | |
| 6-7 | Task execution reference | | 0x0508 | |
| 6-8 | Message reference | | 0x0509 | |
| 6-9 | Speed status reference | | 0x050A | |
| 6-10 | Arm designation status reference | | 0x050B | |
| 6-11 | Arm status reference | | 0x050C | |
| 6-12 | Service mode status reference | | 0x050D | |
| 6-13 | Point unit status reference | | 0x050E | |
| 6-14 | Return-to-origin status reference | | 0x050F | |

4. Remote command information

4.1 Special commands

Special commands are used in applications different from other remote commands. A list of those commands is shown below.

| No. | Command contents | Command code (RWwn) |
|-----|---|---------------------|
| 1 | Status reset command | 0x0000 |
| 2 | Main robot current position reference command | 0x8000 |
| 3 | Sub robot current position reference command | 0x4000 |

4.1.1 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 after executing a remote command, this command must always be executed before running the next command.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0000 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0000 |
| RWrn+1 | Response | |
| to | | |
| RWrn+15 | | |

4.1.2 Main robot current position reference command

Execute this command to obtain the main robot current position data. This command returns normal end status (0x0200) as the status code, but continually executes the main robot current position reference command until the status reset command is run. Units for the current position obtained at this time are the same as the point unit system of the controller. This command is useful when constantly monitoring the main robot current position.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x8000 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | a |
| | | bit 15–bit 1 | 0 |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

a : Shows in 1 bit the units for the current position data obtained. Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

bbbbbbbb : Shows the data in 32 bits. (little endian)
 Data is shown in integers when units are in pulses.
 Data is shown in integers (×100) when units are in millimeters.

Example:
 Values are expressed as shown at right when controller display units are in millimeters and with:

Axis 1 = 200.01
 Axis 3 = -123.45
 Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x4E21 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0xCFC7 |
| RWrn+9 | 0xFFFF |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.1.3 Sub robot current position reference command

Execute this command to obtain the sub robot current position data. This command returns normal end status (0x0200) as the status code, but continually executes the sub robot current position reference command until the status reset command is run. Units for the current position obtained at this time are the same as the point unit system of the controller. This command is valid when constantly monitoring the sub robot current position.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x4000 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

| Remote register | Contents | Value | | |
|-----------------|-------------|--------------|------------|------------|
| RWrn | Status code | 0x0200 | | |
| RWrn+1 | Not used | | | |
| RWrn+2 | | | | |
| RWrn+3 | Point flag | bit 0 | Point unit | a |
| | | bit 15-bit 1 | Not used | 0 |
| RWrn+4 | Axis-1 data | | | 0xbbbbbbbb |
| RWrn+5 | | | | |
| RWrn+6 | Axis-2 data | | | 0xbbbbbbbb |
| RWrn+7 | | | | |
| RWrn+8 | Axis-3 data | | | 0xbbbbbbbb |
| RWrn+9 | | | | |
| RWrn+10 | Axis-4 data | | | 0xbbbbbbbb |
| RWrn+11 | | | | |
| RWrn+12 | Axis-5 data | | | 0xbbbbbbbb |
| RWrn+13 | | | | |
| RWrn+14 | Axis-6 data | | | 0xbbbbbbbb |
| RWrn+15 | | | | |

a : Shows in 1 bit the units for the current position data obtained.
Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

bbbbbbbb : Shows the data in 32 bits. (little endian)
Data is shown in integers when units are in pulses.
Data is shown in integers (×100) when units are in millimeters.

Example:

Values are expressed as shown at right when controller display units are in pulses and with:

Axis 1 = 123456
Axis 2 = -123
Other axes = 0

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0xE240 |
| RWrn+5 | 0x0001 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2 Category 1 remote commands

These are remote commands mainly for movement commands. A list of these commands is shown below.

| No. | Command contents | | Command code (RWwn) | | |
|--------------|--|------------------------|---------------------|-----------|--------|
| | | | Main robot | Sub robot | |
| 1 | MOVE command | PTP point designation | | 0x0001 | 0x0081 |
| | | Arch designation | | 0x0002 | 0x0082 |
| | | Linear interpolation | | 0x0003 | 0x0083 |
| | | Circular interpolation | | 0x0004 | 0x0084 |
| | | Direct PTP designation | Millimeters units | 0x0006 | 0x0086 |
| Pulses units | 0x0007 | | 0x0087 | | |
| 2 | MOVEI command | PTP point designation | | 0x0009 | 0x0089 |
| | | Direct PTP designation | Millimeters units | 0x000E | 0x008E |
| | | | Pulses units | 0x000F | 0x008F |
| 3 | DRIVE command | Point designation | | 0x0010 | 0x0090 |
| | | Direct designation | Millimeters units | 0x0012 | 0x0092 |
| | | | Pulses units | 0x0013 | 0x0093 |
| 4 | DRIVEI command | Point designation | | 0x0014 | 0x0094 |
| | | Direct designation | Millimeters units | 0x0016 | 0x0096 |
| | | | Pulses units | 0x0017 | 0x0097 |
| 5 | Pallet command | PTP designation | | 0x0018 | 0x0098 |
| | | Arch designation | | 0x0019 | 0x0099 |
| 6 | Jog movement command | | | 0x0020 | 0x00A0 |
| 7 | Inching movement command | | | 0x0024 | 0x00A4 |
| 8 | Point teaching command | | | 0x0028 | 0x00A8 |
| 9 | Absolute reset movement command | | | 0x0030 | 0x00B0 |
| 10 | Absolute reset command | | | 0x0031 | 0x00B1 |
| 11 | Return-to-origin command | | | 0x0032 | 0x00B2 |
| 12 | Servo command | On designation | | 0x0034 | 0x00B4 |
| | | Off designation | | 0x0035 | 0x00B5 |
| | | Free designation | | 0x0036 | 0x00B6 |
| | | Power-on designation | | 0x0037 | |
| 13 | Manual speed change command | | | 0x0038 | 0x00B8 |
| 14 | Automatic speed change command | | | 0x0039 | 0x00B9 |
| 15 | Program speed change command | | | 0x003A | 0x00BA |
| 16 | Shift designation change command | | | 0x003B | 0x00BB |
| 17 | Hand designation change command | | | 0x003C | 0x00BC |
| 18 | Arm designation change command | | | 0x003D | 0x00BD |
| 19 | Point display unit designation command | | | 0x003E | |

* The DRIVE command (3) and DRIVEI command (4) are only valid for a single axis.

* The movement methods on the jog movement command (6) and inching movement command (7) will differ according to the point units that were specified.

* Point units for the point teaching command (8) will differ according to the point units that were specified.

* If no axis is specified, the absolute reset command (10) is executed on all axes (main robot + sub robot) in either case of command code 0x0031 or 0x00B1.

* If no axis is specified, the return-to-origin command (11) is executed on all axes (main robot + sub robot) in either case of command code 0x0032 or 0x00B2.

* The point display unit designation command (19) is for use on the controller.



NOTE

- In the MOVE command, linear interpolation (0x0083) and circular interpolation (0x0084) for sub robot are only available on the following software versions.
RCX14x: Ver. 8.64 onwards RCX22x: Ver. 9.11 onwards RCX240: all versions
- On controllers whose software version is earlier than 8.45 (RCX14x), the return-to-origin command is always executed on all axes (main robot + sub robot) and command code 0x0032 can only be used.

4.2.1 MOVE command

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

4.2.1.1 PTP designation

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

■ Command

| Remote register | Contents | | Value | |
|-----------------|------------------------|----------------|--|--------|
| RWwn | Command code | | | |
| | | For main robot | 0x0001 | |
| | | For sub robot | 0x0081 | |
| RWwn+1 | Command flag | bit 0 | Axis designation flag | a |
| | | bit 2–bit 1 | Speed designation flag | bb |
| | | bit 14–bit 3 | (0:Fixed) | 0 |
| | | bit 15 | Current position output designation flag | n |
| RWwn+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) | |
| RWwn+3 | Specified speed | | 0xssss | |
| RWwn+4 | Point number | | 0xpppp | |
| RWwn+5 | Not used | | 0x0000 | |
| to | | | | |
| RWwn+15 | | | | |

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.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (=0x0001) to 100 (=0x0064)

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)



CAUTION

In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | Point unit |
| | | bit 15-bit 1 | Not used |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data. Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the MOVE command with PTP designation as shown at right, when moving all axes of the main robot to point number 100 at 50% speed. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0001 |
| RWwn+1 | 0x8004 |
| RWwn+2 | 0x0000 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x0064 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in pulses and with:

Axis 1 = 123456
 Axis 2 = -123
 Other axes = 0

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0xE240 |
| RWrn+5 | 0x0001 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.1.2 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

| Remote register | Contents | | Value | |
|-----------------|------------------------|----------------|--|--------|
| RWwn | Command code | | | |
| | | For main robot | 0x0002 | |
| | | For sub robot | 0x0082 | |
| RWwn+1 | 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 14–bit 5 | (0:Fixed) | 0 |
| | | bit 15 | Current position output designation flag | n |
| RWwn+2 | 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) | |
| RWwn+3 | Specified speed | | 0xssss | |
| RWwn+4 | Point number | | 0xpppp | |
| RWwn+5 | Not used | | 0x0000 | |
| RWwn+6 | | | | |
| RWwn+7 | | | | |
| RWwn+8 | Arch position data | | 0xqqqqqqqq | |
| RWwn+9 | Not used | | 0x0000 | |
| RWwn+10 | | | | |
| to | | | | |
| RWwn+15 | | | | |

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.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

d : Specify the arch data units in 1 bit.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (=0x0001) to 100 (=0x0064)

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)

qqqqqqqq : Specify the arch position in 32 bits. (little endian)
Data should be integers when units are in pulses. Data should be integers (×100) when units are in millimeters.



CAUTION

In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | | | Value |
|-----------------|--------------|--------------|------------|------------|
| RWrn | Status code | | | 0x0200 |
| RWrn+1 | Not used | | | |
| RWrn+2 | Not used | | | |
| RWrn+3 | Point flag | bit 0 | Point unit | a |
| | | bit 15–bit 1 | Not used | 0 |
| RWrn+4 | Axis-1 data | | | 0xbbbbbbbb |
| RWrn+5 | Axis-2 data | | | 0xbbbbbbbb |
| RWrn+6 | Axis-3 data | | | 0xbbbbbbbb |
| RWrn+7 | Axis-4 data | | | 0xbbbbbbbb |
| RWrn+8 | Axis-5 data | | | 0xbbbbbbbb |
| RWrn+9 | Axis-6 data | | | 0xbbbbbbbb |
| RWrn+10 | Axis-7 data | | | 0xbbbbbbbb |
| RWrn+11 | Axis-8 data | | | 0xbbbbbbbb |
| RWrn+12 | Axis-9 data | | | 0xbbbbbbbb |
| RWrn+13 | Axis-10 data | | | 0xbbbbbbbb |
| RWrn+14 | Axis-11 data | | | 0xbbbbbbbb |
| RWrn+15 | Axis-12 data | | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data.
Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-------------------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 to RWrn+15 | Not used | |

- aabb** : Shows the group number in upper 8 bits, and the category number in lower 8 bits.
- ccdd** : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the MOVE command with arch designation as shown at right, when moving all axes of the main robot to point number 100 at 50% speed by way of a Z-axis arch position of 10.00mm. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0002 |
| RWwn+1 | 0x8014 |
| RWwn+2 | 0x0400 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x0064 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x03E8 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in millimeters and with:

- Axis 1 = 123.45
 Axis 2 = -1.23
 Axis 3 = 50.00
 Axis 4 = 90.23
 Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x3039 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x233F |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.1.3 Linear interpolation

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



NOTE

In the MOVE command, linear interpolation (0x0083) for sub robot is only available on the following software versions.

RCX14x: Ver. 8.64 onwards RCX22x: Ver. 9.11 onwards RCX240: all versions

■ Command

| Remote register | Contents | | Value | |
|-----------------|--------------------------|----------------|--|----|
| RWwn | Command code | | | |
| | | For main robot | 0x0003 | |
| | | For sub robot | 0x0083 | |
| RWwn+1 | 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 14–bit 7 | (0:Fixed) | 0 |
| | | bit 15 | Current position output designation flag | n |
| RWwn+2 | Not used | | 0x0000 | |
| RWwn+3 | Specified speed | | 0xssss | |
| RWwn+4 | Point number | | 0xpppp | |
| RWwn+5 | Not used | | 0x0000 | |
| to | | | | |
| RWwn+9 | | | | |
| RWwn+10 | Acceleration designation | | 0xrrrr | |
| RWwn+11 | Deceleration designation | | 0xrrrr | |
| RWwn+12 | Not used | | 0x0000 | |
| to | | | | |
| RWwn+15 | | | | |

bb : Specify the speed setting method in 2 bits.

| Value | Meaning |
|-------|-----------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |
| 11 | Speed is specified in mm/s. |

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. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

ssss : Specify the speed in 16 bits.

Specified range: Speed % : 1 (=0x0001) to 100 (=0x0064)

Specified speed in mm/s : 1 (=0x0001) to 1000 (=0x03E8)

- pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)
- rrrr : Specify the acceleration and deceleration in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)



CAUTION In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | | | Value |
|-----------------|-------------|--------------|------------|------------|
| RWrn | Status code | | | 0x0200 |
| RWrn+1 | Not used | | | |
| RWrn+2 | | | | |
| RWrn+3 | Point flag | bit 0 | Point unit | a |
| | | bit 15–bit 1 | Not used | 0 |
| RWrn+4 | Axis-1 data | | | 0xbbbbbbbb |
| RWrn+5 | | | | |
| RWrn+6 | Axis-2 data | | | 0xbbbbbbbb |
| RWrn+7 | | | | |
| RWrn+8 | Axis-3 data | | | 0xbbbbbbbb |
| RWrn+9 | | | | |
| RWrn+10 | Axis-4 data | | | 0xbbbbbbbb |
| RWrn+11 | | | | |
| RWrn+12 | Axis-5 data | | | 0xbbbbbbbb |
| RWrn+13 | | | | |
| RWrn+14 | Axis-6 data | | | 0xbbbbbbbb |
| RWrn+15 | | | | |

a : Shows in 1 bit the units for current position output point data.
Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the MOVE command with linear interpolation as shown at right, when moving all axes of the main robot to point number 100 at a speed of 200 mm/s and at 50% acceleration. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0003 |
| RWwn+1 | 0x8026 |
| RWwn+2 | 0x0000 |
| RWwn+3 | 0x00C8 |
| RWwn+4 | 0x0064 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0032 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in millimeters and with:

Axis 1 = 123.45
 Axis 2 = -1.23
 Axis 3 = 50.00
 Axis 4 = 90.23
 Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x3039 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x233F |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.1.4 Circular interpolation

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



NOTE

In the MOVE command, circular interpolation (0x0084) for sub robot is only available on the following software versions.

RCX14x: Ver. 8.64 onwards RCX22x: Ver. 9.11 onwards RCX240: all versions

■ Command

| Remote register | Contents | | Value |
|-----------------|--------------------------|--|-------------------------------|
| RWwn | Command code | | |
| | | For main robot | 0x0004 |
| | | For sub robot | 0x0084 |
| RWwn+1 | Command flag | bit 0 | (0:Fixed) |
| | | bit 2–bit 1 | Speed designation flag |
| | | bit 4–bit 3 | (0:Fixed) |
| | | bit 5 | Acceleration designation flag |
| | | bit 6 | Deceleration designation flag |
| | | bit 14–bit 7 | (0:Fixed) |
| | bit 15 | Current position output designation flag | n |
| RWwn+2 | Not used | | 0x0000 |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | First point number | | 0xpppp |
| RWwn+5 | Second point number | | 0xpppp |
| RWwn+6 | Not used | | 0x0000 |
| to | | | |
| RWwn+9 | | | |
| RWwn+10 | Acceleration designation | | 0xrrrr |
| RWwn+11 | Deceleration designation | | 0xrrrr |
| RWwn+12 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

bb : Specify the speed setting method in 2 bits.

| Value | Meaning |
|-------|-----------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |
| 11 | Speed is specified in mm/s. |

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. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

ssss : Specify the speed in 16 bits.

Specified range: Speed % : 1 (=0x0001) to 100 (=0x0064)

Specified speed in mm/s : 1 (=0x0001) to 1000 (=0x03E8)

- pppp : Specify the first and second point numbers in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)
- rrrr : Specify the acceleration and deceleration in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

**CAUTION**

In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ **Status**

Normal end

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | Point unit |
| | | bit 15–bit 1 | Not used |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

- a : Shows in 1 bit the units for current position output point data.
Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

- 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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

- aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.
- ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

4. Remote command information

Example:

Specify the MOVE command with circular interpolation as shown at right, when moving all axes of the main robot to point numbers 100 and 101 at 20% speed and 50% deceleration. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0004 |
| RWwn+1 | 0x8044 |
| RWwn+2 | 0x0000 |
| RWwn+3 | 0x0014 |
| RWwn+4 | 0x0064 |
| RWwn+5 | 0x0065 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0032 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in millimeters and with:

Axis 1 = 123.45
Axis 2 = -1.23
Axis 3 = 50.00
Axis 4 = 90.23
Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x3039 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x233F |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.1.5 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**

| Remote register | Contents | | Value |
|-----------------|------------------------|--------------|---|
| RWwn | Command code | | For main robot 0x0006 |
| | | | For sub robot 0x0086 |
| RWwn+1 | Command flag | bit 0 | Axis designation flag a |
| | | bit 2–bit 1 | Speed designation flag bb |
| | | bit 14–bit 3 | (0:Fixed) 0 |
| | | bit 15 | Current position output designation flag n |
| RWwn+2 | Specified axis to move | bit 0 | Axis 1 |
| | | 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) |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | Axis-1 data | | 0xpppppppp |
| RWwn+5 | | | |
| RWwn+6 | Axis-2 data | | 0xpppppppp |
| RWwn+7 | | | |
| RWwn+8 | Axis-3 data | | 0xpppppppp |
| RWwn+9 | | | |
| RWwn+10 | Axis-4 data | | 0xpppppppp |
| RWwn+11 | | | |
| RWwn+12 | Axis-5 data | | 0xpppppppp |
| RWwn+13 | | | |
| RWwn+14 | Axis-6 data | | 0xpppppppp |
| RWwn+15 | | | |

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.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (=0x0001) to 100 (=0x0064)

pppppppp : Specify the target position data for each axis in 32 bits.
(little endian)
Data should be integers (×100) in millimeter units.



CAUTION

Do not try to specify only axis 4 to move on SCARA robots. Attempting to specify only axis 4 will cause a "5.38: Illegal option".
When specifying axis 4, then also specify axis 1 and axis 2 at the same time.

■ **Status**

Normal end

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | a |
| | | bit 15–bit 1 | 0 |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data. Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the MOVE command with direct PTP designation (millimeter units) as shown at right, when moving all axes of the main robot to the following points at 50% speed.

Axis 1 = 100.00
 Axis 2 = -200.00
 Axis 3 = 50.00
 Axis 4 = -180.00
 Other axes = 0.00

The current position output is specified at this time.

Values are expressed as shown at right, when controller display units are in millimeters.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0006 |
| RWwn+1 | 0x8004 |
| RWwn+2 | 0x0000 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x2710 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0xB1E0 |
| RWwn+7 | 0xFFFF |
| RWwn+8 | 0x1388 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0xB9B0 |
| RWwn+11 | 0xFFFF |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x2710 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xB1E0 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0xB9B0 |
| RWrn+11 | 0xFFFF |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.1.6 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

| Remote register | Contents | | Value |
|-----------------|------------------------|----------------|--|
| RWwn | Command code | For main robot | 0x0007 |
| | | For sub robot | 0x0087 |
| RWwn+1 | Command flag | bit 0 | Axis designation flag |
| | | bit 2–bit 1 | Speed designation flag |
| | | bit 14–bit 3 | (0:Fixed) |
| | | bit 15 | Current position output designation flag |
| RWwn+2 | Specified axis to move | bit 0 | Axis 1 |
| | | 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) | 0x00tt |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | Axis-1 data | | 0xpppppppp |
| RWwn+5 | | | |
| RWwn+6 | Axis-2 data | | 0xpppppppp |
| RWwn+7 | | | |
| RWwn+8 | Axis-3 data | | 0xpppppppp |
| RWwn+9 | | | |
| RWwn+10 | Axis-4 data | | 0xpppppppp |
| RWwn+11 | | | |
| RWwn+12 | Axis-5 data | | 0xpppppppp |
| RWwn+13 | | | |
| RWwn+14 | Axis-6 data | | 0xpppppppp |
| RWwn+15 | | | |

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.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (=0x0001) to 100 (=0x0064)

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

■ Status

Normal end

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | Point unit |
| | | bit 15–bit 1 | Not used |
| | | | a |
| | | | 0 |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data. Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

4. Remote command information

Example:

Specify the MOVE command with direct designation PTP (pulse units) as shown at right, when moving all axes of the main robot to the following points at 50% speed.

Axis 1 = 100000
Axis 2 = -200000
Axis 3 = 50000
Axis 4 = -180000
Other axes = 0

The current position output is specified at this time.

Values are expressed as shown at right, when controller display units are in pulses.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0007 |
| RWwn+1 | 0x8004 |
| RWwn+2 | 0x0000 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x86A0 |
| RWwn+5 | 0x0001 |
| RWwn+6 | 0xF2C0 |
| RWwn+7 | 0xFFFC |
| RWwn+8 | 0xC350 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x40E0 |
| RWwn+11 | 0xFFFF |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x86A0 |
| RWrn+5 | 0x0001 |
| RWrn+6 | 0xF2C0 |
| RWrn+7 | 0xFFFC |
| RWrn+8 | 0xC350 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x40E0 |
| RWrn+11 | 0xFFFF |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.2 MOVEI command

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

4.2.2.1 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 in the controller versions shown below, the resumed motion can occur either to the original target position, or to a new target position referenced to the current position, in accordance with the "MOVEI/DRIVEI start position" setting selected at the other parameters. For details, refer to the controller user's manual.
RCX14x: Ver. 8.66 onwards RCX22x: Ver. 9.13 onwards RCX240: all versions
- 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).
- In controller versions prior to those shown above, motion occurs to a new target position referenced to the current position when MOVEI is interrupted and then re-executed.

■ Command

| Remote register | Contents | | Value |
|-----------------|------------------------|----------------|--|
| RWwn | Command code | | |
| | | For main robot | 0x0009 |
| | | For sub robot | 0x0089 |
| RWwn+1 | Command flag | bit 0 | Axis designation flag |
| | | bit 2–bit 1 | Speed designation flag |
| | | bit 14–bit 3 | (0:Fixed) |
| | | bit 15 | Current position output designation flag |
| RWwn+2 | Specified axis to move | bit 0 | Axis 1 |
| | | 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) |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | Point number | | 0xpppp |
| RWwn+5 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

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.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

- 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.
Specified range: 1 (=0x0001) to 100 (=0x0064)
- pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)



CAUTION In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | Point unit |
| | | bit 15-bit 1 | Not used |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

- a : Shows in 1 bit the units for current position output point data. Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

- 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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

- aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.
- ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the MOVEI command with PTP designation as shown at right, when moving all axes of the main robot a distance specified by point number 100 at 50% speed. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0009 |
| RWwn+1 | 0x8004 |
| RWwn+2 | 0x0000 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x0064 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in pulses and with:

Axis 1 = 123456
 Axis 2 = -123
 Other axes = 0

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0xE240 |
| RWrn+5 | 0x0001 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.2.2 Direct PTP designation (millimeter units)

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



NOTE

- If the MOVEI command is interrupted and then re-executed in the controller versions shown below, the resumed motion can occur either to the original target position, or to a new target position referenced to the current position, in accordance with the "MOVEI/DRIVEI start position" setting selected at the other parameters. For details, refer to the controller user's manual.
RCX14x: Ver. 8.66 onwards RCX22x: Ver. 9.13 onwards RCX240: all versions
- 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).
- In controller versions prior to those shown above, motion occurs to a new target position referenced to the current position when MOVEI is interrupted and then re-executed.

■ Command

| Remote register | Contents | | Value |
|-----------------|------------------------|----------------|---|
| RWwn | Command code | For main robot | 0x000E |
| | | For sub robot | 0x008E |
| RWwn+1 | Command flag | bit 0 | Axis designation flag a |
| | | bit 2–bit 1 | Speed designation flag bb |
| | | bit 14–bit 3 | (0:Fixed) 0 |
| | | bit 15 | Current position output designation flag n |
| RWwn+2 | Specified axis to move | bit 0 | Axis 1 |
| | | 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) |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | Axis-1 data | | 0xpppppppp |
| RWwn+5 | | | |
| RWwn+6 | Axis-2 data | | 0xpppppppp |
| RWwn+7 | | | |
| RWwn+8 | Axis-3 data | | 0xpppppppp |
| RWwn+9 | | | |
| RWwn+10 | Axis-4 data | | 0xpppppppp |
| RWwn+11 | | | |
| RWwn+12 | Axis-5 data | | 0xpppppppp |
| RWwn+13 | | | |
| RWwn+14 | Axis-6 data | | 0xpppppppp |
| RWwn+15 | | | |

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.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (=0x0001) to 100 (=0x0064)

pppppppp : Specify the target movement distance data for each axis in 32 bits. (little endian)
Data should be integers (×100) in millimeter units.

■ Status

Normal end

| Remote register | Contents | | Value |
|---------------------|-------------|--------------|------------|
| RWr _n | Status code | | 0x0200 |
| RWr _{n+1} | Not used | | |
| RWr _{n+2} | Not used | | |
| RWr _{n+3} | Point flag | bit 0 | Point unit |
| | | bit 15–bit 1 | Not used |
| RWr _{n+4} | Axis-1 data | | 0xbbbbbbbb |
| RWr _{n+5} | Axis-1 data | | 0xbbbbbbbb |
| RWr _{n+6} | Axis-2 data | | 0xbbbbbbbb |
| RWr _{n+7} | Axis-2 data | | 0xbbbbbbbb |
| RWr _{n+8} | Axis-3 data | | 0xbbbbbbbb |
| RWr _{n+9} | Axis-3 data | | 0xbbbbbbbb |
| RWr _{n+10} | Axis-4 data | | 0xbbbbbbbb |
| RWr _{n+11} | Axis-4 data | | 0xbbbbbbbb |
| RWr _{n+12} | Axis-5 data | | 0xbbbbbbbb |
| RWr _{n+13} | Axis-5 data | | 0xbbbbbbbb |
| RWr _{n+14} | Axis-6 data | | 0xbbbbbbbb |
| RWr _{n+15} | Axis-6 data | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data.
Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|---------------------|------------------------|--------|
| RWr _n | Status code | 0x4000 |
| RWr _{n+1} | Error code | 0xaabb |
| RWr _{n+2} | Additional information | 0xccdd |
| RWr _{n+3} | Not used | |
| to | | |
| RWr _{n+15} | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

4. Remote command information

Example:

Specify the MOVEI command with direct PTP designation (millimeter units) as shown at right, when moving all axes of the main robot a distance specified by the following points from "0.00" mm positions at 50% speed.

Axis 1 = 100.00
 Axis 2 = -200.00
 Axis 3 = 50.00
 Axis 4 = -180.00
 Other axes = 0.00

The current position output is specified at this time.

Values are expressed as shown at right, when controller display units are in millimeters.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x000E |
| RWwn+1 | 0x8004 |
| RWwn+2 | 0x0000 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x2710 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0xB1E0 |
| RWwn+7 | 0xFFFF |
| RWwn+8 | 0x1388 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0xB9B0 |
| RWwn+11 | 0xFFFF |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x2710 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xB1E0 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0xB9B0 |
| RWrn+11 | 0xFFFF |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.2.3 Direct PTP designation (pulse units)

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



NOTE

- If the MOVEI command is interrupted and then re-executed in the controller versions shown below, the resumed motion can occur either to the original target position, or to a new target position referenced to the current position, in accordance with the "MOVEI/DRIVEI start position" setting selected at the other parameters. For details, refer to the controller user's manual.
RCX14x: Ver. 8.66 onwards RCX22x: Ver. 9.13 onwards RCX240: all versions
- 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).
- In controller versions prior to those shown above, motion occurs to a new target position referenced to the current position when MOVEI is interrupted and then re-executed.

■ Command

| Remote register | Contents | | Value |
|-----------------|------------------------|--------------|--|
| RWwn | Command code | | For main robot |
| | | | 0x000F |
| RWwn+1 | Command flag | | For sub robot |
| | | | 0x008F |
| RWwn+1 | Command flag | bit 0 | Axis designation flag |
| | | bit 2–bit 1 | Speed designation flag |
| | | bit 14–bit 3 | (0:Fixed) |
| | | bit 15 | Current position output designation flag |
| RWwn+2 | Specified axis to move | bit 0 | Axis 1 |
| | | 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) |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | Axis-1 data | | 0xpppppppp |
| RWwn+5 | | | |
| RWwn+6 | Axis-2 data | | 0xpppppppp |
| RWwn+7 | | | |
| RWwn+8 | Axis-3 data | | 0xpppppppp |
| RWwn+9 | | | |
| RWwn+10 | Axis-4 data | | 0xpppppppp |
| RWwn+11 | | | |
| RWwn+12 | Axis-5 data | | 0xpppppppp |
| RWwn+13 | | | |
| RWwn+14 | Axis-6 data | | 0xpppppppp |
| RWwn+15 | | | |

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.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (=0x0001) to 100 (=0x0064)

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

| Remote register | Contents | | Value |
|---------------------|-------------|--------------|------------|
| RWr _n | Status code | | 0x0200 |
| RWr _{n+1} | Not used | | |
| RWr _{n+2} | Not used | | |
| RWr _{n+3} | Point flag | bit 0 | Point unit |
| | | bit 15-bit 1 | Not used |
| RWr _{n+4} | Axis-1 data | | 0xbbbbbbbb |
| RWr _{n+5} | Axis-1 data | | 0xbbbbbbbb |
| RWr _{n+6} | Axis-2 data | | 0xbbbbbbbb |
| RWr _{n+7} | Axis-2 data | | 0xbbbbbbbb |
| RWr _{n+8} | Axis-3 data | | 0xbbbbbbbb |
| RWr _{n+9} | Axis-3 data | | 0xbbbbbbbb |
| RWr _{n+10} | Axis-4 data | | 0xbbbbbbbb |
| RWr _{n+11} | Axis-4 data | | 0xbbbbbbbb |
| RWr _{n+12} | Axis-5 data | | 0xbbbbbbbb |
| RWr _{n+13} | Axis-5 data | | 0xbbbbbbbb |
| RWr _{n+14} | Axis-6 data | | 0xbbbbbbbb |
| RWr _{n+15} | Axis-6 data | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data.
Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|---------------------|------------------------|--------|
| RWr _n | Status code | 0x4000 |
| RWr _{n+1} | Error code | 0xaabb |
| RWr _{n+2} | Additional information | 0xccdd |
| RWr _{n+3} | Not used | |
| to | | |
| RWr _{n+15} | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the MOVEI command with direct PTP designation (millimeter units) as shown at right, when moving all axes of the main robot a distance specified by the following points from "0" pulse positions at 50% speed.

Axis 1 = 100000
 Axis 2 = -200000
 Axis 3 = 50000
 Axis 4 = -180000
 Other axes = 0

The current position output is specified at this time.

Values are expressed as shown at right, when controller display units are in millimeters.

| Remote register | Value |
|-----------------|---------|
| RWwn | 0x000F |
| RWwn+1 | 0x8004 |
| RWwn+2 | 0x0000 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x86A0 |
| RWwn+5 | 0x0001 |
| RWwn+6 | 0xF2C0 |
| RWwn+7 | 0xFFFC |
| RWwn+8 | 0xC350 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x40E0 |
| RWwn+11 | 0xFFFFD |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

| Remote register | Value |
|-----------------|---------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x86A0 |
| RWrn+5 | 0x0001 |
| RWrn+6 | 0xF2C0 |
| RWrn+7 | 0xFFFC |
| RWrn+8 | 0xC350 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x40E0 |
| RWrn+11 | 0xFFFFD |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 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.

4.2.3.1 Point designation

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

■ Command

| Remote register | Contents | | Value |
|-----------------|------------------------|--------------|--|
| RWwn | Command code | | For main robot |
| | | | For sub robot |
| | | | 0x0010 |
| RWwn+1 | Command flag | bit 0 | (1:Fixed) |
| | | bit 2–bit 1 | Speed designation flag |
| | | bit 6–bit 3 | (0:Fixed) |
| | | bit 7 | Torque limit designation flag |
| | | bit 14–bit 8 | (0:Fixed) |
| | | bit 15 | Current position output designation flag |
| RWwn+2 | Specified axis to move | bit 0 | Axis 1 |
| | | 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) |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | Point number | | 0xpppp |
| RWwn+5 | Not used | | 0x0000 |
| to | | | |
| RWwn+7 | | | |
| RWwn+8 | Specified torque | | 0xqqqq |
| RWwn+9 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

bb : Specify the speed setting method in 2 bits.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

h : Specify in 1 bit whether to use torque limit.

| Value | Meaning |
|-------|--------------------------------|
| 0 | Torque limit is not specified. |
| 1 | Torque limit is specified. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (= 0x0001) to 100 (=0x0064)

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)

qqqq : Specify the percentage of rated torque in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

**CAUTION**

- When the torque limit is specified by the command flag, this command ends in the following cases.

<RCX240, RCX22x, and RCX14x with software version 8.45 onwards>

- The axis has reached the target position when the time required to move to the target position has elapsed.
- Time-out period was exceeded while the axis torque has reached the specified torque value. (Time-out period depends on the TRQTIME statement or TRQTIME2 statement executed in the program.)

<RCX14x with software version earlier than 8.45>

- The axis has reached the target position when the time required to move to the target position has elapsed.
- The axis torque has already reached the specified torque value for more than 1 second when the time required to move to the target position has elapsed.
- The torque has reached the specified torque value when the time required to move to the target position has elapsed, and this condition has continued for 1 second.
- This command cannot use a torque offset value.
- In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

**NOTE**

Refer to the programming manual for detailed information on the TRQTIME and TRQTIME2 statements of the robot language.

■ Status

Normal end

| Remote register | Contents | | | Value |
|----------------------|-------------|--------------|------------|------------|
| RWr _n | Status code | | | 0x0200 |
| RWr _n +1 | Not used | | | |
| RWr _n +2 | Not used | | | |
| RWr _n +3 | Point flag | bit 0 | Point unit | a |
| | | bit 15-bit 1 | Not used | 0 |
| RWr _n +4 | Axis-1 data | | | 0xbbbbbbbb |
| RWr _n +5 | Axis-1 data | | | 0xbbbbbbbb |
| RWr _n +6 | Axis-2 data | | | 0xbbbbbbbb |
| RWr _n +7 | Axis-2 data | | | 0xbbbbbbbb |
| RWr _n +8 | Axis-3 data | | | 0xbbbbbbbb |
| RWr _n +9 | Axis-3 data | | | 0xbbbbbbbb |
| RWr _n +10 | Axis-4 data | | | 0xbbbbbbbb |
| RWr _n +11 | Axis-4 data | | | 0xbbbbbbbb |
| RWr _n +12 | Axis-5 data | | | 0xbbbbbbbb |
| RWr _n +13 | Axis-5 data | | | 0xbbbbbbbb |
| RWr _n +14 | Axis-6 data | | | 0xbbbbbbbb |
| RWr _n +15 | Axis-6 data | | | 0xbbbbbbbb |

- a : Shows in 1 bit the units for current position output point data. Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the DRIVE command with point designation as shown at right, to move axis 3 of the main robot to point number 100 at 50% speed. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0010 |
| RWwn+1 | 0x8005 |
| RWwn+2 | 0x0004 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x0064 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right, when controller display units are in pulses and with:

Axis 1 = 123456

Axis 2 = -123

Other axes = 0

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0xE240 |
| RWrn+5 | 0x0001 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.3.2 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

| Remote register | Contents | | Value | |
|-----------------|------------------------|--------------|--|----------|
| RWwn | Command code | | For main robot | 0x0012 |
| | | | For sub robot | 0x0092 |
| RWwn+1 | Command flag | bit 0 | (1:Fixed) | 1 |
| | | bit 2–bit 1 | Speed designation flag | bb |
| | | bit 6–bit 3 | (0:Fixed) | 0 |
| | | bit 7 | Torque limit designation flag | h |
| | | bit 14–bit 8 | (0:Fixed) | 0 |
| | | bit 15 | Current position output designation flag | n |
| RWwn+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) | |
| RWwn+3 | Specified speed | | 0xssss | |
| RWwn+4 | Movement data | | 0xppppppppp | |
| RWwn+5 | | | | |
| RWwn+6 | | | | Not used |
| RWwn+7 | Specified torque | | 0xqqqq | |
| RWwn+8 | | | | |
| RWwn+9 | | | | |
| to | | | | Not used |
| RWwn+15 | | | | |

bb : Specify the speed setting method in 2 bits.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

h : Specify in 1 bit whether to use torque limit.

| Value | Meaning |
|-------|--------------------------------|
| 0 | Torque limit is not specified. |
| 1 | Torque limit is specified. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (=0x0001) to 100 (=0x0064)

pppppppp : Specify target position data for specified axis in 32 bits.
(little endian)

Data should be integers (× 100) in millimeter units.

qqqq : Specify the percentage of rated torque in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)



CAUTION

- When the torque limit is specified by the command flag, this command ends in the following cases.
 - <RCX240, RCX22x, and RCX14x with software version 8.45 onwards>
 - The axis has reached the target position when the time required to move to the target position has elapsed.
 - Time-out period was exceeded while the axis torque has reached the specified torque value. (Time-out period depends on the TRQTIME statement or TRQTIME2 statement executed in the program.)
 - <RCX14x with software version earlier than 8.45>
 - The axis has reached the target position when the time required to move to the target position has elapsed.
 - The axis torque has already reached the specified torque value for more than 1 second when the time required to move to the target position has elapsed.
 - The torque has reached the specified torque value when the time required to move to the target position has elapsed, and this condition has continued for 1 second.
- This command cannot use a torque offset value.



NOTE

Refer to the programming manual for detailed information on the TRQTIME and TRQTIME2 statements of the robot language.

■ **Status**

Normal end

| Remote register | Contents | | | Value |
|---------------------|-------------|--------------|------------|------------|
| RWr _n | Status code | | | 0x0200 |
| RWr _{n+1} | Not used | | | |
| RWr _{n+2} | Not used | | | |
| RWr _{n+3} | Point flag | bit 0 | Point unit | a |
| | | bit 15–bit 1 | Not used | 0 |
| RWr _{n+4} | Axis-1 data | | | 0xbbbbbbbb |
| RWr _{n+5} | Axis-1 data | | | 0xbbbbbbbb |
| RWr _{n+6} | Axis-2 data | | | 0xbbbbbbbb |
| RWr _{n+7} | Axis-2 data | | | 0xbbbbbbbb |
| RWr _{n+8} | Axis-3 data | | | 0xbbbbbbbb |
| RWr _{n+9} | Axis-3 data | | | 0xbbbbbbbb |
| RWr _{n+10} | Axis-4 data | | | 0xbbbbbbbb |
| RWr _{n+11} | Axis-4 data | | | 0xbbbbbbbb |
| RWr _{n+12} | Axis-5 data | | | 0xbbbbbbbb |
| RWr _{n+13} | Axis-5 data | | | 0xbbbbbbbb |
| RWr _{n+14} | Axis-6 data | | | 0xbbbbbbbb |
| RWr _{n+15} | Axis-6 data | | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data. Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

bbbbbbb : 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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the DRIVE command with direct designation (millimeter units) as shown at right, to move axis 3 of the main robot to a position of "50.00" at 50% speed. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0012 |
| RWwn+1 | 0x8005 |
| RWwn+2 | 0x0004 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x1388 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in millimeters and with:

Axis 1 = 100.00
 Axis 2 = -200.00
 Axis 3 = 50.00
 Axis 4 = -180.00
 Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x2710 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xB1E0 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0xB9B0 |
| RWrn+11 | 0xFFFF |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.3.3 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

| Remote register | Contents | | Value |
|-----------------|------------------------|----------------|--|
| RWwn | Command code | For main robot | 0x0013 |
| | | For sub robot | 0x0093 |
| RWwn+1 | Command flag | bit 0 | (1:Fixed) |
| | | bit 2–bit 1 | Speed designation flag |
| | | bit 6–bit 3 | (0:Fixed) |
| | | bit 7 | Torque limit designation flag |
| | | bit 14–bit 8 | (0:Fixed) |
| | | bit 15 | Current position output designation flag |
| RWwn+2 | Specified axis to move | bit 0 | Axis 1 |
| | | 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) |
| RWwn+3 | Specified speed | 0xssss | |
| RWwn+4 | Movement data | 0xpppppppp | |
| RWwn+5 | | | |
| RWwn+6 | | | |
| RWwn+7 | Not used | 0x0000 | |
| RWwn+8 | Specified torque | 0xqqqq | |
| RWwn+9 | Not used | 0x0000 | |
| to | | | |
| RWwn+15 | | | |

bb : Specify the speed setting method in 2 bits.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

h : Specify in 1 bit whether to use torque limit.

| Value | Meaning |
|-------|--------------------------------|
| 0 | Torque limit is not specified. |
| 1 | Torque limit is specified. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (=0x0001) to 100 (=0x0064)

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

qqqq : Specify the percentage of rated torque in 16 bits.
Specified range: 1 (=0x0001) to 100 (=0x0064)

**CAUTION**

- When the torque limit is specified by the command flag, this command ends in the following cases.
 - <RCX240, RCX22x, and RCX14x with software version 8.45 onwards>
 - The axis has reached the target position when the time required to move to the target position has elapsed.
 - Time-out period was exceeded while the axis torque has reached the specified torque value. (Time-out period depends on the TRQTIME statement or TRQTIME2 statement executed in the program.)
 - <RCX14x with software version earlier than 8.45>
 - The axis has reached the target position when the time required to move to the target position has elapsed.
 - The axis torque has already reached the specified torque value for more than 1 second when the time required to move to the target position has elapsed.
 - The torque has reached the specified torque value when the time required to move to the target position has elapsed, and this condition has continued for 1 second.
- This command cannot use a torque offset value.

**NOTE**

Refer to the programming manual for detailed information on the TRQTIME and TRQTIME2 statements of the robot language.

■ Status

Normal end

| Remote register | Contents | | | Value |
|-----------------|-------------|--------------|------------|------------|
| RWrn | Status code | | | 0x0200 |
| RWrn+1 | Not used | | | |
| RWrn+2 | Not used | | | |
| RWrn+3 | Point flag | bit 0 | Point unit | a |
| | | bit 15–bit 1 | Not used | 0 |
| RWrn+4 | Axis-1 data | | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data. Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the DRIVE command with direct designation (pulse units) as shown at right, to move axis 3 of the main robot to a position of "5000" pulses at 50% speed. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0013 |
| RWwn+1 | 0x8005 |
| RWwn+2 | 0x0004 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x1388 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in pulses and with:

Axis 1 = 10000
 Axis 2 = -20000
 Axis 3 = 5000
 Axis 4 = -18000
 Other axes = 0

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x2710 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xB1E0 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0xB9B0 |
| RWrn+11 | 0xFFFF |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 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.

4.2.4.1 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 in the controller versions shown below, the resumed motion can occur either to the original target position, or to a new target position referenced to the current position, in accordance with the "MOVEI/DRIVEI start position" setting selected at the other parameters. For details, refer to the controller user's manual.
RCX14x: Ver. 8.66 onwards RCX22x: Ver. 9.13 onwards RCX240: all versions
- 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).
- In controller versions prior to those shown above, motion occurs to a new target position referenced to the current position when DRIVEI is interrupted and then re-executed.

■ Command

| Remote register | Contents | | Value |
|-----------------|------------------------|--------------|---|
| RWwn | Command code | | For main robot 0x0014 |
| | | | For sub robot 0x0094 |
| RWwn+1 | Command flag | bit 0 | (1:Fixed) 1 |
| | | bit 2–bit 1 | Speed designation flag bb |
| | | bit 14–bit 3 | (0:Fixed) 0 |
| | | bit 15 | Current position output designation flag n |
| RWwn+2 | Specified axis to move | bit 0 | Axis 1 |
| | | 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) |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | Point number | | 0xpppp |
| RWwn+5 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

bb : Specify the speed setting method in 2 bits.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (= 0x0001) to 100 (=0x0064)
- pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)



CAUTION In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | | | Value |
|---------------------|-------------|--------------|------------|------------|
| RWr _n | Status code | | | 0x0200 |
| RWr _{n+1} | Not used | | | |
| RWr _{n+2} | Not used | | | |
| RWr _{n+3} | Point flag | bit 0 | Point unit | a |
| | | bit 15–bit 1 | Not used | 0 |
| RWr _{n+4} | Axis-1 data | | | 0xbbbbbbbb |
| RWr _{n+5} | Axis-1 data | | | 0xbbbbbbbb |
| RWr _{n+6} | Axis-2 data | | | 0xbbbbbbbb |
| RWr _{n+7} | Axis-2 data | | | 0xbbbbbbbb |
| RWr _{n+8} | Axis-3 data | | | 0xbbbbbbbb |
| RWr _{n+9} | Axis-3 data | | | 0xbbbbbbbb |
| RWr _{n+10} | Axis-4 data | | | 0xbbbbbbbb |
| RWr _{n+11} | Axis-4 data | | | 0xbbbbbbbb |
| RWr _{n+12} | Axis-5 data | | | 0xbbbbbbbb |
| RWr _{n+13} | Axis-5 data | | | 0xbbbbbbbb |
| RWr _{n+14} | Axis-6 data | | | 0xbbbbbbbb |
| RWr _{n+15} | Axis-6 data | | | 0xbbbbbbbb |

- a : Shows in 1 bit the units for current position output point data.
Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

- 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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|---------------------|------------------------|--------|
| RWr _n | Status code | 0x4000 |
| RWr _{n+1} | Error code | 0xaabb |
| RWr _{n+2} | Additional information | 0xccdd |
| RWr _{n+3} | Not used | |
| to | | |
| RWr _{n+14} | | |
| RWr _{n+15} | | |

- aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.
- ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the DRIVEI command with point designation as shown at right, to move axis 3 of the main robot a distance specified by point number 100 at 50% speed. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0014 |
| RWwn+1 | 0x8005 |
| RWwn+2 | 0x0004 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x0064 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in pulses and with:

Axis 1 = 123456
 Axis 2 = -123
 Other axes = 0

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0xE240 |
| RWrn+5 | 0x0001 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.4.2 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 in the controller versions shown below, the resumed motion can occur either to the original target position, or to a new target position referenced to the current position, in accordance with the "MOVEI/DRIVEI start position" setting selected at the other parameters. For details, refer to the controller user's manual.
RCX14x: Ver. 8.66 onwards RCX22x: Ver. 9.13 onwards RCX240: all versions
- 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).
- In controller versions prior to those shown above, motion occurs to a new target position referenced to the current position when DRIVEI is interrupted and then re-executed.

■ Command

| Remote register | Contents | | Value |
|-----------------|------------------------|----------------|--|
| RWwn | Command code | | |
| | | For main robot | 0x0016 |
| | | For sub robot | 0x0096 |
| RWwn+1 | Command flag | bit 0 | (1:Fixed) |
| | | bit 2–bit 1 | Speed designation flag |
| | | bit 14–bit 3 | (0:Fixed) |
| | | bit 15 | Current position output designation flag |
| RWwn+2 | Specified axis to move | bit 0 | Axis 1 |
| | | 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) |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | Movement data | | 0xpppppppp |
| RWwn+5 | | | |
| RWwn+6 | | | |
| to | Not used | | |
| RWwn+15 | | | 0x0000 |

bb : Specify the speed setting method in 2 bits.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (=0x0001) to 100 (=0x0064)

pppppppp : Specify the target movement distance data for specified axis in 32 bits. (little endian)
Data should be integers (×100) in millimeter units.

■ Status

Normal end

| Remote register | Contents | | Value |
|-----------------|--------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | Point unit |
| | | bit 15–bit 1 | Not used |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-7 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-8 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-9 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-10 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-11 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-12 data | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data.
Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

4. Remote command information

Example:

Specify the DRIVEI command with direct designation (millimeter units) as shown at right, to move axis 3 a distance equal to "50.00" from "0.00" position at 50% speed. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0016 |
| RWwn+1 | 0x8005 |
| RWwn+2 | 0x0004 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x1388 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in millimeters and with:

Axis 1 = 100.00
 Axis 2 = -200.00
 Axis 3 = 50.00
 Axis 4 = -180.00
 Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x2710 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xB1E0 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0xB9B0 |
| RWrn+11 | 0xFFFF |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.4.3 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 in the controller versions shown below, the resumed motion can occur either to the original target position, or to a new target position referenced to the current position, in accordance with the "MOVEI/DRIVEI start position" setting selected at the other parameters. For details, refer to the controller user's manual.
RCX14x: Ver. 8.66 onwards RCX22x: Ver. 9.13 onwards RCX240: all versions
- 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).
- In controller versions prior to those shown above, motion occurs to a new target position referenced to the current position when DRIVEI is interrupted and then re-executed.

■ Command

| Remote register | Contents | | Value |
|-----------------|------------------------|--------------|--|
| RWwn | Command code | | For main robot |
| | | | 0x0017 |
| RWwn+1 | Command flag | | For sub robot |
| | | | 0x0097 |
| RWwn+1 | Command flag | bit 0 | (1:Fixed) |
| | | bit 2–bit 1 | Speed designation flag |
| | | bit 14–bit 3 | (0:Fixed) |
| | | bit 15 | Current position output designation flag |
| RWwn+2 | Specified axis to move | bit 0 | Axis 1 |
| | | 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) |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | Movement data | | 0xpppppppp |
| RWwn+5 | | | |
| RWwn+6 | | | |
| to | | | |
| RWwn+15 | Not used | | 0x0000 |

bb : Specify the speed setting method in 2 bits.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (=0x0001) to 100 (=0x0064)

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

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | Point unit |
| | | bit 15–bit 1 | Not used |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data.
Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

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. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0017 |
| RWwn+1 | 0x8005 |
| RWwn+2 | 0x0004 |
| RWwn+3 | 0x0032 |
| RWwn+4 | 0x1388 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in pulses and with:

Axis 1 = 10000
 Axis 2 = -20000
 Axis 3 = 5000
 Axis 4 = -18000
 Other axes = 0

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x2710 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xB1E0 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0xB9B0 |
| RWrn+11 | 0xFFFF |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.5 Pallet movement command

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

4.2.5.1 PTP designation

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

■ Command

| Remote register | Contents | | Value |
|-----------------|----------------------|--------------|--|
| RWwn | Command code | | For main robot |
| | | | For sub robot |
| RWwn+1 | Command flag | bit 0 | (0:Fixed) |
| | | bit 2–bit 1 | Speed designation flag |
| | | bit 14–bit 3 | (0:Fixed) |
| | | bit 15 | Current position output designation flag |
| RWwn+2 | Not used | | 0x0000 |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | Pallet number | | 0xpppp |
| RWwn+5 | Work position number | | 0xwwww |
| RWwn+6 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

bb : Specify the speed setting method in 2 bits.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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

pppp : Specify the pallet number in 16 bits.
Specified range: 0 (=0x0000) to 19 (=0x0013)

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

■ Status

Normal end

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | Point unit |
| | | bit 15–bit 1 | Not used |
| | | | a |
| | | | 0 |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data. Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

4. Remote command information

Example:

Specify the PMOVE command with PTP designation as shown at right, when moving the main robot to work position number 21 on pallet number 1 at 70% speed. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0018 |
| RWwn+1 | 0x8004 |
| RWwn+2 | 0x0000 |
| RWwn+3 | 0x0046 |
| RWwn+4 | 0x0001 |
| RWwn+5 | 0x0015 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in millimeters and with:

Axis 1 = 123.45
Axis 2 = -1.23
Axis 3 = 20.00
Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x3039 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x07D0 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.5.2 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**

| Remote register | Contents | | Value |
|-----------------|-----------------------|--------------|---|
| RWwn | Command code | | For main robot 0x0019 |
| | | | For sub robot 0x0099 |
| RWwn+1 | 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 14–bit 5 | (0:Fixed) 0 |
| | | bit 15 | Current position output designation flag n |
| RWwn+2 | 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) | |
| RWwn+3 | Specified speed | | 0xssss |
| RWwn+4 | Pallet number | | 0xpppp |
| RWwn+5 | Work position number | | 0xwwww |
| RWwn+6 | Not used | | 0x0000 |
| RWwn+7 | | | |
| RWwn+8 | Arch position data | | 0xqqqqqqqq |
| RWwn+9 | | | |
| RWwn+10 | | | |
| to | Not used | | 0x0000 |
| RWwn+15 | | | |

bb : Specify the speed setting method in 2 bits.

| Value | Meaning |
|-------|-------------------------|
| 00 | Speed is not specified. |
| 10 | Speed is set in %. |

d : Specify the arch data units in 1 bit.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

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.
Specified range: 1 (=0x0001) to 100 (=0x0064)

pppp : Specify the pallet number in 16 bits.
Specified range: 0 (=0x0000) to 19 (=0x0013)

- www** : Specify the work position number in 16 bits.
 Specified range: 1 (=0x0001) to 32767 (=0x7FFF)
- qqqqqqqq** : Specify the arch position data in 32 bits. (little endian)
 Data should be integers when units are in pulses.
 Data should be integers (×100) when units are in millimeters.

■ Status

Normal end

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | Point unit |
| | | bit 15-bit 1 | Not used |
| | | | a |
| | | | 0 |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

- a** : Shows in 1 bit the units for current position output point data.
 Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

- 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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

- aabb** : Shows the group number in upper 8 bits, and the category number in lower 8 bits.
- ccdd** : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the PMOVE command with arch designation as shown at right, when moving the Z-axis to work position number 32 on pallet number 10 at 70% speed by way of a Z-axis arch position of 10.00mm. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0019 |
| RWwn+1 | 0x8014 |
| RWwn+2 | 0x0400 |
| RWwn+3 | 0x0046 |
| RWwn+4 | 0x000A |
| RWwn+5 | 0x0020 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x03E8 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when controller display units are in millimeters and with:

Axis 1 = 123.45
 Axis 2 = -1.23
 Axis 3 = 50.00
 Axis 4 = 90.23
 Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x3039 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x233F |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.6 Jog movement command

Execute this command in MANUAL mode to move the robot in jog mode. This command can only be executed in MANUAL mode. This command is linked with the controller's point display unit. So the axis moves in PTP motion when the display units are in pulses, and moves by linear interpolation on the Cartesian coordinates when the units are in millimeters. Jog speed is determined by the manual movement speed.

To stop the jog command, set the dedicated input of the interlock signal (SI11) to OFF. Abnormal end status (0x4000) appears as the status code and the error code indicates that the robot has stopped by the interlock (0x0C02). After confirming that movement has stopped, set the dedicated input of the interlock signal to ON.

■ Command

| Remote register | Contents | | Value |
|-----------------|----------------------------|--------------|--|
| RWwn | Command code | | For main robot |
| | | | For sub robot |
| | | | 0x0020 |
| RWwn+1 | Command flag | bit 14–bit 0 | (0:Fixed) |
| | | bit 15 | Current position output designation flag |
| | | | 0 |
| RWwn+2 | Axis to move and direction | bit 0 | Axis 1 |
| | | bit 1 | Axis 2 |
| | | bit 2 | Axis 3 |
| | | bit 3 | Axis 4 |
| | | bit 4 | Axis 5 |
| | | bit 5 | Axis 6 |
| | | bit 6 | (0:Fixed) |
| | | bit 7 | Direction |
| | | bit 15–bit 8 | (0:Fixed) |
| | | | 0 |
| bit 7 | Direction | | d |
| | | bit 15–bit 8 | (0:Fixed) |
| | | | 0 |
| RWwn+3 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

tt : Specify the axis to move in 0 to 3 bits. Only one axis can be specified.

d : Specify the movement direction in 1 bit.

| Value | Meaning |
|-------|------------|
| 0 | +direction |
| 1 | -direction |

■ Status Normal end

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | Point unit |
| | | bit 15–bit 1 | Not used |
| | | | a |
| | | | 0 |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data.
Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end (When jog movement was stopped by interlock)

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x4000 |
| RWrn+1 | Error code | | 0x0C02 |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | Point unit |
| | | bit 15–bit 1 | Not used |
| | | | a |
| | | | 0 |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

a : Shows the output point data unit for current position in 1 bit.
Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end (Other cases)

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the jog command as shown at right, to move axis 1 of the main robot in the minus (-) direction. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0020 |
| RWwn+1 | 0x8000 |
| RWwn+2 | 0x0081 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x0000 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right, after robot movement with the jog command is stopped by the interlock signal, when controller display units are in millimeters and with:

Axis 1 = 123.45
 Axis 2 = -1.23
 Axis 3 = 20.00
 Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x4000 |
| RWrn+1 | 0x0C02 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x3039 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x07D0 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.7 Inching movement command

Execute this command to move the robot by inching in MANUAL mode. Inching movement distance is linked to the manual movement speed. The inching command can only be executed in MANUAL mode.

This command is linked with the controller's point display unit. So when display units are in pulses, the axis moves a certain number of pulses at the manual speed setting. When display units are in millimeters, the axis moves on Cartesian coordinates by linear interpolation at the manual speed setting divided by 100.

■ Command

| Remote register | Contents | | Value |
|-------------------|----------------------------|--------------|--|
| RWwn | Command code | | For main robot |
| | | | 0x0024 |
| RWwn+1 | Command flag | bit 14–bit 0 | (0:Fixed) |
| | | bit 15 | Current position output designation flag |
| RWwn+2 | Axis to move and direction | bit 0 | Axis 1 |
| | | bit 1 | Axis 2 |
| | | bit 2 | Axis 3 |
| | | bit 3 | Axis 4 |
| | | bit 4 | Axis 5 |
| | | bit 5 | Axis 6 |
| | | bit 6 | (0:Fixed) |
| | | bit 7 | Direction |
| RWwn+3 | bit 15–bit 8 | | (0:Fixed) |
| RWwn+3 to RWwn+15 | Not used | | 0x0000 |

n : Specify in 1 bit whether to output current position.

| Value | Meaning |
|-------|------------|
| 0 | No output. |
| 1 | Output. |

tt : Specify the axis to move in 0 to 3 bits. Only one axis can be specified.

d : Specify the movement direction in 1 bit.

| Value | Meaning |
|-------|------------|
| 0 | +direction |
| 1 | –direction |

■ Status

Normal end

| Remote register | Contents | | Value |
|-----------------|-------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWrn+2 | Not used | | |
| RWrn+3 | Point flag | bit 0 | Point unit |
| | | bit 15-bit 1 | Not used |
| RWrn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+5 | Axis-1 data | | 0xbbbbbbbb |
| RWrn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+7 | Axis-2 data | | 0xbbbbbbbb |
| RWrn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+9 | Axis-3 data | | 0xbbbbbbbb |
| RWrn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+11 | Axis-4 data | | 0xbbbbbbbb |
| RWrn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+13 | Axis-5 data | | 0xbbbbbbbb |
| RWrn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | 0xbbbbbbbb |

a : Shows in 1 bit the units for current position output point data. Linked with point display unit of controller.

| Value | Meaning |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |

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 (×100) when point display units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Specify the inching command as shown at right, to move axis 2 of the main robot in the plus direction. When controller's point display units are in millimeters, movement is in 0.5 mm steps at 50% manual speed. The current position output is specified at this time.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0024 |
| RWwn+1 | 0x8000 |
| RWwn+2 | 0x0002 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x0000 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right, after executing the inching command and then stopping point movement, when controller display units are in millimeters and with;

Axis 1 = 123.45

Axis 2 = -1.23

Axis 3 = 20.00

Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x3039 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xFF85 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x07D0 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.2.8 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

| Remote register | Contents | | Value |
|-----------------|--------------|----------------|--------|
| RWwn | Command code | For main robot | 0x0028 |
| | | For sub robot | 0x00A8 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Point number | | 0xpppp |
| RWwn+3 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

pppp : Specify the point number in 16 bits.
Specified range: 0 (= 0x0000) to 9999 (= 0x270F)



CAUTION In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the point teaching command as shown at right, to teach the main robot current position to point 4000.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0028 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0FA0 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| to | |
| RWrn+15 | |

4.2.9 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

| Remote register | Contents | | Value | |
|-----------------|----------------------------|----------------|-----------|---|
| RWwn | Command code | For main robot | 0x0030 | |
| | | For sub robot | 0x00B0 | |
| RWwn+1 | Not used | | 0x0000 | |
| RWwn+2 | Axis to move and direction | bit 0 | Axis 1 | |
| | | 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 | |
| RWwn+3 | Not used | | 0x0000 | |
| to | | | | |
| RWwn+15 | | | | |

tt : Specify the axis to move in 0 to 3 bits. Only one axis can be specified.

d : Specify the movement direction in 1 bit.

| Value | Meaning |
|-------|------------|
| 0 | +direction |
| 1 | –direction |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the absolute reset movement command as shown at right, to move axis 2 of the main robot in the minus (-) direction to a position capable of absolute reset.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0030 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0082 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| to | |
| RWrn+15 | |

4.2.10 Absolute reset command

Execute this command to perform absolute reset on the specified axis. When absolute reset of the specified axis uses the mark method, a position capable of absolute reset is required. If no particular axis is specified (RWwn+2 is 0), then absolute reset is performed on all axes (main robot + sub robot) in either case of command code 0x0031 or 0x00B1. This command cannot be executed if return-to-origin on a mark-specified axis is incomplete. Perform absolute reset on each axis.

■ Command

| Remote register | Contents | | Value |
|-----------------|----------------|----------------|--------|
| RWwn | Command code | For main robot | 0x0031 |
| | | For sub robot | 0x00B1 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Specified axis | bit 0 | Axis 1 |
| | | 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) | 0x00tt |
| RWwn+3 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

tt : Specify the axis to perform absolute reset in 0 to 3 bits.

Only one axis can be specified.

If no particular axis is specified then absolute reset is performed on all axes (main robot + sub robot).

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | | |
| to | Not used | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

- aabb** : Shows the group number in upper 8 bits, and the category number in lower 8 bits.
- ccdd** : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

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

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0031 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0002 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| to | |
| RWrn+15 | |

4.2.11 Return-to-origin command

This command executes return-to-origin on the specified axis. When this command is executed on an incremental mode axis, that axis moves to its origin. When executed on a semi-absolute mode axis, an absolute search is performed on that axis. If no axis is specified (RWwn+2 is 0), return-to-origin is performed on all axes (main robot + sub robot) in either case of command code 0x0032 or 0x00B2.



CAUTION

- The return-to-origin command is only available from software version 8.33 onwards (RCX14x).
- Axes can be specified with the return-to-origin command only from software version 8.45 onwards (RCX14x). On earlier version controllers, the return-to-origin command is always performed on all axes and command code 0x0032 can only be used.

■ Command

| Remote register | Contents | | Value |
|-----------------|------------------|----------------|-----------|
| RWwn | Command code | For main robot | 0x0032 |
| | | For sub robot | 0x00B2 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Specify the axis | bit 0 | Axis 1 |
| | | 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) |
| RWwn+3 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

- tt** : Specify the axis to perform return-to-origin in 0 to 3 bits. Only one axis can be specified. If no particular axis is specified then return-to-origin is performed on all axes (main robot + sub robot).

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to perform return-to-origin on axis 2 of the main robot.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0032 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0002 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| to | |
| RWrn+15 | |

4.2.12 Servo command

Execute this command group to operate the robot servos.

Servo ON :

Execute this command to turn on the servo of a specified axis. The motor power must be turned on when specifying the axis. All controller servos are turned on if no axis is specified.

Servo OFF :

Execute this command to turn off the servo of a specified axis. All controller 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. Servo OFF and Free are repeated when this command is consecutively executed.

Power ON:

Execute this command to turn on the motor power. No axis can be specified.

■ Command

| Remote register | Contents | | Value | |
|-----------------|----------------|-----------------------|----------------|--------|
| RWwn | Command code | Servo ON | For main robot | 0x0034 |
| | | | For sub robot | 0x00B4 |
| | | Servo OFF | For main robot | 0x0035 |
| | | | For sub robot | 0x00B5 |
| | | Servo Free | For main robot | 0x0036 |
| | | | For sub robot | 0x00B6 |
| | Power ON | All controller servos | 0x0037 | |
| RWwn+1 | Not used | | 0x0000 | |
| RWwn+2 | 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) | | |
| RWwn+3 | Not used | | 0x0000 | |
| to | | | | |
| RWwn+15 | | | | |

tt : Specify the axis to move in 0 to 3 bits. All controller servos are processed if no axis is specified. No axis can be specified when executing Power ON.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the servo command as shown at right, to free the servo of axis 4 of the main robot.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0036 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0008 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

4.2.13 Manual speed change command

Execute this command to change the manual movement speed in MANUAL mode. This command can only be executed in MANUAL mode.

■ Command

| Remote register | Contents | | Value |
|-----------------|-----------------|----------------|--------|
| RWwn | Command code | For main robot | 0x0038 |
| | | For sub robot | 0x00B8 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Specified speed | | 0xssss |
| RWwn+3 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |
| | | | |

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

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

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

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0038 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0014 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

4.2.14 Auto speed change command

Execute this command to change the auto movement speed in AUTO mode.

■ Command

| Remote register | Contents | | Value |
|-----------------|-----------------|----------------|--------|
| RWwn | Command code | For main robot | 0x0039 |
| | | For sub robot | 0x00B9 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Specified speed | | 0xssss |
| RWwn+3 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

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

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the auto speed change command as shown at right, to set the auto movement speed of the main robot to 80%.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0039 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0050 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

4.2.15 Program speed change command

Execute this command to change the program speed in AUTO mode. The program speed changed with this command is reset to 100% when the program is reset or changed.

■ Command

| Remote register | Contents | | Value |
|-----------------|-----------------|----------------|--------|
| RWwn | Command code | For main robot | 0x003A |
| | | For sub robot | 0x00BA |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Specified speed | | 0xssss |
| RWwn+3 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |
| | | | |

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

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |
| | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |
| | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the program speed change command as shown at right, to set the program speed for the main robot to 80%.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x003A |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0050 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |
| | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |
| | |

4.2.16 Shift designation change command

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

■ Command

| Remote register | Contents | | Value |
|-----------------|------------------------|----------------|--------|
| RWwn | Command code | For main robot | 0x003B |
| | | For sub robot | 0x00BB |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Specified shift number | | 0xssss |
| RWwn+3 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

ssss : Specify the shift number in 16 bits.
Specified range: 0 (=0x0000) to 9 (0x0009)

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

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

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x003B |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0004 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

4.2.17 Hand designation change command

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

■ Command

| Remote register | Contents | | Value |
|-----------------|-----------------------|----------------|--------|
| RWwn | Command code | For main robot | 0x003C |
| | | For sub robot | 0x00BC |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Specified hand number | | 0xssss |
| RWwn+3 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |
| | | | |

ssss : Specify the hand number in 16 bits.

Specified range for main robot : 0 (=0x0000) to 3 (0x0003)

Specified range for sub robot : 4 (=0x0004) to 7 (0x0007)

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

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

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x003C |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0001 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

4.2.18 Arm designation change command

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

■ Command

| Remote register | Contents | | Value |
|-----------------|-------------------------|----------------|--------|
| RWwn | Command code | For main robot | 0x003D |
| | | For sub robot | 0x00BD |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Status of specified arm | | 0xssss |
| RWwn+3 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

ssss : Specify the arm designation status in 16 bits.

| Value | Meaning |
|--------|---------------------|
| 0x0000 | Right-handed system |
| 0x0001 | Left-handed system |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the arm designation change command as shown at right, to set the arm designation status of the main robot to the right-handed system.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x003D |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0000 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

4.2.19 Point display unit designation command

Execute this command to change the point display unit.

■ **Command**

| Remote register | Contents | Value |
|-----------------|-----------------------------------|--------|
| RWwn | Command cod | 0x003E |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Display units for specified point | 0xssss |
| RWwn+3 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify the point display unit system in 16 bits.

| Value | Meaning |
|--------|-------------------------------------|
| 0x0000 | Pulse units |
| 0x0001 | Millimeter units |
| 0x0002 | Millimeter units (Tool coordinates) |

■ **Status**

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the point display unit designation command as shown at right, to set the point display units to pulses.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x003E |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0000 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

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 (RWwn) | |
|-----|--------------------------------|-------------------------------|---------------------|--------|
| 1 | Point-related commands | Point data definition | 0x0100 | |
| | | Point data reference | 0x0101 | |
| 2 | Point comment-related commands | Point comment data definition | 0x0104 | |
| | | Point comment data reference | 0x0105 | |
| 3 | Pallet-related command | Pallet data definition | 0x0108 | |
| | | Pallet data reference | 0x0109 | |
| 4 | Shift-related command | Shift data definition | 0x010C | |
| | | Shift data reference | 0x010D | |
| 5 | Hand-related command | Hand data definition | Main robot | 0x0110 |
| | | | Sub robot | 0x0190 |
| | | Hand data reference | 0x0111 | |

4.3.1 Point-related command

Execute this command to define or obtain point data.

4.3.1.1 Point data definition

This command defines point data by specifying the point number and position data on each axis.

■ Command

| Remote register | Contents | | Value |
|-----------------|--------------|--------------|-------------|
| RWwn | Command code | | 0x0100 |
| RWwn+1 | Command flag | bit 0 | Point unit |
| | | bit 2–bit 1 | Hand system |
| | | bit 15–bit 3 | (0:Fixed) |
| RWwn+2 | Point number | | 0xssss |
| RWwn+3 | Not used | | 0x0000 |
| RWwn+4 | Axis-1 data | | 0xbbbbbbbb |
| RWwn+5 | | | |
| RWwn+6 | Axis-2 data | | 0xbbbbbbbb |
| RWwn+7 | | | |
| RWwn+8 | Axis-3 data | | 0xbbbbbbbb |
| RWwn+9 | | | |
| RWwn+10 | Axis-4 data | | 0xbbbbbbbb |
| RWwn+11 | | | |
| RWwn+12 | Axis-5 data | | 0xbbbbbbbb |
| RWwn+13 | | | |
| RWwn+14 | Axis-6 data | | 0xbbbbbbbb |
| RWwn+15 | | | |

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. |
| Others | No hand system is defined. |

ssss : Specify the point number in 16 bits.
Specified range: 1 (=0x0001) to 9999 (=0x270F)

bbbbbbbb : Specify the point data in 32 bits. (little endian)
Data should be integers when units are in pulses.
Data should be integers (×100) when units are in millimeters.



CAUTION

In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

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

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0100 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0064 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x2710 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0xB1E0 |
| RWwn+7 | 0xFFFF |
| RWwn+8 | 0x1388 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0xB9B0 |
| RWwn+11 | 0xFFFF |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.3.1.2 Point data reference

Use this command to find and obtain point data by specifying the point number.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0101 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Point number | 0xssss |
| RWwn+3 | Not used | |
| to | | |
| RWwn+15 | | |

ssss : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)



CAUTION

In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|--------------|-------------------------------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Point number | 0xssss |
| RWrn+3 | Point flag | bit 0 Point unit u |
| | | bit 2–bit 1 Hand system tt |
| | | bit 15–bit 3 (0:Fixed) 0 |
| RWrn+4 | Axis-1 data | 0xbbbbbbbb |
| RWrn+5 | | |
| RWrn+6 | Axis-2 data | 0xbbbbbbbb |
| RWrn+7 | | |
| RWrn+8 | Axis-3 data | 0xbbbbbbbb |
| RWrn+9 | | |
| RWrn+10 | Axis-4 data | 0xbbbbbbbb |
| RWrn+11 | | |
| RWrn+12 | Axis-5 data | 0xbbbbbbbb |
| RWrn+13 | | |
| RWrn+14 | Axis-6 data | 0xbbbbbbbb |
| RWrn+15 | | |

ssss : Shows the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)

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. |

bbbbbbbb : Shows the point data in 32 bits. (little endian)
 Data is shown in integers when units are in pulses.
 Data is shown in integers (×100) when units are in millimeters.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the point data reference command as shown at right, to search and obtain point data at point number 50.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0101 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0032 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x0000 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly to obtain the following point data.

Point number = 50
 Axis 1 = 100.00
 Axis 2 = -200.00
 Axis 3 = 50.00
 Axis 4 = -180.00
 Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0032 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x2710 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xB1E0 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0xB9B0 |
| RWrn+11 | 0xFFFF |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.3.2 Point comment-related command

Execute this command to define or obtain point comment data.

4.3.2.1 Point comment data definition

Use this command to define point comment data by specifying the point number and point comment data.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|----------|
| RWwn | Command code | 0x0104 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Point number | 0xssss |
| RWwn+3 | Not used | 0x0000 |
| RWwn+4 | Comment data | 0xbbbb |
| RWwn+5 | | 0xbbbb |
| RWwn+6 | | 0xbbbb |
| RWwn+7 | | 0xbbbb |
| RWwn+8 | | 0xbbbb |
| RWwn+9 | | 0xbbbb |
| RWwn+10 | | 0xbbbb |
| RWwn+11 | | 0x00bb |
| RWwn+12 | | Not used |
| to | | |
| RWwn+15 | | |

ssss : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)

bb : Specify 1 byte comment data in 8 bits. (little endian)
Specified range: "~" (=0x20) to "~" (=0x7E)



CAUTION

In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

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)
  
```

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0104 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0064 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x4157 |
| RWwn+5 | 0x5449 |
| RWwn+6 | 0x4F20 |
| RWwn+7 | 0x4752 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.3.2.2 Point comment data reference

Use this command to search and obtain point comment data by specifying the point number.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0105 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Point number | 0xssss |
| RWwn+3 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)



CAUTION
In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|--------------|----------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Point number | 0xssss |
| RWrn+3 | Not used | |
| RWwn+4 | Comment data | 0xbbbb |
| RWwn+5 | | 0xbbbb |
| RWwn+6 | | 0xbbbb |
| RWwn+7 | | 0xbbbb |
| RWwn+8 | | 0xbbbb |
| RWwn+9 | | 0xbbbb |
| RWwn+10 | | 0xbbbb |
| RWwn+11 | | 0x00bb |
| RWwn+12 | | Not used |
| to | | |
| RWwn+15 | | |

ssss : Shows the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)

bb : Shows the 1 byte comment data in 8 bits. (little endian)

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the point comment data reference command as shown at right, to obtain point comment data at point number 50.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0105 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0032 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x0000 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly to obtain the following point data.

Point number = 50
 Comment data = "WAIT ORG"

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0032 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x4157 |
| RWrn+5 | 0x5449 |
| RWrn+6 | 0x4F20 |
| RWrn+7 | 0x4752 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.3.3 Pallet-related command

Execute this command to define or obtain pallet data.

4.3.3.1 Pallet data definition

Use this command to define pallet data by specifying the pallet number and the number of pallets (Nx, Ny, Nz).



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

| Remote register | Contents | Value |
|-----------------|---------------------------------------|--------|
| RWwn | Command code | 0x0108 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Pallet number | 0xssss |
| RWwn+3 | Number of pallets in X direction (Nx) | 0xaaaa |
| RWwn+4 | Number of pallets in Y direction (Ny) | 0xaaaa |
| RWwn+5 | Number of pallets in Z direction (Nz) | 0xaaaa |
| RWwn+6 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify the pallet number in 16 bits.

Specified range: 0 (=0x0000) to 19 (=0x0013)

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 32767 or less.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

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

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0108 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x000A |
| RWwn+3 | 0x000A |
| RWwn+4 | 0x000F |
| RWwn+5 | 0x0001 |
| RWwn+6 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

4.3.3.2 Pallet data reference

Use this command to obtain pallet data by specifying the pallet number.

■ Command

| Remote register | Contents | Value |
|-----------------|---------------|--------|
| RWwn | Command code | 0x0109 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Pallet number | 0xssss |
| RWwn+3 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify the pallet number in 16 bits.
 Specified range: 0 (=0x0000) to 19 (=0x0013)

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|---------------------------------------|--------|
| RWrn | Status code | 0x0200 |
| RWwn+1 | Not used | |
| RWwn+2 | Pallet number | 0xssss |
| RWwn+3 | Number of pallets in X direction (Nx) | 0xaaaa |
| RWwn+4 | Number of pallets in Y direction (Ny) | 0xaaaa |
| RWwn+5 | Number of pallets in Z direction (Nz) | 0xaaaa |
| RWwn+6 | Not used | |
| to | | |
| RWwn+15 | | |

ssss : Shows the pallet number in 16 bits.
 aaaa : Shows the number of pallets in 16 bits.

Abnormal end

| Remote register | Contents | Value |
|-------------------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 to RWrn+15 | Not used | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the pallet data reference command as shown at right, to obtain pallet data at pallet number 10.

| Remote register | Value |
|-------------------------|--------|
| RWwn | 0x0109 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x000A |
| RWwn+3 to RWwn+15 | 0x0000 |

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

| Remote register | Value |
|-------------------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x000A |
| RWrn+3 | 0x000A |
| RWrn+4 | 0x000F |
| RWrn+5 | 0x0001 |
| RWrn+6 to RWrn+15 | 0x0000 |

4.3.4 Shift-related command

Execute this command to define or obtain shift data.

4.3.4.1 Shift data definition

Use this command to define shift data by specifying the shift number and shift data.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|------------|
| RWwn | Command code | 0x010C |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Shift number | 0xssss |
| RWwn+3 | Not used | 0x0000 |
| RWwn+4 | Axis-1 data | 0xbbbbbbbb |
| RWwn+5 | | |
| RWwn+6 | Axis-2 data | 0xbbbbbbbb |
| RWwn+7 | | |
| RWwn+8 | Axis-3 data | 0xbbbbbbbb |
| RWwn+9 | | |
| RWwn+10 | Axis-4 data | 0xbbbbbbbb |
| RWwn+11 | | |
| RWwn+12 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify the shift number in 16 bits.
Specified range: 0 (=0x0000) to 9 (=0x0009)

bbbbbbbb : Specify the shift data in 32 bits. (little endian)
Data should be integers (×100).

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

4. Remote command information

Example:

Use the shift data definition command as shown at right, to create the following shift data.

Shift number = 5
 Axis 1 = 100.00
 Axis 2 = -200.00
 Axis 3 = 50.00
 Axis 4 = -180.00

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x010C |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0005 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x2710 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0xB1E0 |
| RWwn+7 | 0xFFFF |
| RWwn+8 | 0x1388 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0xB9B0 |
| RWwn+11 | 0xFFFF |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.3.4.2 Shift data reference

Use this command to search and obtain shift data by specifying the shift number.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x010D |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Shift number | 0xssss |
| RWwn+3 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify the shift number in 16 bits.
Specified range: 0 (=0x0000) to 9 (=0x0009)

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|--------------|------------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Shift number | 0xssss |
| RWrn+3 | Not used | |
| RWrn+4 | Data 1 | 0xbbbbbbbb |
| RWrn+5 | | |
| RWrn+6 | Data 2 | 0xbbbbbbbb |
| RWrn+7 | | |
| RWrn+8 | Data 3 | 0xbbbbbbbb |
| RWrn+9 | | |
| RWrn+10 | Data 4 | 0xbbbbbbbb |
| RWrn+11 | | |
| RWrn+12 | Not used | |
| to | | |
| RWrn+15 | | |

ssss : Shows the shift number in 16 bits.

bbbbbbbb : Shows the shift data in 32 bits. (little endian)
Data is show in integers (×100).

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

4. Remote command information

Example:

Use the shift data reference command as shown at right, to obtain shift data at shift number 5.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x010D |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0005 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x0000 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly to obtain the following shift data.

Shift number = 5
Axis 1 = 100.00
Axis 2 = -200.00
Axis 3 = 50.00
Axis 4 = -180.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0005 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x2710 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xB1E0 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0xB9B0 |
| RWrn+11 | 0xFFFF |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.3.5 Hand-related command

Execute this command to define or obtain hand data.

4.3.5.1 Hand data definition

Use this command to define hand data by specifying the hand number and each data.

■ Command

| Remote register | Contents | | Value |
|-----------------|--------------|----------------|------------|
| RWwn | Command code | For main robot | 0x0110 |
| | | For sub robot | 0x0190 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Hand number | | 0xssss |
| RWwn+3 | Not used | | 0x0000 |
| RWwn+4 | Data 1 | | 0xbbbbbbbb |
| RWwn+5 | | | |
| RWwn+6 | Data 2 | | 0xbbbbbbbb |
| RWwn+7 | | | |
| RWwn+8 | Data 3 | | 0xbbbbbbbb |
| RWwn+9 | | | |
| RWwn+10 | Data 4 | | 0xbbbbbbbb |
| RWwn+11 | | | |
| RWwn+12 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

ssss : Specify the hand number in 16 bits.
 Specified range for main robot : 0 (0x0000) to 3 (=0x0003)
 Specified range for sub robot : 4 (=0x0004) to 7 (=0x0007)

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 (×100) 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 (×100) in 32 bits. (little endian)
 Data 4 : When hand is installed to R-axis =1, other cases =0

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-------------------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 to RWrn+15 | Not used | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the hand data definition command as shown at right, to create hand data for a Cartesian robot.

Hand number = 1
 Data 1 = 100.00
 Data 2 = -20.00
 Data 3 = 50.00
 Data 4 = 0

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0110 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0001 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x2710 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0xF830 |
| RWwn+7 | 0xFFFF |
| RWwn+8 | 0x1388 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.3.5.2 Hand data reference

Use this command to obtain hand data by specifying the hand number.

■ Commands

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0111 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Hand number | 0xssss |
| RWwn+3 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify the hand number in 16 bits.
 Specified range: 0 (0x0000) to 7 (=0x0007)
 (Numbers 0 to 3 are hand data for main robot, and numbers 4 to 7 are hand data for sub robot.)

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|------------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Hand number | 0xssss |
| RWrn+3 | Not used | |
| RWrn+4 | Data 1 | 0xbbbbbbbb |
| RWrn+5 | Data 2 | 0xbbbbbbbb |
| RWrn+6 | | |
| RWrn+7 | Data 3 | 0xbbbbbbbb |
| RWrn+8 | | |
| RWrn+9 | Data 4 | 0xbbbbbbbb |
| RWrn+10 | | |
| RWrn+11 | | |
| RWrn+12 | Not used | |
| to | | |
| RWrn+15 | | |

ssss : Shows the hand 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 (×100) 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 (×100) in 32 bits. (little endian)

Data 4 : When hand is installed to R-axis =1, other cases =0

Abnormal end

| Remote register | Contents | Value |
|-------------------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 to RWrn+15 | Not used | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the hand data reference command as shown at right, to obtain hand data.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0111 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0001 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x0000 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly to obtain the following hand data.

Hand number = 1
 Data 1 = 10000
 Data 2 = -20.00
 Data 3 = 50.00
 Data 4 = 0

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0001 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x2710 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0xF830 |
| RWrn+7 | 0xFFFF |
| RWrn+8 | 0x1388 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4 Category 3 remote commands

Category 2 remote commands are arithmetic commands. A command list is given below.

| No. | Command contents | | Command code (RWwn) | |
|-----------|----------------------------------|---------------------------|---------------------|------------|
| 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 | | |
| | 2 | Parameter-related command | Assignment | Main robot |
| Sub robot | | | | 0x02A0 |
| Reference | | | Main robot | 0x0224 |
| | | | Sub robot | 0x02A4 |
| 3 | Point-related command | Point assignment | | 0x0230 |
| | | Addition | | 0x0234 |
| | | Subtraction | | 0x0235 |
| | | Pallet point assignment | | 0x0238 |
| 4 | Element assignment command | Point element assignment | "x1" input format | 0x0240 |
| | | | "x100" input format | 0x0241 |
| | | Shift element assignment | "x100" 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.

4.4.1.1 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**

| Remote register | Contents | Value |
|-----------------|--|------------|
| RWwn | Command code | 0x0200 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Variable number 1 (Variable number at calculation destination) | 0xssss |
| RWwn+3 | Not used | 0x0000 |
| RWwn+4 | Numerical data | 0xbbbbbbbb |
| RWwn+5 | | |
| RWwn+6 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify variable number 1 in 16 bits.
 Specified range for integer variable : 0 (0x0000) to 7 (=0x0007)
 Specified range for real variable : 256 (=0x0100) to 263 (=0x0107)

| Integer variable | Variable number | Real variable | Variable number |
|------------------|-----------------|---------------|-----------------|
| SGI0 | 0(=0x0000) | SGR0 | 256(=0x0100) |
| SGI1 | 1(=0x0001) | SGR1 | 257(=0x0101) |
| : | : | : | : |
| SGI7 | 7(=0x0007) | SGR7 | 263(=0x0107) |

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

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to assign numerical data to variable number 1.

Variable number 1 = 1

Numerical data = 10000

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0200 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0001 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x2710 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4.1.2 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

| Remote register | Contents | Value |
|-----------------|---|--------|
| RWwn | Command code | 0x0201 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Variable number 1 (Variable number at assignment destination) | 0xssss |
| RWwn+3 | Not used | 0x0000 |
| RWwn+4 | Variable number 2 (Variable number at assignment source) | 0xssss |
| RWwn+5 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify variable numbers 1 and 2 in 16 bits.
 Specified range for integer variable : 0 (0x0000) to 7 (=0x0007)
 Specified range for real variable : 256 (=0x0100) to 263 (=0x0107)

| Integer variable | Variable number | Real variable | Variable number |
|------------------|-----------------|---------------|-----------------|
| SGI0 | 0(=0x0000) | SGR0 | 256(=0x0100) |
| SGI1 | 1(=0x0001) | SGR1 | 257(=0x0101) |
| : | : | : | : |
| SGI7 | 7(=0x0007) | SGR7 | 263(=0x0107) |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

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

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0201 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0001 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x0002 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4.1.3 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

| Remote register | Contents | Value | |
|-----------------|--|----------------|--------|
| RWwn | Command code | Addition | 0x0204 |
| | | Subtraction | 0x0208 |
| | | Multiplication | 0x020C |
| | | Division | 0x0210 |
| RWwn+1 | Not used | 0x0000 | |
| RWwn+2 | Variable number 1 (Variable number at calculation destination) | 0xssss | |
| RWwn+3 | Not used | 0x0000 | |
| RWwn+4 | Numerical data | 0xbbbbbbbb | |
| RWwn+5 | | | |
| RWwn+6 | Not used | 0x0000 | |
| to | | | |
| RWwn+15 | | | |

ssss : Specify variable number 1 in 16 bits.
 Specified range for integer variable : 0 (0x0000) to 7 (=0x0007)
 Specified range for real variable : 256 (=0x0100) to 263 (=0x0107)

| Integer variable | Variable number | Real variable | Variable number |
|------------------|-----------------|---------------|-----------------|
| SGI0 | 0(=0x0000) | SGR0 | 256(=0x0100) |
| SGI1 | 1(=0x0001) | SGR1 | 257(=0x0101) |
| : | : | : | : |
| SGI7 | 7(=0x0007) | SGR7 | 263(=0x0107) |

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 value when assigning to a real variable.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command to assign numerical data to a static variable as shown at right.

Variable number 1 = 1
Numerical data = 10000

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0204 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0001 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x2710 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4.1.4 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

| Remote register | Contents | | Value |
|-----------------|---|----------------|--------|
| RWwn | Command code | Addition | 0x0205 |
| | | Subtraction | 0x0209 |
| | | Multiplication | 0x020D |
| | | Division | 0x0211 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Variable number 1 (Variable number at arithmetic operation destination) | | 0xssss |
| RWwn+3 | Not used | | 0x0000 |
| RWwn+4 | Variable number 2 (Variable number at arithmetic operation source) | | 0xssss |
| RWwn+5 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

ssss : Specify variable numbers 1 and 2 in 16 bits.
 Specified range for integer variable : 0 (0x0000) to 7 (=0x0007)
 Specified range for real variable : 256 (=0x0100) to 263 (=0x0107)

| Integer variable | Variable number | Real variable | Variable number |
|------------------|-----------------|---------------|-----------------|
| SGI0 | 0(=0x0000) | SGR0 | 256(=0x0100) |
| SGI1 | 1(=0x0001) | SGR1 | 257(=0x0101) |
| : | : | : | : |
| SGI7 | 7(=0x0007) | SGR7 | 263(=0x0107) |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this arithmetic operation command to multiply static variables as shown at right.

Variable number 1 = 1

Variable number 2 = 2

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x020D |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0001 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x0002 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4.1.5 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

| Remote register | Contents | Value |
|-----------------|-----------------|--------|
| RWwn | Command code | 0x0214 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Variable number | 0xssss |
| RWwn+3 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify variable number in 16 bits.
 Specified range for integer variable : 0 (0x0000) to 7 (=0x0007)
 Specified range for real variable : 256 (=0x0100) to 263 (=0x0107)

| Integer variable | Variable number | Real variable | Variable number |
|------------------|-----------------|---------------|-----------------|
| SGI0 | 0(=0x0000) | SGR0 | 256(=0x0100) |
| SGI1 | 1(=0x0001) | SGR1 | 257(=0x0101) |
| : | : | : | : |
| SGI7 | 7(=0x0007) | SGR7 | 263(=0x0107) |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------------|------------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Variable number | 0xssss |
| RWrn+3 | Not used | |
| RWrn+4 | Value of variable | 0xbbbbbbbb |
| RWrn+5 | | |
| RWrn+6 | | |
| to | | |
| RWrn+15 | Not used | |

ssss : Specify variable number in 16 bits.
 Specified range for integer variable : 0 (0x0000) to 7 (=0x0007)
 Specified range for real variable : 256 (=0x0100) to 263 (=0x0107)

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

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to obtain the numerical value of variable number 5.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0214 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0005 |
| RWwn+3 | 0x0000 |
| RWwn+4 | 0x0000 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly to obtain the following variable.

Variable number = 5
Value = 50

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0005 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0032 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4.2 Parameter-related command

Execute this command to assign a value to a parameter or obtain a parameter.

4.4.2.1 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 |

| | 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 2048 |
| OUTPOS | OUT effective position (pulses) | 260(=0x0104) | 1 to 614400 |
| ARCH | Arch position (pulses) | 261(=0x0105) | 1 to 614400 |
| AXWGHT | Axis payload (kg) | 262(=0x0106) | 0 to maximum payload |
| TORQUE | Torque (%) | 263(=0x0107) | 1 to 100 |

■ Command

| Remote register | Contents | | Value |
|-----------------|------------------|---------------------------------|------------------|
| RWwn | Command code | For main robot For sub robot | 0x0220 0x02A0 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Parameter number | | 0xssss |
| RWwn+3 | Specified axis | bit 0 | Axis 1 |
| | | 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) | 0x00tt |
| RWwn+4 | Numerical data | | 0xbbbbbbbb |
| RWwn+5 | | | |
| RWwn+6 | | | |
| to | Not used | | 0x0000 |
| RWwn+15 | | | |

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

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to assign a numerical value to the tolerance for axis 3 of the main robot.

Parameter number = 259

Specified axis = 3

Numerical data = 1000

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0220 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0103 |
| RWwn+3 | 0x0004 |
| RWwn+4 | 0x03E8 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4.2.2 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 |

| 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 2048 |
| OUTPOS OUT effective position (pulses) | 260(=0x0104) | 1 to 614400 |
| ARCH Arch position (pulses) | 261(=0x0105) | 1 to 614400 |
| AXWGHT Axis payload (kg) | 262(=0x0106) | 0 to maximum payload |

■ Command

| Remote register | Contents | | Value |
|-----------------|------------------|----------------|-----------|
| RWwn | Command code | For main robot | 0x0224 |
| | | For sub robot | 0x02A4 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Parameter number | | 0xssss |
| RWwn+3 | Specified axis | bit 0 | Axis 1 |
| | | 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) |
| RWwn+4 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

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

| Remote register | Contents | | Value |
|-----------------|------------------|--------------|------------|
| RWrn | Status code | | 0x0200 |
| RWwn+1 | Not used | | |
| RWwn+2 | Parameter number | | 0xssss |
| RWwn+3 | Specified axis | bit 0 | Axis 1 |
| | | bit 1 | Axis 2 |
| | | bit 2 | Axis 3 |
| | | bit 3 | Axis 4 |
| | | bit 4 | Axis 5 |
| | | bit 5 | Axis 6 |
| | | bit 15–bit 6 | Not used |
| RWwn+4 | Numerical data | | 0xbbbbbbbb |
| RWwn+5 | | | |
| RWwn+6 | | | |
| to | Not used | | |
| RWwn+15 | | | |

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

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to obtain the OUT effective position of axis 1 of the main robot.

Parameter number = 260

Specified axis = 1

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0224 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0104 |
| RWwn+3 | 0x0001 |
| RWwn+4 | 0x0000 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 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

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0104 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0xFFFF |
| RWrn+5 | 0x0001 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4.3 Point-related command

Execute this command to assign a point to a parameter or obtain a parameter.

4.4.3.1 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

| Remote register | Contents | Value |
|-----------------|---|--------|
| RWwn | Command code | 0x0230 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Point number 1 (Point number at assignment destination) | 0xssss |
| RWwn+3 | Point number 2 (Point number at assignment source) | 0xssss |
| RWwn+4 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify the point number in 16 bits.
Specified range: 0 (= 0x0000) to 9999 (=0x270F)



CAUTION

In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | RWrn+1 | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to assign a point to the specified point.

Point number 1 = 1

Point number 2 = 100

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0230 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0001 |
| RWwn+3 | 0x0064 |
| RWwn+4 | 0x0000 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4.3.2 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

| Remote register | Contents | Value | |
|-----------------|--|-------------|--------|
| RWwn | Command code | Addition | 0x0234 |
| | | Subtraction | 0x0235 |
| RWwn+1 | Not used | 0x0000 | |
| RWwn+2 | Point number 1 (Point number at operation destination) | 0xssss | |
| RWwn+3 | Point number 2 (Point number at operation source) | 0xssss | |
| RWwn+4 | Not used | 0x0000 | |
| to | | | |
| RWwn+15 | | | |

ssss : Specify the point number in 16 bits.
 Specified range: 0 (= 0x0000) to 9999 (=0x270F)



CAUTION

In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

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

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0234 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0001 |
| RWwn+3 | 0x0064 |
| RWwn+4 | 0x0000 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4.3.3 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

| Remote register | Contents | Value |
|-----------------|---|--------|
| RWwn | Command code | 0x0238 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Point number (Point number at assignment destination) | 0xssss |
| RWwn+3 | Pallet number | 0xaaaa |
| RWwn+4 | Work position number | 0xbbbb |
| RWwn+5 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

ssss : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)

aaaa : Specify the pallet number in 16 bits.
Specified range: 0 (=0x0000) to 19 (=0x0013)

bbbb : Specify the work position number in 16 bits.
Specified range: 1 (=0x0000) to 32767 (=0x7FFF)



CAUTION

In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

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

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0238 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0064 |
| RWwn+3 | 0x0002 |
| RWwn+4 | 0x0085 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4.4 Element assignment command

Execute this command to assign a number to a point or shift element.

4.4.4.1 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 "x1" input format as a numerical value, 1000 is assigned.

When 1000 is specified in the "x100" input format as a numerical value, 10.00 is assigned.

Use the proper input format according to the point data format of the assignment destination.

■ **Command**

| Remote register | Contents | | Value |
|-----------------|---|---------------------|------------|
| RWwn | Command code | "x1" input format | 0x0240 |
| | | "x100" input format | 0x0241 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Point number (Point number at assignment destination) | | 0xssss |
| RWwn+3 | Data number designation | bit 0 | Data 1 |
| | | 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) | |
| RWwn+4 | Numerical value | | 0xbbbbbbbb |
| RWwn+5 | | | |
| RWwn+6 | | | |
| to | Not used | | 0x0000 |
| RWwn+15 | | | |

ssss : Specify the point number in 16 bits.
Specified range: 0 (0x0000) to 9999 (=0x270F)

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 "x1" input format.
Specify data in integers (×100) when using "x100" input format.



CAUTION

In the RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

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 = 10.00

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0241 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0001 |
| RWwn+3 | 0x0008 |
| RWwn+4 | 0x03E8 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.4.4.2 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

| Remote register | Contents | | Value |
|-----------------|---|--------------|------------|
| RWwn | Command code | | 0x0245 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Shift number (Shift number at assignment destination) | | 0xssss |
| RWwn+3 | Data number designation | bit 0 | Data 1 |
| | | bit 1 | Data 2 |
| | | bit 2 | Data 3 |
| | | bit 3 | Data 4 |
| | | bit 15–bit 4 | (0:Fixed) |
| RWwn+4 | Numerical value | | 0xbbbbbbbb |
| RWwn+5 | | | |
| RWwn+6 | | | |
| to | Not used | | 0x0000 |
| RWwn+15 | | | |

ssss : Specify the shift number in 16 bits.
Specified range: 0 (0x0000) to 9 (=0x0009)

tt : Specify the data number in bit pattern using lower 4 bits.

bbbbbbbb : Specify the integer (×100) in 32 bits. (little endian)

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

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 = 10.00

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0245 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0001 |
| RWwn+3 | 0x0002 |
| RWwn+4 | 0x03E8 |
| RWwn+5 | 0x0000 |
| RWwn+6 | 0x0000 |
| RWwn+7 | 0x0000 |
| RWwn+8 | 0x0000 |
| RWwn+9 | 0x0000 |
| RWwn+10 | 0x0000 |
| RWwn+11 | 0x0000 |
| RWwn+12 | 0x0000 |
| RWwn+13 | 0x0000 |
| RWwn+14 | 0x0000 |
| RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.5 Category 4 remote commands

Category 4 remote commands are IO (I/O) port commands. A command list is given below.

| No. | Command contents | | Command code (RWwn) | |
|-----|------------------|------------|---------------------|--------|
| 1 | I/O port command | Assignment | port units | 0x0300 |
| | | Assignment | bit units | 0x0301 |
| | | Reference | port units | 0x0304 |

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.

4.5.1.1 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

| Remote register | Contents | | Value |
|-----------------|------------------------|---------------|----------------------|
| RWwn | Command code | Port units | 0x0300 |
| | | Bit units | 0x0301 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Port number | bit 3–bit 0 | Bit number |
| | | bit 7–bit 4 | Units of port number |
| | | bit 11–bit 8 | Tens of port number |
| | | bit 15–bit 12 | Specified port type |
| RWwn+3 | Assignment bit pattern | | 0x00bb |
| RWwn+4 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

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 | 1 | 2 to 7, 10 to 17, 20 to 27 |
| MO | 10 | 2 to 7, 10 to 17, 20 to 27 |
| LO | 11 | 0 |
| TO | 100 | 0 |
| SO | 110 | 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

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

- aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.
- ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to output a numerical value to the following output port.

Output port = DO12 ()
Numerical data = 7

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0300 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x1120 |
| RWwn+3 | 0x0007 |
| RWwn+4 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

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

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0301 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x1021 |
| RWwn+3 | 0x0001 |
| RWwn+4 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

4.5.1.2 I/O port reference

Use this command to obtain the contents of a port number by specifying the port number.

■ Command

| Remote register | Contents | | Value |
|-----------------|--------------|---------------|----------------------|
| RWwn | Command code | Port units | 0x0304 |
| RWwn+1 | Not used | | 0x0000 |
| RWwn+2 | Port number | bit 3–bit 0 | (0:Fixed) |
| | | bit 7–bit 4 | Units of port number |
| | | bit 11–bit 8 | Tens of port number |
| | | bit 15–bit 12 | Specified port type |
| RWwn+3 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

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 | 0 | 0 to 7,10 to 17,20 to 27 |
| DO | 1 | 0 to 7,10 to 17,20 to 27 |
| MO | 10 | 0 to 7,10 to 17,20 to 27 |
| LO | 11 | 0 |
| TO | 100 | 0 |
| SI | 101 | 0 to 7,10 to 17,20 to 27 |
| SO | 110 | 0 to 7,10 to 17,20 to 27 |

■ Status

Normal end

| Remote register | Contents | | Value |
|-----------------|-------------|---------------|----------------------|
| RWrn | Status code | | 0x0200 |
| RWrn+1 | Not used | | |
| RWwn+2 | Port number | bit 3–bit 0 | Not used |
| | | bit 7–bit 4 | Units of port number |
| | | bit 11–bit 8 | Tens of port number |
| | | bit 15–bit 12 | Specified port type |
| RWrn+3 | Bit pattern | | 0x00bb |
| RWrn+4 | Not used | | |
| to | | | |
| RWrn+15 | | | |

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

| Remote register | Contents | | Value |
|-----------------|------------------------|--|--------|
| RWrn | Status code | | 0x4000 |
| RWrn+1 | Error code | | 0xaabb |
| RWrn+2 | Additional information | | 0xccdd |
| RWrn+3 | Not used | | |
| to | | | |
| RWrn+15 | | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

4. Remote command information

Example:

Use this command as shown at right, to obtain the following port data.

Output port = DO12 ()

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0304 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x1120 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

Output port = DO12 ()

Numerical data = 7

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x1120 |
| RWrn+3 | 0x0007 |
| RWrn+4 | 0x0000 |
| to | |
| RWrn+15 | |

Example:

Use this command as shown at right, to output a numerical value to the following port data.

Input port = DI2 ()

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0304 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x0020 |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

Input port = DI2 ()

Numerical data = 127

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0020 |
| RWrn+3 | 0x007F |
| RWrn+4 | 0x0000 |
| to | |
| RWrn+15 | |

4.6 Category 5 remote commands

Category 5 remote commands are key operation commands. A command list is given below.



NOTE

Category 5 commands can be used in AUTO mode.

| No. | Command contents | Command code (RWwn) | |
|-----|---|------------------------|--------|
| 1 | Execution program designation | 0x0401 | |
| 2 | Program execution | Program execution | 0x0402 |
| | | Program step execution | 0x0403 |
| | | Program skip execution | 0x0404 |
| | | Program next execution | 0x0405 |
| 3 | Program reset | 0x0406 | |
| 4 | Program task switching | 0x0407 | |
| 5 | Program execution information reference | 0x0408 | |

- * Key operation commands are the same as key instructions from the programming box. Normal status signifies that key input was received correctly and does not mean the actual operation was executed.
- * Upon receiving a normal status after issuing a key command, allow a time interval of at least 100ms before issuing the next command. This interval will prevent errors that may occur when issuing consecutive commands.
- * Check the robot program in-progress 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 execute a robot program.

■ **Command**

| Remote register | Contents | Value |
|-----------------|--------------|----------|
| RWwn | Command code | 0x0401 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Program name | 0xbbbb |
| RWwn+3 | | 0xbbbb |
| RWwn+4 | | 0xbbbb |
| RWwn+5 | | 0xbbbb |
| RWwn+6 | | Not used |
| to | | |
| RWwn+15 | | |

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 8 characters, use a space.

■ **Status**

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to specify a program name "ABC_DE".

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0401 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x4241 |
| RWwn+3 | 0x5F43 |
| RWwn+4 | 0x4544 |
| RWwn+5 | 0x2020 |
| RWwn+6 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| to | |
| RWrn+15 | |

4.6.2 Program execution

These commands execute robot program operations. These are only valid in AUTO mode.

| Command | Meaning |
|------------------------|--|
| Program execution | Starts automatic operation of a robot program. Performs the same processing as the START key on MPB (RUN key on RPB) and 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 the STEP key (F11) on MPB or RPB. |
| Program skip execution | Skips one line in the program. Performs the same processing as the SKIP key (F12) on MPB or RPB. |
| 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 the NEXT key (F13) on MPB or RPB. |

■ Command

| Remote register | Contents | Value | |
|-----------------|--------------|------------------------|--------|
| RWwn | Command code | Program execution | 0x0402 |
| | | Program step execution | 0x0403 |
| | | Program skip execution | 0x0404 |
| | | Program next execution | 0x0405 |
| RWwn+1 | Not used | 0x0000 | |
| to | | | |
| RWwn+15 | | | |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use these commands to execute a program as shown at right.

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0402 |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| to | |
| RWrn+15 | |

4.6.3 Program reset

This command resets the robot program. This is only valid in AUTO mode. Check the program reset status output signal (SO14) to verify the program has been reset.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0406 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command to reset a program as shown at right,.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0406 |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| to | |
| RWrn+15 | |

4.6.4 Program task switching

This command switches tasks to run, when the robot program is stopped. This is only valid in AUTO mode.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0407 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| to | | |
| RWrn+15 | | |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command to switch tasks as shown at right.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0407 |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| to | |
| RWrn+15 | |

4.6.5 Program execution information reference

Execute this command to acquire information on task execution, when the robot program is stopped. This is only valid in AUTO mode.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0408 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-----------------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWwn+2 | Program name | 0xbbbb |
| RWwn+3 | | 0xbbbb |
| RWwn+4 | | 0xbbbb |
| RWwn+5 | | 0xbbbb |
| RWwn+6 | Task number | 0xtttt |
| RWwn+7 | Execution line number | 0xllll |
| RWwn+8 | Task priority | 0xpppp |
| RWwn+9 | Not used | |
| to | | |
| RWrn+15 | | |

bb : Shows the 1-byte program name in 8 bits. (little endian).
Program names are shown with letters (uppercase), numbers and underscores (_).
A space indicates a portion in the program name not having all 8 characters.

tttt : Shows the currently selected task number (1 to 8).

llll : Shows the currently executed line of selected task (1 to 9999). A value + 10000 is shown when COMMON program is running.

pppp : Shows the priority of currently selected task (17 to 47).

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command to switch program tasks as shown at right.

Values are expressed as shown at right when executed correctly to switch to the following program task.

Program name = "ABCDEFGH"
 Task number = 2
 Execution number = 101
 Task priority = 32

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0408 |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x4241 |
| RWrn+3 | 0x4443 |
| RWrn+4 | 0x4645 |
| RWrn+5 | 0x4847 |
| RWrn+6 | 0x0002 |
| RWrn+7 | 0x0065 |
| RWrn+8 | 0x0020 |
| RWrn+9 | 0x0000 |
| to | |
| RWrn+15 | |

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 (RWwn) |
|-----|------------------------------------|------------------|----------------|---------------------|
| 1 | Version information reference | | | 0x0501 |
| 2 | Controller configuration reference | | | 0x0502 |
| 3 | Servo status reference | | | 0x0503 |
| 4 | Absolute reset status reference | | | 0x0504 |
| 5 | Current position reference | Pulse units | For main robot | 0x0505 |
| | | | For sub robot | 0x0585 |
| | | Millimeter units | For main robot | 0x0506 |
| | | | For sub robot | 0x0586 |
| 6 | Task status reference | | | 0x0507 |
| 7 | Task execution reference | | | 0x0508 |
| 8 | Message reference | | | 0x0509 |
| 9 | Speed status reference | | | 0x050A |
| 10 | Arm designation status reference | | | 0x050B |
| 11 | Arch arm status reference | | | 0x050C |
| 12 | Service mode status reference | | | 0x050D |
| 13 | Point unit status reference | | | 0x050E |
| 14 | Return-to-origin status reference | | | 0x050F |

4.7.1 Version information reference

Execute this command to acquire information on the software version used in the robot controller.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0501 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|--------------------------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Host software version | 0xaabb |
| RWrn+3 | Host software revision | 0xcccc |
| RWrn+4 | Axis-1 driver software version | 0xddee |
| RWrn+5 | Axis-2 driver software version | 0xddee |
| RWrn+6 | Axis-3 driver software version | 0xddee |
| RWrn+7 | Axis-4 driver software version | 0xddee |
| RWrn+8 | Axis-5 driver software version | 0xddee |
| RWrn+9 | Axis-6 driver software version | 0xddee |
| RWrn+10 | Axis-7 driver software version | 0xddee |
| RWrn+11 | Axis-8 driver software version | 0xddee |
| RWrn+12 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the controller's host software version in upper 8 bits and lower 8 bits.

cccc : Shows the controller's host software revision in 16 bits.

ddee : Shows the controller's driver software version in upper 8 bits and lower 8 bits.

For axes that do not exist actually, the value is 0x0FFF.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

4. Remote command information

Example:

Use this command to obtain a software version as shown at right.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0501 |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

Host software version : V8.08
 Host software revision : R1013
 Axis-1 driver software version : V1.01
 Axis-2 driver software version : V1.01
 Axis-3 driver software version : V1.01
 Axis-4 driver software version : V1.01

No other axis exists.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0808 |
| RWrn+3 | 0x03F5 |
| RWrn+4 | 0x0101 |
| RWrn+5 | 0x0101 |
| RWrn+6 | 0x0101 |
| RWrn+7 | 0x0101 |
| RWrn+8 | 0x0FFF |
| RWrn+9 | 0x0FFF |
| RWrn+10 | 0x0FFF |
| RWrn+11 | 0x0FFF |
| RWrn+12 | 0x0000 |
| to | |
| RWrn+15 | |

4.7.2 Controller configuration reference

Execute this command to acquire information on the settings made for the robot controller.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0502 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|----------------------------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Main robot number | 0xaaaa |
| RWrn+3 | Sub robot number | 0xaaaa |
| RWrn+4 | Axis-1 robot number | 0xaaaa |
| RWrn+5 | Axis-2 robot number | 0xaaaa |
| RWrn+6 | Axis-3 robot number | 0xaaaa |
| RWrn+7 | Axis-4 robot number | 0xaaaa |
| RWrn+8 | Axis-5 robot number | 0xaaaa |
| RWrn+9 | Axis-6 robot number | 0xaaaa |
| RWrn+10 | Axis-7 robot number | 0xaaaa |
| RWrn+11 | Axis-8 robot number | 0xaaaa |
| RWrn+12 | Unit number of option slot No. 1 | 0xpppp |
| RWrn+13 | Unit number of option slot No. 2 | 0xpppp |
| RWrn+14 | Unit number of option slot No. 3 | 0xpppp |
| RWrn+15 | Unit number of option slot No. 4 | 0xpppp |

aaaa : Shows the robot number.

The robot number is determined before shipment according to the user specifications.

pppp : Shows the option slot unit No.

| No. | Unit |
|-----|-------------------------------|
| 0 | Non |
| 6 | DIO unit (NPN specifications) |
| 7 | DIO unit (PNP specifications) |
| 16 | CC-Link unit |
| 17 | DeviceNet unit |
| 18 | Profibus unit |
| 19 | Ethernet unit |
| 21 | YC-Link unit |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command to obtain the robot configuration as shown at right.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0502 |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

Main robot number : 2000 (YK250X)
 Sub robot number : 100 (no robot)
 Axis-1 robot number : 2000 (YK250X)
 Axis-2 robot number : 2000 (YK250X)
 Axis-3 robot number : 2000 (YK250X)
 Axis-4 robot number : 2000 (YK250X)
 Axis-5 robot number : 0 (no axis)
 Axis-6 robot number : 0 (no axis)
 Axis-7 robot number : 0 (no axis)
 Axis-8 robot number : 0 (no axis)
 Option slot 1 : 16 (CC-Link unit)
 Option slot 2 : 6 (DIO unit (NPN specifications))
 Option slot 3 : 6 (DIO unit (NPN specifications))
 Option slot 4 : 0 (no unit)

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x07D0 |
| RWrn+3 | 0x0064 |
| RWrn+4 | 0x07D0 |
| RWrn+5 | 0x07D0 |
| RWrn+6 | 0x07D0 |
| RWrn+7 | 0x07D0 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0010 |
| RWrn+13 | 0x0006 |
| RWrn+14 | 0x0006 |
| RWrn+15 | 0x0000 |

4.7.3 Servo status reference

Execute this command to acquire information on servo status.

■ **Command**

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0503 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ **Status**

Normal end

| Remote register | Contents | Value |
|-----------------|--------------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Axis-1 information | 0xaaaa |
| RWrn+3 | Axis-2 information | 0xaaaa |
| RWrn+4 | Axis-3 information | 0xaaaa |
| RWrn+5 | Axis-4 information | 0xaaaa |
| RWrn+6 | Axis-5 information | 0xaaaa |
| RWrn+7 | Axis-6 information | 0xaaaa |
| RWrn+8 | Axis-7 information | 0xaaaa |
| RWrn+9 | Axis-8 information | 0xaaaa |
| RWrn+10 | Not used | |
| to | | |
| RWrn+15 | | |

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

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command to acquire a servo status as shown at right.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0503 |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

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)
- Axis 7 : 9 (no axis)
- Axis 8 : 9 (no axis)

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0001 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x0002 |
| RWrn+5 | 0x0001 |
| RWrn+6 | 0x0009 |
| RWrn+7 | 0x0009 |
| RWrn+8 | 0x0009 |
| RWrn+9 | 0x0009 |
| RWrn+10 | 0x0000 |
| to | |
| RWrn+15 | |

4.7.4 Absolute reset status reference

Execute this command to acquire information on absolute reset status.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0504 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|--------------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Axis-1 information | 0xaaaa |
| RWrn+3 | Axis-2 information | 0xaaaa |
| RWrn+4 | Axis-3 information | 0xaaaa |
| RWrn+5 | Axis-4 information | 0xaaaa |
| RWrn+6 | Axis-5 information | 0xaaaa |
| RWrn+7 | Axis-6 information | 0xaaaa |
| RWrn+8 | Axis-7 information | 0xaaaa |
| RWrn+9 | Axis-8 information | 0xaaaa |
| RWrn+10 | Not used | |
| to | | |
| RWrn+15 | | |

aaaa : Shows the absolute reset status of each axis.

| Value | Contents |
|-------|-----------------------------|
| 0 | Return-to-origin incomplete |
| 1 | Return-to-origin complete |
| 9 | No axis |

Abnormal end

| Remote register | Contents | Value |
|-------------------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 to RWrn+15 | Not used | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command to acquire an absolute reset status as shown at right.

| Remote register | Value |
|-------------------------|--------|
| RWwn | 0x0504 |
| RWwn+1 to RWwn+15 | 0x0000 |

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)
- Axis 7 : 9 (no axis)
- Axis 8 : 9 (no axis)

| Remote register | Value |
|--------------------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0001 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0001 |
| RWrn+6 | 0x0009 |
| RWrn+7 | 0x0009 |
| RWrn+8 | 0x0009 |
| RWrn+9 | 0x0009 |
| RWrn+10 to RWrn+15 | 0x0000 |

4.7.5 Current position reference

Execute this command group to obtain the robot current position data.

4.7.5.1 Pulse designation

Use this command to obtain the robot current position data in pulse units.

■ Command

| Remote register | Contents | | Value |
|-----------------|--------------|----------------|--------|
| RWwn | Command code | For main robot | 0x0505 |
| | | For sub robot | 0x0585 |
| RWwn+1 | Not used | | 0x0000 |
| to | | | |
| RWwn+15 | | | |

■ Status

Normal end

| Remote register | Contents | | | Value |
|-----------------|-------------|--------------|------------|------------|
| RWrn | Status code | | | 0x0200 |
| RWrn+1 | Not used | | | |
| RWrn+2 | Not used | | | |
| RWrn+3 | Point flag | bit 0 | Point unit | 0 |
| | | bit 15–bit 1 | Not used | 0 |
| RWrn+4 | Axis-1 data | | | 0xbbbbbbbb |
| RWrn+5 | Axis-2 data | | | 0xbbbbbbbb |
| RWrn+6 | Axis-3 data | | | 0xbbbbbbbb |
| RWrn+7 | Axis-4 data | | | 0xbbbbbbbb |
| RWrn+8 | Axis-5 data | | | 0xbbbbbbbb |
| RWrn+9 | Axis-6 data | | | 0xbbbbbbbb |
| RWrn+10 | Axis-1 data | | | 0xbbbbbbbb |
| RWrn+11 | Axis-2 data | | | 0xbbbbbbbb |
| RWrn+12 | Axis-3 data | | | 0xbbbbbbbb |
| RWrn+13 | Axis-4 data | | | 0xbbbbbbbb |
| RWrn+14 | Axis-5 data | | | 0xbbbbbbbb |
| RWrn+15 | Axis-6 data | | | 0xbbbbbbbb |

bbbbbbbb : Shows the current position output data in 32 bits. (little endian)
Data is shown in integers.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to obtain the main robot current position data in pulse units.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0505 |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

4. Remote command information

Values are expressed as shown at right when executed correctly to obtain the following positions in pulse units.

Axis 1 = 20001
 Axis 3 = -12345
 Other axes = 0

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| RWrn+4 | 0x4E21 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0xCFC7 |
| RWrn+9 | 0xFFFF |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.7.5.2 Millimeter designation

Use this command to obtain the robot current position data in millimeter units.

■ Command

| Remote register | Contents | | Value |
|-------------------------|--------------|----------------|--------|
| RWwn | Command code | For main robot | 0x0506 |
| | | For sub robot | 0x0586 |
| RWwn+1 to RWwn+15 | Not used | | 0x0000 |

■ Status

Normal end

| Remote register | Contents | | | Value |
|-----------------|--------------|--------------|-------------|------------|
| RWrn | Status code | | | 0x0200 |
| RWrn+1 | Not used | | | |
| RWrn+2 | Not used | | | |
| RWrn+3 | Point flag | bit 0 | Point unit | 1 |
| | | bit 2–bit 1 | Hand system | tt |
| | | bit 15–bit 3 | Not used | 0 |
| RWrn+4 | Axis-1 data | | | 0xbbbbbbbb |
| RWrn+5 | Axis-2 data | | | 0xbbbbbbbb |
| RWrn+6 | Axis-3 data | | | 0xbbbbbbbb |
| RWrn+7 | Axis-4 data | | | 0xbbbbbbbb |
| RWrn+8 | Axis-5 data | | | 0xbbbbbbbb |
| RWrn+9 | Axis-6 data | | | 0xbbbbbbbb |
| RWrn+10 | Axis-7 data | | | 0xbbbbbbbb |
| RWrn+11 | Axis-8 data | | | 0xbbbbbbbb |
| RWrn+12 | Axis-9 data | | | 0xbbbbbbbb |
| RWrn+13 | Axis-10 data | | | 0xbbbbbbbb |
| RWrn+14 | Axis-11 data | | | 0xbbbbbbbb |
| RWrn+15 | Axis-12 data | | | 0xbbbbbbbb |

tt : Shows in 2 bits the current 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 (×100).

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to obtain the main robot current position data in millimeter units.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0506 |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly to obtain the following positions in millimeter units.

Axis 1 = 200.01
Axis 3 = -123.45
Other axes = 0.00

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x4E21 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0xCFC7 |
| RWrn+9 | 0xFFFF |
| RWrn+10 | 0x0000 |
| RWrn+11 | 0x0000 |
| RWrn+12 | 0x0000 |
| RWrn+13 | 0x0000 |
| RWrn+14 | 0x0000 |
| RWrn+15 | 0x0000 |

4.7.6 Task status reference

Execute this command to acquire task execution status.

■ **Command**

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0507 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ **Status**

Normal end

| Remote register | Contents | Value |
|-----------------|----------------------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Execution status of task 1 | 0xaaaa |
| RWrn+3 | Execution status of task 2 | 0xaaaa |
| RWrn+4 | Execution status of task 3 | 0xaaaa |
| RWrn+5 | Execution status of task 4 | 0xaaaa |
| RWrn+6 | Execution status of task 5 | 0xaaaa |
| RWrn+7 | Execution status of task 6 | 0xaaaa |
| RWrn+8 | Execution status of task 7 | 0xaaaa |
| RWrn+9 | Execution status of task 8 | 0xaaaa |
| RWrn+10 | Not used | |
| to | | |
| RWrn+15 | | |

aaaa : Shows the execution status of each task.

| Value | Contents |
|-------|---|
| 0 | Stop status |
| 1 | Run status (Ready status / Wait status) |
| 2 | Suspend status |
| 9 | No task |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to acquire the execution status of a task.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0507 |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

- Task 1 : 1 (Run status)
- Task 2 : 1 (Run 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)

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0001 |
| RWrn+3 | 0x0001 |
| RWrn+4 | 0x0009 |
| RWrn+5 | 0x0009 |
| RWrn+6 | 0x0002 |
| RWrn+7 | 0x0009 |
| RWrn+8 | 0x0009 |
| RWrn+9 | 0x0009 |
| RWrn+10 | 0x0000 |
| to | |
| RWrn+15 | |

4.7.7 Task execution line reference

Execute this command to acquire information on task execution line.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x0508 |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|--------------------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Execution line of task 1 | 0xaaaa |
| RWrn+3 | Execution line of task 2 | 0xaaaa |
| RWrn+4 | Execution line of task 3 | 0xaaaa |
| RWrn+5 | Execution line of task 4 | 0xaaaa |
| RWrn+6 | Execution line of task 5 | 0xaaaa |
| RWrn+7 | Execution line of task 6 | 0xaaaa |
| RWrn+8 | Execution line of task 7 | 0xaaaa |
| RWrn+9 | Execution line of task 8 | 0xaaaa |
| RWrn+10 | Not used | |
| to | | |
| RWrn+15 | | |

aaaa : Shows the execution line of each task.
When no task exists, the value is 0.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

4. Remote command information

Example:

Use this command as shown at right, to acquire the execution line of a task.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0508 |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

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

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0001 |
| RWrn+3 | 0x0013 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0063 |
| RWrn+7 | 0x0000 |
| RWrn+8 | 0x0000 |
| RWrn+9 | 0x0000 |
| RWrn+10 | 0x0000 |
| to | |
| RWrn+15 | |

4.7.8 Message reference

Execute this command to acquire information on error message status.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------------------|--------|
| RWwn | Command code | 0x0509 |
| RWwn+1 | Not used | 0x0000 |
| RWwn+2 | Error acquisition number | 0xaaaa |
| RWwn+3 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

aaaa : Specify the error acquisition number.

| No. | Contents |
|----------|---|
| 0 | Message currently displayed on programming box. |
| 1 to 500 | Message number stored in error history. |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.



NOTE

When "0" is specified for Error acquisition number, the message number and additional information which were last displayed on the programming box will be set to RWrn+1 and RWrn+2. When error is cleared, 0 will be set to RWrn+1 and RWrn+2.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to acquire the status of an error message.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x0509 |
| RWwn+1 | 0x0000 |
| RWwn+2 | 0x000A |
| RWwn+3 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0C02 |
| RWrn+2 | 0x0000 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

4.7.9 Speed status reference

Execute this command to acquire information on current speed status.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x050A |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status**Normal end**

| Remote register | Contents | Value |
|-----------------|-------------|-------------------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Main robot | AUTO mode speed |
| RWrn+3 | | MANUAL mode speed |
| RWrn+4 | Sub robot | AUTO mode speed |
| RWrn+5 | | MANUAL mode speed |
| RWrn+6 | Not used | |
| to | | |
| RWrn+15 | | |

aaaa : Shows the speed setting (1 to 100).
Shows "0" when no robot axis is specified.

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use the speed status reference command as shown at right, to acquire the status of current speed.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x050A |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

Main robot speed in AUTO mode : 50%

Main robot speed in MANUAL mode : 50%

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0032 |
| RWrn+3 | 0x0032 |
| RWrn+4 | 0x0000 |
| RWrn+5 | 0x0000 |
| RWrn+6 | 0x0000 |
| to | |
| RWrn+15 | |

4.7.10 Arm designation status reference

Execute this command to acquire information on currently designated arm.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x050B |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|-------------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Main robot status | 0xaaaa |
| RWrn+3 | Sub robot status | 0xaaaa |
| RWrn+4 | Not used | |
| to | | |
| RWrn+15 | | |

aaaa : Shows the arm designation status.

| Value | Contents |
|-------|-------------------------------|
| 0 | Right-handed system status |
| 1 | Left-handed system status |
| 9 | Robots other than SCARA robot |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to acquire the status of currently specified arm.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x050B |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

Main robot : 1 (Left-handed system status)

Sub robot : 9 (Robots other than SCARA robot)

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0001 |
| RWrn+3 | 0x0009 |
| RWrn+4 | 0x0000 |
| to | |
| RWrn+15 | |

4.7.11 Arm status reference

Execute this command to acquire information on arm.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x050C |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status**Normal end**

| Remote register | Contents | Value |
|-----------------|-------------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Main robot status | 0xaaaa |
| RWrn+3 | Sub robot status | 0xaaaa |
| RWrn+4 | Not used | |
| to | | |
| RWrn+15 | | |

aaaa : Shows the arm status.

| Value | Contents |
|-------|-------------------------------|
| 0 | Right-handed system status |
| 1 | Left-handed system status |
| 9 | Robots other than SCARA robot |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to acquire the status of arm.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x050C |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

Main robot : 1 (Left-handed system status)

Sub robot : 9 (Robots other than SCARA robot)

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0001 |
| RWrn+3 | 0x0009 |
| RWrn+4 | 0x0000 |
| to | |
| RWrn+15 | |

4.7.12 Service mode status reference

Execute this command to acquire current information on service mode.

To use this command, DI dedicated input must be enabled by input device exclusive control.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x050D |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status

Normal end

| Remote register | Contents | Value |
|-----------------|----------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Setting status | 0xaaaa |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aaaa : Shows the service mode setting status.

| Value | Contents |
|-------|--------------|
| 0 | Normal mode |
| 1 | Service mode |

Abnormal end

| Remote register | Contents | Value |
|-----------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to acquire the status of service mode.

| Remote register | Value |
|-----------------|--------|
| RWwn | 0x050D |
| RWwn+1 | 0x0000 |
| to | |
| RWwn+15 | |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-----------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0001 |
| RWrn+3 | 0x0000 |
| to | |
| RWrn+15 | |

4.7.13 Point unit status reference

Execute this command to acquire current information on point units.

■ Command

| Remote register | Contents | Value |
|-----------------|--------------|--------|
| RWwn | Command code | 0x050E |
| RWwn+1 | Not used | 0x0000 |
| to | | |
| RWwn+15 | | |

■ Status**Normal end**

| Remote register | Contents | Value |
|-----------------|----------------|--------|
| RWrn | Status code | 0x0200 |
| RWrn+1 | Not used | |
| RWrn+2 | Setting status | 0xaaaa |
| RWrn+3 | Not used | |
| to | | |
| RWrn+15 | | |

aaaa : Shows the point setting status.

| Value | Contents |
|-------|------------------|
| 0 | Pulse units |
| 1 | Millimeter units |
| 2 | Tool coordinates |

Abnormal end

| Remote register | Contents | Value |
|-------------------------|------------------------|--------|
| RWrn | Status code | 0x4000 |
| RWrn+1 | Error code | 0xaabb |
| RWrn+2 | Additional information | 0xccdd |
| RWrn+3 to RWrn+15 | Not used | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command as shown at right, to acquire the status of point units.

| Remote register | Value |
|-------------------------|--------|
| RWwn | 0x050E |
| RWwn+1 to RWwn+15 | 0x0000 |

Values are expressed as shown at right when executed correctly.

| Remote register | Value |
|-------------------------|--------|
| RWrn | 0x0200 |
| RWrn+1 | 0x0000 |
| RWrn+2 | 0x0001 |
| RWrn+3 to RWrn+15 | 0x0000 |

4.7.14 Return-to-origin status reference

Execute this command to acquire information on the return-to-origin status.

**CAUTION**

The return-to-origin status reference command is available with software version 8.45 onwards (RCX14x).

■ Command

| Remote register | Contents | Value |
|-------------------------|--------------|--------|
| RWwn | Command code | 0x050F |
| RWwn+1 to RWwn+15 | Not used | 0x0000 |

■ Status

Normal end

| Remote register | Contents | Value |
|--|--------------------|--------|
| RWr _n | Status code | 0x0200 |
| RWr _{n+1} | Not used | |
| RWr _{n+2} | Axis-1 information | 0xaaaa |
| RWr _{n+3} | Axis-2 information | 0xaaaa |
| RWr _{n+4} | Axis-3 information | 0xaaaa |
| RWr _{n+5} | Axis-4 information | 0xaaaa |
| RWr _{n+6} | Axis-5 information | 0xaaaa |
| RWr _{n+7} | Axis-6 information | 0xaaaa |
| RWr _{n+8} | Axis-7 information | 0xaaaa |
| RWr _{n+9} | Axis-8 information | 0xaaaa |
| RWr _{n+10} to RWr _{n+15} | Not used | |

aaaa : Shows the return-to-origin status of each axis.

| Value | Contents |
|-------|-----------------------------|
| 0 | Return-to-origin incomplete |
| 1 | Return-to-origin complete |
| 9 | No axis |

Abnormal end

| Remote register | Contents | Value |
|---|------------------------|--------|
| RWr _n | Status code | 0x4000 |
| RWr _{n+1} | Error code | 0xaabb |
| RWr _{n+2} | Additional information | 0xccdd |
| RWr _{n+3} to RWr _{n+15} | Not used | |

aabb : Shows the group number in upper 8 bits, and the category number in lower 8 bits.

ccdd : Shows the additional information section in upper 8 bits, and the detail value in lower 8 bits.

Example:

Use this command to obtain a return-to-origin status as shown at right.

| Remote register | Value |
|---|--------|
| RWw _n | 0x050F |
| RWw _{n+1} to RWw _{n+15} | 0x0000 |

Values are expressed as shown at right when executed correctly.

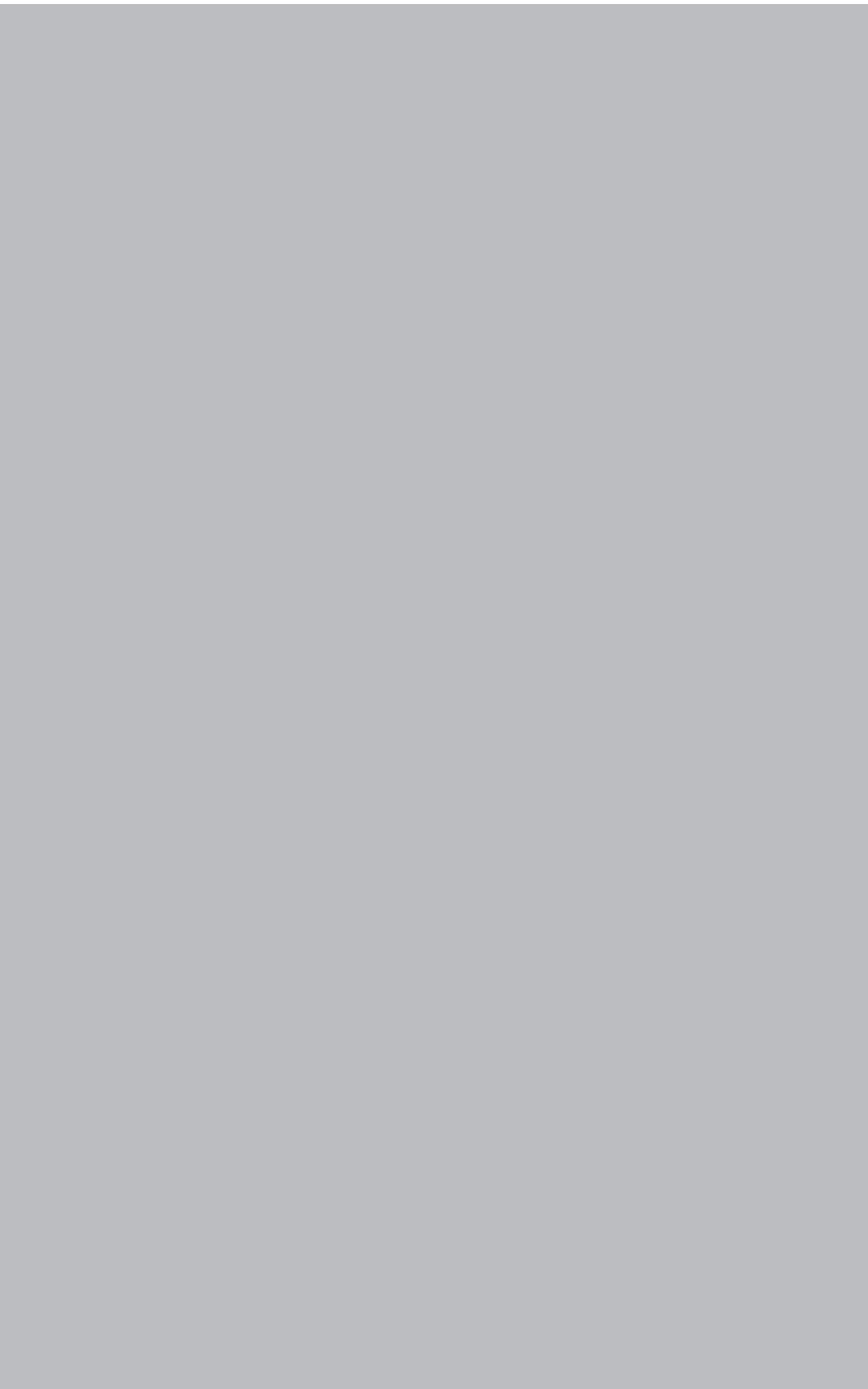
Axis 1 : 1 (Return-to-origin complete)
 Axis 2 : 1 (Return-to-origin complete)
 Axis 3 : 0 (Return-to-origin incomplete)
 Axis 4 : 1 (Return-to-origin complete)
 Axis 5 : 9 (no axis)
 Axis 6 : 9 (no axis)
 Axis 7 : 9 (no axis)
 Axis 8 : 9 (no axis)

| Remote register | Value |
|--|--------|
| RWr _n | 0x0200 |
| RWr _{n+1} | 0x0000 |
| RWr _{n+2} | 0x0001 |
| RWr _{n+3} | 0x0001 |
| RWr _{n+4} | 0x0000 |
| RWr _{n+5} | 0x0001 |
| RWr _{n+6} | 0x0009 |
| RWr _{n+7} | 0x0009 |
| RWr _{n+8} | 0x0009 |
| RWr _{n+9} | 0x0009 |
| RWr _{n+10} to RWr _{n+15} | 0x0000 |

MEMO

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1. IO command format

Using bit information from the SI/SO port on the CC-Link compatible module allows issuing commands directly from the PLC. It is now possible to execute commands such as the MOVE command that were impossible to execute up until now without using the robot program or RS-232C port.



CAUTION

To use remote commands, the "Remote cmd / IO cmd (SI05)" parameter in **SYSTEM > PARAM > OP.BRD** mode must be set to "VALID" in advance. Refer to the **CC-Link user's manual and controller user's manual for more details.**

The following features are assigned to each IO.

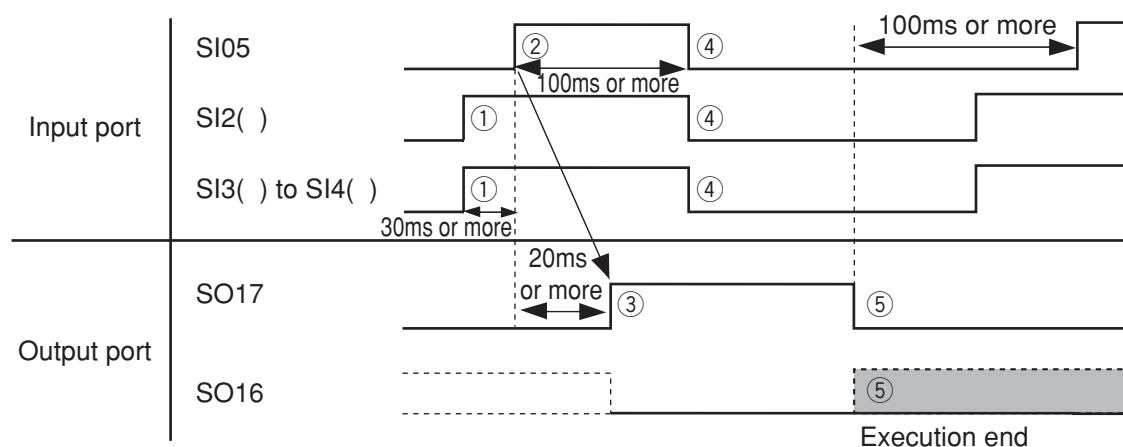
| Output (Controller → PLC) | | Input (Controller ← PLC) | |
|---------------------------|------------------------------|--------------------------|------------------------------------|
| Output por | Contents | Input port | Contents |
| SO16 | Execution check output | SI05 | IO command execution trigger input |
| SO17 | Execution in-progress output | SI2() | Command code |
| | | SI3() | Command data |
| | | SI4() | |

- IO commands cannot be executed simultaneously with remote commands.
- Commands cannot be executed unless the status is ready to accept commands (0x0000).
- IO commands cannot be executed while program execution is in progress (SO13 is ON).
- IO commands cannot be executed simultaneously with on-line commands.
- IO commands assign command codes to be executed to SI2(), and command data to SI3() and SI4(). These are executed when the SI05 is changed from OFF to ON. The controller processes the IO commands when they are received and sends execution check results and execution in-progress information to the PLC via SO16 and SO17.
- Command data added to the IO commands will differ according to the IO command. See detailed information available on the IO commands. Command data settings must always be made before attempting to set the IO commands.
- Data is set in binary code. If the data size is greater than 8 bits, set the upper bit data into the higher address. (little endian)
For example, to set 0x0F9F [hexadecimal] (=3999) in the SI13 () and SI14 () ports, set 0x0F [hexadecimal] in SI4 () and set 0x9F [hexadecimal] in SI13 ().
- The IO command execution trigger is disabled when the execution in-progress output SO17 is ON.
- The execution in-progress output SO17 is ON in the following cases.
 - When an IO command is running after receiving IO command execution trigger input.
 - When an IO command is terminated after receiving IO command execution trigger input yet a maximum of 100ms state is maintained when IO command trigger input is ON.

- The IO command trigger input pulse must always be maintained for 100ms or more during input. Commands cannot be accepted if this state is not maintained.
- Sometimes 20ms or more is needed for the execution in-progress output SO17 to turn ON after startup (rising edge) of the IO command trigger input pulse. The IO command trigger input might not be accepted during this period.
- After inputting the IO command trigger input pulse and the in-progress output turns OFF, at least a 100ms time period must always elapse before executing the next command. If this elapsed time period is too small, the IO command execution trigger input might not be accepted.
- The execution check output SO16 turns OFF when an IO command is received.
- The execution check output SO16 turns ON when an IO command ended correctly, but stays OFF if an IO command ended abnormally.

2. Sending and receiving IO commands

Sending and receiving is performed in the IO register as shown below.



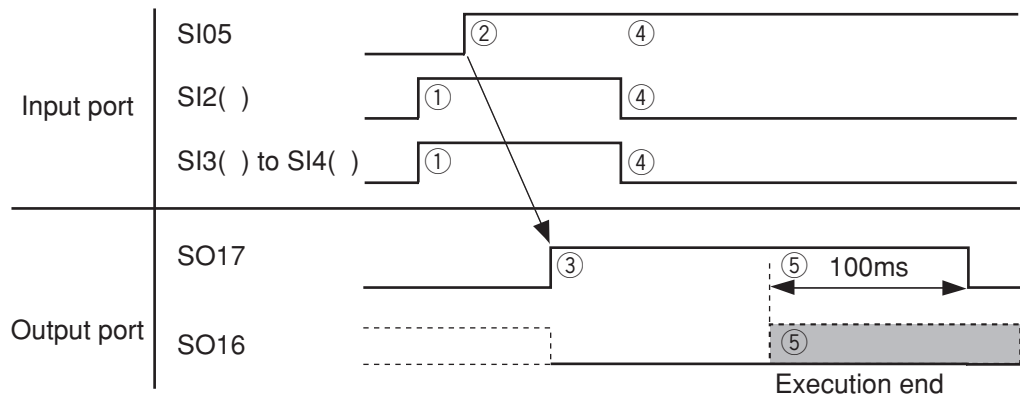
- ① Set command code and command data (Time interval between ① and ②: 30ms or more)
- ② Set IO command execution trigger input (Pulse width: 100ms or more)
- ③ Transition to execute
- ④ Clear the IO command trigger input and command code and command data
- ⑤ Set termination of IO command and execution check output

Example: Follow these steps when sending and receiving IO commands to execute the PTP movement command to point 19.

- ① Set the following values in the register to execute the PTP movement command by designating a point.
 - SI2 () : Command code (0x01)
 - SI3 () : Lower point setting (0x13= point 19)
 - SI4 () : Upper point setting (0x00=point 19)
- ② Set to ON after SI05 turns OFF.
- ③ The controller receives the IO command and executes it if the command and command data are acceptable. The in-progress output (SO17) turns ON and the execution check output (SO16) is turned OFF at this time. The robot moves to the position specified by point 19.
- ④ Clear SI2 () through SI4 () after checking that in-progress output (SO17) is ON.
- ⑤ The command has ended so in-progress output (SO17) turns OFF and execution check output (SO16) turns ON if command ended correctly, and turns OFF if the command failed.

2. Sending and receiving IO commands

- * If SI05 was not set to OFF in ④, the in-progress output (SO17) remains ON for a maximum of 100ms from the timing in ⑤.



3. IO command list

IO commands are expressed with hexadecimal codes.

| No. | Command contents | | Command code (SI2()) | |
|-----|--|-----------------------------|-----------------------|-----------|
| | | | Main robot | Sub robot |
| 1 | MOVE command | PTP point designation | 0x01 | 0x81 |
| | | Linear interpolation | 0x03 | 0x83 |
| 2 | MOVEI command | PTP designation | 0x09 | 0x89 |
| 3 | Pallet movement command | PTP designation at pallet 0 | 0x18 | 0x98 |
| 4 | Jog movement command | | 0x20 | 0xA0 |
| 5 | Inching movement command | | 0x24 | 0xA4 |
| 6 | Point teaching command | | 0x28 | 0xA8 |
| 7 | Absolute reset movement command | | 0x30 | 0xB0 |
| 8 | Absolute reset command | | 0x31 | 0xB1 |
| 9 | Return-to-origin command | | 0x32 | 0xB2 |
| 10 | Servo command | On designation | 0x34 | 0xB4 |
| | | Off designation | 0x35 | 0xB5 |
| | | Free designation | 0x36 | 0xB6 |
| | | Power-on designation | 0x37 | |
| 11 | Manual movement speed command | | 0x38 | 0xB8 |
| 12 | Auto movement speed command | | 0x39 | 0xB9 |
| 13 | Program speed change command | | 0x3A | 0xBA |
| 14 | Shift designation change command | | 0x3B | 0xBB |
| 15 | Hand designation change command | | 0x3C | 0xBC |
| 16 | Arm designation change command | | 0x3D | 0xBD |
| 17 | Point display unit designation command | | 0x3E | |

* The pallet movement command (3) is only valid for pallet 0.

* The movement methods on the jog movement command (4) and inching movement command (5) will differ according to the point units that were specified.

* The point teaching command uses different point units according to the point units that were specified.

* If no axis is specified, the absolute reset command (8) is executed on all axes (main robot + sub robot) in either case of command code 0x31 or 0xB1.

* If no axis is specified, the return-to-origin command (9) is executed on all axes (main robot + sub robot) in either case of command code 0x32 or 0xB2.

* The point display unit designation command (17) is for use on the controller.



NOTE

- In the MOVE command, linear interpolation (0x83) for sub robot is only available on the following software versions.

RCX14x: Ver. 8.64 onwards RCX22x: Ver. 9.11 onwards RCX240: all versions

- On controllers (RCX14x) whose software version is earlier than 8.45, the return-to-origin command is always executed on all axes (main robot + sub robot) and command code 0x32 can only be used.

4. IO command description

4.1 MOVE command

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

4.1.1 PTP designation

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

■ Command

| SI port | Contents | | Value |
|----------------|--------------|----------------|--------|
| SI2() | Command code | For main robot | 0x01 |
| | | For sub robot | 0x81 |
| SI3() SI4() | Point number | | 0xpppp |

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)



CAUTION

In RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.



NOTE

When a SCARA robot is used and a hand system flag is set for the point data you specify, that hand system has priority over the current arm type.

4.1.2 Linear interpolation

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



NOTE

In the MOVE command, linear interpolation (0x83) for sub robot is only available on the following software versions.

RCX14x: Ver. 8.64 onwards RCX22x: Ver. 9.11 onwards RCX240: all versions

■ Command

| SI port | Contents | | Value |
|----------------|--------------|----------------|--------|
| SI2() | Command code | For main robot | 0x03 |
| | | For sub robot | 0x83 |
| SI3() SI4() | Point number | | 0xpppp |

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)



CAUTION

- In RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.
- When moving the robot by linear interpolation to a point where a hand system flag is specified, make sure that the same hand system is used at the current position and target position. If the same hand system is not used, then an error will occur and robot movement will not be allowed.



NOTE

When a SCARA robot is used and a hand system flag is set for the point data you specify, that hand system has priority over the current arm type.

4.2 MOVEI command

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

4.2.1 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 in the controller versions shown below, the resumed motion can occur either to the original target position, or to a new target position referenced to the current position, in accordance with the "MOVEI/DRIVEI start position" setting selected at the other parameters. For details, refer to the controller user's manual.
RCX14x: Ver. 8.66 onwards RCX22x: Ver. 9.13 onwards RCX240: all versions
- 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).
- In controller versions prior to those shown above, motion occurs to a new target position referenced to the current position when MOVEI is interrupted and then re-executed.

■ Command

| SI port | Contents | | Value |
|----------------|--------------|----------------|--------|
| SI2() | Command code | For main robot | 0x09 |
| | | For sub robot | 0x89 |
| SI3() SI4() | Point number | | 0xpppp |

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)



CAUTION

In RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.



NOTE

When a SCARA robot is used and a hand system flag is set for the point data you specify, that hand system has priority over the current arm type.

4.3 Pallet movement command

Execute this command group to move the robot to a position with respect to pallet 0.

4.3.1 PTP designation

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

■ **Command**

| SI port | Contents | | Value |
|---------|----------------------|----------------|-------|
| SI2() | Command code | For main robot | 0x18 |
| | | For sub robot | 0x98 |
| SI3() | Work position number | | 0xwww |
| SI4() | | | |

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

4.4 Jog movement command

This command moves the robot in jog mode while in MANUAL mode. This command is only valid in MANUAL mode. This command is linked with the controller point display units. The robot axis moves in PTP motion when display units are in pulses, and moves by linear interpolation on Cartesian coordinates when units are in millimeters. Jog speed is determined by the MANUAL speed.

To stop the jog movement command, set the dedicated input interlock signal (SI11) to OFF. After checking that jog movement has stopped, set the interlock signal back to ON.

■ **Command**

| SI port | Contents | | Value | |
|---------|----------------------------|----------------|-----------|----|
| SI2() | Command code | For main robot | 0x20 | |
| | | For sub robot | 0xA0 | |
| SI3() | 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 |
| SI4() | Not used | | 0x00 | |

tt : Specify the axis to move in 0 to 3 bits. Only one axis can be specified.

d : Specify the movement direction in 1 bit.

| Value | Meaning |
|-------|------------|
| 0 | +direction |
| 1 | -direction |

4.5 Inching movement command

Execute this command to move the robot by inching in MANUAL mode. Inching movement distance is linked to the manual movement speed. The inching command can only be executed in MANUAL mode.

This command is linked with the controller's point display unit system. So when display units are in pulses, the axis moves a certain number of pulses at the manual speed setting. When display units are in millimeters, the axis moves on Cartesian coordinates by linear interpolation at the manual speed setting divided by 100.

■ Command

| SI port | Contents | | Value |
|---------|----------------------------|-------|----------------|
| SI2() | Command code | | For main robot |
| | | | For sub robot |
| SI3() | Axis to move and direction | bit 0 | Axis 1 |
| | | bit 1 | Axis 2 |
| | | bit 2 | Axis 3 |
| | | bit 3 | Axis 4 |
| | | bit 4 | Axis 5 |
| | | bit 5 | Axis 6 |
| | | bit 6 | (0:Fixed) |
| | | bit 7 | Direction |
| SI4() | Not used | | 0x00 |

tt : Specify the axis to move in 0 to 3 bits. Only one axis can be specified.

d : Specify the movement direction in 1 bit.

| Value | Meaning |
|-------|------------|
| 0 | +direction |
| 1 | -direction |

4.6 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 system.

■ Command

| SI port | Contents | | Value |
|---------|--------------|--|----------------|
| SI2() | Command code | | For main robot |
| | | | For sub robot |
| SI3() | Point number | | 0xpppp |
| SI4() | | | |

pppp : Specify the point number in 16 bits.
Specified range: 0 (=0x0000) to 9999 (=0x270F)



CAUTION

In RCX40 controllers whose software version is earlier than 8.28, point numbers from 0 to 4000 can be specified.

4.7 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

| SI port | Contents | | Value |
|---------|----------------------------|-------|----------------|
| SI2() | Command code | | For main robot |
| | | | For sub robot |
| SI3() | Axis to move and direction | bit 0 | Axis 1 |
| | | bit 1 | Axis 2 |
| | | bit 2 | Axis 3 |
| | | bit 3 | Axis 4 |
| | | bit 4 | Axis 5 |
| | | bit 5 | Axis 6 |
| | | bit 6 | (0:Fixed) |
| bit 7 | Direction | | |
| SI4() | Not used | | 0x00 |

tt : Specify the axis to move in 0 to 3 bits. Only one axis can be specified.

d : Specify the movement direction in 1 bit.

| Value | Meaning |
|-------|------------|
| 0 | +direction |
| 1 | -direction |

4.8 Absolute reset command

This command executes absolute reset of the specified axis. When absolute reset of the specified axis uses the mark method, the axis must be at a position where absolute reset can be executed. If no axis is specified (SI3() is 0), then absolute reset is performed on all axes (main robot + sub robot) in either case of command code 0x31 or 0xB1. However, this command cannot be executed if return-to-origin is not yet complete on the axis using the mark method. In this case, perform return-to-origin individually on each axis.

■ Command

| SI port | Contents | | Value |
|-------------|------------------|-------|----------------|
| SI2() | Command code | | For main robot |
| | | | For sub robot |
| SI3() | Specify the axis | bit 0 | Axis 1 |
| | | 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) | | |
| SI4() | Not used | | 0x00 |

tt : Specify the axis to perform absolute reset in 0 to 3 bits. Only one axis can be specified.

If no particular axis is specified then absolute reset is performed on all axes (main robot + sub robot).

4.9 Return-to-origin command

This command executes return-to-origin on the specified axis.

When this command is executed, return-to-origin is performed on an incremental mode axis and absolute search is performed on a semi-absolute mode axis. If no axis is specified (SI3() is 0), this command is performed on all axes (main robot + sub robot) in either case of command code 0x32 or 0xB2.



CAUTION

- The return-to-origin command is only available from software version 8.33 onwards (RCX14x).
- Axes can be specified with the return-to-origin command only from software version 8.45 onwards (RCX14x). On earlier version controllers, the return-to-origin command is always performed on all axes and command code 0x32 can only be used.

■ Command

| SI port | Contents | | Value | |
|---------|------------------|-------------|----------------|------|
| SI2() | Command code | | For main robot | 0x32 |
| | | | For sub robot | 0xB2 |
| SI3() | Specify the axis | 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 7-bit 6 | (0:Fixed) | 0 |
| SI4() | Not used | | 0x00 | |

tt : Specify the axis to perform return-to-origin in 0 to 3 bits.
Only one axis can be specified.
If no particular axis is specified then return-to-origin is performed on all axes (main robot + sub robot).

4.10 Servo command

Execute this command group to operate the robot servos.

Servo ON :

Execute this command to turn on the servo of a specified axis. The motor power must be turned on when specifying the axis. All controller servos are turned on if no axis is specified.

Servo OFF :

Execute this command to turn off the servo of a specified axis. All controller 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. Servo OFF and Free are repeated when this command is consecutively executed.

Power ON:

Execute this command to turn on the motor power. No axis can be specified.

■ Command

| SI port | Contents | | Value | | |
|---------------|------------------|------------|----------------|-----------------------|------|
| SI2() | Command code | Servo ON | For main robot | 0x34 | |
| | | | For sub robot | 0xB4 | |
| | | Servo OFF | For main robot | 0x35 | |
| | | | For sub robot | 0xB5 | |
| | | Servo Free | For main robot | 0x36 | |
| For sub robot | 0xB6 | | | | |
| SI3() | Specify the axis | Power ON | | All controller servos | 0x37 |
| | | 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 7-bit 6 | (0:Fixed) | 0 | | | |
| SI4() | Not used | | 0x00 | | |

tt : Specify the axis to move in 0 to 3 bits. All controller servos are processed if no axis is specified. No axis can be specified when executing Power ON.

4.11 Manual speed change command

Execute this command to change the manual movement speed in MANUAL mode. This command can only be executed in MANUAL mode.

■ Command

| SI port | Contents | | Value |
|---------|-----------------|----------------|-------|
| SI2() | Command code | For main robot | 0x38 |
| | | For sub robot | 0xB8 |
| SI3() | Specified speed | | 0xss |
| SI4() | Not used | | 0x00 |

ss : Specify the manual movement speed in 8 bits.
Specified range: 1 (=0x01) to 100 (=0x64)

4.12 Auto speed change command

Execute this command to change the auto movement speed in AUTO mode.

■ Command

| SI port | Contents | | Value |
|---------|-----------------|----------------|-------|
| SI2() | Command code | For main robot | 0x39 |
| | | For sub robot | 0xB9 |
| SI3() | Specified speed | | 0xss |
| SI4() | Not used | | 0x00 |

ss : Specify the auto movement speed in 8 bits.
Specified range: 1 (=0x01) to 100 (=0x64)

4.13 Program speed change command

Execute this command to change the program speed in AUTO mode.

The program speed changed with this command is reset to 100% when the program is reset or changed.

■ Command

| SI port | Contents | | Value |
|---------|-----------------|----------------|-------|
| SI2() | Command code | For main robot | 0x3A |
| | | For sub robot | 0xBA |
| SI3() | Specified speed | | 0xss |
| SI4() | Not used | | 0x00 |

ss : Specify the program speed in 8 bits.
Specified range: 1 (=0x01) to 100 (=0x64)

4.14 Shift designation change command

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

■ Command

| SI port | Contents | | Value |
|---------|------------------------|----------------|-------|
| SI2() | Command code | For main robot | 0x3B |
| | | For sub robot | 0xBB |
| SI3() | Specified shift number | | 0xss |
| SI4() | Not used | | 0x00 |

ss : Specify the shift number in 8 bits.
Specified range: 0 (=0x00) to 9 (0x09)

4.15 Hand designation change command

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

■ Command

| SI port | Contents | | Value |
|---------|-----------------------|----------------|-------|
| SI2() | Command code | For main robot | 0x3C |
| | | For sub robot | 0xBC |
| SI3() | Specified hand number | | 0xss |
| SI4() | Not used | | 0x00 |

ss : Specify the hand number in 8 bits.
Specified range for main robot : 0 (=0x00) to 3 (0x03)
Specified range for sub robot : 4 (=0x04) to 7 (0x07)

4.16 Arm designation change command

Execute this command to change the arm designation status.

■ Command

| SI port | Contents | | Value |
|---------|-------------------------|----------------|-------|
| SI2() | Command code | For main robot | 0x3D |
| | | For sub robot | 0xBD |
| SI3() | Status of specified arm | | 0xss |
| SI4() | Not used | | 0x00 |

ss : Specify the arm designation status in 8 bits.

| Value | Meaning |
|-------|---------------------|
| 0x00 | Right-handed system |
| 0x01 | Left-handed system |

4.17 Point display unit designation command

Execute this command to change the point display unit.

■ Command

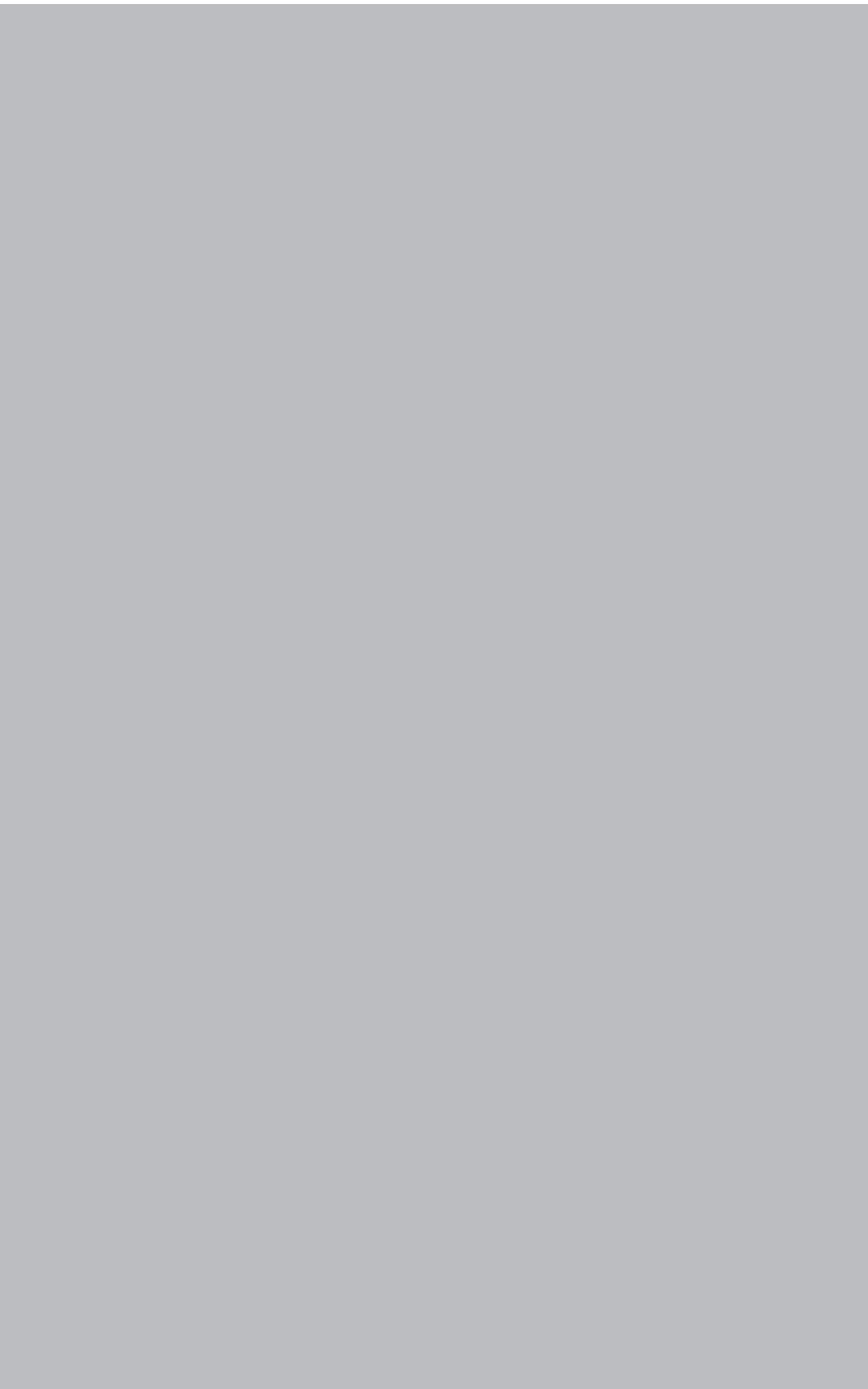
| SI port | Contents | | Value |
|---------|-----------------------------------|----------------|-------|
| SI2() | Command code | For main robot | 0x3E |
| | | For sub robot | |
| SI3() | Display units for specified point | | 0xss |
| SI4() | Not used | | 0x00 |

ss : Specify the point display unit in 8 bits.

| Value | Meaning |
|-------|-------------------------------------|
| 0x00 | Pulse units |
| 0x01 | Millimeter units |
| 0x02 | Millimeter units (Tool coordinates) |

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1. Definition of terms

1. CC-Link (Control & Communications Link)

CC-Link is a registered commercial product of the CC-Link Association.

2. SAFE mode setting

This setting enables service mode and allows setting limits on items such as speed limits during MANUAL mode.

Always make the SAFE mode settings for items with CE markings.

3. Service mode

This mode is activated by making the SAFE mode setting. Service mode is controlled by the service mode input signal.

4. SAFETY connector

This is a controller connector for supplying the emergency stop and service mode signals.

5. STD.DIO connector

This is a controller connector for supplying dedicated IO and general-purpose IO signals.

6. Bit information

Bit data exchanged between the master station PLC and the controller.

7. Word information

Word data exchanged between the master station PLC and the controller.

8. Little endian

Method that assigns the LSB (least significant bit) to the lower address in the memory when handling word information data as double word data.

For example, when assigning a value such as 0x00012345 to SOD (2), 0x2345 is assigned to the first word of SOW (2), and 0x0001 is assigned to the second word of SOW (3).

Revision record

| Manual version | Issue date | Description |
|----------------|------------|---|
| Ver.1.05 | Jun. 2007 | Modification of status for jog movement command (Remote command). Addition of comment regarding RCX22 series. Clerical error corrections, etc. |
| Ver.1.06 | Sep. 2007 | Addition of linear interpolation and circular interpolation commands (MOVE command) for sub robots. Addition of descriptions regarding semi-absolute type axes. Clerical error corrections, etc. |
| Ver.1.07 | Oct. 2007 | Addition of description about "MOVEI/DRIVEI start position" parameter. Clerical error corrections, etc. |
| Ver.1.08 | Jun. 2009 | Addition of description about Direct PTP designation (millimeter units) for MOVE command. Wording of controller name was changed, etc. |
| | Sep. 2011 | The manual's version number was changed to match that for the Japanese manual. |
| Ver. 1.10 | Sep. 2011 | Addition of explanation of Axis-5 and -6 to the axis-specifying command. Addition of Axis-5 and -6 data to the status of axis-moving command. Correction of command code (3 places). Addition of NOTE to the message reference command. |

Command Reference Manual

YAMAHA RCX series
Robot Controller **CC-Link**
network board

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