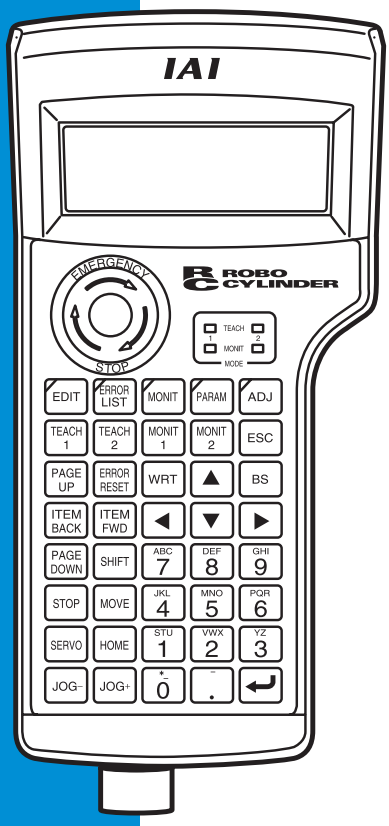
ROBO CYLINDER

# Teaching Pendant

## CON-T, CON-TG, CON-TGS

Instruction Manual Tenth Edition




*IAI Corporation*

# Please Read Before Use

Thank you for purchasing our product.

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

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

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

## [Important]

- This Instruction Manual is original.
- The product cannot be operated in any way unless expressly specified in this Instruction Manual. IAI shall assume no responsibility for the outcome of any operation not specified herein.
- Information contained in this Instruction Manual is subject to change without notice for the purpose of product improvement.
- If you have any question or comment regarding the content of this manual, please contact the IAI sales office near you.
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# Disconnection of the Teaching Pendant from the PCON / ACON / SCON Controller / ERC2

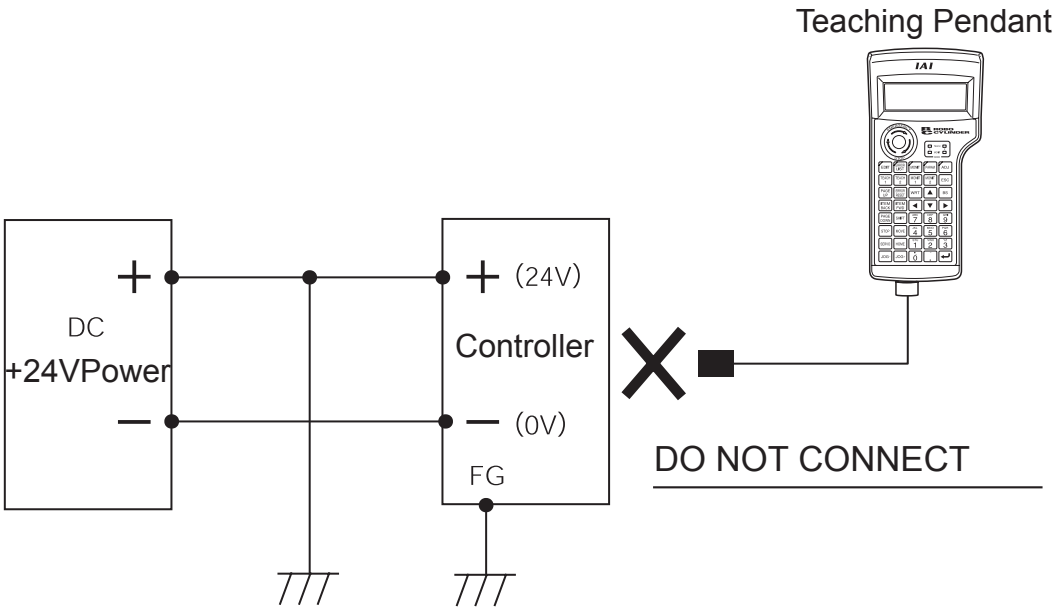
* After disconnecting the Teaching Pendant from the PCON / ACON / SCON controller / ERC2 with the AUTO/MANU switch, always turn the AUTO/MANU switch to AUTO.

* For the PCON / ACON controller / ERC2 without AUTO/MANU switch, always set the TP Operation Mode to “MONIT 2” before disconnecting the Teaching Pendant from the controller.
(Refer to “6.10 TP Operation Mode.”)
(Note) When the controller is set by connecting the Teaching Pendant to the PCON / ACON / controller without an AUTO/MANU switch, the conditions shown below occur.
When the controller is set by connecting the Teaching Pendant to the gateway unit/SIO converter, the conditions shown below occur.
  - If the Teaching Pendant is disconnected while the setting of “TEACH 1” or “TEACH 2” remains, I/O will become invalid and control from PLC will become impossible.
  - If the Teaching Pendant is disconnected while the setting of “MONIT 1” remains, the maximum speed will become the safety speed set for the parameter regardless of a command from PLC.

# Precautions in Teaching Pendant Connection

When the controller's power input "+" terminal is grounded, the applicable teaching pendant model cannot be connected.
When it is connected, the normal power is not supplied and it might cause the breakdown of the teaching pendant.

Applicable Models: CON-T, RCM-T, RCM-TD



# Support Models

The following are the versions to which we have started support:

Table 1 List 1 of Support Models

| Model No. | CON-T Supported/Unsupported | CON-TG/TGS Supported/Unsupported | Support Started Version |
|---|---|---|---|
| RCP *1 | ○ | × | V1.00 |
| RCS *1 | ○ | × | V1.00 |
| E-Con *1 | ○ | × | V1.00 |
| RCP2 *1 | ○ | × | V1.00 |
| ERC | *2 | *2 | V1.00 |
| ERC2 | *2 | *2 | V1.00 |
| PCON | ○ | ○ | V1.00 |
| ACON | ○ | ○ | V1.00 |
| ACON-CA | ○ | ○ | V1.20 |
| DCON-CA | ○ | ○ | V1.20 |
| SCON-C | ○ | ○ | V1.00 |
| SCON-CA | ○ | ○ | V1.10 |
| PCON-CA | ○ | ○ | V1.13 |
| ERC3 (CON Mode (CN)) | ○ | ○ | V1.13 |

*1: CON-T Teaching Pendant also supports the RCP, RCS, E-Con and RCP2 controllers.

*2: For the support for the ERC2 and ERC, confirm it using the seal attached on the left side (viewed from the rear) of the cover.

Description on ERC2 Seal

| I/O Type | Unsupported | Supported |
|---|---|---|
| NP | NP U5 M | NP T1 4904 |
| PN | PN U3 M | PN T1 4904 |

Description on ERC Seal

| I/O Type | Unsupported | Supported |
|---|---|---|
| NP | T1 | T1 4904 |
| PN | EP T1 | EP T1 4904 |

* Check the model to connect and the version of the Teaching Pendant. If any unsupported model is connected, unexpected movement may occur.

* ERC2, PCON, ACON, SCON, or DCON cannot be used by linking to any model of those shown in *1.

MEMO

# Table of Contents

# Safety Guide

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

## Safety Precautions for Our Products

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

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

| No. | Operation Description | Description |
|---|---|---|
| 2 | Transportation | ● When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane.<br>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.<br>● When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped.<br>● Transport it using an appropriate transportation measure.<br>The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the instruction manual for each model.<br>● Do not step or sit on the package.<br>● Do not put any heavy thing that can deform the package, on it.<br>● When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work.<br>● When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit.<br>● Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength.<br>● Do not get on the load that is hung on a crane.<br>● Do not leave a load hung up with a crane.<br>● Do not stand under the load that is hung up with a crane. |
| 3 | Storage and Preservation | ● The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation.<br>● Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake. |
| 4 | Installation and Start | (1) Installation of Robot Main Body and Controller, etc.<br>● Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury.<br>Also, be equipped for a fall-over or drop due to an act of God such as earthquake.<br>● Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life.<br>● When using the product in any of the places specified below, provide a sufficient shield.<br>1) Location where electric noise is generated<br>2) Location where high electrical or magnetic field is present<br>3) Location with the mains or power lines passing nearby<br>4) Location where the product may come in contact with water, oil or chemical droplets |

| No. | Operation Description | Description |
|---|---|---|
| 4 | Installation and Start | (2) Cable Wiring<br>● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool.<br>● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error.<br>● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error.<br>● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction.<br>● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product.<br>● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire. |
| | | (3) Grounding<br>● The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation.<br>● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure to use a twisted pair cable with wire thickness 0.5mm$^2$ (AWG20 or equivalent) or more for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards).<br>● Perform Class D Grounding (former Class 3 Grounding with ground resistance 100Ω or below). |

| No. | Operation Description | Description |
|---|---|---|
| 4 | Installation and Start | (4) Safety Measures<br>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.<br>● When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury.<br>● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation.<br>● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product.<br>● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input.<br>● When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury.<br>● Take the measure so that the work part is not dropped in power failure or emergency stop.<br>● Wear protection gloves, goggle or safety shoes, as necessary, to secure safety.<br>● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire.<br>● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. |
| 5 | Teaching | ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.<br>● Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well.<br>● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency.<br>● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly.<br>● Place a sign "Under Operation" at the position easy to see.<br>● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.<br>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated. |

| No. | Operation Description | Description |
|---|---|---|
| 6 | Trial Operation | ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.<br>● After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation.<br>● When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation.<br>● Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc.<br>● Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction. |
| 7 | Automatic Operation | ● Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence.<br>● Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication.<br>● Make sure to operate automatic operation start from outside of the safety protection fence.<br>● In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product.<br>● When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure. |

| No. | Operation Description | Description |
|---|---|---|
| 8 | Maintenance and Inspection | ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.<br>● Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well.<br>● When the work is to be performed inside the safety protection fence, basically turn OFF the power switch.<br>● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency.<br>● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly.<br>● Place a sign “Under Operation” at the position easy to see.<br>● For the grease for the guide or ball screw, use appropriate grease according to the Instruction Manual for each model.<br>● Do not perform the dielectric strength test. Failure to do so may result in a damage to the product.<br>● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.<br>● The slider or rod may get misaligned OFF the stop position if the servo is turned OFF. Be careful not to get injured or damaged due to an unnecessary operation.<br>● Pay attention not to lose the cover or untightened screws, and make sure to put the product back to the original condition after maintenance and inspection works.<br>Use in incomplete condition may cause damage to the product or an injury.<br>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated. |
| 9 | Modification and Dismantle | ● Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion. |
| 10 | Disposal | ● When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste.<br>● When removing the actuator for disposal, pay attention to drop of components when detaching screws.<br>● Do not put the product in a fire when disposing of it.<br>The product may burst or generate toxic gases. |
| 11 | Other | ● Do not come close to the product or the harnesses if you are a person who requires a support of medical devices such as a pacemaker. Doing so may affect the performance of your medical device.<br>● See Overseas Specifications Compliance Manual to check whether complies if necessary.<br>● For the handling of actuators and controllers, follow the dedicated instruction manual of each unit to ensure the safety. |

# Alert Indication

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

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

# 1. Safety Precautions ⚠

(1) Use a genuine product specified by us for wiring between the actuator and the Controller.

(2) Keep out of the operating range of a machine such as an actuator while it is operating or in a ready state (condition in which the controller's power is ON). When using it in places where persons may approach, fence it off.

(3) Before carrying out assembly and adjustment work or maintenance and inspection work of the machine, be sure to disconnect the power cord. While working, display the plate specified as such at an easy-to-read location. In addition, give special consideration to prevent third parties from turning on the power carelessly by hauling in the power cord to the operator. Alternatively, lock the power plug or receptacle and direct the operator to keep the key or prepare a safety plug.

(4) When more than one operator works, advance work by determining the signal method and checking each other's safety. Especially, for work associated with axial movement regardless of power ON/OFF or motor-driven/manual operation, be sure to confirm safety by calling out to other(s) in advance.

(5) When the user (customer) extends wiring, malfunction may occur due to faulty wiring. In this case, inspect wiring thoroughly and check it for properness before turning on the power.

# 2. Warranty



## 2.1 Warranty Period

One of the following periods, whichever is shorter:

- 18 months after our shipment
- 12 months after delivery to the place designated by you

## 2.2 Scope of the Warranty

Our products are covered by warranty when all of the following conditions are met. Faulty products covered by warranty will be replaced or repaired free of charge:

(1) The breakdown or problem in question pertains to our product as delivered by us or our authorized dealer.

(2) The breakdown or problem in question occurred during the warranty period.

(3) The breakdown or problem in question occurred while the product was in use for an appropriate purpose under the conditions and environment of use specified in the instruction manual and catalog.

(4) The breakdown or problem in question was caused by a specification defect or problem, or by the poor quality of our product.

Note that breakdowns due to any of the following reasons are excluded from the scope of warranty:

[1] Anything other than our product

[2] Modification or repair performed by a party other than us (unless we have approved such modification or repair)

[3] Anything that could not be easily predicted with the level of science and technology available at the time of shipment from our company

[4] A natural disaster, man-made disaster, incident or accident for which we are not liable

[5] Natural fading of paint or other symptoms of aging

[6] Wear, depletion or other expected result of use

[7] Operation noise, vibration or other subjective sensation not affecting function or maintenance

Note that the warranty only covers our product as delivered and that any secondary loss arising from a breakdown of our product is excluded from the scope of warranty.

## 2.3 Honoring the Warranty

As a rule, the product must be brought to us for repair under warranty.

## 2.4 Limited Liability

(1) We shall assume no liability for any special damage, consequential loss or passive loss such as a loss of expected profit arising from or in connection with our product.

(2) We shall not be liable for any program or control method created by the customer to operate our product or for the result of such program or control method.

## 2.5 Conditions of Conformance with Applicable Standards/ Regulations, Etc., and Applications

(1) If our product is combined with another product or any system, device, etc., used by the customer, the customer must first check the applicable standards, regulations and/or rules. The customer is also responsible for confirming that such combination with our product conforms to the applicable standards, etc. In such a case we will not be liable for the conformance of our product with the applicable standards, etc.

(2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications. Contact us if you must use our product for any of these applications:

[1] Medical equipment pertaining to maintenance or management of human life or health

[2] A mechanism or mechanical equipment intended to move or transport people (such as a vehicle, railway facility or aviation facility)

[3] Important safety parts of mechanical equipment (such as safety devices)

[4] Equipment used to handle cultural assets, art or other irreplaceable items

(3) Contact us at the earliest opportunity if our product is to be used in any condition or environment that differs from what is specified in the catalog or instruction manual.

## 2.6 Other Items Excluded from Warranty

The price of the product delivered to you does not include expenses associated with programming, the dispatch of engineers, etc. Accordingly, a separate fee will be charged in the following cases even during the warranty period:

[1] Guidance for installation/adjustment and witnessing of test operation

[2] Maintenance and inspection

[3] Technical guidance and education on operating/wiring methods, etc.

[4] Technical guidance and education on programming and other items related to programs

# 3. Application Environment

- In order to avoid breakdown, please do not apply any type of machinery impact to the Teaching Pendant.

- Always hold onto the entire Teaching Pendant Body so that the Teaching Pendant Cable does not get pulled by unwanted cables.

| | |
|---|---|
| **Caution:** | This Teaching Pendant is designed exclusively for IAI RC Controllers (PCON, ACON, SCON, DCON, ERC2, ERC3, RCP, RCS, E-Con and RCP2) and should not be used to connect with other devices. |
| **:** | Turn the controller front side PORT switch OFF before connecting to controller equipped with a PORT switch. |

# 4. Functions and Specifications of Teaching Pendant

CON-T Teaching Pendant was created exclusively for the PCON, ACON, SCON, DCON, RCP, RCS, E-Con and RCP2 Controllers, ERC2 and ERC3.
CON-TG/TGS was created exclusively for the PCON, ACON, SCON, and DCON Controllers, ERC2 and ERC3.

Through the communication between the controllers, the RC Controller is designed to function as the Display Operation Unit to edit or display the data (parameter data, position data, etc.,) that is stored inside the controller, as well as to execute teaching without using the PC Interface Software.

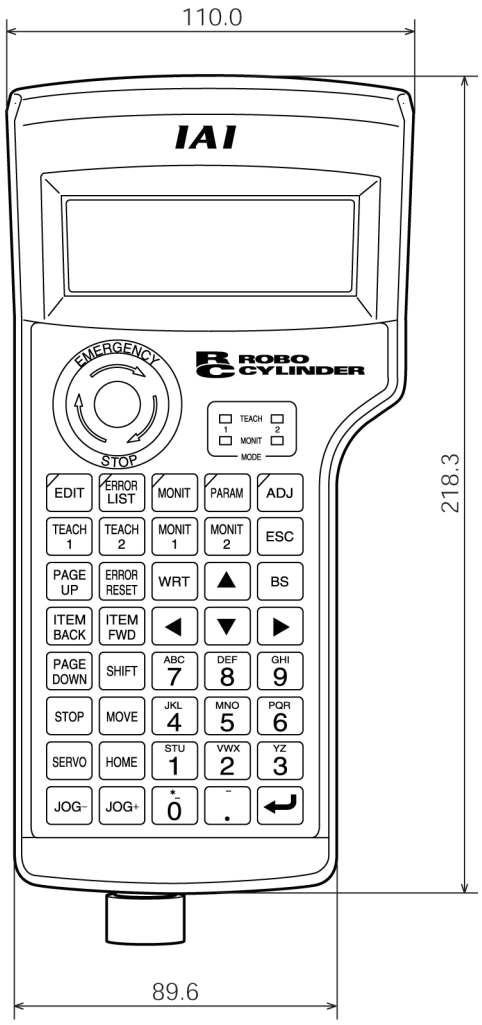
For using the CON-TG/TGS teaching pendant, it is connected to the adaptor (RCB-LB-TG/TGS) for the teaching pendant, included to conform to the higher safety category.
Refer to “5.3 Connection of CON-TG/TGS to the Controller”.

## 4.1 Specifications

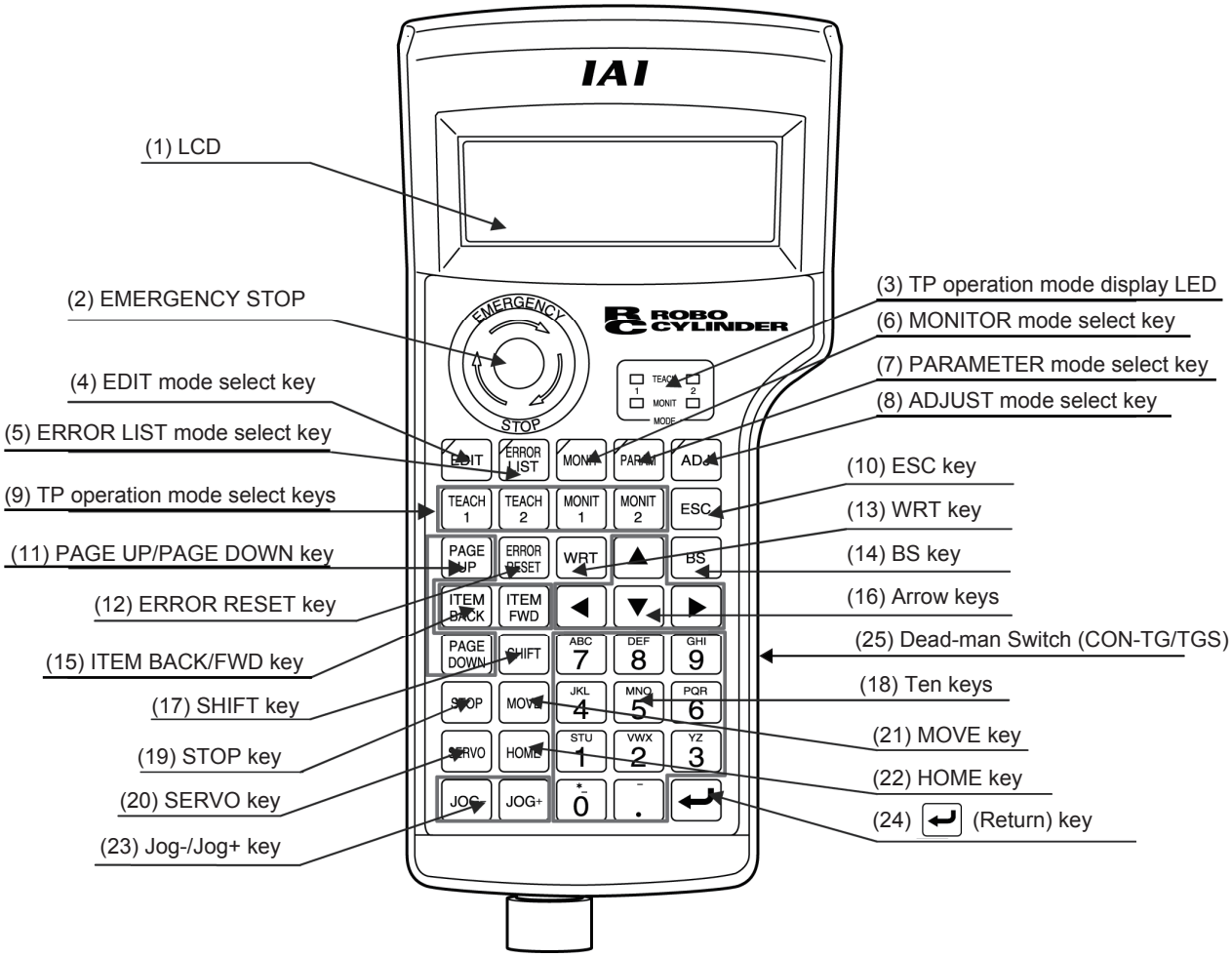
| Item | Specification |
|---|---|
| Ambient Temperature & Humidity | Temperature: 0°~40°C Humidity: 85% RH or less<br>* RH relative humidity |
| Operating Environment | Free of corrosive gas, especially, no excessive dust |
| Weight | 400g (Excluding cables) |
| Cable Length | 5m (Standard) |

## 4.2 External View

External Dimensions



## 4.3 Description of Each Part




**(1) LCD**

This is a liquid crystal display with a maximum of horizontal: 20 characters per column and vertical: 4 columns per row. The edit or teaching contents of various set values are displayed.

**(2) EMERGENCY STOP (Emergency Stop Push Button Switch)**

This switch is a mushroom-shaped push-lock, turn-reset type switch.
This switch connects serially with the controller emergency stop signal line. Once pushed down, this switch will be in an emergency stop status and the power supply to the motor will be cut off (normally, closed: b contact).

(* For information on the emergency stop signal line and its status, refer to the RC Robo Cylinder Operating Manual.)
To reset the emergency stop status, turn the operating portion of this switch in the arrow direction.

**Caution:** If multiple controllers are connected using link cables, the EMERGENCY STOP switch is enabled only for the axis of the controller which is connected to the Teaching Pendant.

: For the ACON-CG, PCON-CG and RCP2-CG (cutout relay external type) Series, the EMERGENCY STOP switch is enabled only when the emergency stop circuit is externally installed. Always read the operating manual of the controller carefully.

: For the emergency stop wiring of each controller, refer to the operating manual of each controller.



**(3) TP operation mode display LED**

• TEACH1: The LED is lit in the Teach 1 mode.

PIO Prh: Enables writing of position data, parameters, etc., in the controller and commands of the actuator movement system.

SftyVel Efct: Keeps the maximum speed at the safety speed set for the parameter regardless of position data.

• TEACH2: The LED is lit in the Teach 2 mode.

PIO Prh: Enables writing of position data, parameters, etc., in the controller and commands of the actuator movement system.

SftyVel Non: Enables movement at the speed registered in position data.

• MONIT1: The LED is lit in the Monitor 1 mode.

PIO Prh: Enables monitoring only. Writing of position data, parameters, etc., in the controller and commands of the actuator movement system are disabled.

SftyVel Efct: Keeps the maximum speed at the safety speed set for the parameter regardless of position data.

• MONIT2: The LED is lit in the Monitor 2 mode.

PIO Prh: Enables monitoring only. Writing of position data, parameters, etc., in the controller and commands of the actuator movement system are disabled.

SftyVel Non: Enables movement at the speed registered in position data.

**(4) EDIT mode select key**

Moves to the “Edit/Teach” mode. This key is valid when the LED of the EDIT mode select key is lit.

**(5) ERROR LIST mode select key**

Moves to the “Error List” mode. This key is valid when the LED of the ERROR LIST mode select key is lit.

When alarm occurs at the controller, the LED of the “ERROR LIST” key is flashing.

**(6) MONITOR mode select key**

Moves to the “Monitor” mode. This key is valid when the LED of the MONITOR mode select key is lit.

**(7) PARAMETER mode select key**

Moves to the “User Parameter” mode. This key is valid when the LED of the PARAMETER mode select key is lit.

**(8) ADJUST mode select key**

Moves to the “User Adjustment” mode. This key is valid when the LED of the ADJUST mode select key is lit.

**(9) TP operation mode select keys**

Select TEACH1 (Teach 1 mode), TEACH2 (Teach 2 mode), MONIT1 (Monitor 1 mode) or MONIT2 (Monitor 2 mode).
The mode will move to the TP operation mode selected.
After movement, the LED of the operation mode selected lit.

**(10) ESC key**

- Return to the parent screen display
  Although Teaching Pendant operation is composed of several layer nests, using this key will return the user to one upper layer (parent screen).

| When you don’t understand the operation, retry operation after returning to the upper layer with the ESC key. |
|---|

- Input data cancel during data input operation
  If you press this key during data input operation, the input data will be canceled.
- Stop switch during movement or continuous movement
  Once this switch is pushed down during movement or continuous movement, operation will decelerate and stop immediately.

**(11) PAGE UP/PAGE DOWN key**

Changes screens by incrementing or decrementing edit and display item No. (Position No., Error List No., User Parameter No.).

**(12) ERROR RESET key**

When an error occurs at any level that allows recovery without software reset, the error reset and message clear can be performed with this key.

**(13) WRT key**

Transfers edited data to the controller. (Data will be saved to the memory of the controller.)
Only the data displayed on the LCD will be transferred. (Multiple position No. can’t be transferred all together at the same time.)
If it is position data, transferred all together at position data.

**(14) BS key**

Backspace key. If you press this key during data input, the last input character will be cleared.

**(15) ITEM BACK/FWD key**

Changes items by incrementing or decrementing item No. on the Edit screen, Monitor screen or User Parameter screen.

**(16) Arrow keys**

- Edit screen
  The cursor will move to each edit item in the screen. The screen will not be changed.
- Monitor screen, Error List screen
  Changes the screen by incrementing or decrementing with the ▲ or ▼ key.
  Changes the screen by incrementing or decrementing the axis No. among connection axes with the ◀ or ▶ key.

**(17) SHIFT key**

This key is not used since it is for a future function enhancement.

**(18) Ten keys**

These keys are used for numeric input.

To input characters from A to F for the hexadecimal number, perform the following operation. (Applicable for Version V1.10 or later)

A : Hold [-.] key down and press [*0] key at the same time.
B : Hold [-.] key down and press [STU 1] key at the same time.
C : Hold [-.] key down and press [VWX 2] key at the same time.
D : Hold [-.] key down and press [YZ 3] key at the same time.
E : Hold [-.] key down and press [JKL 4] key at the same time.
F : Hold [-.] key down and press [MNO 5] key at the same time.

**(19) STOP key**

Once this key is pushed down during movement or continuous movement, operation will decelerate and stop immediately.
(This key is valid in the Teach/Play mode.)

**(20) SERVO key**

Changes the servo ON/OFF of the actuator.
(This key is valid in the Teach/Play mode.)

**(21) MOVE key**

Starts the movement or continuous movement of the actuator.
(This key is valid in the Teach/Play mode with the servo ON status.)

**(22) HOME key**

Executes homing. (This key is valid in the Teach/Play mode with the servo ON status.)

**(23) JOG-/JOG+ key**

- JOG - : Negative direction jog movement
- JOG + : Positive direction jog movement

(This key is valid in the Teach/Play mode with the servo ON status.)

**(24) ↵ (Return) key**

This key is used for the confirmation of data input or operation.

**(25) Dead-man Switch (CON-TG/TGS)**

There are three stages for the dead-man switch. The ON/OFF in each stage are described as follows.

| | | |
|---|---|---|
| 1st Stage | Switch OFF | The condition where finger is released from the switch, or the force of pressing the switch is very weak. |
| 2nd Stage | Switch ON | Condition where the switch is pressed with appropriate force. |
| 3rd Stage | Switch OFF | Condition where the switch is pressed strongly. |

The servo-motor can be turned ON under the switch ON condition.
When the switch is turned OFF, the driving power source is disconnected and the servo-motor is turned OFF.
Even when the switch is turned OFF, the operations in the modes where turning ON the servo-motor is not required are available (such as edit mode).

# 5. Connection With the Controller

## 5.1 Connection with the Teaching Pendant

(1) Connect the Teaching Pendant Cable to the Main Communication Port connector which is located on the front of the controller.
Always turn the PORT switch OFF first before connecting a controller having this switch.
For the locations of the Main Communication Port connector and PORT switch, refer to the operating manual for the controller you use.

(2) After connecting, turn the PORT switch of the controller having this switch ON.

## 5.2 How to Disengage the Teaching Pendant

Hold down the STOP key in the Teaching Pendant. Then select "1. End" to finish all processes.

Then, turn the PORT switch OFF for the controller having this switch.

Operation:

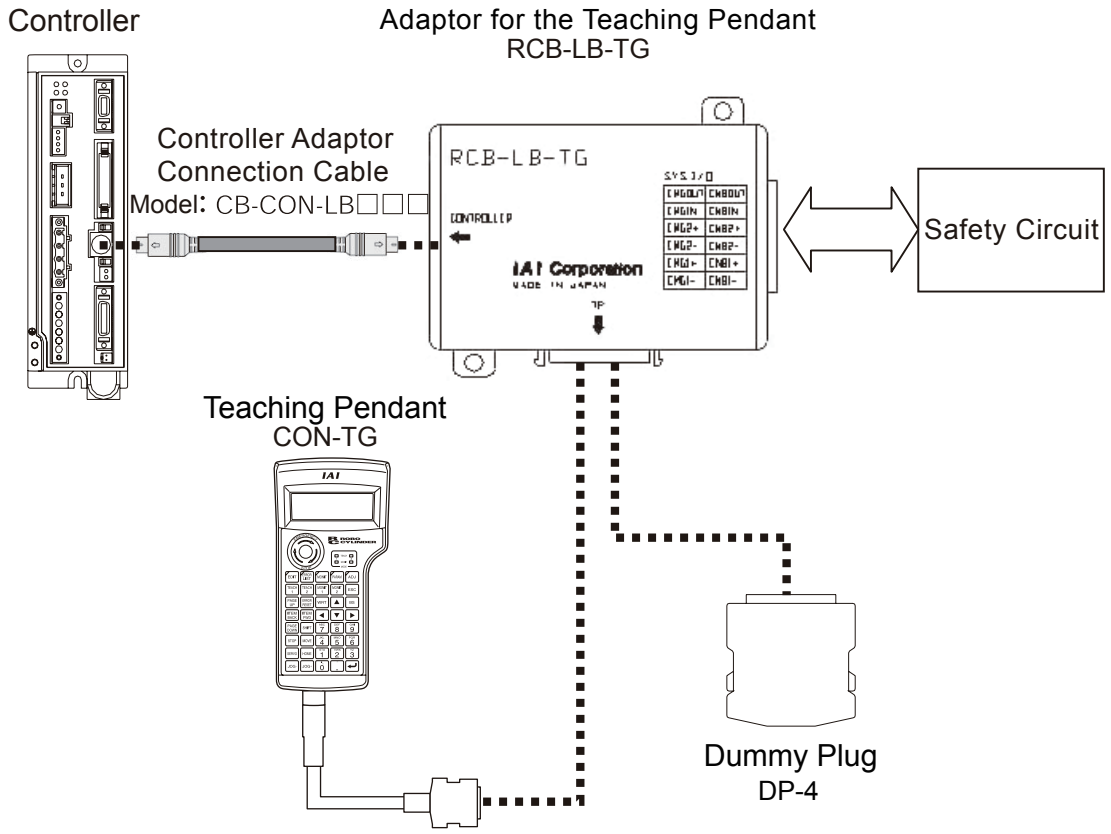
1. Hold down the STOP key for more than 2.5 seconds.
2. Press the ten keys STU 1 to select “1. End.”
3. Turn the PORT switch OFF for the controller having this switch.
4. Remove the Teaching Pendant connector.

| | |
|---|---|
| **Caution:** | In the case of using PCON, ACON, SCON or ERC2, when the teaching pendant is disconnected, the controller is stopped momentarily in an emergency, but immediately after that, the emergency stop is cancelled.<br>Do not disconnect the teaching pendant during the controller operation.<br>Also, take the greatest care to design the emergency stop circuit including the emergency stop switch for the teaching pendant. |

| | |
|---|---|
| **Caution:** | In the case of the PCON, ACON controller or ERC2 not having the AUTO/MANU switch, set the TP Operation Mode to “Monitor 2” before disconnecting the Teaching Pendant from the controller. (Refer to “6.10 TP Operation Mode.”)<br><br>when controller setting is made by connecting the Teaching Pendant to the gateway unit or SIO converter:<br>● If the Teaching Pendant is disconnected while the setting of “Teach 1” or “Teach 2” remains, I/O will become invalid and control from PLC will become impossible.<br>● If the Teaching Pendant is disconnected while the setting of “Monitor 1” remains, the maximum speed will become the safety speed set for the parameter regardless of a command from PLC. |

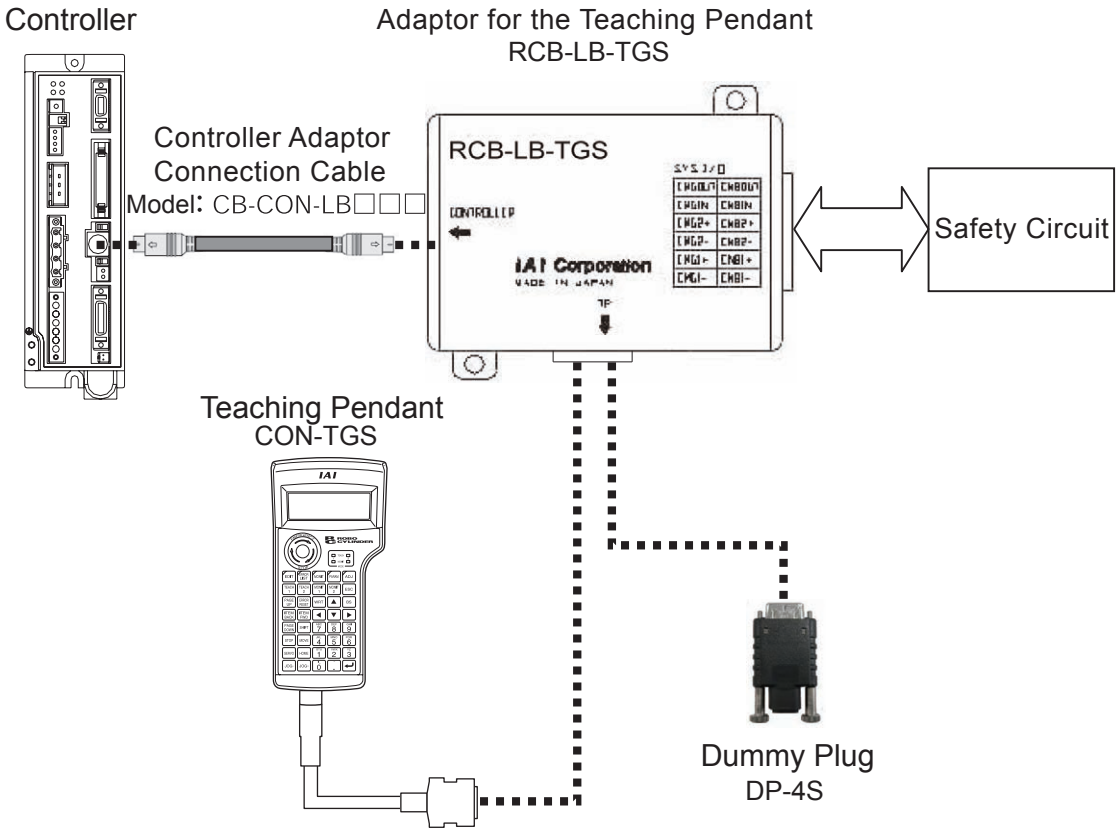
## 5.3 Connection between CON-TG/TGS and the Controller

**[Connection between CON-TG and RCB-LB-TG]**



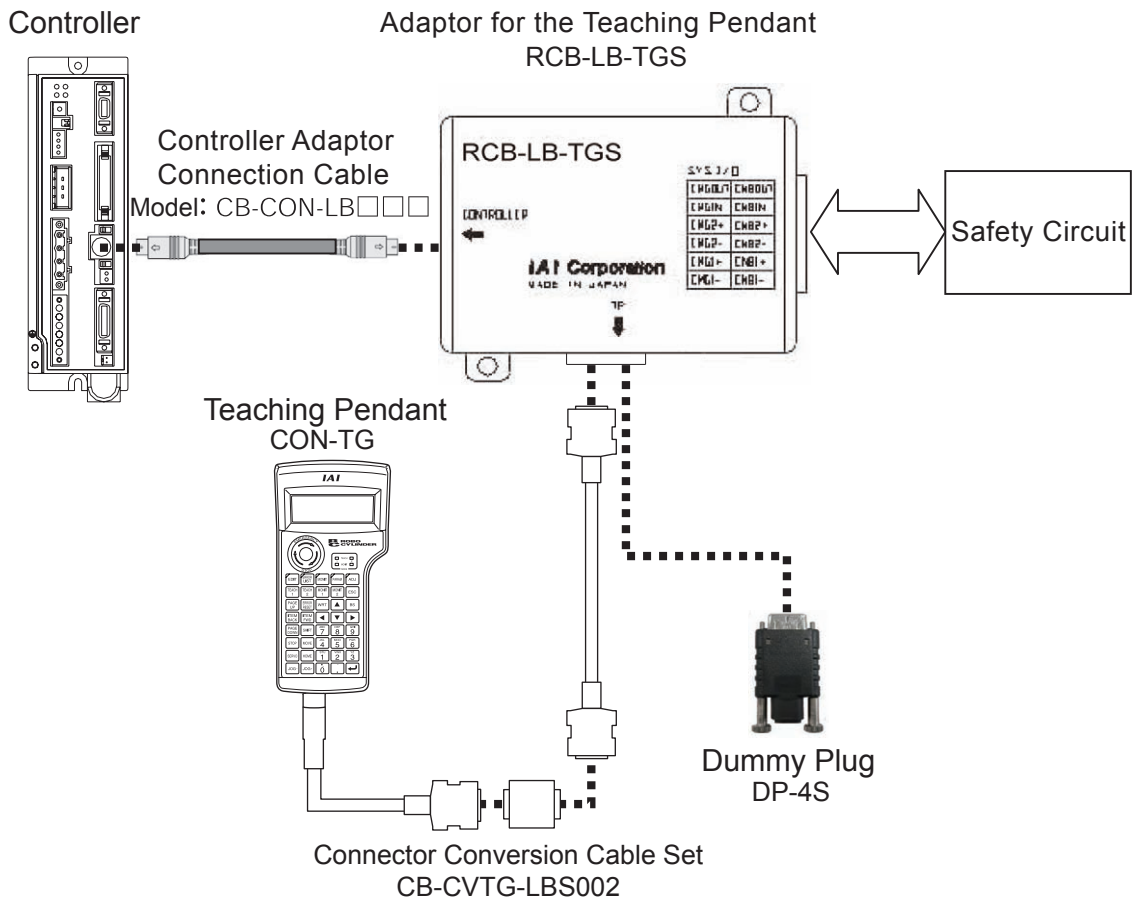

| | |
|---|---|
| **Caution:** | When the teaching pendant CON-TG is not to be connected, make sure to insert the dummy plug DP-4 into the adaptor for the teaching pendant. |

**[Connection between CON-TGS and RCB-LB-TGS]**




| | |
|---|---|
| **Caution:** | When the teaching pendant CON-TGS is not to be connected, make sure to insert the dummy plug DP-4S into the adaptor for the teaching pendant. |

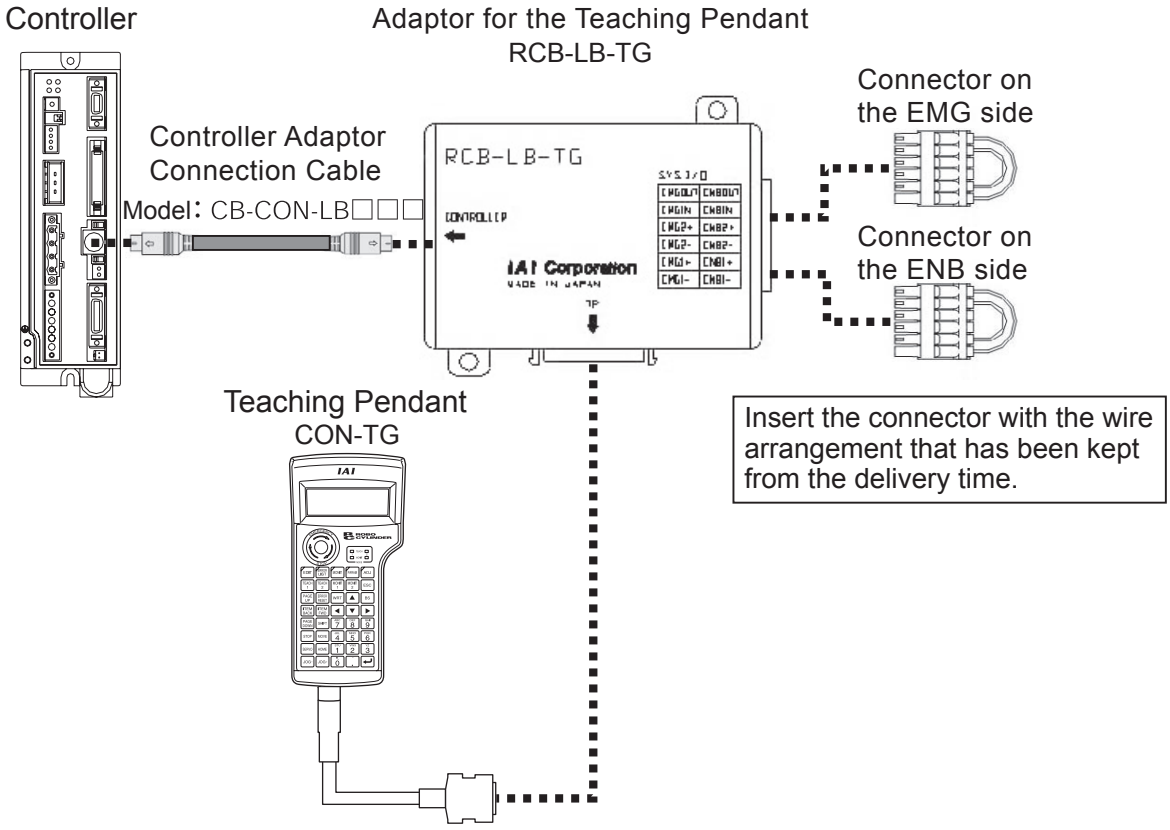
**[Connection between CON-TG and RCB-LB-TGS]**



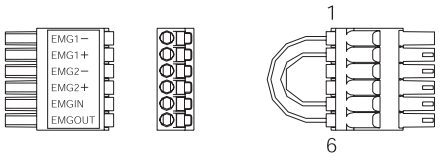

| | |
|---|---|
| **Caution:** | When the teaching pendant CON-TG is not to be connected, make sure to insert the dummy plug DP-4S into the adaptor for the teaching pendant. |

When the CON-TG/TGS teaching pendant is used as the teaching pendant with the dead-man switch,connect it to the controller as shown in the following diagram.

[Connection between CON-TG and RCB-LB-TG]

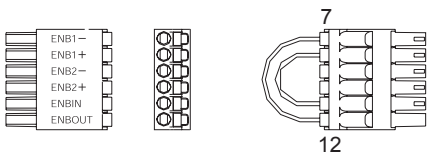



Wire Arrangement of the Connector on the EMG side at the time of delivery



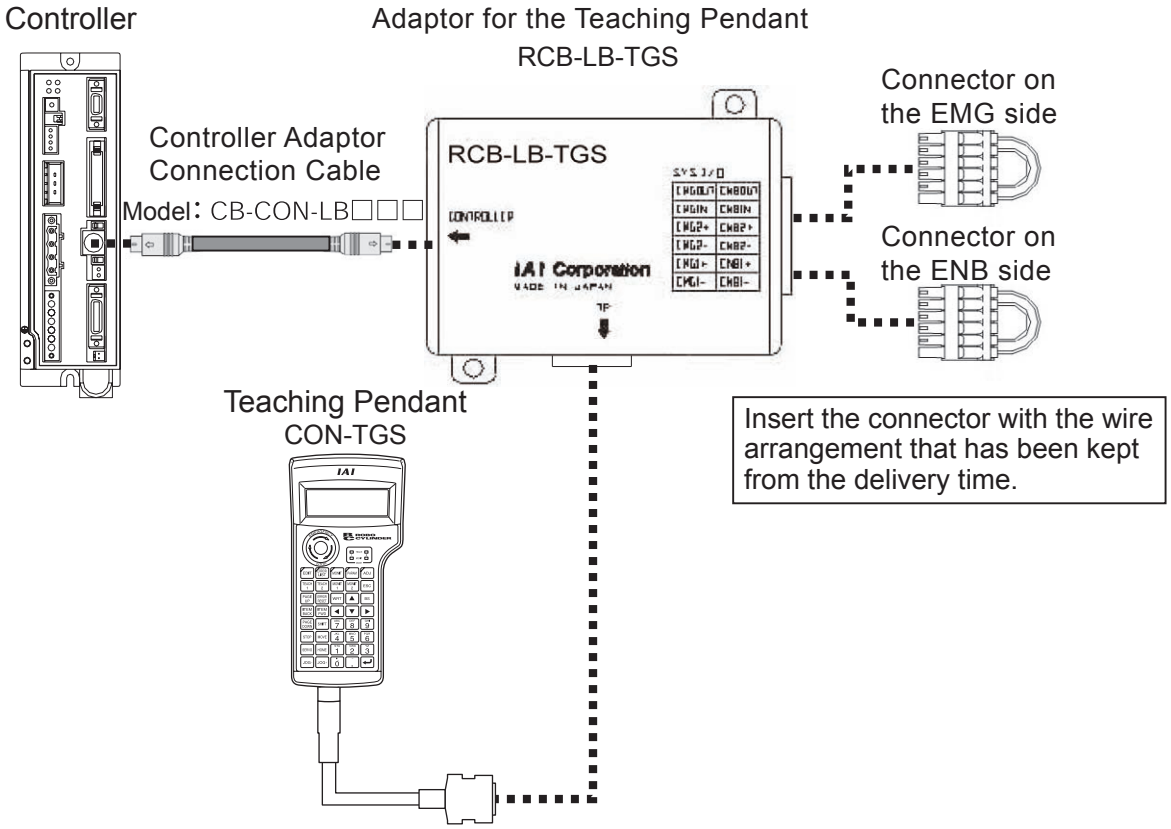

| Wiring | Color | Signal | No. |
|---|---|---|---|
| AWG24 | YW | EMG1− | 1 |
| | YW | EMG1+ | 2 |
| | — | EMG2− | 3 |
| | — | EMG2+ | 4 |
| | YW | EMGIN | 5 |
| | YW | EMGOUT | 6 |

Wire Arrangement of the Connector on the ENB side at the time of delivery

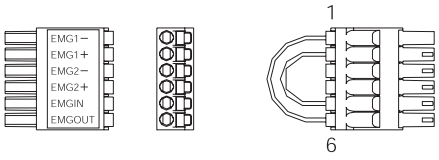



| Wiring | Color | Signal | No. |
|---|---|---|---|
| AWG24 | YW | ENB1− | 7 |
| | YW | ENB1+ | 8 |
| | — | ENB2− | 9 |
| | — | ENB2+ | 10 |
| | YW | ENBIN | 11 |
| | YW | ENBOUT | 12 |

[Connection between CON-TGS and RCB-LB-TGS]

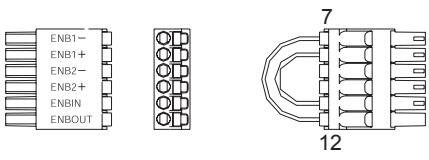



Wire Arrangement of the Connector on the EMG side at the time of delivery



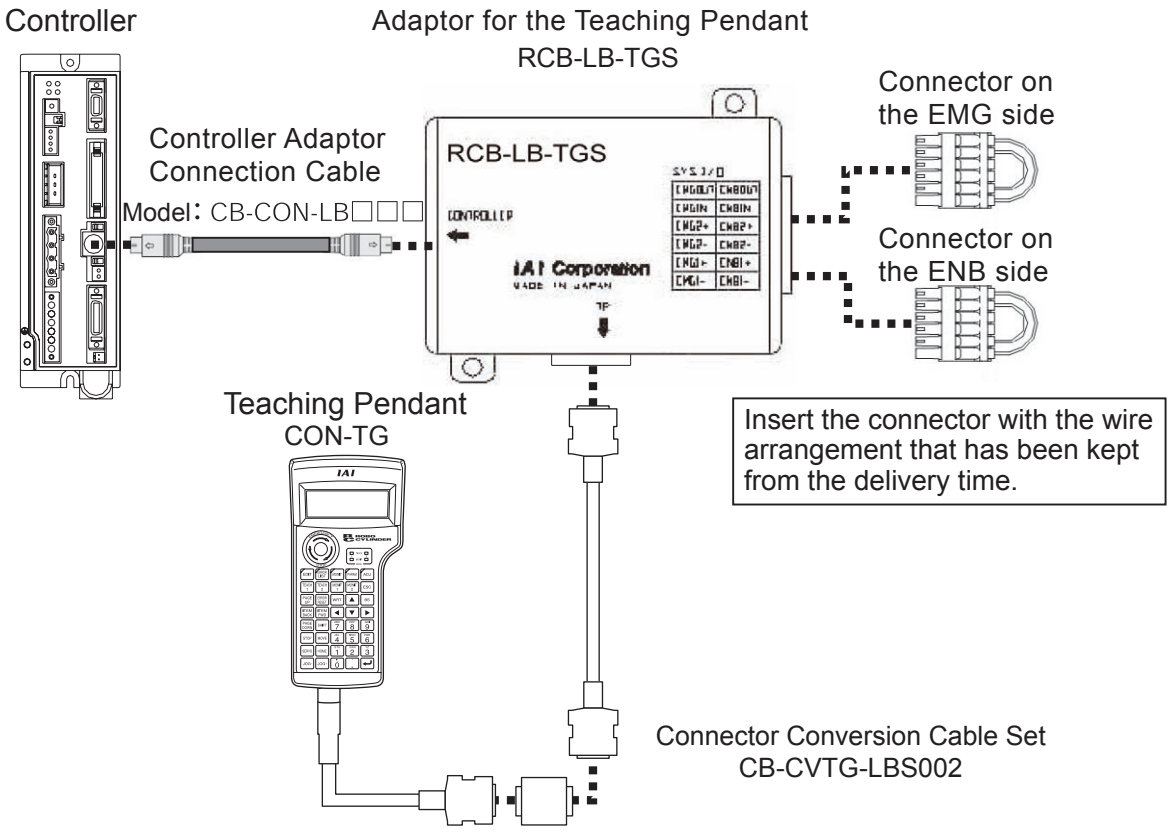

| Wiring | Color | Signal | No. |
|---|---|---|---|
| AWG24 | YW | EMG1− | 1 |
| | YW | EMG1+ | 2 |
| | — | EMG2− | 3 |
| | — | EMG2+ | 4 |
| | YW | EMGIN | 5 |
| | YW | EMGOUT | 6 |

Wire Arrangement of the Connector on the ENB side at the time of delivery

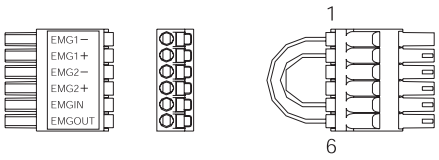



| Wiring | Color | Signal | No. |
|---|---|---|---|
| AWG24 | YW | ENB1− | 7 |
| | YW | ENB1+ | 8 |
| | — | ENB2− | 9 |
| | — | ENB2+ | 10 |
| | YW | ENBIN | 11 |
| | YW | ENBOUT | 12 |

[Connection between CON-TG and RCB-LB-TGS]

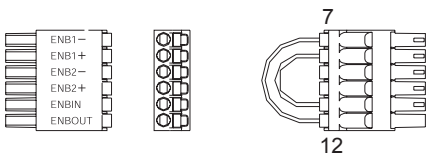



Wire Arrangement of the Connector on the EMG side at the time of delivery




| Wiring | Color | Signal | No. |
|---|---|---|---|
| AWG24 | YW | EMG1− | 1 |
| | YW | EMG1+ | 2 |
| | — | EMG2− | 3 |
| | — | EMG2+ | 4 |
| | YW | EMGIN | 5 |
| | YW | EMGOUT | 6 |

Wire Arrangement of the Connector on the ENB side at the time of delivery

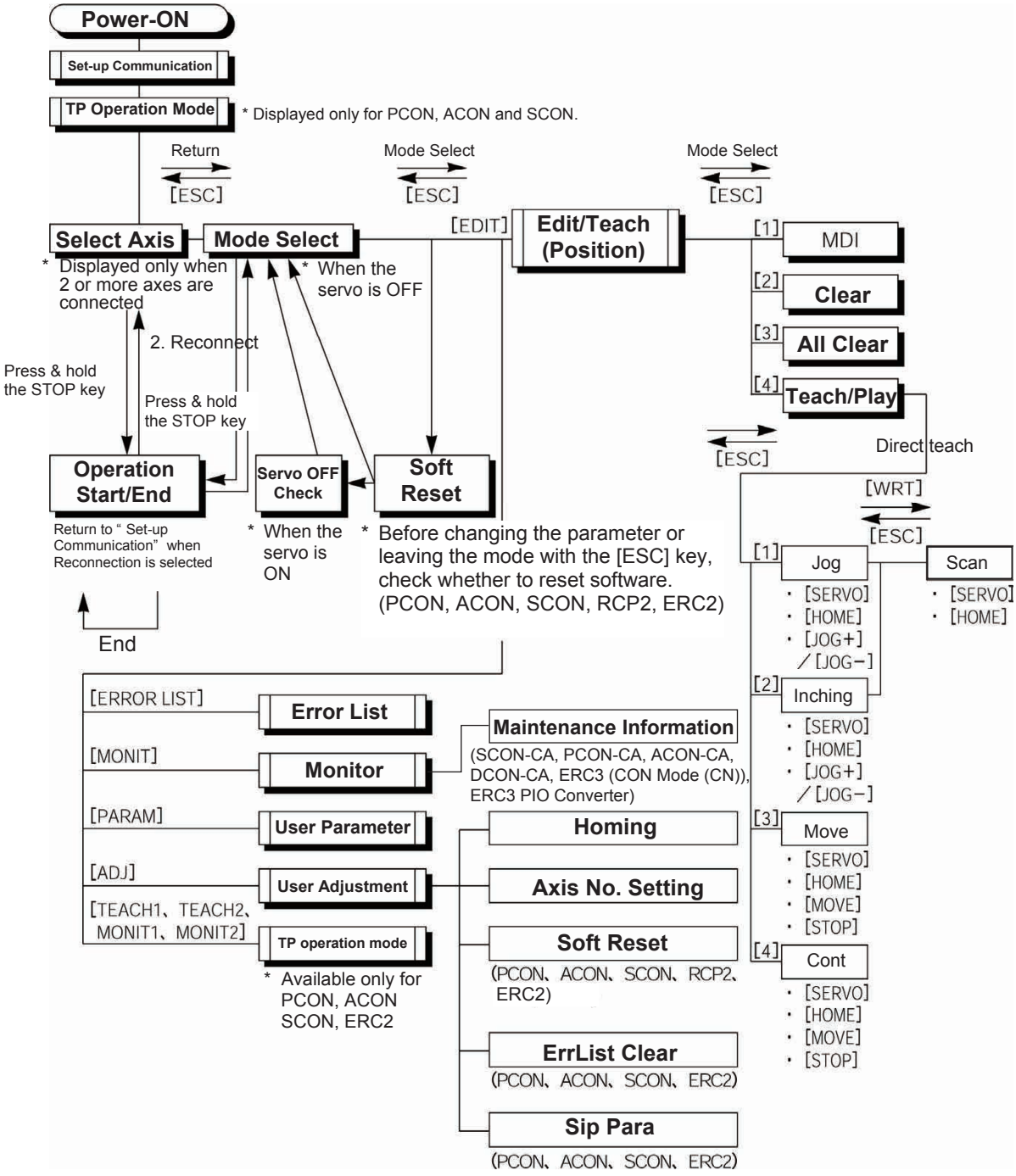



| Wiring | Color | Signal | No. |
|---|---|---|---|
| AWG24 | YW | ENB1− | 7 |
| | YW | ENB1+ | 8 |
| | — | ENB2− | 9 |
| | — | ENB2+ | 10 |
| | YW | ENBIN | 11 |
| | YW | ENBOUT | 12 |

# 6. Operation: Mode Flow Chart

**(1) Positioner (PCON-PL/PO, ACON-PL/PO and SCON: Mode other than the Pulse Train Mode)**

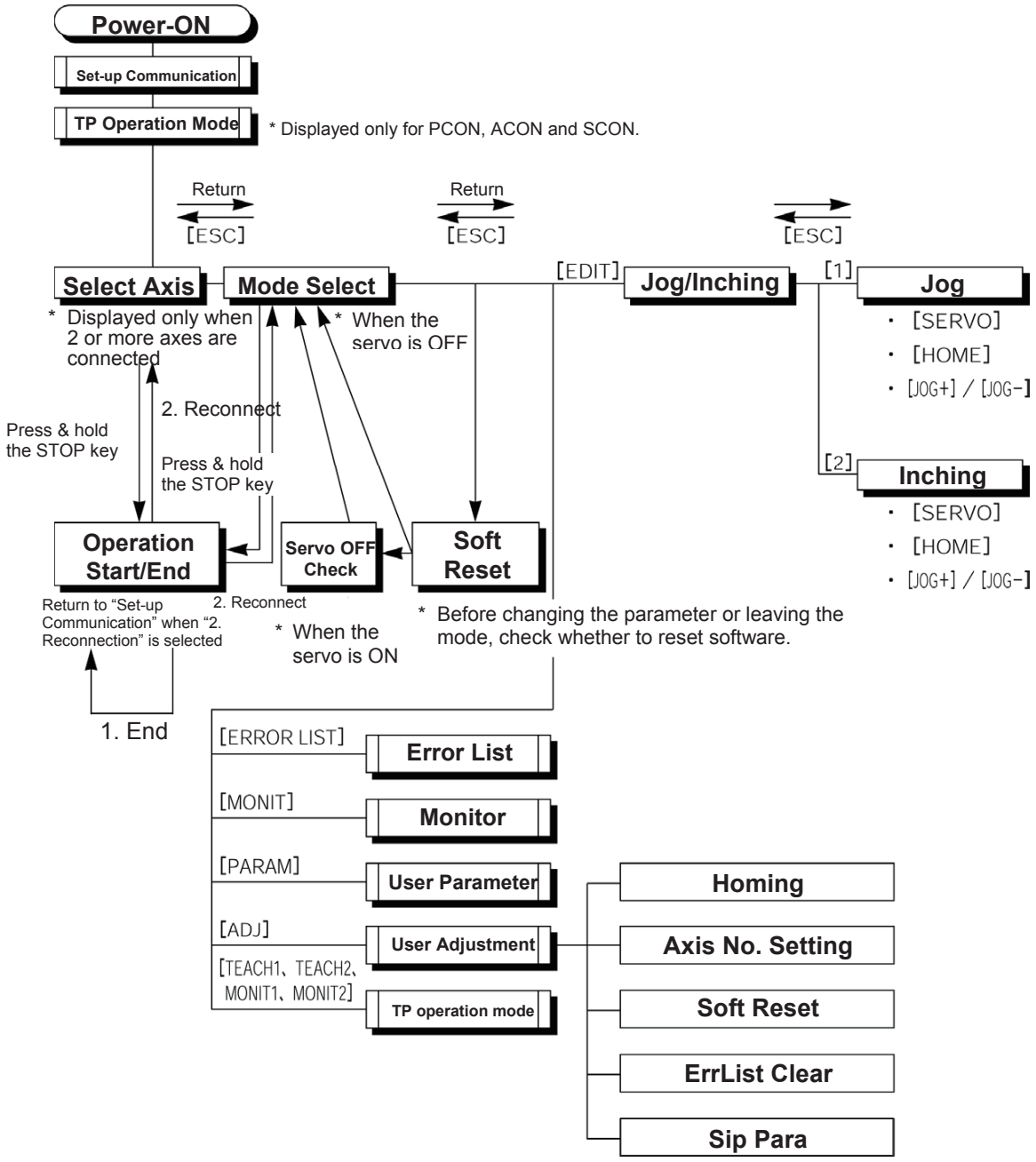
The total picture of operations performed with the Teaching Pendant has the tree structure as shown below. To return to the previous screen, press the ESC key.



### (2) Pulse Train (PCON-PL/PO, ACON-PL/PO and SCON: Pulse Train Mode)

The total picture of operations performed with the Teaching Pendant has the tree structure as shown below.

To return to the previous screen, press the ESC key.



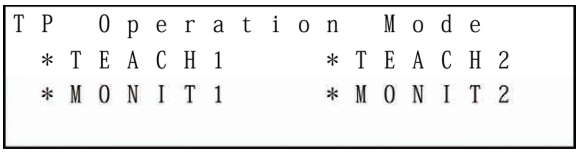
## 6.1 Initial Screen and TP Operation Mode Screen During Power - UP

When Teaching Pendant is connected to the controller, power is supplied to the Teaching Pendant and operation starts.
In the case of a controller with a PORT switch, power will be supplied to the Teaching Pendant and operation will start once power is supplied to the Teaching Pendant.

Upon power-on, the LCD display screen (hereinafter called the “screen”) displays the Teaching Pendant software version as follows:


**Initial Screen During Power-UP**

In the case of the PCON, ACON, SCON or DCON controller, ERC2 or ERC3 the screen will automatically move to the TP Operation Mode selection screen once checking of the connection is completed.
In the case of the RCP, RCS, E-Con or RCP2 controller, the screen will automatically move to the Select Axis screen if multiple units are connected.




**TP Operation Mode Selection Screen**

Select and press one of the [TEACH 1], [TEACH 2], [MONIT 1] or [MONIT 2] keys. The screen will move the controller selection (Axis Select) screen.



Select an operation mode from the following 4 menu items:

- TEACH1: The LED is lit in the Teach 1 mode.
  - PIO Prh: Enables writing of position data, parameters, etc., in the controller and commands of the actuator movement system.
  - SftyVel Efct: Keeps the maximum speed at the safety speed set for the parameter regardless of position data.

- TEACH2: The LED is lit in the Teach 2 mode.
  - PIO Prh: Enables writing of position data, parameters, etc., in the controller and commands of the actuator movement system.
  - SftyVel Non: Enables movement at the speed registered in position data.

- MONIT1: The LED is lit in the Monitor 1 mode.
  - PIO Prh: Enables monitoring only. Writing of position data, parameters, etc., in the controller and commands of the actuator movement system are disabled.
  - SftyVel Efct: Keeps the maximum speed at the safety speed set for the parameter regardless of position data.

- MONIT2: The LED is lit in the Monitor 2 mode.
  - PIO Prh: Enables monitoring only. Writing of position data, parameters, etc., in the controller and commands of the actuator movement system are disabled.
  - SftyVel Non: Enables movement at the speed registered in position data.

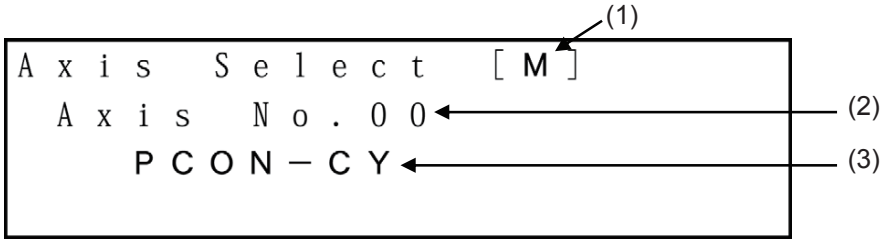
## 6.2 Controller Selection (when using multiple units)

In the case of multiple units connected serially via the communication line, the axis selection screen will be displayed. For a single unit, since there is no need to select the axis, the first screen below will not appear (refer to Section 6.3 entitled Operational Mode Selection of this manual).

If the jig No. is incremented or decremented with the PAGE UP or PAGE DOWN key, power-on controllers will be displayed in order when the power is applied to the Teaching Pendant. Display the controller to be selected.

Then, press the return key. The selection will be confirmed and the screen will change to the “Mode Select” screen.

The controller can connect up to 16 units. However, the PCON, ACON, SCON, DCON, ERC2 or ERC3 group controllers cannot be used by linking to the RCP, RCS, E-Con or RCP2 controllers.




**Axis Selection Screen**

(1) Protocol type display M: Modbus, T: proprietary protocol

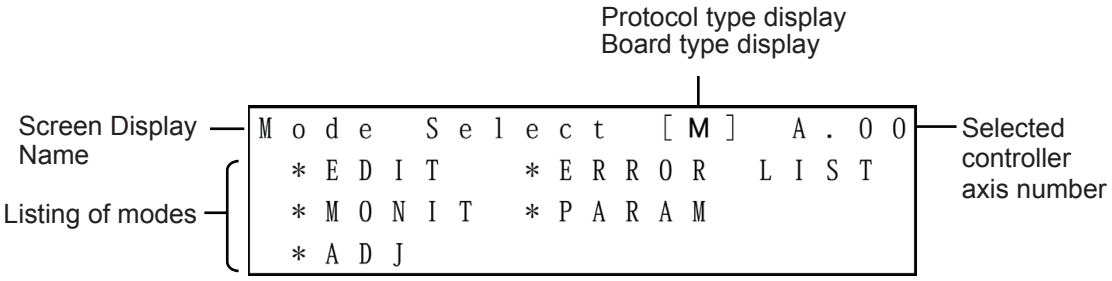
(2) Axis No. display

(3) Connection axis display: In the case of PCON, ACON, SCON, DCON, ERC2 or ERC3, the series name and type name of the connection axis such as PCON-CY will be displayed.
In the case of RCP, RCS, E-Con or RCP2, “Connected” will be displayed.

| | |
|---|---|
| **Caution:** | In the case of controllers with the PORT switch, only the powered controller(s) will be detected when the PORT switch is ON and power is present for the Teaching Pendant. |

The content explained hereinafter will be based on operation in response to the selected axis (controller).

## 6.3 Operation Mode Selection




**Mode Selection Screen**

For the modes, select one of the 5 options as it appears on the above screen.
To select it, press one of the EDIT, ERROR LIST, MONIT, PARAM or ADJ keys.

The screen will move to the screen of the selected mode.
However, it cannot move to any mode with the key LED out.

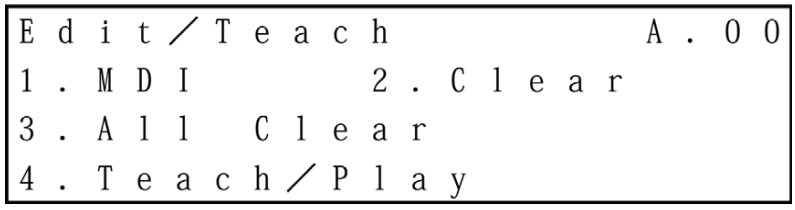
**Category of Modes**

| | |
|---|---|
| (1) * EDIT | Positioner (PCON-PL/PO, ACON-PL/PO or SCON: Mode other than the Pulse Train mode. ERC3: Mode other than the Pulse Train Mode) Display and Edit function for positioner table (Refer to 6.4 and 6.5) Pulse Train (PCON-PL/PO, ACON-PL/PO or SCON: Pulse Train Mode. ERC3: Pulse Train Mode) Jog Operation, Inching Operation (Refer to 6.5.8) |
| (2) * MONIT | Controller status display (Refer to 6.6) |
| (3) * ERROR LIST | Alarm content detailed display (Refer to 6.7) |
| (4) * PARAM | Setting of axis zone signal output range and axis attributes (Refer to 6.8) |
| (5) * ADJ | Executing homing and axis number setting of controller series (Refer to 6.9) |

## 6.4 Edit/Teaching

### 6.4.1 PCON, ACON, SCON, DCON, ERC2 or ERC3

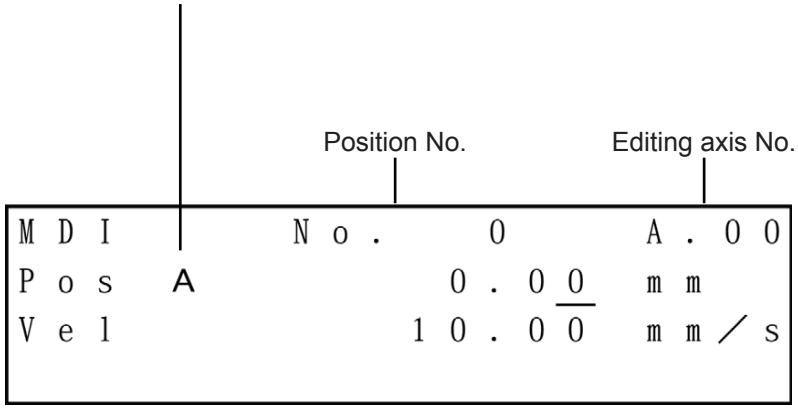
When the "*EDIT" mode is selected, the Edit/Teach select screen will be displayed.




**Edit/Teach Select Screen**

When the [STU 1] key is pressed to select MDI, the contents of the position data table stored in the controller will be displayed.

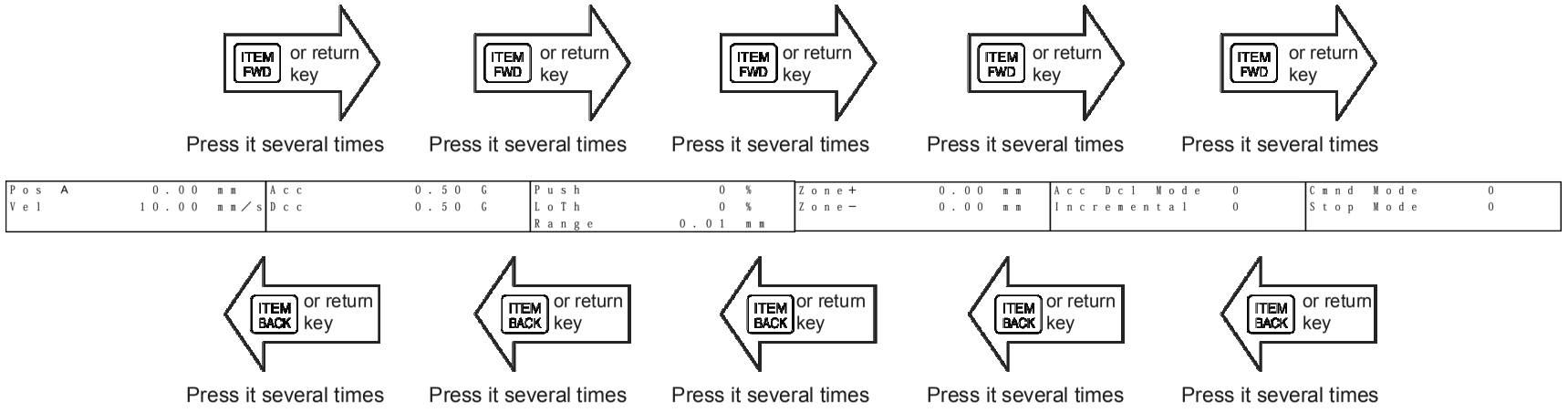
A: Absolute coordinate specification (ABS)
I : Relative coordinate specification (INC)




**Position and Velocity Data Screen**

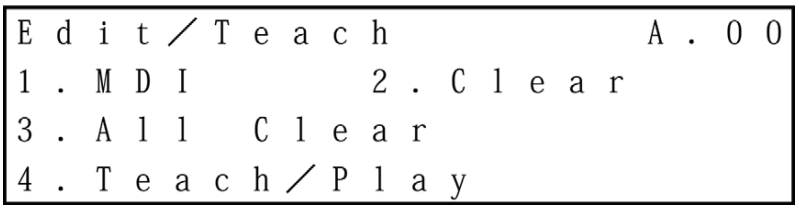
Specification of Position No.
When the position No. is incremented or decremented with the [PAGE UP] or [PAGE DOWN] key, the position data of the displayed position No. will be displayed in order.
Alternatively, move the cursor to the position No. with the [◀], [▼], [▲] or [▶] key, input a numeric value with the ten keys and press the return key. The position data of the specified position No. will be displayed.

The position data table screen is divided and displayed as below.
When the ITEM BACK or ITEM FWD key is pressed, the cursor in the screen will move. Pressing the key again after the cursor has reached the top or bottom line will change the screen.
In the same way, when the return key is pressed, the cursor in the screen will move. Pressing the key again after the cursor has reached the top or bottom line will change the screen.



### 6.4.2 RCP, RCS, E-Con or RCP2

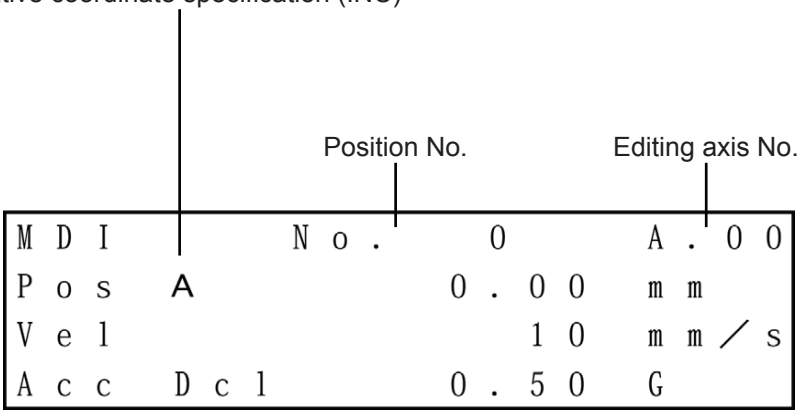
When the “*EDIT” mode is selected, the Edit/Teach select screen will be displayed.




**Edit/Teach Select Screen**

When the [STU 1] key is pressed to select MDI, the contents of the position data table stored in the controller will be displayed.

A: Absolute coordinate specification (ABS)
I : Relative coordinate specification (INC)

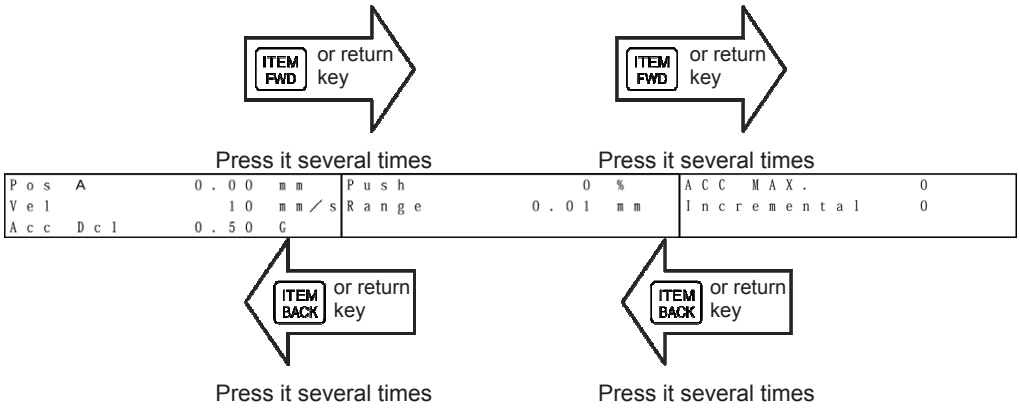



**Position and Velocity Data Screen**

Specification of Position No.
When the position No. is incremented or decremented with the [PAGE UP] or [PAGE DOWN] key, the position data of the displayed position No. will be displayed in order.
Alternatively, move the cursor to the position No. with the [◀], [▼], [▲] or [▶] key, input a numeric value with the ten keys and press the return key. The position data of the specified position No. will be displayed.

The position data table screen is divided and displayed as below.

When the ITEM BACK or ITEM FWD key is pressed, the cursor in the screen will move.
Pressing the key again after the cursor has reached the top or bottom line will change the screen.
In the same way, when the return key is pressed, the cursor in the screen will move.
Pressing the key again after the cursor has reached the top or bottom line will change the screen.



## 6.5 Position Data Table Contents

### 6.5.1 Position Data Table Contents for PCON, ACON, SCON, DCON, ERC2 or ERC3

The setting items of the position data table are No., Position, Vel, Acc/Dcl, Push, LoTh, Range, Zone+, Zone-, AccDcl Mode, Cmnd Mode and Stop Mode. They are displayed in 6 screens.
The items of Zone+, Zone-, AccDcl Mode and Stop Mode are enabled (ON) or disabled (OFF) according to the controller type. (V1.00 and earlier)
For the version V1.10 or later, some items are changed and also added. These items are valid only for SCON-CA, PCON-CA, ACON-CA, DCON-CA, ERC3 (CON Mode (CN)) or ERC3 PIO Converter.

1) Gain Set: "Cmnd Mode" is changed to "Gain Set".

2) Vibration Control Number: "Vibration Control No." is newly added.

List of ON/OFF of Position Table According to Model

| Position Table | Zone +/- | | AccDcl Mode | | | Stop Mode | | Gain Set | Vibration Control No. |
|---|---|---|---|---|---|---|---|---|---|
| | | | Trapezoid | S-shape | First-order Delay | Full Servo | Auto Servo OFF | | |
| ERC2 | ○ | PIO pattern: 3 | ○ | × | × | ○ | ○ | × | × |
| ERC2-SE | ○ | - | ○ | × | × | ○ | × | × | × |
| ERC3 | ○ | PIO pattern: 2 | ○ | ○ | ○ | ○ | ○ | × | × |
| ERC3 PIO Converter | ○ | PIO pattern: 0, 1, 2, 4, 5 | ○ | ○ | ○ | ○ | ○ | × | × |
| PCON-C/CG/CF | ○ | PIO pattern: 0, 1, 2, 4, 5 | ○ | × | × | ○ | ○ | × | × |
| -CA | ○ | PIO pattern: 0, 1, 2, 4, 5 | ○ | ○ | ○ | ○ | ○ | × | × |
| -CY | ○ | PIO pattern: 1 | ○ | × | × | ○ | ○ | × | × |
| -SE | ○ | - | ○ | × | × | ○ | × | × | × |
| ACON-C/CG | ○ | PIO pattern: 0, 1, 2, 4, 5 | ○ | ○ | ○ | | ○ | × | × |
| ACON-CA | ○ | PIO pattern: 0, 1, 2, 4, 5 | ○ | ○ | ○ | | ○ | ○ | ○ |
| -CY | ○ | PIO pattern: 1 | ○ | ○ | ○ | | ○ | × | × |
| -SE | ○ | - | ○ | ○ | ○ | | × | × | × |
| DCON-CA | ○ | PIO pattern: 0, 1, 2, 4, 5 | | | | | ○ | × | × |
| SCON-C positioner | ○ | PIO pattern: 0, 1, 2, 4, 5 | ○ | ○ | ○ | | ○ | × | × |
| SCON-CA positioner | ○ | PIO pattern: 0, 1, 2, 4, 5, 6, 7 | ○ | ○ | ○ | | ○ | ○ | ○ |

(1) No.: Indicates the position data number.

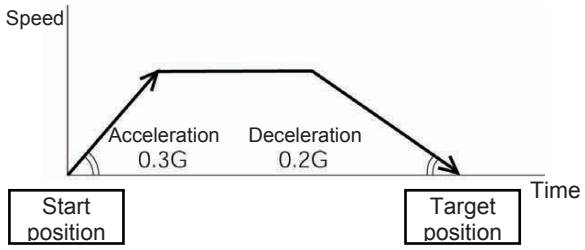
> ⚠**Warning:** Always specify absolute coordinates for the 3-point type of PCON-C/CG, PCON-CA, ACON-C/CG, ACON-CA, DCON-CA, SCON-C, SCON-CA or ERC3 (CON Mode (CN)), and the proximity switch type of PCON-CY and ACON-CY.
> If you specify relative coordinates, a position data error will occur.
> In the above case, if you specify "Push," push completion cannot be judged.

(2) Position: Input the target position to move the actuator to, in [mm].

- Absolute Coordinates: Input the target location by determining the distance between the original point and target position. No negative value can be input.
- Relative Coordinates: Input the target location by determining the distance between the current position and target position. Any negative value

(3) Vel: • Input the speed at which the actuator will be moved, in [mm/sec].
The initial value will depend on the actuator type.
(Note) For SCON-CA, PCON-CA and ERC3, an alarm will be displayed if the set value is lower than the minimum velocity.

(4) Acc/Dcc: • Input the acceleration/deceleration at which the actuator will be moved, in [G].
Basically, use acceleration/deceleration within the catalog rated value range.
The input range allows larger value input than the catalog rated values, on the assumption that the tact time will be reduced if the transfer mass is significantly smaller than the rated value.
Make the numeric value smaller if transfer work vibrates and causes trouble during acceleration/deceleration.
(Note) For SCON-CA, PCON-CA and ERC3, an alarm will be displayed if the set value exceeds the rated acceleration/deceleration.




The acceleration will become sudden if the numeric value is made larger and it will become gradual if the numeric value is made smaller.

**Caution:** Enter appropriate values for Vel and Acc/Dec in such a way as to prevent excessive impact or vibration from being applied to the actuator in consideration of the installation conditions and the shape of transferred work by referring to the "List of Actuator Specifications" in the Appendix.
Increasing such values largely relates to the transfer mass and the actuator characteristics vary depending on the model, consult IAI regarding the input-limiting values.

(5) Push: • Select the "positioning operation" or "push operation".
The default value is "0."
0: Normal positioning operation
Other than 0: Indicates the current-limiting value and indicates the push operation.

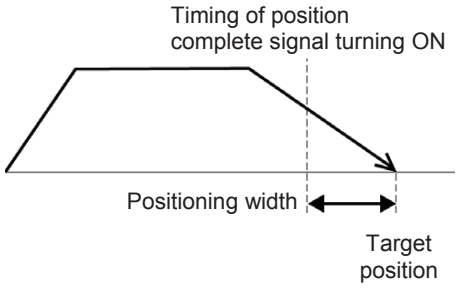
**Caution:** In the case of PCON, ACON, SCON or ERC2 there are cases where the input value to "Push" may be rounded off to a multiple of the minimum resolution of the controller (during data acquisition from the controller).

(6) LoTh: • In the case of the PCON-CF/CFA controller, the load output signal (PIO) will be output if the command torque exceeds the value (%) set to “LoTh.”
Set the test range with “Zone+/-”.
Use it to judge whether push has been performed normally.
* For details, refer to the Operating Manual of PCON-CF/CFA Controller.

(7) Range: • The “positioning operation” and “push operation” have different meanings.
Positioning operation:
It defines the distance to the target position from a position at which the position complete signal turns ON.
The default value is 0.1 mm.

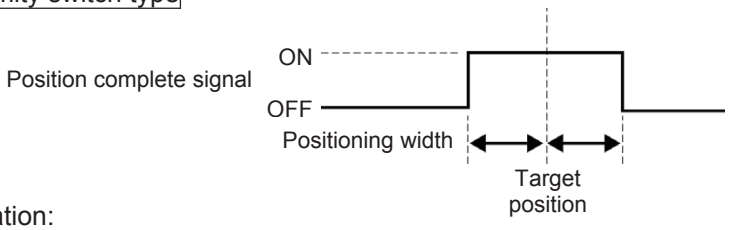
Standard type

Since increasing the positioning width value hastens the next sequence operation, it becomes a factor for tact time reduction. Set the optimum value by considering the balance of the entire equipment.

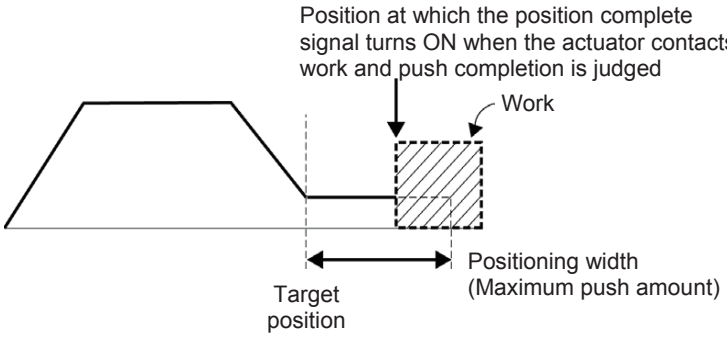



However, it defines the width of the position complete signal to turn ON for the 3-point type of PCON-C/CG/CF, PCON-CA, ACON-C/CG, ACON-CA, DCON-CA, SCON and ERC3 PIO Converter and the proximity switch type of PCON-CY and ACON-CY.

3-point type and proximity switch type




Push operation:
It defines the maximum push amount from the target position in the push operation.
Set the positioning width in such a way as to prevent positioning completion before the actuator contacts work by considering mechanical variations of work.




(Note) For PCON-CA, ACON-CA, DCON-CA and ERC3, a smaller value than the minimum positioning width cannot be set.

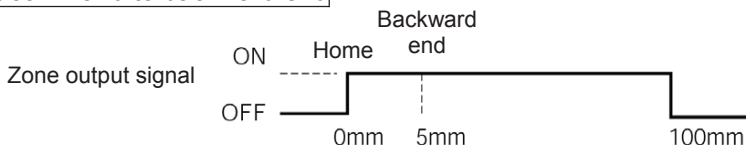
(8) Zone +/-:

- It defines the zone where the zone output signal of the standard type turns ON.
  Individual setting is available for each target position to give flexibility.

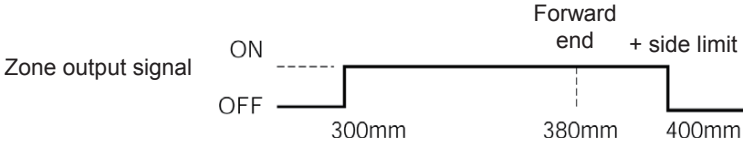
[Setting example]

| No. | Position [mm] | Zone+ [mm] | Zone- [mm] | Comment |
|---|---|---|---|---|
| 0 | 5.00 | 100.00 | 0.00 | Backward end |
| 1 | 380.00 | 400.00 | 300.00 | Forward end |
| 2 | 200.00 | 250.00 | 150.00 | Midpoint |

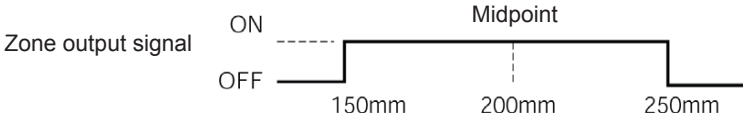
Movement command to backward end




Movement command to forward end



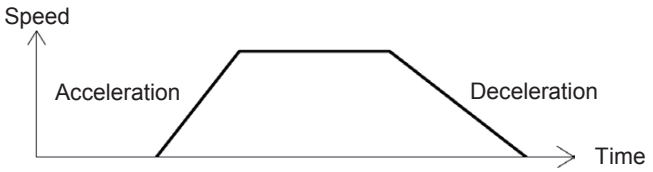

Movement command to midpoint




(9) Acc/Dcl Mode:

- It defines the acceleration/deceleration characteristics.
  The default value is 0.
  0: Trapezoid pattern
  1: S-shaped motion
  2: First-order delay filter

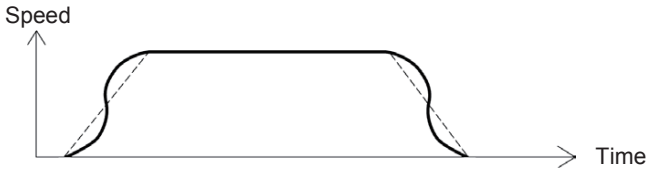
Trapezoid pattern




* Set the acceleration and deceleration in the “Acc” and “Dcl” fields of the position table.

S-shaped motion

A curve, which is gradual at the beginning of acceleration but rises sharply halfway, is drawn.
Use it in the applications for which you want to set the acceleration/deceleration high due to tact time requirement but desire a gradual curve at the beginning of movement or immediately before stop.

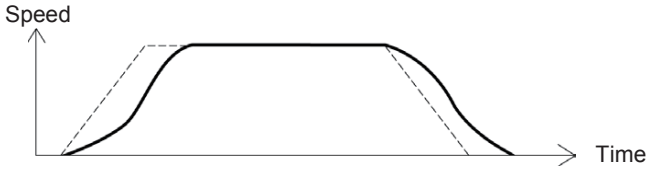



* Set the degree of the S-shaped motion with the parameter No. 56 [S-shaped motion ratio setting]. The setting unit is % and the setting range is between 0 and 100.
(The above is the image graph when 100% setting is made.)
If “0” is set, the S-shaped motion becomes invalid.
However, it will not be reflected in jogging/increment movement by PC or Teaching Pendant operation.

(Note) It cannot be set for the ERC2 or PCON controller. The parameter No. 56 is reserved.

First-order delay filter

More gradual acceleration/deceleration curves are drawn than the linear acceleration/deceleration (trapezoid pattern).
Use this in the applications by giving micro vibrations to work during acceleration/deceleration not desired.




* Set the degree of the first-order lag with the parameter No. 55 (constant for the position command first-order filtering). The setting unit is 0.1 msec and the setting range is between 0.0 and 100.0.
If “0” is set, the first-lag filter will become invalid.
However, it will not be reflected in jogging/increment movement by PC or Teaching Pendant operation.

(Note) It cannot be set for the ERC2, PCON controller. The parameter No. 55 is reserved.

(10) Cmnd Mode: • This field is invalid.
The factory setting is 0.

(11) Stop Mode: • It defines the power saving method on standby after completion of positioning to the target position set in the “Position” field of the position number.

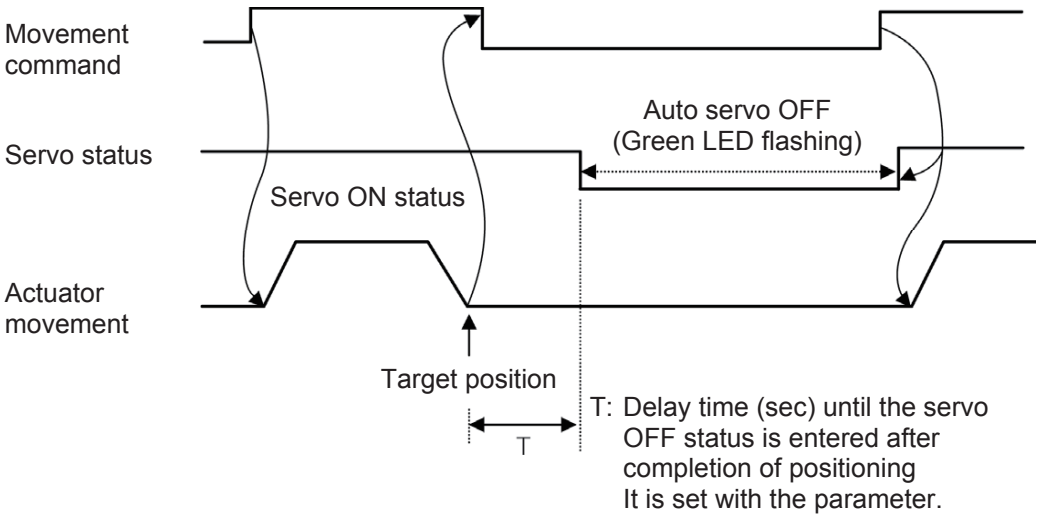
0: Invalid power saving method * The default setting is 0 (invalid).
1: Auto servo OFF method. Delay time defined with the parameter No. 36
2: Auto servo OFF method. Delay time defined with the parameter No. 37
3: Auto servo OFF method. Delay time defined with the parameter No. 38
4: Full servo control method

Full servo control method

The holding current can be reduced by servo-controlling the pulse motor.
The degree of reduction varies depending on the actuator model, load condition, etc., but the holding current decreases approximately by a factor of 2 to 4.
No displacement occurs since this method maintains the servo ON status.
The actual holding current can be checked on the monitoring screen of PC-compatible software.

Auto servo OFF method

When a given length of time has elapsed after completion of positioning, the servo OFF status is automatically entered.
(Since the holding current does not flow, the power consumption can be saved by the same amount.)
When a movement command is subsequently given from PLC, the status returns to the servo ON and the actuator starts to move.



(12) Gain Set (SCON-CA: Displayed in Version V1.10 or later, ACON-CA: Displayed in Version V1.20 or later)
(Note) Setting is available only on SCON-CA or ACON-CA.

6 parameters necessary for Servo Gain Adjustment are gathered to make up 1 set.
4 types of settings are able to be registered and the servo gains can be switched over for each positioning operation.

[Parameters constructed in 1 set]

- Servo Gain Number (Position Gain)
- Position Feed Forward Gain
- Speed Loop Proportion Gain
- Speed Loop Integration Gain
- Torque Filter Time Constant
- Current Control Band Number

| Setting | Operation after Positioning Complete | Parameter No. |
|---|---|---|
| 0 | Gain Set 0 | 7, 71, 31 to 33, 54 |
| 1 | Gain Set 1 | 120 to 125 |
| 2 | Gain Set 2 | 126 to 131 |
| 3 | Gain Set 3 | 132 to 137 |

(13) Vibration Control No. (SCON-CA: Displayed in Version V1.10 or later, ACON-CA: Displayed in Version V1.20 or later)
(Note) Setting is available only on SCON-CA or ACON-CA.

It controls the vibration (resonance) generated by the load due to the mounted actuator.
It possesses a capacity to deal with 3 types of vibration.
There are 3 parameters corresponds to 1 type of vibration and they are compiled in 1 set.
Set the parameter set corresponds to the position number necessary for the vibration control in the position table.

| Setting | Vibration Control Frequency (Specific Frequency) | Parameter No. |
|---|---|---|
| 0 | Standard Position Control (No Vibration Control) | - |
| 1 | Vibration Control Parameter Set 1 | 97 to 100 |
| 2 | Vibration Control Parameter Set 2 | 101 to 104 |
| 3 | Vibration Control Parameter Set 3 | 105 to 108 |

**Caution:**
(1) The vibration frequency that can be controlled (applicable specific frequency) is from 0.5 to 30Hz.
(2) The vibration control is applicable only for the vibration generated by the load of the actuator connected to this controller. Other vibrations cannot be controlled.
(3) The vibration control is applicable only for the vibration in the direction of the actuator operation. Vibration in other directions cannot be controlled.
(4) The vibration control is not applicable for home-return and pressing operations.
(5) It does not corresponds to Pulse Train Input Mode.
(6) If the vibration frequency setting is low, the takt time may become long. The value below approximately 6Hz makes the positioning finishing to take more than 150ms.

### 6.5.2 Position Data Table Contents for RCP, RCS, E-Con and RCP2

The setting items of the position data table are No., Position, Vel, Acc/Dcl, Push, Range and Acc only MAX. They are displayed in 3 screens.

(1) No. Indicates the position data number.

(2) Position: Input the target position to move the actuator to, in [mm].

- Absolute Coordinates: Input the target location by determining the distance between the original point and target position. No negative value can be input.
- Relative Coordinates: Input the target location by determining the distance between the current position and target position. Any negative value can be input (if coordinates are in the negative direction).

**Caution:** In the case of PCON, ACON or SCON, there are cases where the input value to "Push" may be rounded off to the multiple of the minimum resolution of the controller (during data acquisition from the controller).

(3) Vel:

- Input the speed at which the actuator will be moved, in [mm/sec]. The initial value will depend on the actuator type.

(4) Acc/Dcc:

- Input the acceleration/deceleration at which the actuator will be moved, in [G]. The initial value will depend on the actuator type.

(5) Push:

- Select the positioning operation or push operation. The default value is "0."
  0: Normal positioning operation
  Other than 0: Indicates the current-limiting value and indicates the push operation.
- In the case of push mode, data number is the servo motor current control value during push. Uses a value that matches the actuator with a maximum value of 100%.

(6) Range:
- Enter the positioning completion detection width in mm (distance to the target position) in the positioning mode.
- The distance to the target position indicates that the value input here is the upstream distance prior to reaching the target position and the position complete signal is output when the actuator enters that upstream range.
  The default value will depend on the actuator type. (see diagram A)
- Enter the maximum push amount (distance from the target position) in the push mode. [mm] (see diagram B)
- When the push direction is a negative direction from the displayed coordinate, a "negative" sign should be placed in the range column.

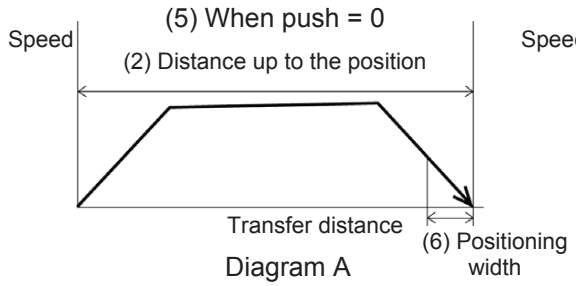


Diagram A

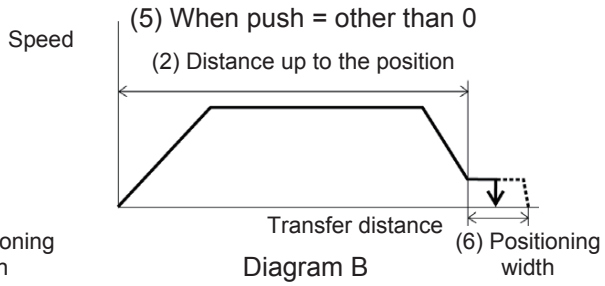
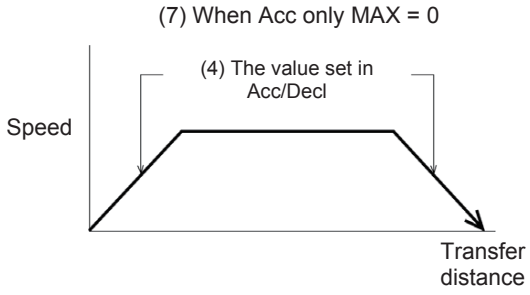


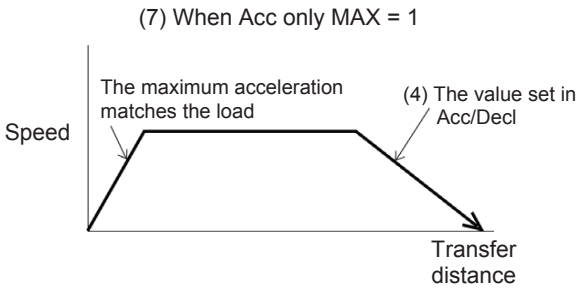
Diagram B

(7) Acc only MAX:
- Selects either the assigned acceleration or the maximum acceleration.
  Inputs are either 1 or 0. The default value is set as 0.

  0: Assigned acceleration
  The value placed in (4) will be used as the actual acceleration value and deceleration value.

  1: Maximum acceleration
  This will automatically utilize the maximum acceleration matched to the load.
  Deceleration remains as the assigned value in (4).



### 6.5.3 Data New Input

The following 4 ways to input new position data exist:

(1) Numeric Input (MDI): Numeric input the position data directly from the Teaching Pendant ten keys.
(For the input example, see page 48.)

(2) Direct Teach: Turn the servo controller OFF, manually move the slider to match the desired location and read and command that location into the position table.
(For the input example, see page 57.)

(3) Jog: Use the arrow key to jog move and match the desired location and read that location (current position) into the position table.
(For the input example, see page 60.)
If you continue pressing the arrow key, the actuator will move at a specified speed (1, 10, 30, 50, 100 mm/sec). However, only the maximum speed will be gained if the maximum speed is slower than the specified speed.

(4) Inching: Use the arrow key to incrementally move and match the desired location and read that location (current position) into the position table.
(For the input example, see page 62.)
If you press the arrow key once, the actuator will move by a specified pitch (0.03, 0.10, 0.50 [mm]). If you continue pressing the arrow key, the actuator will move by jogging at 1 mm/sec. in 2 sec. The speed will then increase every one second. Finer movement than jogging is possible.

Examples of each operation will be explained as follows.

**Caution** : When input position data is performed first after power-on or method of (2), (3), or (4), it is required to perform home return in advance. (Increment specification)
: Jog and Increment movement prior to homing incomplete status is possible up to the slider end. Visually, perform the interference check.

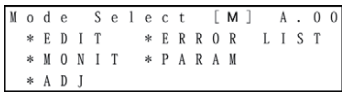
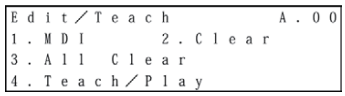
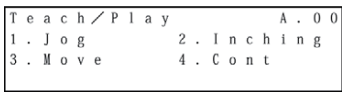
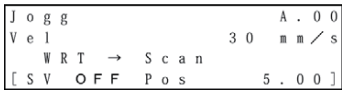
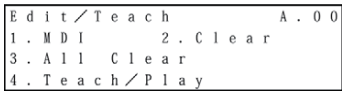
1) Homing

Perform temporary stop reset and servo ON input in advance.

Alternatively, disable servo ON input and temporary stop reset with User Adjustment.

(There is no servo ON input for RCP.)

**Caution:** Operating instructions are described on the screens of PCON, ACON, SCON, DCON, ERC2, ERC3

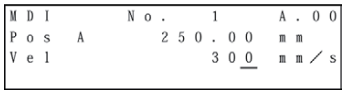
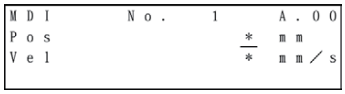
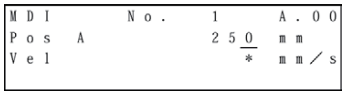
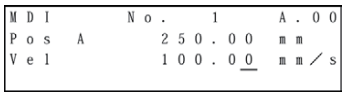
| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the [EDIT] key. |  | |
| 2. | Press the [JKL 4] key to select "Teach/Play." |  | |
| 3. | Press the [STU 1] key to select Jog. |  | |
| 4. | If the SV OFF (servo OFF) status is displayed on the screen, press the [SERVO] key. |  | The servo will automatically be turned ON.<br>"SV ON" (servo ON) will be displayed on the screen. |
| 5. | Press the [HOME] key. |  | Homing will automatically be performed. |
| 6. | Press the [ESC] key twice to return to the Edit/Teach screen, |  | |

2) Numeric Input

| **Caution:** | Operating instructions are described on the screens of PCON, ACON, SCON, DCON, ERC2, ERC3 |
|---|---|

| Example 1: | 2 point continuous loop move 30mm <-> 250mm, Speed 300mm/sec |
|---|---|

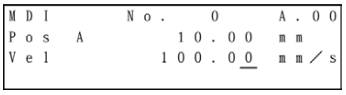
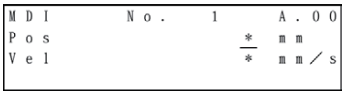
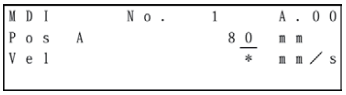
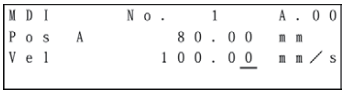
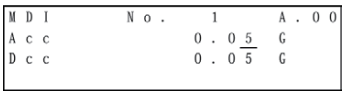
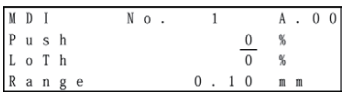
| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the [EDIT] key. | Mode Select [M] A.00<br>*EDIT *ERROR LIST<br>*MONIT *PARAM<br>*ADJ | |
| 2. | Press the [STU 1] key to select "MDI." | Edit/Teach A.00<br>1.MDI 2.Clear<br>3.All Clear<br>4.Teach/Play | |
| 3. | Set 0 into the position No. with the [PAGE UP] or [PAGE DOWN] key. | MDI No. 0 A.00<br>Pos * mm<br>Vel * mm/s | For any unregistered data, the display will show "*" sign. |
| 4. | Move the cursor to the "Pos" input position with the [◀], [▼], [▲] or [▶] key. | MDI No. 0 A.00<br>Pos * mm<br>Vel * mm/s | |
| 5. | Input [YZ 3] [*- 0] here, and then press the Return key. | MDI No. 0 A.00<br>Pos A 30 mm<br>Vel * mm/s | In order to stop during numeric input, press the [ESC] key to cancel the input.<br><br>Example)<br>With the left operation, by pressing [ESC] immediately after inputting [YZ 3] [*- 0], the status will return to the "*" display. |
| 6. | | MDI No. 0 A.00<br>Pos A 30.00 mm<br>Vel 100.00 mm/s | During new position data registration, the initial values set with the user parameters for Vel, Acc, Dcc, etc., will automatically be input.<br><br>In the left screen, the initial value is set as 100 mm/sec. |

| | Operation | Screen | Reference |
|---|---|---|---|
| 7. | Input [YZ 3] [*- 0] [*- 0] here, and then press the Return key.<br>Press the [WRT] key.<br>(The cursor will automatically move to the next [No. 1].) |  | The screen will change to the screen of Position No. 1 for Acc and Dcc. |
| 8. | Change the screen to the screen for Pos and Vel with the [ITEM BACK] key.<br>Move the cursor to “Pos” with the [ITEM BACK] key. |  | |
| 9. | Move the cursor to the “Pos” input position with the [◀], [▼], [▲] or [▶] key.<br>Input [VWX 2] [MNO 5] [*- 0] here, and then press the Return key. |  | In order to stop during numeric input, press the [ESC] key to cancel the input. |
| 10. | |  | The cursor will automatically move to the “Vel” input position. |

| | Operation | Screen | Reference |
|---|---|---|---|
| 11. | Input [3] [0] [0] here, and then press the Return key.<br>Press the [WRT] key.<br>(The cursor will automatically move to the next [No. 2] position.) | MDI No. 1 A.00<br>Pos A 250.00 mm<br>Vel 300 mm/s | The screen will change to the screen of Position No. 2 for Acc and Dcc. |

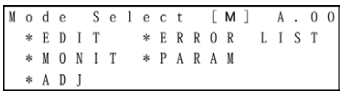
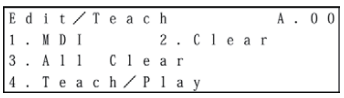
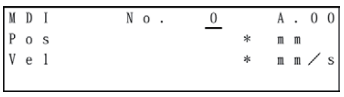
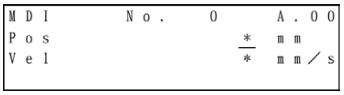
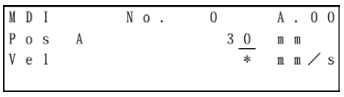
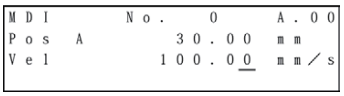
| Example 2: | 2 point continuous loop move | Push operation 10mm position <-> 80mm position (Push range 5mm) |
|---|---|---|

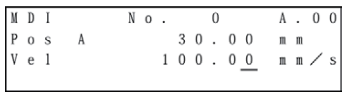
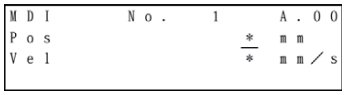
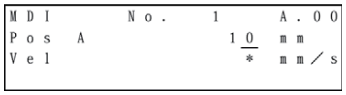
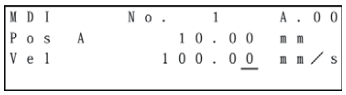
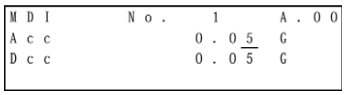
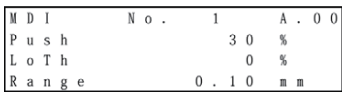
| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the [EDIT] key. | Mode Select [M] A.00<br>*EDIT *ERROR LIST<br>*MONIT *PARAM<br>*ADJ | |
| 2. | Press the [STU 1] key to select "MDI." | Edit/Teach A.00<br>1.MDI 2.Clear<br>3.All Clear<br>4.Teach/Play | |
| 3. | Set 0 into the position No. with the [PAGE UP] or [PAGE DOWN] key. | MDI No. 0 A.00<br>Pos * mm<br>Vel * mm/s | For any unregistered data, the display will show "*" sign. |
| 4. | Move the cursor to the "Pos" input position with the [◀], [▼], [▲] or [▶] key. | MDI No. 0 A.00<br>Pos * mm<br>Vel * mm/s | |
| 5. | Input [STU 1] [* 0] here, and then press the Return key. | MDI No. 0 A.00<br>Pos A 10 mm<br>Vel * mm/s | In order to stop during numeric input, press the [ESC] key to cancel the input.<br>Example)<br>With the left operation, by pressing [ESC] immediately after inputting [STU 1] [* 0], the status will return to the "*" display. |
| 6. | | MDI No. 0 A.00<br>Pos A 10.00 mm<br>Vel 100.00 mm/s | During new position data registration, the initial values set with the user parameters for Vel, Acc, Dcc, etc., will automatically be input.<br>In the left screen, the initial value is set as 100 mm/sec. |

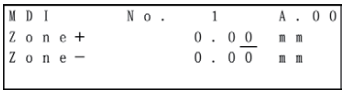
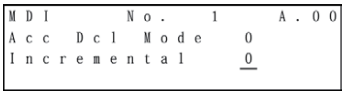
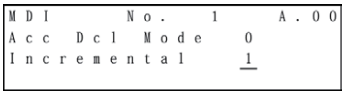
| | Operation | Screen | Reference |
|---|---|---|---|
| 7. | Press the Return key.<br>Press the [WRT] key.<br>(The cursor will automatically move to the next [No. 1] position.) |  | At the left, the user parameter is used as it is.<br>The screen will change to the screen of Position No. 1 for Acc and Dcc. |
| 8. | Change the display to the screen for Pos and Vel with the [ITEM BACK] key.<br>Move the cursor to “Pos” with the [ITEM BACK] key. |  | |
| 9. | Input [DEF 8] [* - 0] here, and then press the Return key. |  | |
| 10. | |  | The cursor will automatically move to “Vel.” |
| 11. | Change the display to the screen for Acc and Dcc with the [ITEM FWD] key. |  | The screen will change. |
| 12. | Change the display to the screen for Push, LoTh and Range with the [ITEM FWD] key. |  | The screen will change. |

| | Operation | Screen | Reference |
|---|---|---|---|
| 13. | Input the current value during push.<br>In this example, input 30%.<br>Input [YZ 3] [* - 0] and then press the Return key.<br>Press the Return key again to move the cursor to “Range.” | MDI No. 1 A.00<br>Push 30 %<br>LoTh 0 %<br>Range 0.10 mm | * For push control, refer to the Controller Operating Manual. |
| 14. | Input the maximum push range during push into the Range.<br>In this example, input 5 mm.<br>Input [MNO 5] and then press the Return key.<br>Press the [WRT] key. | MDI No. 1 A.00<br>Push 30 %<br>LoTh 0 %<br>Range 5 mm | The screen will change to the screen of Position No. 2 for Push, LoTh and Range. |

| Example 3: | Relative Coordinates pitch movement 30 mm → 40 mm → 50 mm…. |
|---|---|

| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the [EDIT] key. |  | |
| 2. | Press the [STU 1] key to select "MDI." |  | |
| 3. | Set 0 into the position No. with the [PAGE UP] or [PAGE DOWN] key. |  | For any unregistered data, the display will show "*" sign. |
| 4. | Move the cursor to the "Pos" input position with the [◀], [▼], [▲] or [▶] key. |  | |
| 5. | Input [YZ 3] [*- 0] here, and then press the Return key. |  | In order to stop during numeric input, press the [ESC] key to cancel the input.<br>Example)<br>With the left operation, by pressing [ESC] immediately after inputting [YZ 3] [*- 0], the status will return to the "*" display. |
| 6. | |  | During new position data registration, the initial values set with the user parameters for Vel, Acc, Dcc, etc., will automatically be input.<br>In the left screen, the initial value is set as 100 mm/sec. |

| | Operation | Screen | Reference |
|---|---|---|---|
| 7. | Press the Return key.<br>Press the [WRT] key.<br>(The cursor will automatically move to the next [No. 1] position.) |  | At the left, the user parameter is used as it is.<br>The screen will change to the screen of Position No. 1 for Acc and Dcc. |
| 8. | Change the display to the screen for Pos and Vel with the [ITEM BACK] key.<br>Move the cursor to “Pos” with the [ITEM BACK] key. |  | |
| 9. | Input [STU 1] [* 0] here, and then press the Return key. |  | |
| 10. | |  | The cursor will automatically move to “Vel.” |
| 11. | Change the display to the screen for Acc and Dcc with the [ITEM FWD] key. |  | The screen will change. |
| 12. | Change the display to the screen for Push, LoTh and Range with the [ITEM FWD] key. |  | The screen will change. |

| | Operation | Screen | Reference |
|---|---|---|---|
| 13. | Change to the screen for Zone + and Zone- with the ITEM FWD key. |  | The screen will change. |
| 14. | Change to the screen for Acc Dcl Mode and Incremental with the ITEM FWD key.<br>Move the cursor to “Incremental” with the ITEM FWD key. |  | |
| 15. | Set to “Incremental” (relative coordinate specification).<br>Input STU 1 and then press the Return key.<br>Press the WRT key. |  | The screen will change to the screen of Postion No. 2 for Cmnd Mode and Stop Mode. |

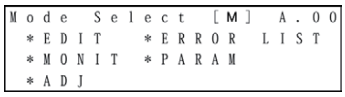
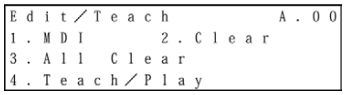
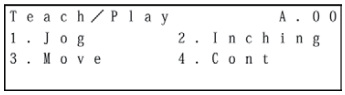
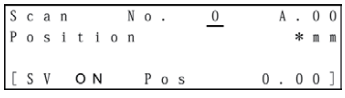
3) Direct Teach

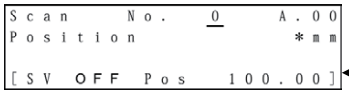
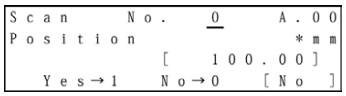
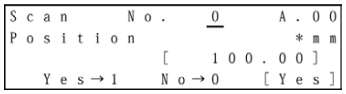
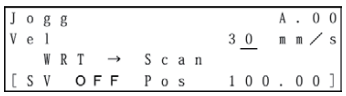
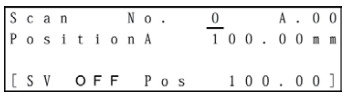
(Method: Manually moving the actuator, matching to the desired position and teaching that position into the position table)

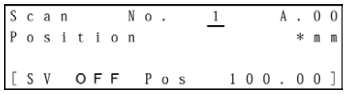
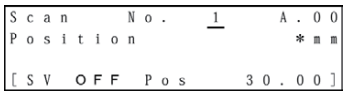
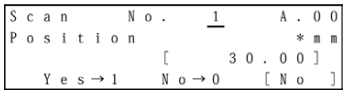
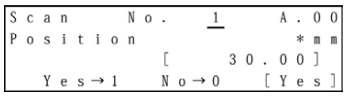
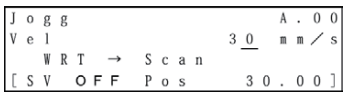
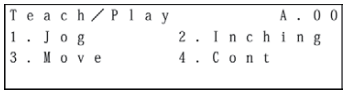
When direct teach operation is performed first after power-on, it is required to perform home return operation in advance. (Refer to page 47.) (Increment specification)

**Caution:** Operating instructions are described on the screens of PCON, ACON, SCON, DCON, ERC2, ERC3

| Example: | 2 point continuous loop Point A --> Point B, speed 300mm/sec |
|---|---|

| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the [EDIT] key. |  | |
| 2. | Press the [JKL 4] key to select "Teach/Play." |  | |
| 3. | Press the [STU 1] key to select "Jog."<br>(Note) Even if "2. Inching" is selected, the same direct teaching will be available. |  | |
| 4. | Press the [WRT] key. |  | |
| 5. | Set the position No. you want to input with the [PAGE UP] and [PAGE DOWN] key.<br>Press the [SERVO] key to put into the servo OFF status. |  | Any remaining data will be written over.<br>For any unregistered data, the display will show "*" sign. |

| | Operation | Screen | Reference |
|---|---|---|---|
| 6. | Manually move the slider and match to the desired position.<br>Press the Return key. |  | The controller status will be displayed on the bottom row of the screen.<br>Servo Control: OFF<br>Position: 100.00<br>You can change the position No.you want to input with the PAGE UP and PAGE DOWN key. |
| 7. | Press the STU 1 key to select "Yes." |  | |
| 8. | Press the Return key. |  | As for Vel, Acc, Dcc, etc., the initial value set with the user parameter will automatically be input.<br>(Note) If scan is performed without executing homing, the error message "Homing Incomplete" will be displayed. Return to the screen of 6 above with the ESC key to put into the servo ON status and press the HOME key to execute homing. |
| 9. | Press the WRT key. |  | |
| 10. | |  | |

| | Operation | Screen | Reference |
|---|---|---|---|
| 11. | Set the position No. youu want to input with the PAGE UP or PAGE DOWN key. |  | |
| 12. | Manually move the slider and match to the desired position.<br>Press the Return key. |  | |
| 13. | Press the STU 1 key to select "Yes." |  | |
| 14. | Press the Return key. |  | |
| 15. | Press the ESC key. |  | |
| 16. | |  | The screen will return to the Teach/Play select screen. |

4) Jog Teach

(Method: Tagging the actuator, matching to the desired position and teaching that position into the position table)

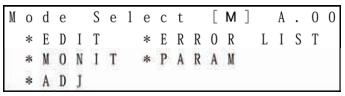
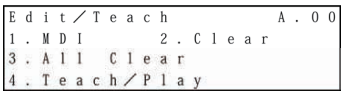
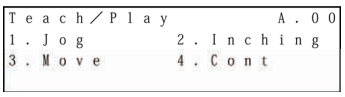
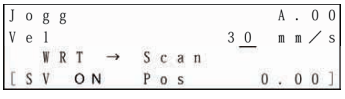
However, only the maximum speed will be gained if the maximum speed is slower than the specified speed.

When jog operation is performed first after power-on, it is required to perform home return operation in advance. (Refer to page 47.) (Increment specification)

**Caution:** Operating instructions are described on the screens of PCON, ACON, SCON, DCON, ERC2, ERC3

| Example: | 2 point continuous loop Point A --> Point B, speed 300mm/sec |
|---|---|



| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the EDIT key. |  | |
| 2. | Press the JKL 4 key to select "Teach/Play." |  | |
| 3. | Press the STU 1 key to select "Jog." |  | |
| 4. | Input the desired jog speed with the ten keys and press the Return key.<br>The input range is from 1 mm/sec to the safety speed set for the parameter. |  | |
| 5. | Move the slider with the JOG- or JOG+ key and match to the desired position. |  | |
| 6. | Press the WRT key. |  | |

| | Operation | Screen | Reference |
|---|---|---|---|
| 7. | Set the position No. you want to input with the PAGE UP or PAGE DOWN key.<br>Press the Return key. | Scan No. 0 A.00<br>Position *mm<br>[SV ON Pos 500.00] | Any remaining data will be written over.<br>For any unregistered data, the display will show "*" sign. |
| 8. | Press the STU 1 key to select "Yes." | Scan No. 0 A.00<br>Position *mm<br>[ 500.00]<br>Yes→1 No→0 [No ] | |
| 9. | Press the Return key. | Scan No. 0 A.00<br>Position *mm<br>[ 500.00]<br>Yes→1 No→0 [Yes] | As for Vel, Acc, Dcc, etc., the initial value set with the user parameter will automatically be input. |
| 10. | Press the ESC key. | Jogg A.00<br>Vel 30 mm/s<br>WRT → Scan<br>[SV ON Pos 500.00] | |
| 11. | | Teach/Play A.00<br>1.Jog 2.Inching<br>3.Move 4.Cont | The screen will return to the Teach/Play select screen. |

5) Inching

(Method: Incremental movement using arrow key, matching to the desired position and teaching that position into the position table)

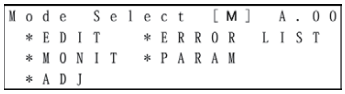
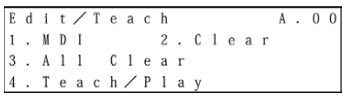
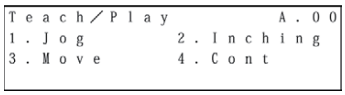
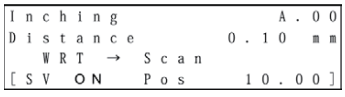
If you press the JOG- and JOG+ key once, the actuator will move by a specified pitch.

If you continue pressing the arrow key, the actuator will move by jogging at 1 mm/sec. The speed will increase every one second. Finer movement than jogging is possible.

When inching movement is performed first after power-on, it is required to perform home return operation in advance. (Refer to page 47.) (Increment specification)

**Caution:** Operating instructions are described on the screens of PCON, ACON, SCON, DCON, ERC2, ERC3

Example: 2 point continuous loop Point A --> Point B, speed 300mm/sec

| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the EDIT key. |  | |
| 2. | Press the JKL 4 key to select "Teach/Play." |  | |
| 3. | Press the VWX 2 key to select "Inching." |  | |
| 4. | Input the desired inching distance with the ten keys and press the Return key.<br>The input range is from 0.01 mm to 1.00 mm. |  | |
| 5. | Move the slider with the JOG- and JOG+ key and match to the desired position. |  | |
| 6. | Press the WRT key. |  | |

| | Operation | Screen | Reference |
|---|---|---|---|
| 7. | Set the position No. you want to input with the PAGE UP or PAGE DOWN key.<br>Press the Return key. | Scan No. 0 A.00<br>Position *mm<br>[SV ON Pos 10.00] | Any remaining data will be written over.<br>For any unregistered data, the display will show "*" sign. |
| 8. | Press the STU 1 key to select "Yes." | Scan No. 0 A.00<br>Position *mm<br>[ 10.00]<br>Yes→1 No→0 [No ] | |
| 9. | Press the Return key. | Scan No. 0 A.00<br>Position *mm<br>[ 10.00]<br>Yes→1 No→0 [Yes] | As for Vel, Acc, Dcc, etc., the initial value set with the user parameter will automatically be input. |
| 10. | Press the ESC key. | Inching A.00<br>Distance 0.10 mm<br>WRT → Scan<br>[SV ON Pos 10.00] | |
| 11. | | Teach/Play A.00<br>1.Jog 2.Inching<br>3.Move 4.Cont | The screen will return to the Teach/Play select screen. |

### 6.5.4 Data Modification

You may write over all of the position data.
Similar to new input, the following 4 cases exist:

(1) Numeric Input (MDI): Manually enter the position data directly from Teaching Pendant ten keys.
(2) Direct Teach: Turns the servo OFF, manually move the slider to the desired location and read that location (current position) into the position table.
(3) Jog: Use the arrow keys to jog to the desired location and read that location (current position) into the position table.
(4) Increment: Use the arrow keys to incrementally move and read that location (current position) into the position table.

Caution during data modification:

* As for manual input, the data entered will erase the old data.
* The position will be updated only when the Return key is pressed to read in the current location (direct teach, jog, increment). It does not influence speed and others.
* Once the position data is cleared, the previous data will no longer remain anywhere. Therefore, when the next position data is registered, any data other than position will be default values. When clearing to re-set the push assign position data, be sure to confirm all items of the position data to input required data.

### 6.5.5 Clear • All Clear

In this section, we will give specific examples of how to clear data in the position table.

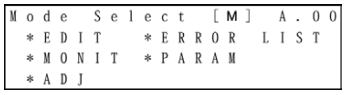
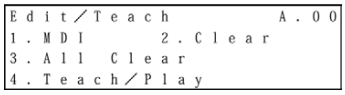
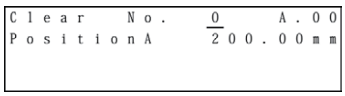
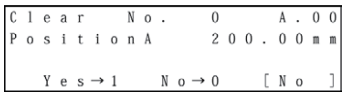
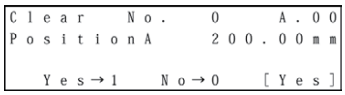
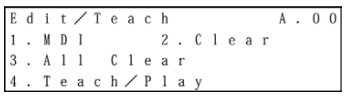
(1) Clear: Resets the assigned position data. The data will become unregistered. (For the input example, see page 65.)
(2) All Clear: Resets all of all position data. (For the input example, see page 66.)

1) Clear

(Method: To clear the position data of assigned location)

| **Caution:** | Operating instructions are described on the screens of PCON, ACON, SCON, DCON, ERC2, ERC3 |
|---|---|

| Example: | Clear the row of position data number 2. |
|---|---|

| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the [EDIT] key. |  | |
| 2. | Press the [2 VWX] key to select "Clear." |  | |
| 3. | Set the position No. you want to clear with the [PAGE UP] or [PAGE DOWN] key.<br>Press the Return key. |  | |
| 4. | Press the [1 STU] key to select "Yes." |  | |
| 5. | Press the Return key. |  | |
| 6. | |  | The data of the specified position No. will be cleared. |

2) All Clear (Operation: To clear all position data)

**Caution:** Operating instructions are described on the screens of PCON, ACON, SCON, DCON, ERC2, ERC3

| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the EDIT key. | Mode Select [M] A.00<br>*EDIT *ERROR LIST<br>*MONIT *PARAM<br>*ADJ | |
| 2. | Press the YZ 3 key to select "All Clear." | Edit/Teach A.00<br>1.MDI 2.Clear<br>3.All Clear<br>4.Teach/Play | |
| 3. | Press the STU 1 key to select "Yes." | All Clear A.00<br>Yes→1 No→0 [No ] | |
| 4. | Press the Return key. | All Clear A.00<br>Yes→1 No→0 [Yes] | |
| 5. | | Edit/Teach A.00<br>1.MDI 2.Clear<br>3.All Clear<br>4.Teach/Play | All position data will be cleared. |

### 6.5.6 Move

You may move towards a position registered in the position data table (1 step move) and continuously move through the continuous position data.
In this section, the move will differ from jog and increment move used with the arrow key.
This will be moved towards a position that was registered in the position data table within the controller.
Use this move for test operation etc.

(1) Move 1 step move from the current location to the assigned position number registered in the position table.

(2) Continuous Continuous operation from the assigned position data number to the continuous position data number until an empty location is reached.

* What is Continuous?
In the case of the position data similar to the table below, when a Continuous command is executed from the position No., the place where data exists continuously (to the position before unregistered data (*)) will operate as one group (Example: Position No.2 → No. 3 → No. 1 → No.2 and so on).

| No. | Posi. mm | Vel. mm/s | Acc./Dcc. G |
|---|---|---|---|
| 0 | * | * | * |
| 1 | 100.00 | 20 | 0.05 |
| 2 | 200.00 | 33 | 0.11 |
| 3 | 333.33 | 100 | 0.22 |
| 4 | * | * | * |
| 5 | 555.55 | 333 | 0.22 |
| 6 | 666.66 | 444 | 0.11 |
| 7 | 777.77 | 777 | 0.07 |

In the case of the Teaching Pendant, continuous movement is performed only through 64 positions such as position No. 0-63 and No. 64-127.
As shown in the example below, continuous movement continues by returning to position No. 61 after No. 63 (returning to the first position No. where position data is continuously input).
No movement is made from position No. 63 to No. 64.

| No. | Position mm | Velocity mm/s |
|---|---|---|
| 0 | * | * |
| 1 | 100.00 | 20 |
| | ⋮ | |
| 60 | * | * |
| 61 | 300.00 | 30 |
| 62 | 400.00 | 40 |
| 63 | 500.00 | 50 |
| 64 | 600.00 | 60 |
| 65 | 700.00 | 70 |
| | ⋮ | |

Specific examples will be provided to explain operation procedures.

| | |
|---|---|
| **Caution:** | With regard to PCON, ACON, SCON, DCON, ERC2, ERC3 complete positions will be output.<br>The positioning complete output will not turn ON when push mode does not encounter a force.<br>When move or Continuous is performed first after power-on, it is required to perform home return operation in advance. (Increment specification) |

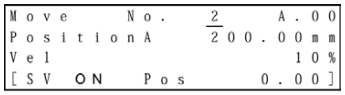
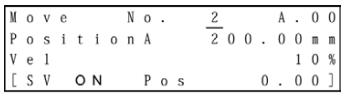
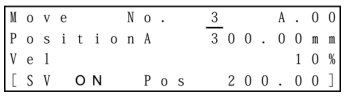
1) Move

(Operation: Registered position data number assigned move)

| | |
|---|---|
| **Caution:** | Operating instructions are described on the screens of PCON, ACON, SCON, DCON, ERC2, ERC3 |

| | |
|---|---|
| Example: | Current position → move towards position number 2, 3 |

| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the [EDIT] key. | Mode Select [M] A.00<br>*EDIT *ERROR LIST<br>*MONIT *PARAM<br>*ADJ | |
| 2. | Press the [JKL 4] key to select "Teach/Play." | Edit/Teach A.00<br>1.MDI 2.Clear<br>3.All Clear<br>4.Teach/Play | |
| 3. | Press the [YZ 3] key to select "Move." | Teach/Play A.00<br>1.Jog 2.Inching<br>3.Move 4.Cont | |
| 4. | | Move No. 0 A.00<br>Position *mm<br>Vel 10%<br>[SV ON Pos 0.00] | For any unregistered data, the display will show "*" sign. |
| 5. | Set the position No. you want to move with the [PAGE UP] or [PAGE DOWN] key. Press the Return key. | Move No. 2 A.00<br>PositionA 200.00mm<br>Vel 10%<br>[SV ON Pos 0.00] | |

| | Operation | Screen | Reference |
|---|---|---|---|
| 6. | Select “Vel” with the ▲ or ▼ key. |  | Speed is divided into 3 levels and can be selected using the ▲ or ▼ key.<br>With the ▲ key, the speed will change in the incremental direction (10%→50%→100%).<br>With the ▼ key, the speed will change in the decremental direction (100%→50%→10%).<br>(Note) When PCON, ACON or SCON is connected, the maximum speed will be the safety speed set for the parameter if the MANU operation mode is set to the Teach mode 1 (safety speed: valid). |
| 7. | If you press the MOVE key, movement will be made to the location of the position No. you set. |  | When the servo is not ON, press the SERVO key to put into the servo ON status. |
| 8. | When moving towards position of No. 3 continuously:<br>Set 3 into the position No. with the PAGE UP key.<br>If you press the MOVE key continuously, movement will be made to the location of position No. 3. |  | |

| | Operation | Screen | Reference |
|---|---|---|---|
| 9. | Press the ESC key. | Move No. 3 A.00<br>PositionA 300.00mm<br>Vel 10%<br>[SV ON Pos 300.00] | |
| 10. | | Teach/Play A.00<br>1.Jog 2.Inching<br>3.Move 4.Cont | The screen will return to the Teach/Play select screen. |

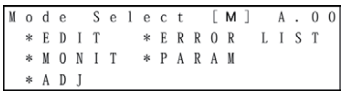
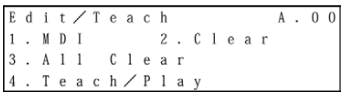
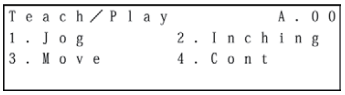
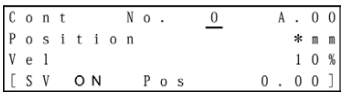
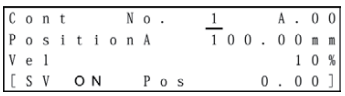
**Caution:** When moving towards position in push mode.
After the actuator pushes the work and position complete output turns ON, the actuator is in a state of continuously pressing the work.
Be extremely careful about handling at this time.

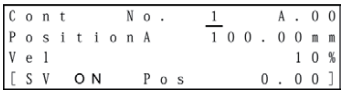
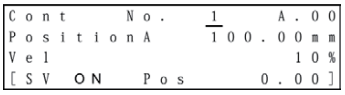
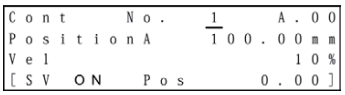
2) Continuous Move

(Operation: Registered position data number assigned continuous move)

| **Caution:** | Operating instructions are described on the screens of PCON, ACON, SCON, DCON, ERC2, ERC3 |
|---|---|

| Example: | Current position → Continuous move towards position numbers 1 to 3 |
|---|---|

| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the [EDIT] key. |  | |
| 2. | Press the [JKL 4] key to select "Teach/Play." |  | |
| 3. | Press the [JKL 4] key to select "Cont." |  | |
| 4. | |  | For any unregistered data, the display will show "*" sign. |
| 5. | Set the position No. you want to move first with the [PAGE UP] or [PAGE DOWN] key.<br>Press the Return key. |  | |

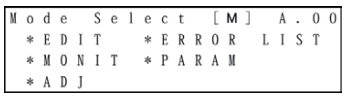
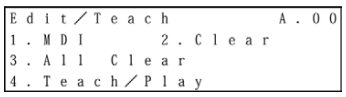
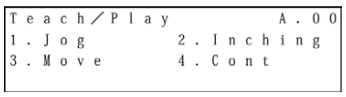
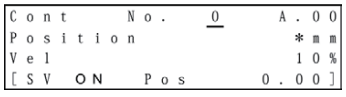
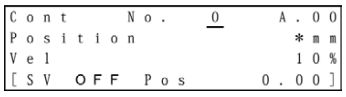
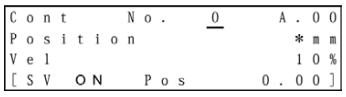
| | Operation | Screen | Reference |
|---|---|---|---|
| 6. | Select “Vel” with the ▲ or ▼ key. |  | Speed is divided into 3 levels and can be selected using the ▲ or ▼ key.<br>With the ▲ key, the speed will change in the incremental direction (10%→50%→100%).<br>With the ▼ key, the speed will change in the decremental direction (100%→50%→10%).<br>(Note) When PCON, ACON, SCON, DCON, ERC2 or ERC3 is connected, the maximum speed will be the safety speed set for the parameter if the MANU operationmode is set to Teach mode 1 (safety speed: effective). |
| 7. | If you press the MOVE key, continuous movement will start.<br>The screen display will change to the screen of the position No. currently moving. |  | When the servo is not ON, press the SERVO key to put into the servo ON status. |
| 8. | When stopping continuous operation, press the STOP or ESC key.<br>When the key is pressed, operation will decelerate and stop.<br>When performing continuous operation again, press the MOVE key. |  | |

| | Operation | Screen | Reference |
|---|---|---|---|
| 9. | When operation stops, press the ESC key. | Cont No. 1 A.00<br>PositionA 100.00mm<br>Vel 10%<br>[SV ON Pos 0.00] | |
| 10. | | Teach/Play A.00<br>1.Jog 2.Inching<br>3.Move 4.Cont | The screen will return to the Teach/Play select screen. |

### 6.5.7 Servo ON/OFF

Servo ON/OFF can be performed.

**Caution:** Operating instructions are described on the screens of PCON, ACON, SCON, DCON, ERC2, ERC3

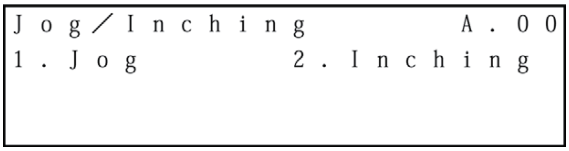
| | Operation | Screen | Reference |
|---|---|---|---|
| 1. | Press the EDIT key. |  | |
| 2. | Press the JKL 4 key to select "Teach/Play." |  | |
| 3. | Press the JKL 4 key to select "Cont." |  | |
| 4. | |  | For any unregistered data, the display will show "*" sign. |
| 5. | If you press the SERVO key in the servo ON status, the status will change to the servo OFF. |  | |
| 6. | If you press the SERVO key in the servo OFF status, the status will change to the servo ON. |  | |

Servo ON/OFF can also be performed in the same way in "1. Jog," "2. Inching," or "4. Cont" mode.

### 6.5.8 Pulse Train (PCON-PL/PO, ACON-PL/PO, SCON: Pulse Train Mode, ERC3: Pulse Train Mode) Based Jogging

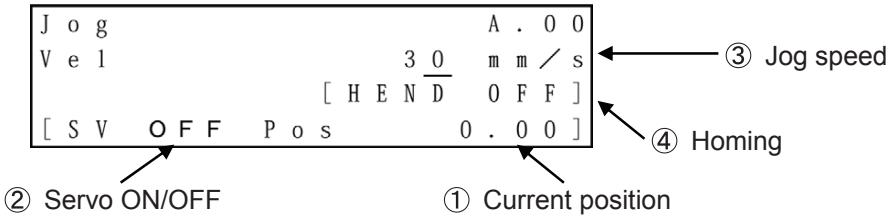
In the case of the PCON-PL/PO, ACON-PL/PO, or SCON controller (pulse train mode), ERC3 (pulse train mode), if you select “Jog” on the Jog/Inching select screen, servo ON/OFF, homing, or jog operation can be performed. If you select “Inching,” inching operation can be performed.

Press the [EDIT] key.
If you press the [STU 1] key, jog operation can be performed. If you press the [VWX 2] key, inching operation can be performed.




(1) Jog operation

The Jog screen will be displayed.
If you press the [JOG+] key, the cursor will move in the positive direction of the displayed coordinates.
If you press the [JOG-] key, the cursor will move in the negativ e direction of the displayed coordinates.




① Current position: Indicates the current position. The unit can be changed between mm and pulse with the [◀], [▼], [▲] or [▶] key.

② Servo ON/OFF: If you press the [SERVO] key, the servo ON/OFF status will be reversed.

③ Jog speed: Input the desired jog speed with the ten keys and press the Return key. The input range is from 1 mm/sec to the safety speed set for the parameter.

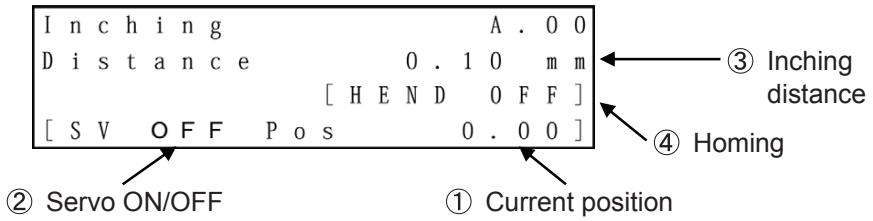
④ Homing: If you press the [HOME] key, homing will be performed.

(2) Inching operation

The Inching screen will be displayed.

If you press the JOG+ key, the cursor will move in the positive direction of the displayed coordinates.

If you press the JOG- key, the cursor will move in the negative direction of the displayed coordinates.




① Current position: Indicates the current position. The unit can be changed between mm and pulse with the ◀, ▼, ▲ or ▶ key.

② Servo ON/OFF: If you press the SERVO key, the servo ON/OFF status will be reversed.

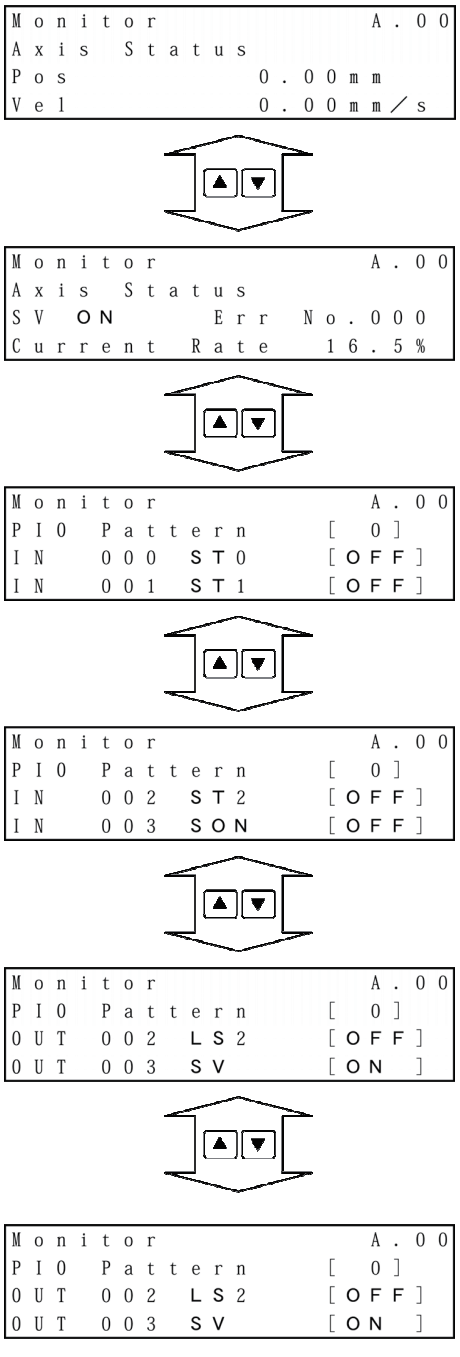
③ Inching distance: Input the desired inching distance with the ten keys and press the Return key. The input range is from 0.01mm to 1.00mm set for the parameter.

④ Homing: If you press the HOME key, homing will be performed.

## 6.6 Monitor

The I/O status and current position will be displayed for all the controllers connected on the serial communication line.

Press the MONIT key.



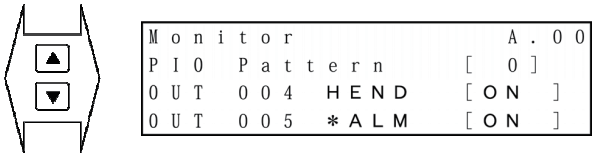

The figure at the left shows an example of the PCON-CY controller.

* The display contents vary depending on the controller or controller's I/O pattern. For details, refer to the operating manual of each controller.

If you press the ◀ or ▶ key, the axis to monitor can be changed.

If you press the ▲ or ▼ key, the screen will change.

To end monitoring, press the ESC key.




After this, the screen will change to the special input port or version display screen.

① On the axis status screen, if you press the ITEM FWD key, the screen will change to the input port monitor screen.

If you press the ITEM BACK key, the screen will change to the version display screen.

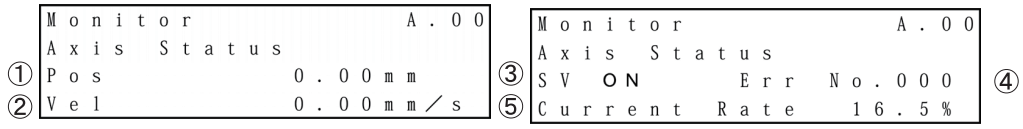
② On the input port screen, if you press the ITEM FWD key, the screen will change to the output port monitor screen,

If you press the ITEM BACK key, the screen will change to the axis status screen.

③ On the output port screen, if you press the ITEM FWD key, the screen will change to the input port monitor screen.

If you press the ITEM BACK key, the screen will change to the special input port monitor screen.

●Display description

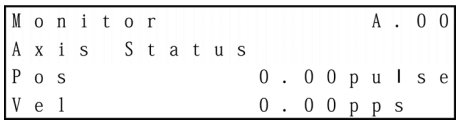



① **Displays the axis position in [mm].**

In the case of the PCON-PL/PO, ACON-PL/PO or SCON controller (pulse train mode), or ERC3 (pulse train mode), if you press the [*0] key, the display will change to the pulse display.

② **Displays the speed of the moving axis in [mm/sec].**

In the case of the PCON-PL/PO, ACON-PL/PO or SCON controller (pulse train mode), or ERC3 (pulse train mode), if you press the [*0] key, the display will change to the pps display.

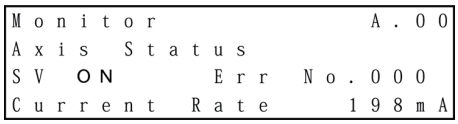



③ Displays the servo ON/OFF status of the axis.

④ Displays the error No. when an error occurs.

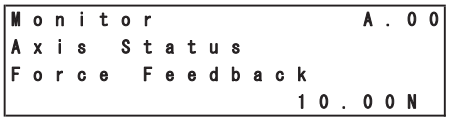
⑤ Displays the percent rated current in [%].

In the case of the PCON, ACON, SCON, DCON, ERC2 or ERC3 controller, if you press the [STU 1] key, the current value will be displayed in [mA].



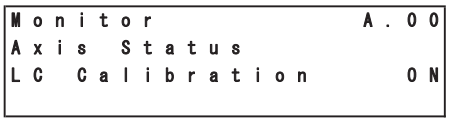

[Display shown only for SCON-CA]

In SCON-CA Controller, the status of Force Feedback Data and Calibration can be confirmed if a loadcell (option) is used.




⑥ Force Feedback Data

This shows the force that is given as a feedback from the loadcell.




⑦ Loadcell Calibration

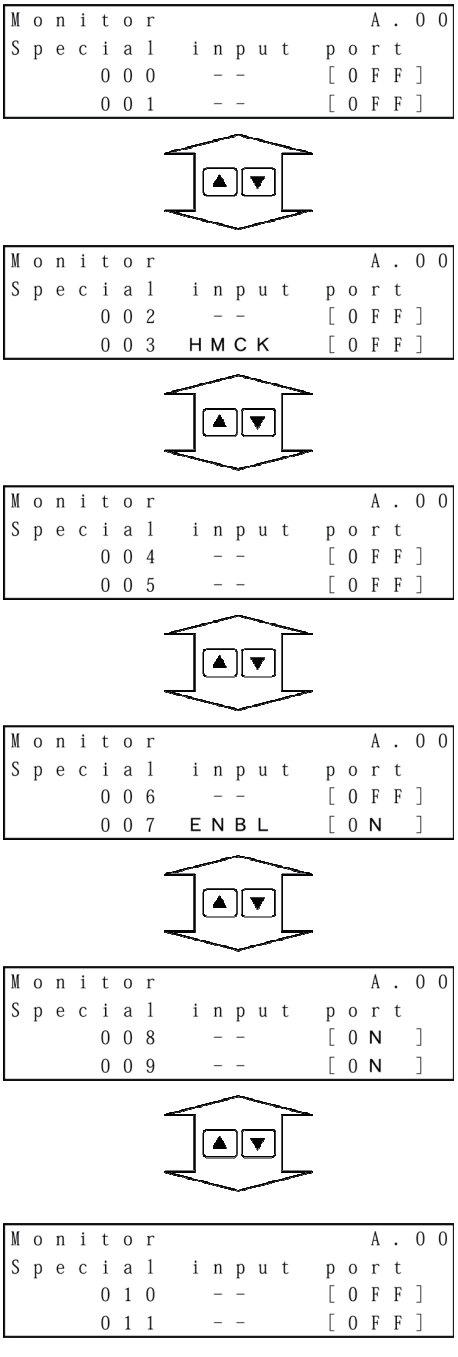
This shows the status of loadcell calibration.

ON : Calibration complete

OFF: Calibration incomplete


⑧ This shows the ratio of the current estimated motor temperature to the motor temperature to generate the overload alarm (0E0).

If you press the [▼] key on the last screen of input ports, the special input port screen will be displayed.
The special input port screen will display special input ports such as HMCK (home check sensor).




If you press the [◀] or [▶] key, the axis to monitor can be changed.

If you press the [▲] or [▼] key, the screen will change.

To end monitoring, press the [ESC] key.

After this, the screen will change to the special input port or version display screen.

① On the special input port monitor screen, if you press the [ITEM FWD] key, the screen will change to the output port monitor screen.

If you press the [ITEM BACK] key, the screen will change to the version display screen.

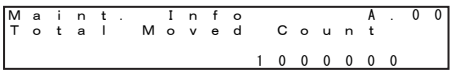
If you press the [▼] key on the last screen of special input ports, the version display screen will be displayed.


If you press the [◀] or [▶] key, the axis to monitor can be changed.

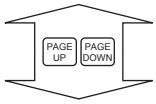
To end monitoring, press the [ESC] key.

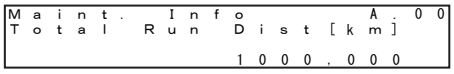
[Maintenance Information]
This mode displays the total number of actuator movement and distance.
(Only SCON-CA, ACON-CA, PCON-CA, DCON-CA, ERC3 (CON Mode (CN)) and ERC3 PIO Converter can display this information.)

Press [.] in the monitor screen.

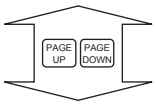


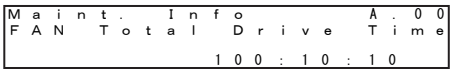

Total Number of Movements
The cumulative total number of actuator movements is shown.




Total Travelled Distance
The cumulative total distance travelled by the actuator is shown.




Total FAN driving time:
This shows the cumulative total of the driving time of the fan.
(It is available only on controllers equipped with a fan.)

The above values can be changed on the maintenance information editing screen.


Move the cursor to the number with using [◀], [▼], [▲], and [▶] keys.
Press the [↵] key.
Press [WRT] key next.
The number is changed.

[Thresholds for Total Number of Movements and Total Travelled Distance]
You can set thresholds for total number of movements and total travelled distance in the parameters specified below, to cause an alarm to generate when each threshold is exceeded.

| Parameter No. | Name |
|---|---|
| 147 | Threshold for total number of movements |
| 148 | Threshold for total travelled distance |

Message-level alarms

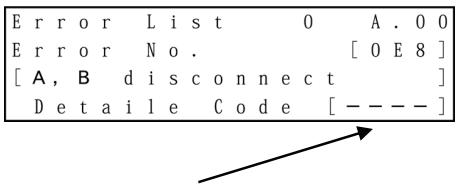
| Alarm code | Name | Description |
|---|---|---|
| 4E | Movements threshold exceeded | This alarm generates when the total number of movements exceeds the threshold set in parameter No. 147. |
| 4F | Travelled distance threshold exceeded | This alarm generates when the total travelled distance exceeds the threshold set in parameter No. 148. |

[Example of use for Total Drive Distance Times]
For an instance, it is recommended to have a grease supply on the scraper area every 300km in the regular inspections when the drive distance exceeds 300km within 3 months for RCPW Rod Type Actuator.
(Have a supply every 3 months for those which do not exceed it.)
In this case, set ‘300’ in Parameter No. 148 at the start of the first run, and an alarm notifies that grease supply is required when the drive distance exceeds 300km.
After the grease supply, set multiple numbers of 300, such like 600, 900, in Parameter 148, and the notification continues to be made for the timings of grease supply.

## 6.7 Error List

Errors occurring after the connection of the Teaching Pendant and those occurring after a controller's power-on will be displayed.

Press the [ERROR LIST] key.



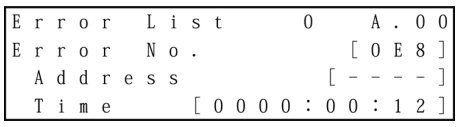

Alarm detailed code
(In the case of "0," - - - - will be displayed.)

Errors occurring in the controller will be displayed.

If you press the [PAGE UP] or [PAGE DOWN] key, the Error List screens can be changed.

The Error List screens of PCON, ACON, SCON, DCON, ERC2 or ERC3 are comprised of 0 to 16.
The previous 16 alarm-level errors including the last (latest) error will be displayed.
In the case of PCON, ACON, SCON, DCON, ERC2 or ERC3 the alarm list contents will be maintained even after the power is turned OFF.

The Error List screens of RCP2, RCS, E-Con or RCP2 are comprised of 0 to 8.
The previous 8 alarm-level errors including the last (latest) error and one last-detected error of the warning level will be displayed.




Display Window for Ver. 1.00 and earlier


Display on SCON-CA
(Version V1.10 and later)
PCON-CA and ERC3 PIO Converter
(Version V1.13 and later)
ACON-CA and DCON-CA
(Version V1.20 and later)

On the screen where the error description is displayed, if you press the [▼] key, Address and Time will be displayed.
The clock is displayed for SCON-CA, PCON-CA and ERC3 PIO Converter.

If you press the [▲] key, the screen will return to the previous screen.

(Note) The power ON log (no error) displays that the power has been applied to the controller. No error has occurred.

On the display for Version 1.00 and earlier, the time passed since the power is turned on this time (with no error) is displayed.

On the display of SCON-CA, PCON-CA, ACON-CA, DCON-CA and ERC3 PIO Converter shows the current time.

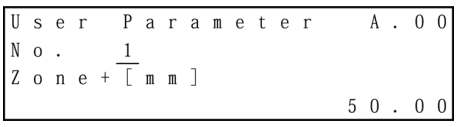
If you press one of the [EDIT], [MONIT], [PARAM] or [ADJ] keys, the mode will change to the mode of the pressed key.

# 6.8 User Parameters

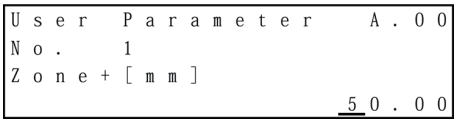
## 6.8.1 User Parameters

Parameters are displayed and edited.

Press the [PARAM] key.

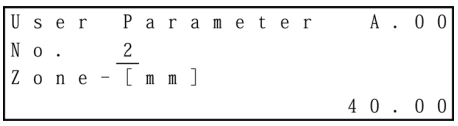



Each parameter can be changed using the [PAGE UP] or [PAGE DOWN] key.
When the cursor is located at “No.,”it is also possible to change to the desired user parameter by directly inputting a numeric value of theparameter No. with the ten key and pressing the Return key.

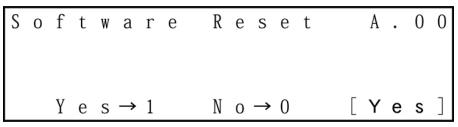



When changinga parameter, move the cursor to the parameter value with the [◀], [▲], [▼] or [▶] key or Return key.
Input a numeric value with the ten key and press the Return key.

Press the [WRT] key.

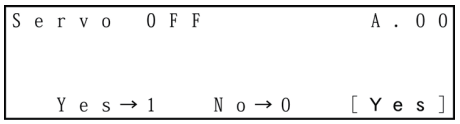



The screen will change to the next screen. Press the [ESC] key.




When “1” (Yes) is selected for “Is the writing data written?,”the screen will change to the Software Reset screen.

Press the [STU 1] key and press the Return key.




When the servo is ON, the screen will change to the Servo OFF confirmation screen.
If you press the [STU 1] key and then press the Return key, the controller will restart and the screen will change to the Mode Select screen.
Since servo is automatically turned OFF, it is not required to turn SON input OFF.

Models which support the software reset (restart) are PCON, ACON, SCON, DCON, ERC2 and ERC3.
For any model which does not support the software reset, restore the power to the controller.

[How to input A to F for Hexadecimal Number]

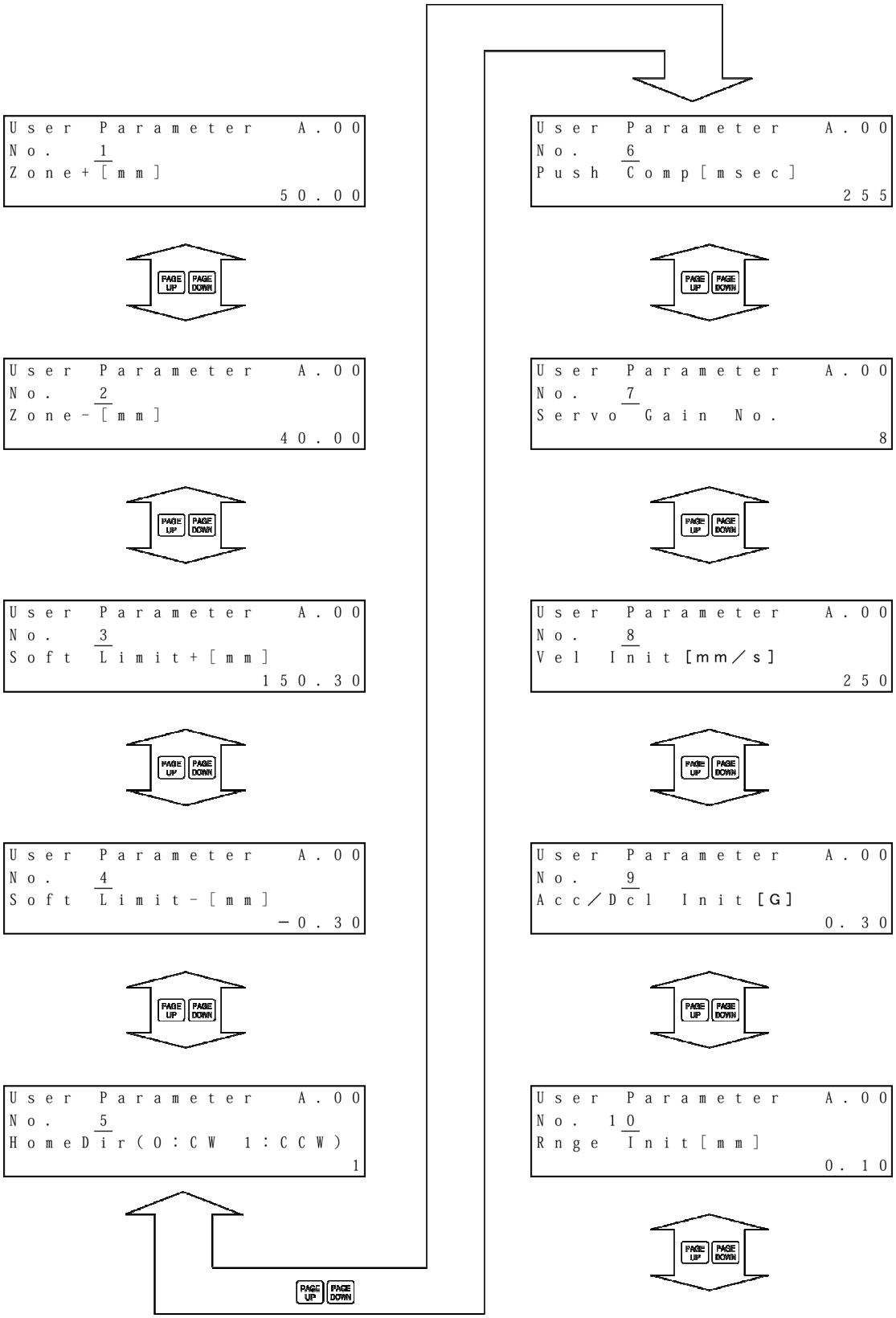
To input characters from A to F for the hexadecimal number, perform the following operation. (Applicable for Version V1.10 or later)

A : Hold [-.] key down and press [* 0] key at the same time.
B : Hold [-.] key down and press [STU 1] key at the same time.
C : Hold [-.] key down and press [VWX 2] key at the same time.
D : Hold [-.] key down and press [YZ 3] key at the same time.
E : Hold [-.] key down and press [JKL 4] key at the same time.
F : Hold [-.] key down and press [MNO 5] key at the same time.

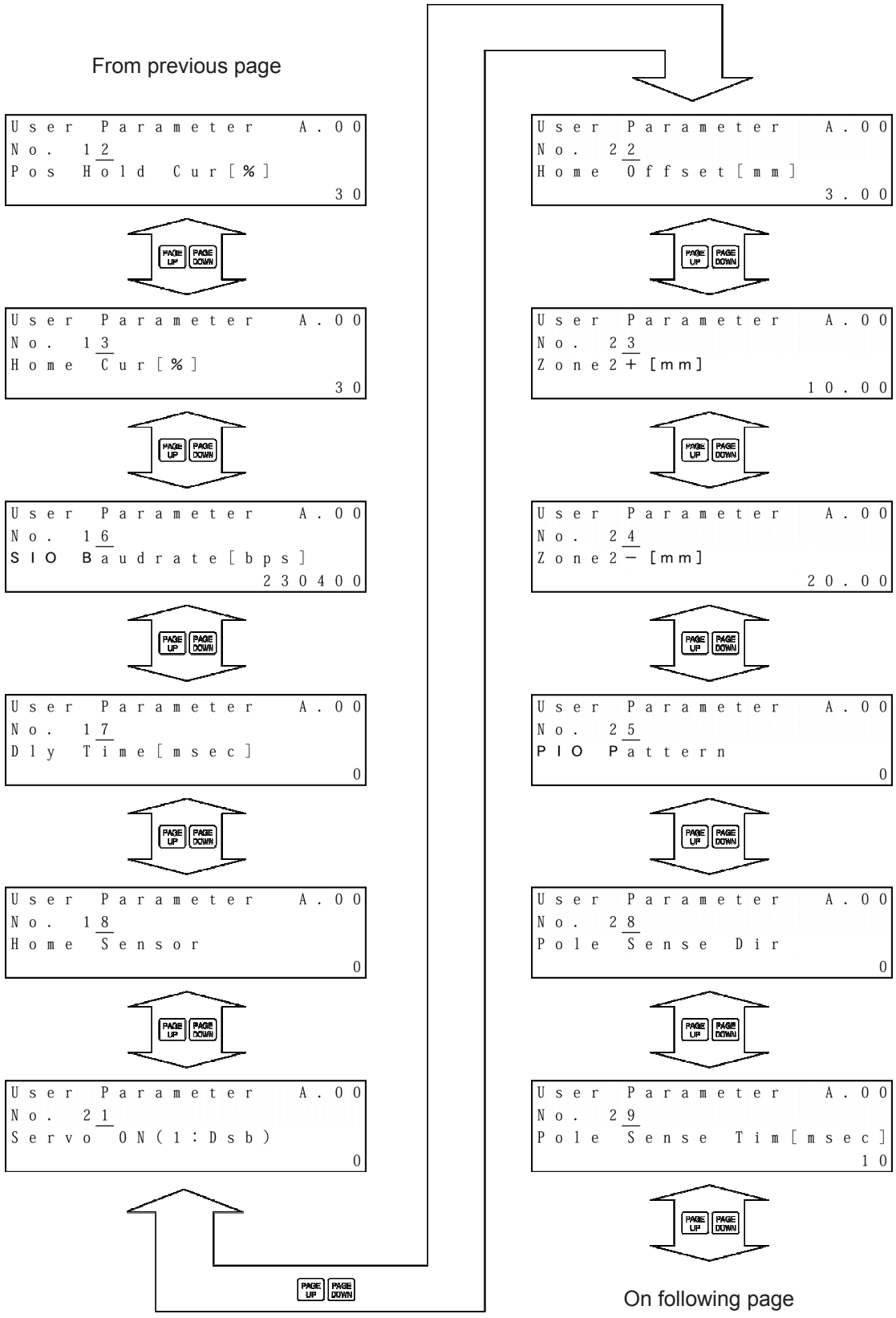
On the following page, user parameter display examples of the PCON-CY controller are provided.

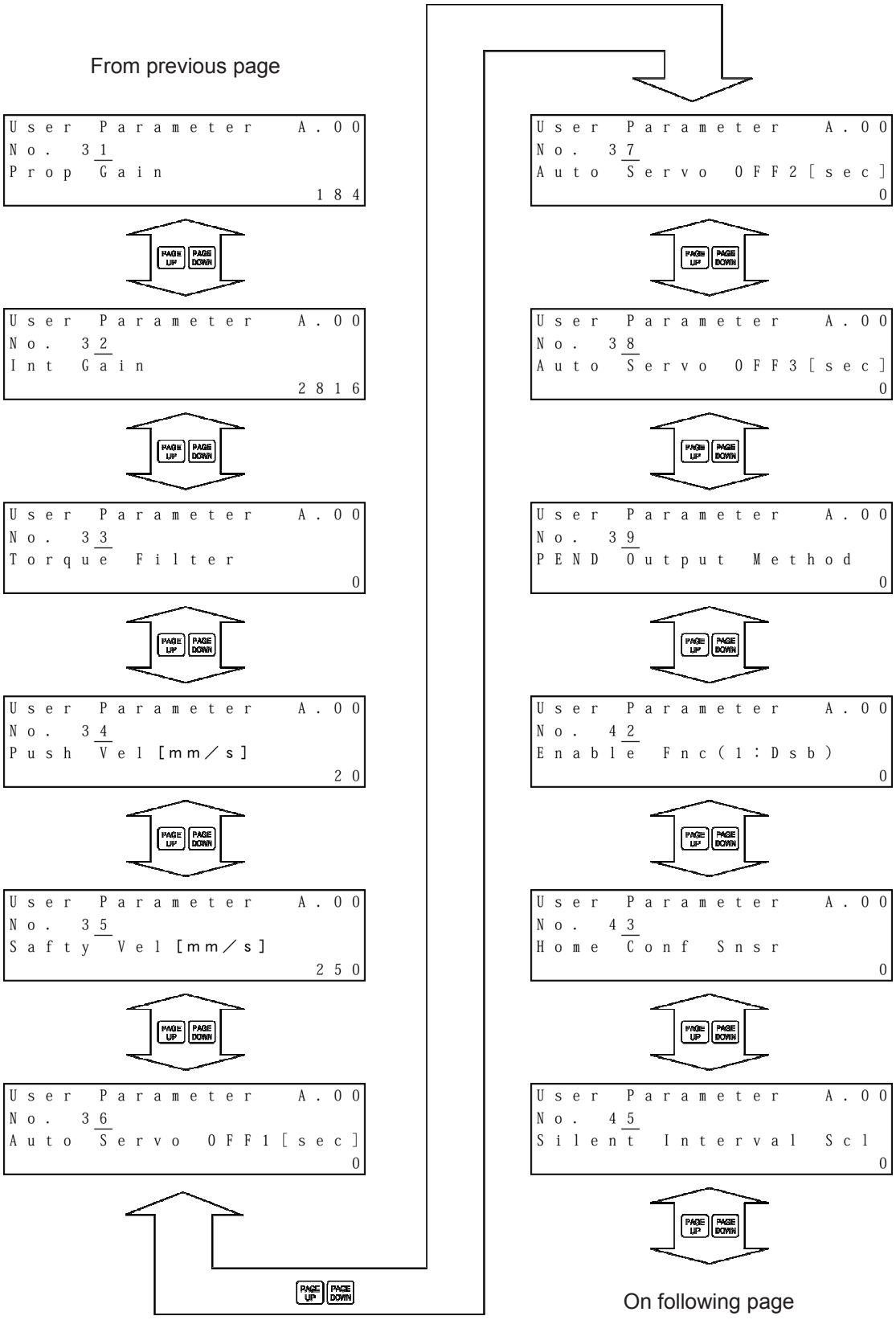
* The contents will vary depending on each controller. Refer to the operating manual of each controller.

Examples of PCON-CY Controller



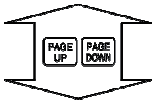

On following page


From previous page
User Parameter A.00
No. 12
Pos Hold Cur[%]
30
PAGE UP
PAGE DOWN
User Parameter A.00
No. 13
Home Cur[%]
30
User Parameter A.00
No. 16
SIO Baudrate[bps]
230400
User Parameter A.00
No. 17
Dly Time[msec]
0
User Parameter A.00
No. 18
Home Sensor
0
User Parameter A.00
No. 21
Servo ON(1:Dsb)
0
User Parameter A.00
No. 22
Home Offset[mm]
3.00
User Parameter A.00
No. 23
Zone2+ [mm]
10.00
User Parameter A.00
No. 24
Zone2− [mm]
20.00
User Parameter A.00
No. 25
PIO Pattern
0
User Parameter A.00
No. 28
Pole Sense Dir
0
User Parameter A.00
No. 29
Pole Sense Tim[msec]
10
On following page


From previous page
User Parameter A.00
No. 31
Prop Gain
184
PAGE UP
PAGE DOWN
User Parameter A.00
No. 32
Int Gain
2816
User Parameter A.00
No. 33
Torque Filter
0
User Parameter A.00
No. 34
Push Vel [mm/s]
20
User Parameter A.00
No. 35
Safty Vel [mm/s]
250
User Parameter A.00
No. 36
Auto Servo OFF1 [sec]
0
User Parameter A.00
No. 37
Auto Servo OFF2 [sec]
0
User Parameter A.00
No. 38
Auto Servo OFF3 [sec]
0
User Parameter A.00
No. 39
PEND Output Method
0
User Parameter A.00
No. 42
Enable Fnc(1:Dsb)
0
User Parameter A.00
No. 43
Home Conf Snsr
0
User Parameter A.00
No. 45
Silent Interval Scl
0
On following page

From previous page

```
User Parameter    A.00
No.  46
Vel Override[%]
                   100
```



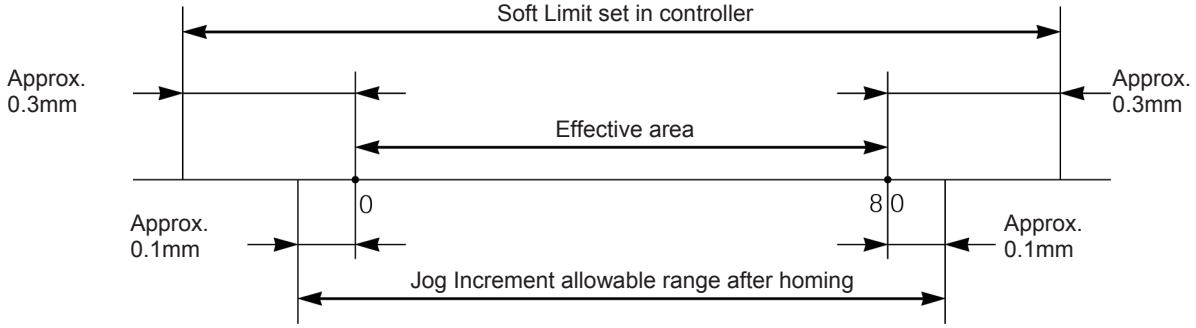

```
User Parameter    A.00
No.  53
Stop Mode Default
                     0
```

• When soft limit is modified at the customer site, please set a value which extends 0.3mm outside of the effective area.

Example: When setting the effective area between 0mm~80mm

Soft limit + side: 80.3

Soft limit - side: -0.3




**Caution:** Please restore the controller power after making parameter changes. Alternatively, reset software in the case of any model which supports the software reset function. Although pressing the emergency switch or port switch ON/OFF will rewrite the parameter, there may be ones that will not be changed.

* Regarding parameter, please refer to the Controller Operating Manual.

### 6.8.2 Pause, Servo ON Input Enable and Disable Setting

(1) Pause

Pause input can be enabled or disabled with user parameter No. 15.

0: Enb, 1: Dsb

(2) Servo ON input

Servo ON input can be enabled or disabled with user parameter No. 21.

0: Enb, 1: Dsb

## 6.9 User Adjustment

### 6.9.1 Homing Operation, Axis Number Setting, Calibration and Time Setting

- Execute homing.
- Set the axis number of the controller (PCON, ACON, ERC2, RCP-RSI, RCP-RM1, etc.).
- Perform the loadcell calibration (SCON-CA)
- Move to the clock setting window to set the current time (SCON-CA, PCON-CA and ERC3 PIO Converter)
- Move onto the maintenance information screen and establish the maintenance information settings. (SCON-CA, PCON-CA, ERC3 (CON Mode (CN)) and ERC3 PIO Converter)

Press the ADJ key.



```
User Adjustment  A.00
Adjust No.       [  0]
Alloc. Axis No.  [  0]
```

- If you input 1 into Adjust No. and press the Return key, homing will be performed.
- Axis number setting
  Move the cursor to Adjust No. with the ▼ key. Input the axis number and press the Return key.
  Input 2 into Adjust No. and press the Return key.

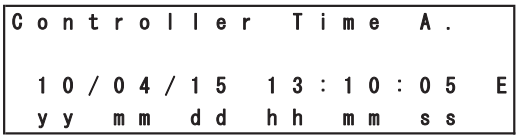
* In the case of the PCON-C/CG and other controllers for which the axis number is set with the rotary switch on the front panel of the controller, axis number setting is not available.

- Calibration
  Enter “6” to Adjustment No. and press the Return key to perform a calibration.
  (Setting is available only on SCON-CA.)
- Time Setting
  Enter “7” to Adjustment No. and press the Return key to move to the clock window to set the current time.
  (Setting is available only on SCON-CA, PCON-CA, ACON-CA, DCON-CA and ERC3 PIO Converter.)
- Maintenance Information
  Enter “8” to Adjustment No. and press the Return key to move to the Maint. Info window to set the maintenance information.
  (Setting is available only on SCON-CA, PCON-CA, ACON-CA, DCON-CA, ERC3 (CON Mode (CN)) and ERC3 PIO Converter.)

**Caution:** Caution: Do not input any numeric value other than 1, 2, 3, 4, 6, 7, 8 and 5119 into Adjust No. In the case of the RCP or RCP2 controller, 0 or 2 is set to parameter No. 25 (PIO pattern) (when there is no servo ON input), do not input 92 into Adjust No., either. The controller will be inoperable due to no servo ON input.

For SCON-CA, PCON-CA, ACON-CA, DCON-CA and ERC3 PIO Converter, the current time setting can be set on the controller.

[Time Setting]




Press either ▲ or ▼ and "E" mark is shown.
It is now ready for time data edit.

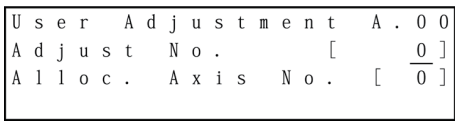
(1) Press either ◀ or ITEM FWD and the cursor switches in the following order:
year ⇒ month ⇒ day ⇒ hour ⇒ minute ⇒ second ⇒ year.
Press either ▶ or ITEM BACK and the cursor switches in the back order:
second ⇒ minute ⇒ hour ⇒ day ⇒ month ⇒ year ⇒ second.
Move the cursor to where a change is desired.

(2) Press ▲ to increase the number.
Press ▼ to decrease the number.
Adjust the clock to the current time.

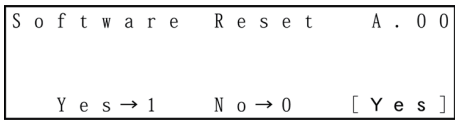
(3) Press the Return key to complete the time setting.
Press ESC key to return to the Mode Select window.

### 6.9.2 Software Reset

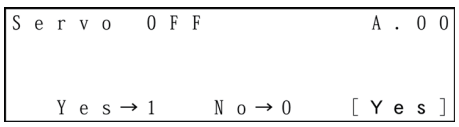
Software reset (controller restart) will be performed.
The compatible models are PCON, ACON, SCON, RCP2, DCON, ERC2 and ERC3.




Input JKL 4 into “Adjust No.” and press the Return key.



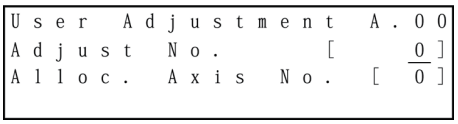

The screen will change to the Software Reset screen.
Press the STU 1 key and press the Return key.
(When not resetting software, press the * - 0 key and press the Return key. The screen will return to the Mode Select screen.)



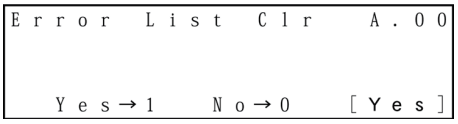

When the servo is ON, the screen will change to the Servo OFF confirmation screen.
Press the STU 1 key and press the Return key. Then the controller will restart and the screen will change to the Mode Select screen. Since the servo is automatically turned OFF, it is not required to turn SON input OFF.

### 6.9.3 Error List Clear

All the contents of the error lists will be cleared.
The compatible models are PCON, ACON, SCON, DCON, ERC2 and ERC3.




Input YZ 3 into “Adjust No.” and press the Return key.




The screen will change to the Error List Clr screen.

Press the STU 1 key and press the Return key.
The error list will be cleared and the screen will return to the Mode Select screen.

(When not clearing the error list, press the *- 0 key and press the Return key. The screen will return to the Mode Select screen.)

## 6.10 TP Operation Mode

The operation mode will be set in the manual mode (MANU).
The compatible models are PCON, ACON, SCON, DCON, ERC2 and ERC3.

When changing the TP operation mode, press the key of the mode you want to change from among the [TEACH 1], [TEACH 2], [MONIT 1] and [MONIT 2] keys.

As an example, when changing from the TEACH1 mode status to the TEACH2 mode, press the [TEACH 2] key.



```
TP Ope Mode Change
 TEACH1    →    TEACH2

  Yes→1    No→0    [Yes]
```

The screen will change to the TP Ope Mode Change data writing confirmation screen.
If you press the [STU 1] key and press the Return key, the TP mode will change and the screen will change to the Mode Select screen.
The LED of TEACH2, which is the TP operation mode display LED, will light.

Select the operation mode from the following 4 menu items:

• Teach 1: The LED is lit in the TEACH1 mode.

PIO Prh: Enables writing of position data, parameters, etc., in the controller and commands of the actuator movement system.

SftyVel Efct: Keeps the maximum speed at the safety speed set for the parameter regardless of position data.

• Teach 2: The LED is lit in the TEACH2 mode.

PIO Prh: Enables writing of position data, parameters, etc., in the controller and commands of the actuator movement system.

SftyVel Non: Enables movement at the speed registered in position data.

• Monitor 1: The LED is lit in the MONIT1 mode.

PIO Per: Enables monitoring only. Writing of position data, parameters, etc., in the controller and commands of the actuator movement system are disabled.

SftyVel Efct: Keeps the maximum speed at the safety speed set for the parameter regardless of position data.

• Monitor 2: The LED is lit in the MONIT2 mode.

PIO Per: Enables monitoring only. Writing of position data, parameters, etc., in the controller and commands of the actuator movement system are disabled.

SftyVel Non: Enables movement at the speed registered in position data.

## 6.11 End

Before removing the Teaching Pendant from the RC controller, be sure to execute End.

Operation:

1. Press the STOP key for more than 2.5 seconds.
   The screen will change to the TP end screen.

```
Operation  Start／End
 TP  [Efct]
   1.Complete
   2.Reconnection
```

2. Press the STU 1 key to select “Complete.”
   The screen display will change to “Non” and the Teaching Pendant will be disconnected from the controller.

```
Operation  Start／End
 TP  [Non ]
   1.Complete
   2.Reconnection
```

In the case of any controller with a PORT switch, turn the controller PORT switch to OFF and remove the Teaching Pendant connector.

When reconnecting the Teaching Pendant to the controller without removing it, press the VWX 2 key to select “Reconnection.” Reconnection will be established and operation will start from the initial screen.

**Caution:** When multiple axes are connected with a controller link cable, after recycling power of a controller that is not directly connected to the Teaching Pendant, please execute a reconnect.

**Caution:** In the case of the PCON, ACON or ERC2 controller with no AUTO/MANU switch, set the TP operation mode to “Monitor 2” before removing the Teaching Pendant. (Refer to “6.10 TP Operation Mode.”)

When the controller is set by connecting the Teaching Pendant to the gateway unit/SIO converter, the conditions shown below occur.

- If the Teaching Pendant is disconnected while the setting of “Teach 1” or “Teach 2” remains, I/O will become invalid and control from PLC will become impossible.
- If the Teaching Pendant is disconnected while the setting of “Monitor 1” remains, the maximum speed will become the safety speed set for the parameter regardless of a command from PLC.

# 7. Message Area

In the message screen, content during error and warning will be displayed.

| Code No. | Error Label | Error Reset | Reference |
|---|---|---|---|
| 000~07F | Controller Warning | Yes | Controller rejects command |
| 080-0FF | Controller Error | Note | Error inside the controller |
| 100~1FF | TP Message | Yes | Input error, guide message, etc. |
| 200~2FF | TP Movement Release | Yes | Movement continuation impossible |
| 300~3FF | TP Cold Start Error | No | TP Power install or reconnect are necessary. |

TP: Teaching Pendant

Note) Refer to “7.3 Controller Error.”

* In the case of any error with error reset “Yes,” if you press the ERROR RESET key, the error will be reset. All the error lists in the controller can be cleared with error list clear of UserAdjustment. (Refer to 6.9.3.)



## 7.1 Warning Label Error (Code No. 000h - 07Fh)

Warning message is cleared by recovery procedure as follows:

Release operation:

1. First, confirm the cause of the warning and resolve the problem.
2. Press down ERROR RESET key.

Warning is probably due to the following possibilities:

- RS485 communication abnormality
- Teaching Pendant operational mistake

a) RS 485 communication related abnormality

Indicates occurrence of any abnormality on the RS485 communication line.

Code No: 05Ah, 05Bh, 05Dh, 05Eh, 07Fh, etc. (Communication error detected by the controller)

Cause: (1) Teaching Pendant is in conflict with other devices (PLC or PC.)
For example, when move command is delivered by PIO signal from teaching while communicating to other devices (PLC), “075h” will occur during homing.

(2) Influence by foreign noise or connections is not properly installed.
The Teaching Pendant and RC controller execute packet communication (move instruction, data transfer, etc.) at all times. At this time, when data changes due to noise, the RC controller will determine that it is incorrect data and will reject the data.

Solution: (1) Confirm the above causes. In the case of frequent warning occurrences, please separately set the signal cable and power line.

(2) Be sure to use one unit to operate the RC controller.
See to it that the Teaching Pendant will not conflict with the PIO signal.

## 7.2 Teaching Pendant Message Level Error

Teaching Pendant Operational Mistake:

When you attempt to input an incorrect value, the message label error will occur.

Code No: 112h, 113h, 114h, 118h, 11Eh, 11Fh, etc. (keypad input value is incorrect.)

## 7.3 Controller Error

An alarm detected from the controller side can be displayed.

This is a serious error due to an abnormality related to servo control and electricity. Please read through the RC Controller operating manual carefully for error compliance.

If any errors of the below code numbers occur, it is required to perform the error reset of the controller (press the ERROR RESET key) to reset it in the case of a movement release level error. It is required to perform the reset of the controller software in the case of a cold start level error. (Refer to 6.9.2.) With regard to the controllers not equipped with the software reset function, it is required to turn on the power again.

Code No: 0B0h, 0B1h, 0B8h, 0B9h, 0BBh, 0BCh, 0BDh, 0BEh
0C0h, 0C1h, 0D0h, 0D1h, 0D8h, 0E0h, 0E8h, 0E9h, 0EAh, 0F8h, etc.

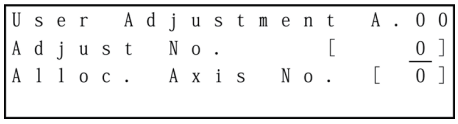
| For details of error codes, refer to the operating manual of the controller you use. |
|---|

# * Appendix

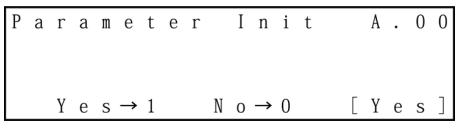
## Parameter (Shipment) Initialization Method

Parameters will be changed (initialized) to shipment parameters.
The compatible models are PCON, ACON, SCON, DCON, ERC2 and ERC3.

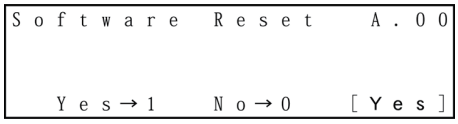
**Caution:** Please take note that if parameter (shipment) initialization is performed, user-set parameters will be changed to shipment parameters.



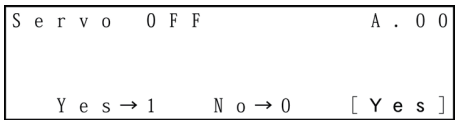

Input [MNO 5] [STU 1] [STU 1] [GHI 9] for “Adjust No.”and press the Return key.




The screen will change to the Parameter Init execution confirmation screen.
Press the [STU 1] key and press the Return key.
(When not performing parameter initialization, press the [* 0] key and press the Return key. The screen will return to the Mode Select screen,)




The screen will change to the Software Reset screen.
Press the [STU 1] key and press the Return key.
When the servo is ON, the screen will change to the Servo OFF confirmation screen.

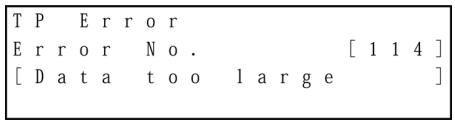



Press the [STU 1] key and press the return key.
Parameters will be initialized and become shipment parameters.
Since the servo is automatically turned OFF, it is not required to turn SON input OFF.

**Caution:** If software reset has not been executed, parameters have been rewritten to shipment parameters but operation will not be performed with shipment parameters.
After the next reset or power-on, the parameters will be effective.

# Teaching Pendant Error Messages

As an example, if an input value is larger than the set range during MDI-mode position data input, the following error screen will be displayed:




If you press the ESC key, the screen will return from the error display screen to the previous screen. In this case, the screen will return to the MDI-mode position data input screen.

The screen will return to the previous screen from the error display screen even using the ERROR RESET key. However, in this case, controller alarm reset will be performed simultaneously.

(Note) Since emergency stop, motor voltage reduction and absolute battery voltage reduction are not alarms, the alarm code will display "- - - -" sign.

Listed in the table below are Teaching Pendant specific errors.
For error of controller, refer to the Operating Manual of each controller.

| Code | Message name | Description |
|---|---|---|
| 112 | Input Incorrect Error | An incorrect value was entered for a parameter.<br>(Example) 9601 was entered as the serial communication speed by mistake. Reenter a correct value. |
| 113<br>114 | Input Under Error<br>Input Over Error | The entered value is smaller than the setting range.<br>The entered value is larger than the setting range.<br>Refer to the actuator specifications or parameter table and reenter a correct value. |
| 115 | Homing Incomplete | The current position was written when home return was not yet completed.<br>Execute home return again. |
| 117 | No Move Data | Target position is not set under the selected position number.<br>Enter the target position first. |
| 11E | Pair Data Mismatch | The values indicating the magnitude relationship of a pair of data are incorrect.<br>(Example) The same value was entered in both the parameters for + and – soft limits.<br>Reenter correct values. |
| 11F | Absolute Value Error | The minimum movement toward the target position is determined by the lead length of the drive system and resolution of the encoder.<br>This message indicates that the entered target value is smaller than the minimum movement.<br>(Example) If the actuator is the RCP2 Series actuator and the lead length is 20 mm, the encoder's resolution is 800 pulses and accordingly the minimum movement becomes 20 ÷ 800 = 0.025 mm/pulse. In this case, this message will be displayed if 0.02 mm is entered at the target position. |
| 121 | Push search end over | The final position in push operation exceeds the soft limit.<br>This has no negative effect if the actuator contacts the work. If the actuator misses the work, however, the soft limit will be reached and this message is displayed as a warning.<br>Change either the target position or positioning band. |

| Code | Message name | Description |
|---|---|---|
| 122 | Allocate, multi-axes connect | Address was assigned when multiple axes were connected.<br>Assign each address only when one axis is connected. |
| 133 | Change to axis number prohibit | In the case of the PCON-C/CG, ACON-C/CG, or SCON controller, the axis number is set with the rotary switch on the front panel.<br>It cannot be set with the Teaching Pendant. |
| -<br>-<br>-<br>- | Change to axis number OK<br>Controller initialize OK<br>Home Change All Clear<br>IO function changed | These messages are displayed to confirm operation.<br>(They do not indicate an operation error or other abnormality.) |
| 201 | Emergency Stop | An emergency stop condition was detected. (This is not an error.)<br>It is displayed for PCON, ACON and SCON. |
| - | Emergency Stop | This message indicates an emergency stop condition. (This is not an error.)<br>It is displayed for PCON, ACON and SCON. |
| - | Motor voltage drop | This message indicates the motor drive power shut-off condition due to an open circuit between the MPI terminal and MPO terminal.<br>(Note) If this message occurs when a circuit between the MPI terminal and MPO terminal is closed, a controller failure is suspected. |
| - | ABS battery voltage drop | This message indicates that the battery voltage dropped when the power was turned ON. |
| 20A | During movement, Servo OFF | This message indicates that an operation was conducted under the condition the servo was off. Turn the servo on before starting an operation. |
| 20E | Soft limit over | This message indicates that a soft limit was reached. |
| 220 | Write in AUTO prohibited | This messages indicates that parameter writing operation was performed in the AUTO mode of the PCON-C/CG, ACON-C/CG, or SCON controller. |
| 221 | Write in Monitor mode prohibited | This message indicates that position data or parameter writing operation was performed in the Monitor mode. |
| 222 | Operation in AUTO prohibited | This message indicates that actuator movement operation was performed in the AUTO mode. |
| 223 | Operation in Monitor mode prohibited | This message indicates that actuator movement operation was performed in the Monitor mode. |
| 301<br>302<br>304<br>305<br>306<br>308<br>30A<br>30B | Over Run Error (M)<br>Framing Error (M)<br>SCIR-QUE OV (M)<br>SCIS-QUE OV (M)<br>R-BF OV (M)<br>Response Time Out (M)<br>Packet R-QUE OV<br>Packet S-QUE OV | These messages indicate an error in the serial communication with the controller.<br>Cause: [1] Garbage data due to the effect of noise<br>[2] Duplicate slave numbers when multiple controllers are controlled by serial communication.<br>Action: [1] Adjust the wiring in a manner eliminating the effect of noise and review the installation of equipment, etc.<br>[2] Change the slave numbers to avoid duplication.<br>If the message is still displayed after taking the above actions, please contact IAI. |
| 307 | Memory Command Reject | This message indicates that the command was refused in the serial communication with the controller. |
| 309 | Wright Address Error | This message indicates that an indeterminate WRITE address error occurred in the serial communication with the controller.<br>These conditions do not occur in normal operation. Should they occur, record the entire error list before cutting off the power for use in the cause investigation. Also, contact IAI. |

| Code | Message name | Description |
|---|---|---|
| 30C | No Connect Error | This message indicates that no controller axis number is recognized.<br>Cause: [1] The controller is not operating properly.<br>[2] Only the supplied communication cable (SGA/SGB) is disconnected.<br>[3] If a SIO converteris used, 24V is supplied to the converter but the link cable is not connected.<br>[4] The ASDRS switch settings are duplicated by mistake when multiple connectors are linked.<br>Action: [1] Check if the RDY lamp on the controller is lit. If the lamp is not lit, the controller is faulty.<br>[2] If a spare Teaching Pendant is available, replace the current pendant with the spare unit, or with a PC and see if the message disappears.<br>[3] Supply power after connecting the link cable between the converter and controller.<br>[4] Make sure the ADRS switch settings are not duplicated.<br>If the message is still displayed after taking the above actions, please contact IAI. |

# Change History

| Revision Date | Revision Description |
|---|---|
| 2011.11 | Fourth edition<br>Page 1 Safety Guide Added<br>Contents changed in Safety Guide<br>Caution notes added for when working with two or more persons<br>Page 8 Contents changed in Warranty<br>Page 16 Addition of How to Input A to F for Hexadecimal Number<br>Page 31 Contents of Position Table for Version V1.10 and Later Added<br>Page 37 Explanations for Gain Set and Vibration Control Number Added<br>Page 73 Explanation for SCON-CA Force Feedback / Loadcell Calibration Added onto Monitor<br>Page 76 Maintenance Information Added<br>Page 78 SCON-CA Error List Screen Added<br>Page 80 Addition of How to Input A to F for Hexadecimal Number<br>Page 86 Calibration and Time Setting added to User Adjustment<br>Page 87 Method for Time Setting Added<br>Page 97 Content of 20A added and 20C, 20D, 210 and 211 deleted in Teaching Pendant Error Display |
| 2012.06 | Fifth edition<br>Page 1 Contents added and changed in Safety Guide<br>Page 43 Correction made in contents of operation in Section 2 |
| 2012.06 | Sixth edition<br>PCON-CA and ERC3 (CON Mode (CN)) are added to the supported models<br>Pages 23, 33, 34, 35, 77, 78, 80, 88, 89 Contents added for PCON-CA, ERC3 (CON Mode (CN)) and ERC3 PIO Converter<br>Page 75 “Overload Level” added to monitor on SCON-CA |
| 2013.08 | Seventh edition<br>CON-TGS added |
| 2014.02 | Edition 7B<br>Page 20 Note corrected |
| 2014.02 | Eighth edition<br>Contents added for ACON-CA and DCON-CA |
| 2014.05 | Ninth edition<br>Page 82 and 83 Correction made to contents of maintenance information |

| Revision Date | Revision Description |
|---|---|
| 2019.05 | Tenth edition<br>Page 23 and 26 Correction made to model code for connector conversion cable set for connection to CON-TG and RCB-LB-TGS<br>Page 22 to 26 Descriptions revised regarding TP adapter |

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