X-SEL
CONTROLLER

X-SEL
Teaching Pendant

Operating Manual Ver. 9.0

IAI America, Inc.

Please Read Before Use

Thank you for purchasing our product.

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

Before operation, read this manual carefully and fully understand it to operate this product safely. The enclosed CD or 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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List of Support Models

Model Name	Support Started Version
XSEL-J/K	V0.01
SEL-E/G (Note 1)	V1.02
DS-S-C1 (Note 1)	V1.02
XSEL-P/Q	V1.13
TT	V1.14
SSEL	V1.30
ASEL	V1.40
PSEL	V1.40

Note 1 When the year of manufacture is too old, the emergency stop switch is not effective.
Be careful.

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Safety Guide

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

Safety Precautions for Our Products

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

No.	Operation Description	Description
1	Model Selection	● This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications. 1) Medical equipment used to maintain, control or otherwise affect human life or physical health. 2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility) 3) Important safety parts of machinery (Safety device, etc.) ● Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product. ● Do not use it in any of the following environments. 1) Location where there is any inflammable gas, inflammable object or explosive 2) Place with potential exposure to radiation 3) Location with the ambient temperature or relative humidity exceeding the specification range 4) Location where radiant heat is added from direct sunlight or other large heat source 5) Location where condensation occurs due to abrupt temperature changes 6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid) 7) Location exposed to significant amount of dust, salt or iron powder 8) Location subject to direct vibration or impact ● 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. ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● When 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. ● Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the operation manual for each model. ● Do not step or sit on the package. ● Do not put any heavy thing that can deform the package, on it. ● When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work. ● When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit. ● Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. ● Do not get on the load that is hung on a crane. ● Do not leave a load hung up with a crane. ● Do not stand under the load that is hung up with a crane.
3	Storage and Preservation	● The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation. ● 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. ● 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. Also, be equipped for a fall-over or drop due to an act of God such as earthquake. ● Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life. ● When using the product in any of the places specified below, provide a sufficient shield. 1) Location where electric noise is generated 2) Location where high electrical or magnetic field is present 3) Location with the mains or power lines passing nearby 4) Location where the product may come in contact with water, oil or chemical droplets

No.	Operation Description	Description
4	Installation and Start	(2) Cable Wiring ● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. ● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. ● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. ● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. ● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. ● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire.
		(3) Grounding ● 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. ● 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). ● 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 ● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury. ● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. ● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product. ● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input. ● When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury. ● Take the measure so that the work part is not dropped in power failure or emergency stop. ● Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. ● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.
5	Teaching	● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign "Under Operation" at the position easy to see. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. * Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.

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

No.	Operation Description	Description
8	Maintenance and Inspection	● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. ● Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well. ● When the work is to be performed inside the safety protection fence, basically turn OFF the power switch. ● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. ● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. ● Place a sign “Under Operation” at the position easy to see. ● For the grease for the guide or ball screw, use appropriate grease according to the Operation Manual for each model. ● Do not perform the dielectric strength test. Failure to do so may result in a damage to the product. ● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. ● 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. ● 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. Use in incomplete condition may cause damage to the product or an injury. * 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. ● When removing the actuator for disposal, pay attention to drop of components when detaching screws. ● Do not put the product in a fire when disposing of it. 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. ● See Overseas Specifications Compliance Manual to check whether complies if necessary. ● For the handling of actuators and controllers, follow the dedicated operation 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 Operation Manual for each model.

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

1. Forward

Thank you very much for purchasing our X-SEL Controller Teaching Pendant. Improper usage or mishandling may result in a product not only being unable to deliver full functions but also produce unexpected troubles or shorten the product's life. Please read this Manual carefully, and operate the product properly by paying attention to its handling. When operating the Teaching Pendant, always keep this Manual at hand and read the relevant items as required.

For the actuator and controller to be used, be sure to refer to the Instruction Manuals attached to the products.

- While the teaching pendant is left connected, "Effect" is valid for the safety velocity (SVel). Therefore, the fastest velocity is under 250 mm/sec when the program is started from the teaching pendant. To operate the controller according to the program velocity command, it is required to change the condition to "No Effect."
  For selection of the safety velocity between Effect and No Effect, refer to "16-8. Safety Velocity."
- When connecting this teaching pendant to the X-SEL-Q type (global specification), emergency stop cannot be reset.
- The display screens must show version 1.13 or newer of the teaching pendant application software. To confirm the version, refer to the section "15-9. Version Information."

2. Before Use

(1) Be sure to read this Instruction Manual for proper use of this product.
(2) Part or all of this Instruction Manual may not be used or reproduced without permission.
(3) For any handling and operating methods other than those described in this Instruction Manual, interpret them as "don't" or "can't."
(4) Please take note that we shall not be liable for any effects resulting from using this Instruction Manual.
(5) Descriptions in this Instruction Manual are subject to change due to product improvements etc., without prior notice in the future.

3. Safety Precautions ⚠

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

4. Warranty

4.1 Warranty Period

One of the following periods, whichever is shorter:
- 18 months after shipment from our company
- 12 months after delivery to the specified location

4.2 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 operation manual and catalog.

(4) The breakdown of problem in question was caused by a specification defect or problem, or by a quality issue with 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.

4.3 Honoring the Warranty

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

4.4 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.

4.5 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.

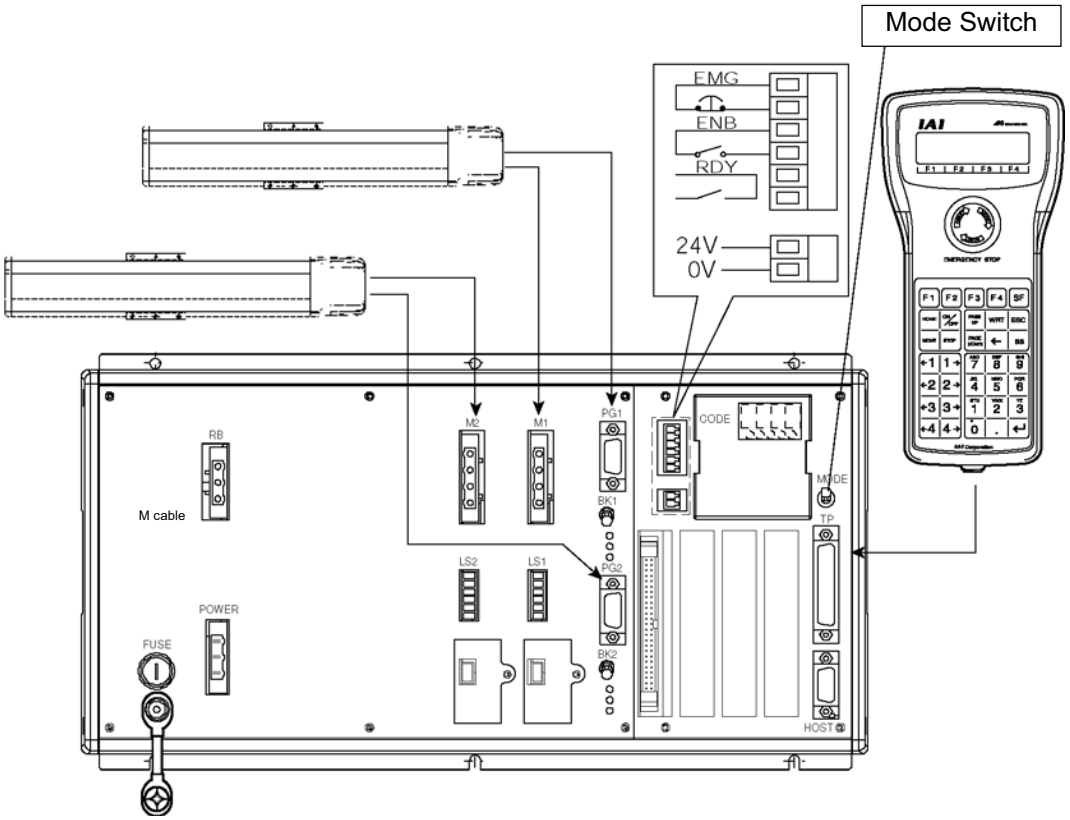
(2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications. Contact us if you must use our product for any of these applications:
   [1]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

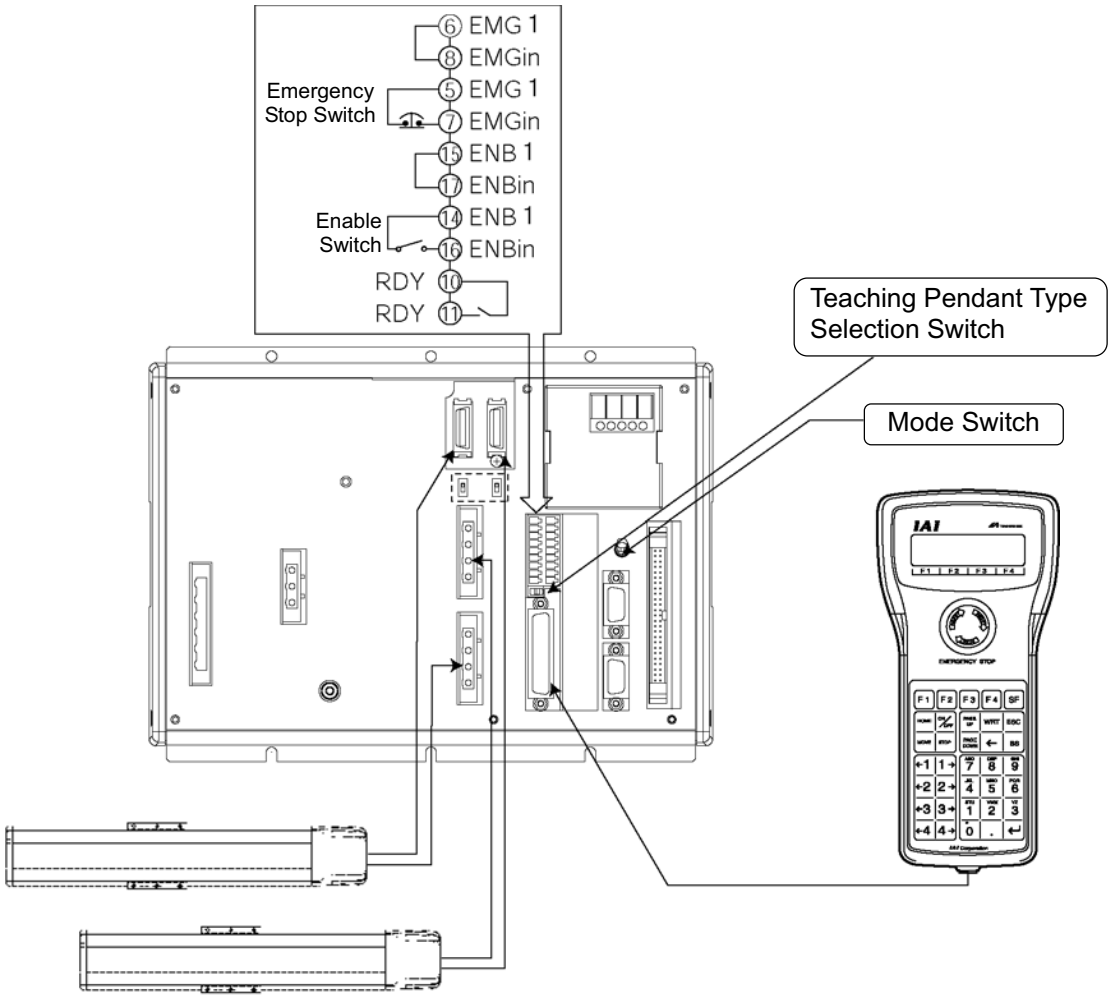
4.6 Other Items Excluded from Warranty

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

5. Connection to Controller



K (J) Type Controller



P Type Controller

Caution

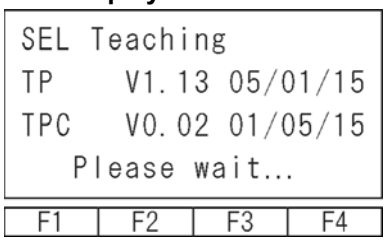
- Set the teaching pendant type selection switch to the right.

1. Connect actuators, I/O 24VDC power source, and system I/O to the controller first. Then connect the cable connector of the teaching pendant to the controller's teaching connector when the main power supply of the controller is OFF.

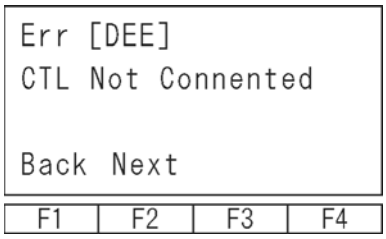
2. After you flip the mode switch to MANU side, supply power to the controller.

Teaching Pendant

LCD Display

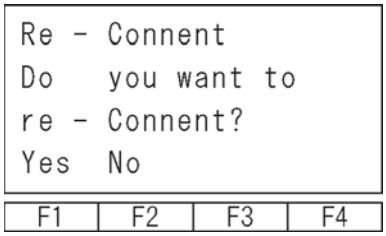


Displays the version of the teaching pendant and moves to the following page, the mode selection screen.



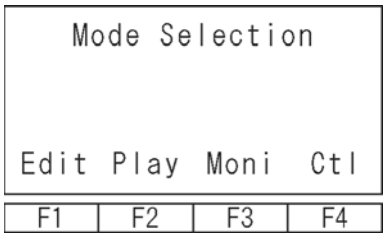
If the mode is switched to AUTO side, the teaching pendant does not connect to the controller and the screen on the left will be displayed. Press ESC key and make it reconnected.

Re-connection Screen



Turn on the mode switch to MANU side and press the F1 (Yes) key to execute re-connection.

Mode Selection Screen



This is the basic screen for all operations.

Extra Caution

When the X-SEL controller J/K type executes “OPEN 1” (channel 1 shared for the teaching pendant) within the SEL program in the MANU (manual) mode, the right of use of the serial port channel 1 is forcefully moved to the SEL program and communication with the teaching pendant is disconnected. The program in the controller is running. (*Error No. A5D “SCIF open error non-auto mode”)
Afterwards, if you wish to stop movement, press ON the Emergency Stop Button (Be especially careful during Jog operation).

*In a case prior to Ver 0.16 of controller main application.

For the controller P/Q type as well as the J/K type with the controller main application ver. 0.16 or later, the following are applied regarding OPEN of the TP port (teaching connector) according to the servo not in use or in use:

<MANU mode, servo not in use>

	Before execution of OPEN	After execution of OPEN
Connection of TP port	Connection to Teaching Pendant	Forced movement to SEL program connection (Message error) Program is executing

Error occurring after OPEN command execution: Error No. A50 “SCIF open error during non-AUTO mode”

<MANU mode, servo in use>

	Before execution of OPEN		After execution of OPEN
Connection of TP port	Connection to Teaching Pendant	⇨	Connection to Teaching Pendant (Cold start error) Program is ending

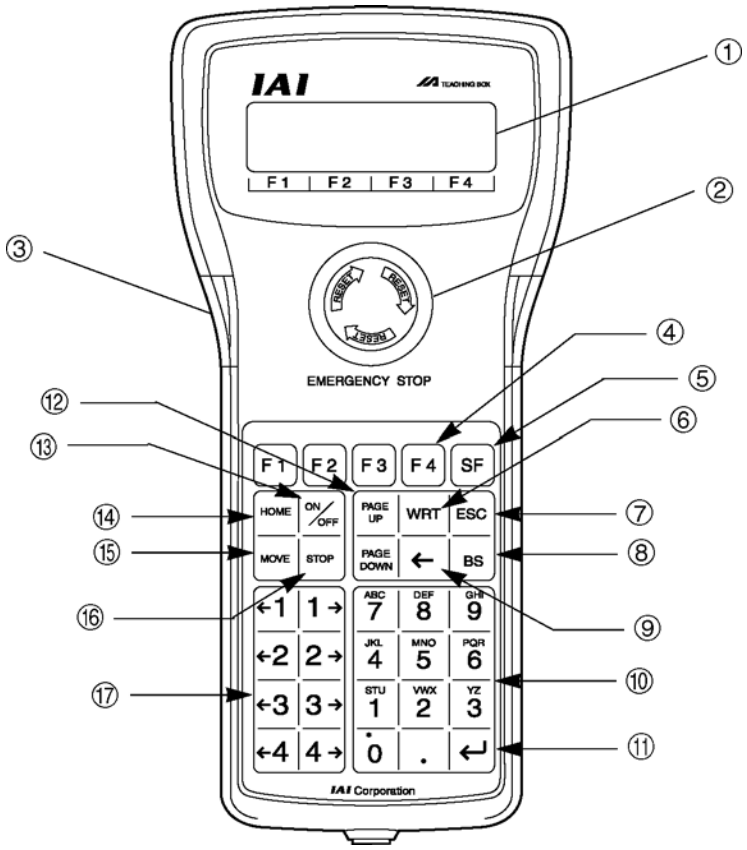
Error occurring after OPEN command execution: Error No. E.89 “SCIF open error during non-AUTO mode (servo ON)

The channel No. of the TP port varies according to the controller’s type.
J/K type: 1 ch “OPEN 1”
P/Q type: 0 ch “OPEN 0”

The above “Extra Caution” notes pertain to all other than “MANU mode with I/O parameter No. 90 = 2 (IAI Protocol).

6. Teaching Pendant Function and Specifications

6.1 Main Operation Keys and Functions



1. LCD Display

4 lines with 20 characters per line capacity display. Shows programs and motion status.

2. Emergency Stop Button

Executes emergency stop.

3. Deadman Switch (Option)

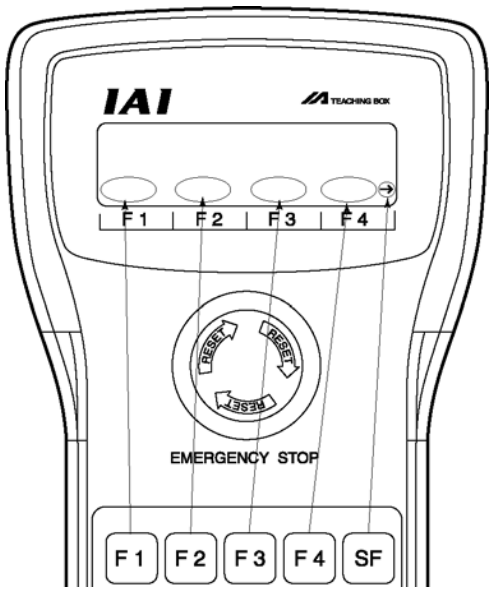
Before operating keys for Servo OFF → Servo ON, keep pressing both sides (ON) and operating keys.

If you press only one side or not press both sides, key operation for Servo OFF → Servo ON doesn't work.

When servo is ON, this switch is under the state of both-side pressed, but when you release the switch, the operation will be finished and the panel window 7 seg LED displays "dsf."

4. F1 F2 F3 F4 (Function keys)

Correspond to each item in the LCD display (function key section).



5. SF key (Shift key)

If there are more than 5 selectable functions ("→" will be displayed at right side of the function key area), it will change the display items in the function key area.)

6. WRT key (Write key)

Transmits edit data to the controller. (Data will be saved in the memory of the controller.)
Only the data shows on the LCD display will be transmitted. (Plural position No., program step No, etc., can't be transmitted all together at the same time.)

7. ESC key (Escape key)

Returns to the previous status from the current status.
If you press this key during data input, the data will be cancelled.

8. BS key (Backspace key)

If you press this key during data input, clear one letter before.
At other time, clear the data where the cursor is placed.

9. ← key (Cursor backward key)

Backward the cursor. It's reverse of Return key function.

10. 10 keys

You can input number, alphabet, and sign.
When the cursor is at any item requiring the input of characters other than "0" to "9" (such as hexadecimal and character strings), the input mode selection is displayed in the function key area. (Alph: alphabet symbol input, Num: numeric value input)

11. ↵ **key (Return key)**
Confirms the input data and moves the cursor position forward .

12. **PAGE UP** · **PAGE DOWN** **key**
Increment or decrement edit and display item No. (Position No., Program No., Step No., etc.)

13. **ON/OFF** **key**
Switches servo ON or OFF of axes. (It is valid within Teac (teach) mode area)

14. **HOME** **key**
Executes homing. (It is valid in the Teac (teach) mode area with the servo ON)

> ⚠ Note : For the Linear Servo actuator, LSAS-N10/N15 quasi absolute type, the actuator moves in a range of approximately 16mm from the stop position when a home return operation is conducted after the power is turned on to confirm the current position. Watch the actuator movement during operation.

15. **MOVE** **key**
Starts actuator movement or continuous movement. (It is valid in the Teac (teach) mode area with the servo ON.)

16. **STOP** **key**
Stops actuator movement or continuous movement. (It is valid in the Teac (teach) mode area with the servo ON.)

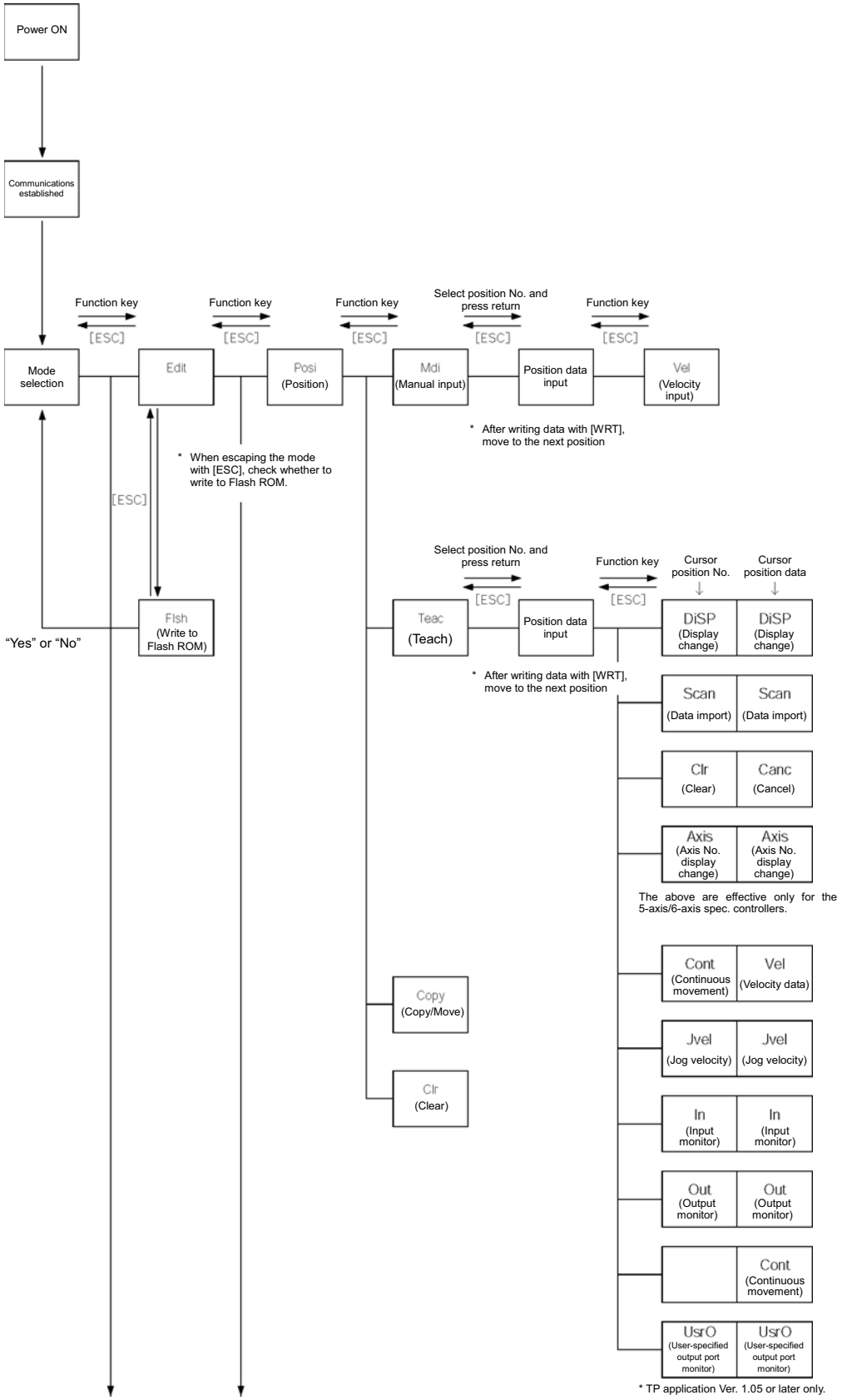
17. **←1** **1→** **←2** **2→** **←3** **3→** **←4** **4→** **(Jog keys)**

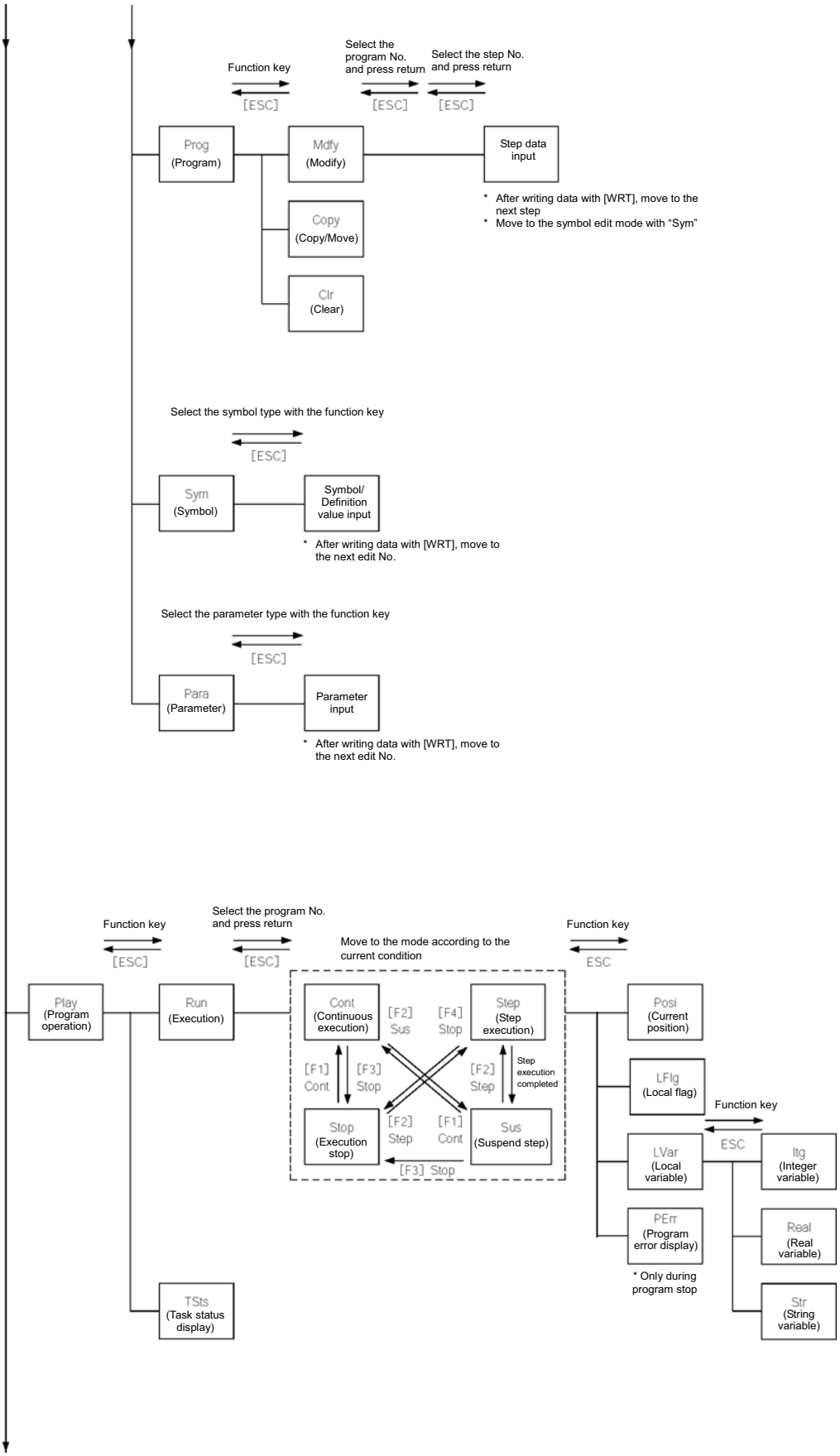
←1	Minus direction jog movement for the 1st axis and 5th axis	(It's valid in the Teac (teach) mode area with the servo ON
1→	Plus direction jog movement for the 1st axis and 5th axis	
←2	Minus direction jog movement for the 2nd axis and 6th axis	
2→	Plus direction jog movement for the 2nd axis and 6th axis	
←3	Minus direction jog movement for the 3rd axis	
3→	Plus direction jog movement for the 3rd axis	
←4	Minus direction jog movement for the 4th axis	
4→	Plus direction jog movement for the 4th axis	

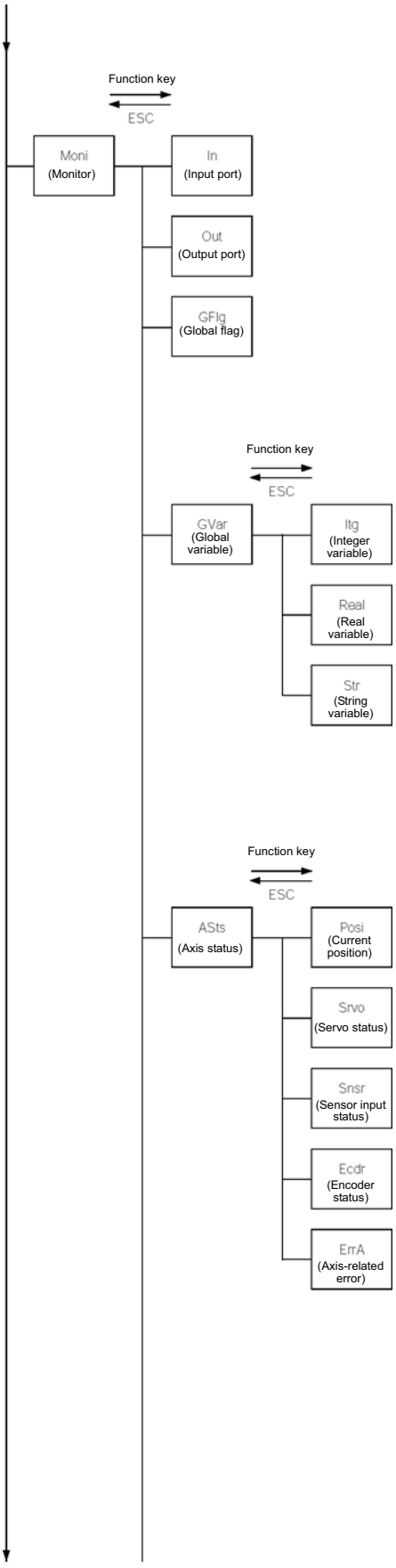
Caution

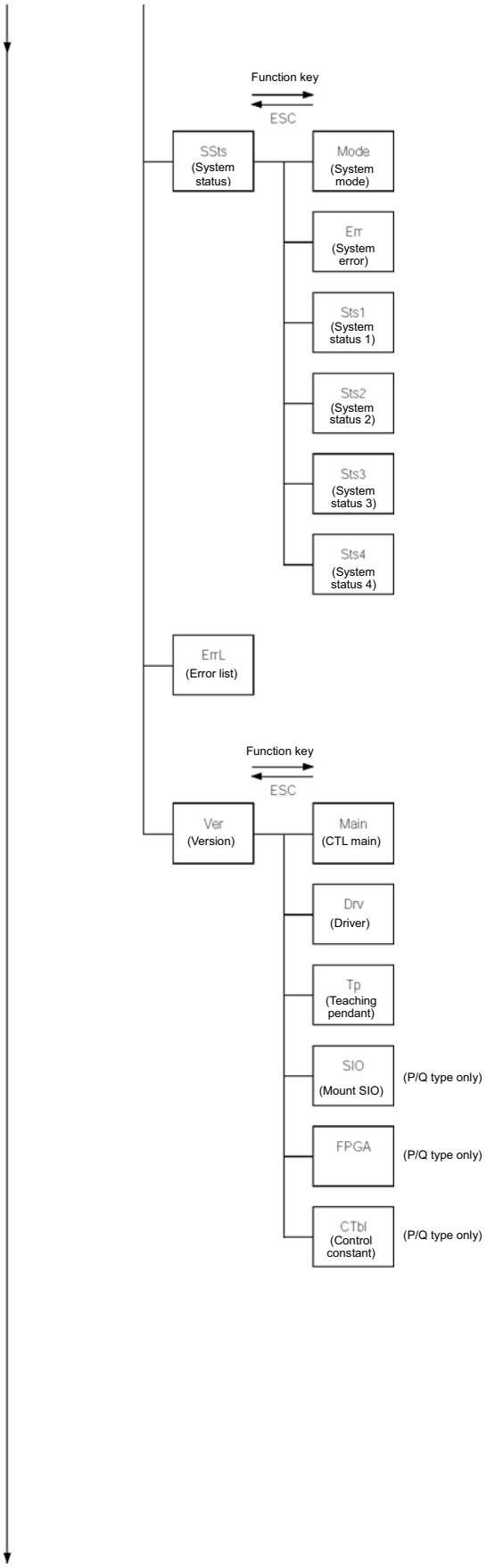
- Such jog actions with the JOG button are also valid for any not-homed axes. However, coordinate values in this case have no meaning. Therefore, be extremely careful about interference with the stroke end.
- If jog operation is performed to the axis in action under the operation-button-acceptable condition, the operation of the applicable axis is aborted when the JOG operation button is turned OFF. (The next operation starts, if any.)

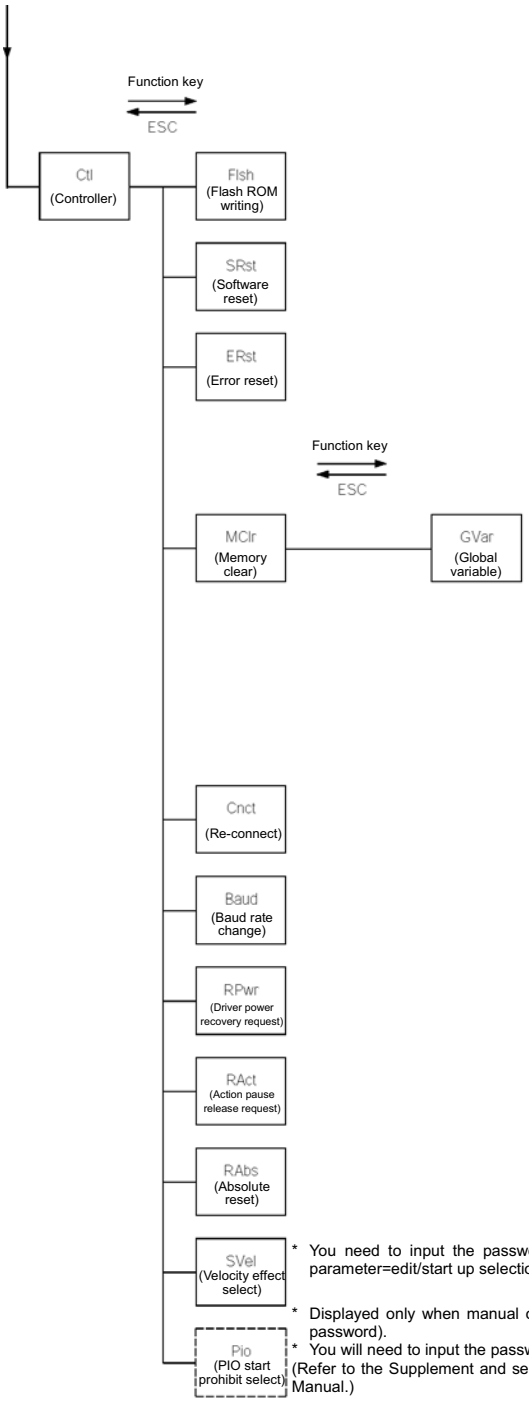
7. Mode Transition Diagram




Function key
[ESC]
Select the program No. and press return
[ESC]
Select the step No. and press return
[ESC]
Prog (Program)
Mdfy (Modify)
Step data input
* After writing data with [WRT], move to the next step
* Move to the symbol edit mode with "Sym"
Copy (Copy/Move)
Clr (Clear)
Select the symbol type with the function key
[ESC]
Sym (Symbol)
Symbol/ Definition value input
* After writing data with [WRT], move to the next edit No.
Select the parameter type with the function key
[ESC]
Para (Parameter)
Parameter input
* After writing data with [WRT], move to the next edit No.
Function key
[ESC]
Select the program No. and press return
[ESC]
Move to the mode according to the current condition
Function key
ESC
Play (Program operation)
Run (Execution)
Cont (Continuous execution)
[F2] Sus
[F4] Stop
Step (Step execution)
[F1] Cont
[F3] Stop
[F2] Step
Step execution completed
Stop (Execution stop)
[F2] Step
[F1] Cont
Sus (Suspend step)
[F3] Stop
Posi (Current position)
LFlg (Local flag)
Function key
ESC
LVar (Local variable)
Itg (Integer variable)
Real (Real variable)
Str (String variable)
PErr (Program error display)
* Only during program stop
TSts (Task status display)

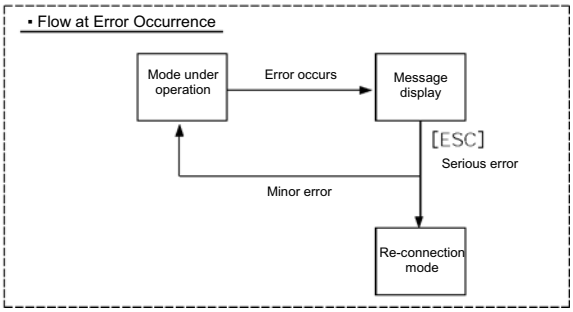

Function key
ESC
Moni
(Monitor)
In
(Input port)
Out
(Output port)
GFlg
(Global flag)
Function key
ESC
GVar
(Global variable)
Itg
(Integer variable)
Real
(Real variable)
Str
(String variable)
Function key
ESC
ASts
(Axis status)
Posi
(Current position)
Srvo
(Servo status)
Snsr
(Sensor input status)
Ecdr
(Encoder status)
ErrA
(Axis-related error)


Function key
ESC
SSts
(System status)
Mode
(System mode)
Err
(System error)
Sts1
(System status 1)
Sts2
(System status 2)
Sts3
(System status 3)
Sts4
(System status 4)
ErrL
(Error list)
Function key
ESC
Ver
(Version)
Main
(CTL main)
Drv
(Driver)
Tp
(Teaching pendant)
SIO
(Mount SIO)
(P/Q type only)
FPGA
(P/Q type only)
CTbl
(Control constant)
(P/Q type only)



* You need to input the password to change setting, when manual operation classification parameter=edit/start up selection (with password).

* Displayed only when manual operation classification parameter=edit/start up selection (with password).
* You will need to input the password to change setting.
(Refer to the Supplement and section 8 “Manual Operation” in the X-SEL Controller Instruction Manual.)

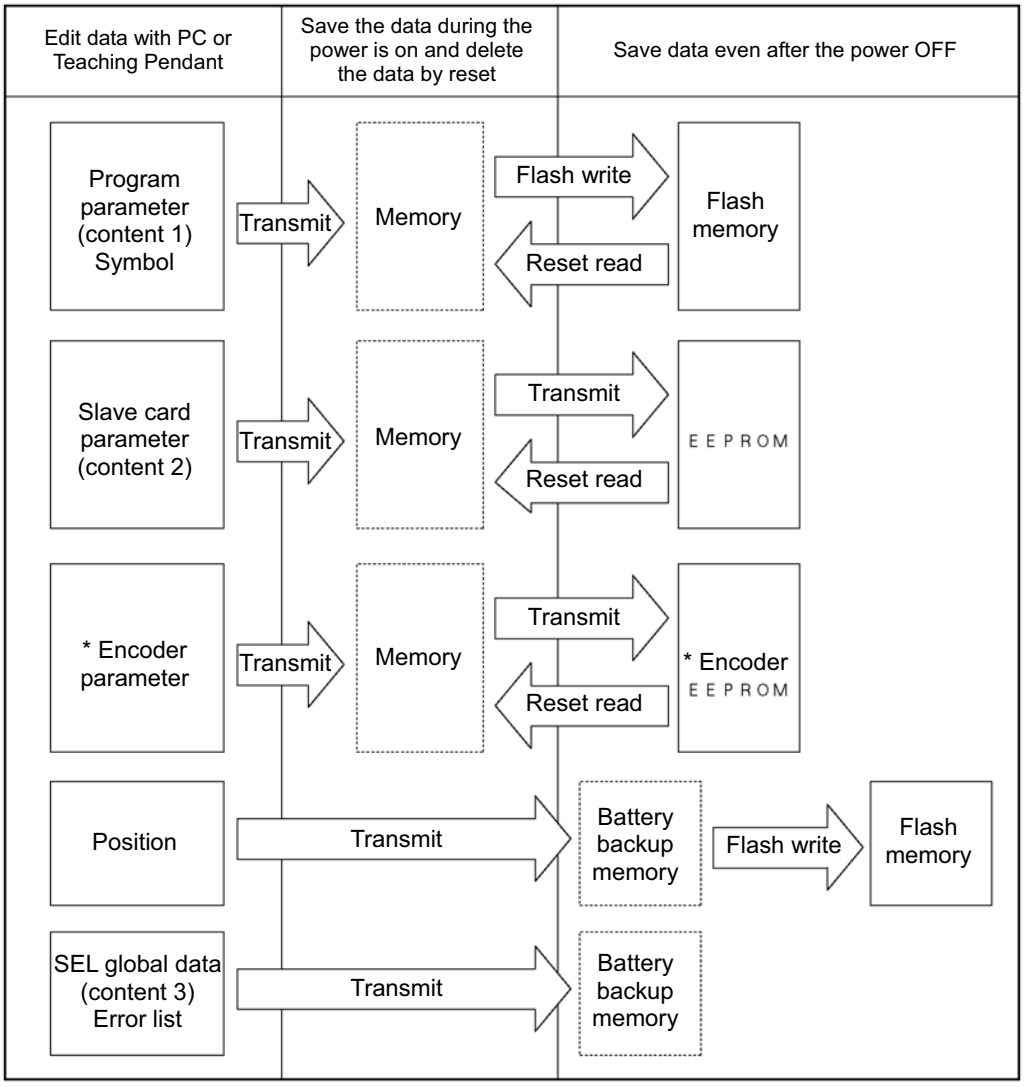


8. How to Save Data

Since the X-SEL Controller adopts flash memory, there is a storage area by battery backup and a storage area by flash memory according to the data to be stored.
In addition, even if data is transferred from the PC software or Teaching Pendant, the data is only to be written in memory as shown in the chart below and the data is erased by power-off or controller reset.
To ensure data storage, write the data you want to store in flash memory.

8-1. Set-up at Shipment with System Memory Backup Battery

(Other parameter No. 20=2 (System memory backup battery equipped))



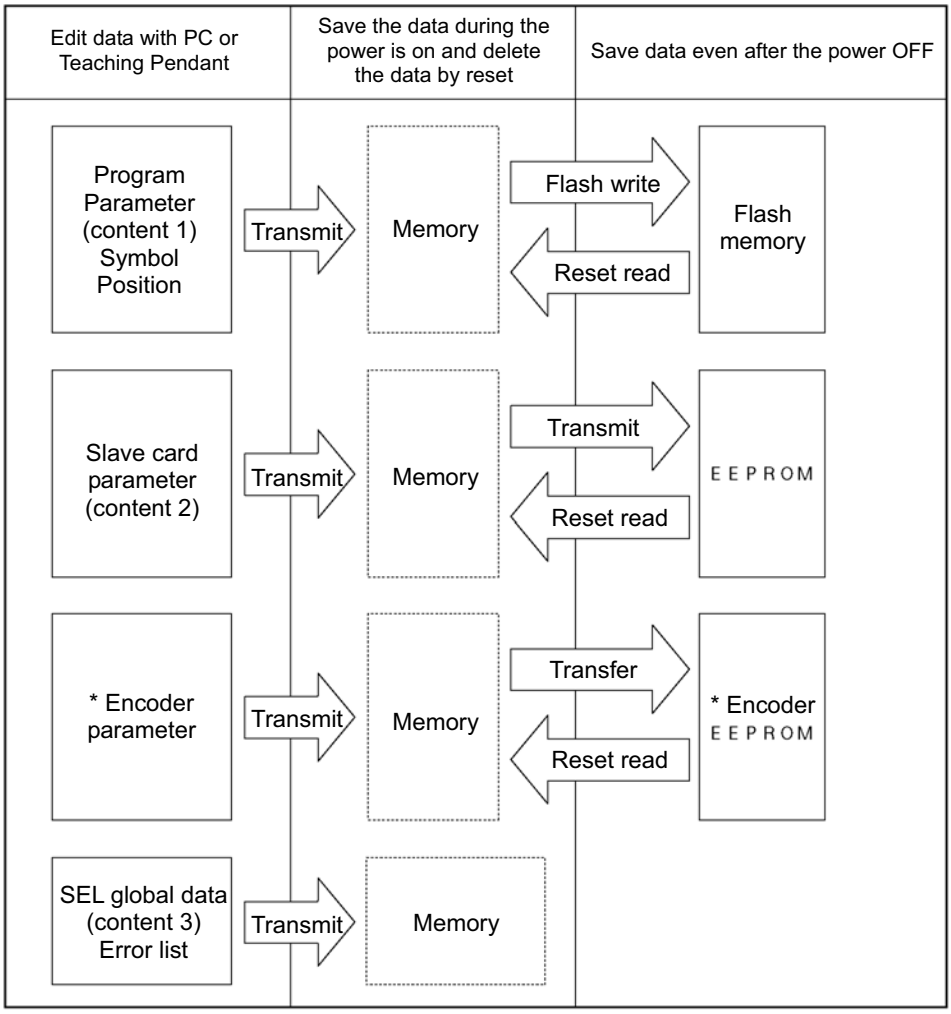
* Encoder parameters are not stored within the controller but in the EEPROM of the actuator's encoder itself. They are read into the controller at power-on or software-reset time.

Since the program, parameter, and symbol will be read from flash memory at restart time, the data in memory becomes the original data before editing unless the data is written in flash memory.
The controller always operates according to the data in memory (within the dotted box) excluding parameters.

Content 1: Parameters excluding content 2 below and encoder parameter
Content 2: Driver card, IO slot card (electric power type card) parameter
Content 3: Flag, Variable, and String

8-2. Set-up at Shipment without System Memory Backup Battery

Other parameter No.20=0 (System memory backup battery unequipped)



Since the program, parameter, symbol, and position will be read from flash memory at restart time, the data in memory becomes the original data before editing unless the data is written in flash memory.
The controller always operates according to the data in memory (within the dotted box) excluding parameters.
Note: SEL global data can't be saved without the backup battery.

8-3. Caution

Cautions in data transfer and flash writing

Never shut OFF the main power while the data is transmitting and writing into flash.

Data may be lost and controller may be rendered inoperable.

Cautions in storing parameters in a file

Encoder parameters are stored in EEPROM of the actuator's encoder itself (not in EEPROM within the controller, which is different from the other parameter types). When the power is turned on or software is reset, encoder parameters are read from EEPROM into the controller.

Therefore, if you store the parameters of the controller, which has been powered on or of which software has been reset when the actuator (encoder) is not connected, in a file, the encoder parameters stored in this file become invalid values.

Cautions in transferring a parameter file to controller

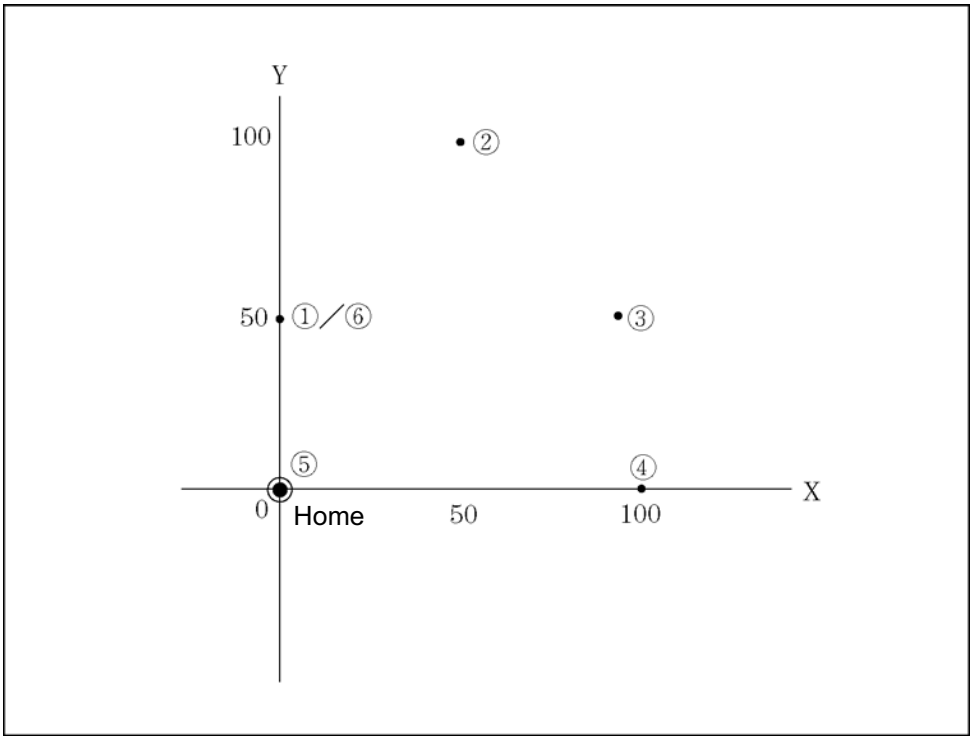
When the parameter file is transferred to the controller, the encoder parameters are transferred to EEPROM of the encoder (excluding manufacturing information and function information).

Therefore, if you transfer the parameter file read from the controller, which has started up when the actuator is not connected, to the controller (which is connected to the actuator), the encoder parameters of invalid values are written in EEPROM of the encoder.

When storing the parameters in a file, do so when the actuator is connected.

9. Simple Operation Procedure

Here, the program and position data to draw a simple “pentagon” passing through the following 6 points (① and ⑥ are same position) by the actuator of 2 axes (X, Y) are created.



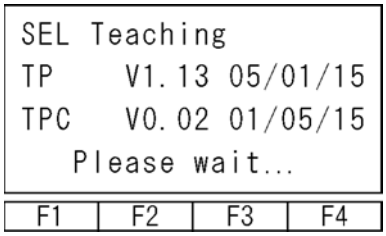
Position Data (① to ⑥)

9-1. Creation of Position Data

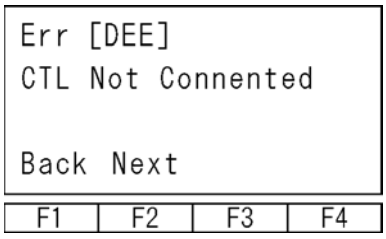
Input 6 points position data which can draw pentagon as the following position data list.

No.	Axis1	Axis2	Vel	Acc	Dcl
1	0.000	50.000	xxxx	x.xx	x.xx
2	50.000	100.000	xxxx	x.xx	x.xx
3	100.000	50.000	xxxx	x.xx	x.xx
4	100.000	0.000	xxxx	x.xx	x.xx
5	0.000	0.000	xxxx	x.xx	x.xx
6	0.000	50.000	xxxx	x.xx	x.xx

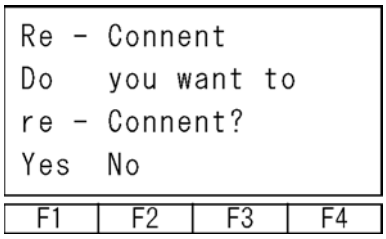
Connect the teaching pendant to the controller and turn on MODE switch to MANU side.
Supply the power to the controller.



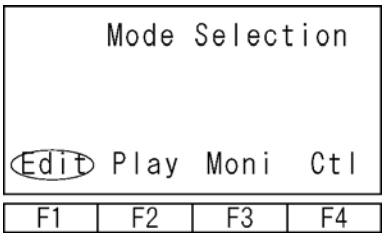
Display the version of the teaching pendant and move to the mode selection screen. (to the following page)



If the MODE switch is AUTO side, the teaching pendant does not connect to the controller and display as the screen on the left. Press ESC key to make it re-connection display.



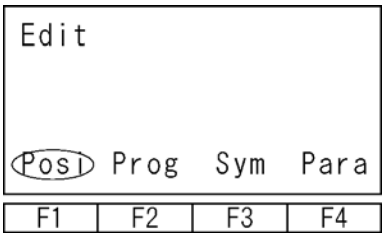
Turn on MODE switch to MANU side and press F1 (Yes) key to re-connect.



Mode Selection Screen

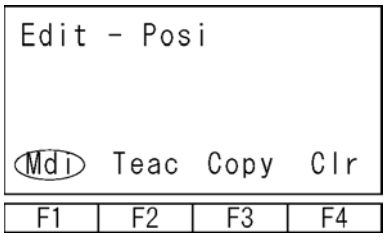
This is the basic screen for all operations.
Press the F1 key (Edit).

* If you make a wrong selection or input, press the ESC key and return to the previous screen. Then, you can continue operation. You can return to the basic screen by pressing the ESC key several times from any screen.



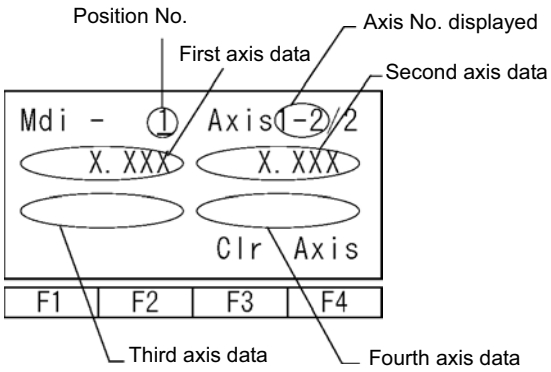
Edit Mode Screen

Press the F1 key (Posi).



Position (Position Data) Edit Screen

Press the F1 key (Mdi).



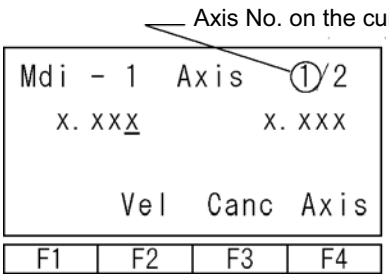
The above is the display of a 2 axis controller. Nothing displays in the 3rd and 4th axes data location.

Position No. Input Mode

The cursor is placed at position No.
If there is no data, x.xxx will be displayed. Press the return key and place the cursor at first axis position data.

* If the data is already input , write over (original data is gone) or use the PAGE UP · PAGE DOWN keys to be placed at x.xxx and then input the data.
  Clear all axis input data by pressing the F1 (Clr) key twice. You can clear the controller data with (Clr) key even if the WRT key is not pressed.

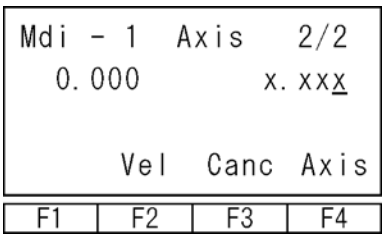
When input the 5th and 6th axes data, press the F4 (Axis) key to switch the display to the 5th and 6th axes data display screen.
(The F4 (Axis) key is used to switch the 1st to 4th axes display screen to the 5th and 6th axes display screen.)



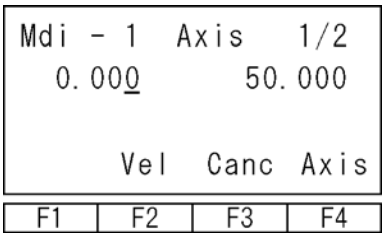
① Data input for the first point

Input 0 (number) and press the return key, 0.000 will be displayed and then the axis No. changes to 2 and the cursor position moves to the second axis position data.

* Position data can be input as 7 digit real having 3 decimal places. This is the maximum amount and range is different by actuator type, so, please check the catalogs.

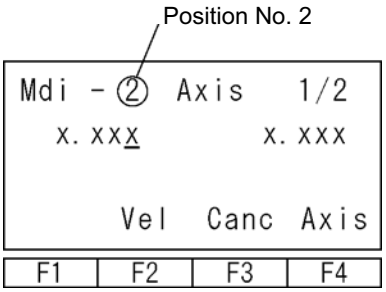


Input 50 at the second axis position data and press return key. (*Every press of return key, the cursor position moves. When you miss input, place the cursor to the miss input position and write over.)
Also you can return the input data to x.xxx with the F3 (Canc) key.



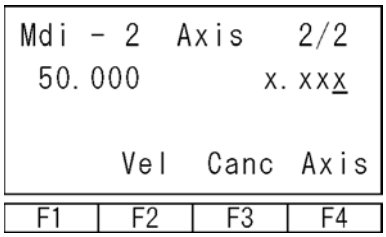
Transmit the data with the WRT key, position No. forwards 1 and becomes 2.

* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.

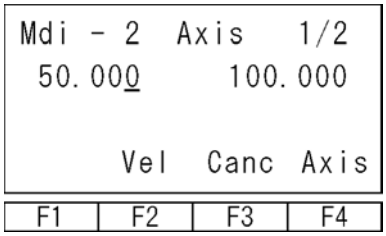


② Data input for the second point

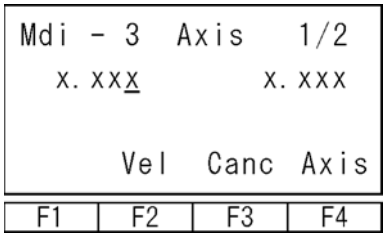
Input 50 on the first axis position data and press return key.



The cursor moves to the second axis position data. Input 100 and press return key.

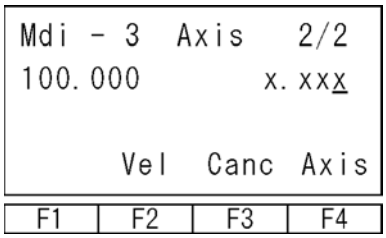


Transmit the data with the WRT key and move to position No. 3.

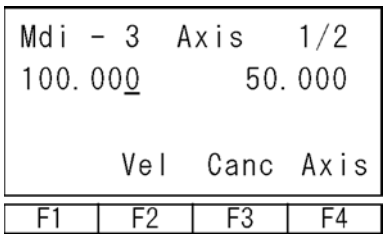


③ Data input for the third point

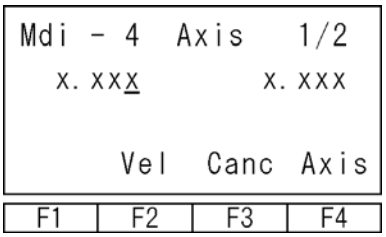
Input 100 for the first axis position data and press the return key.



Input 50 for the second axis position data and press return key.

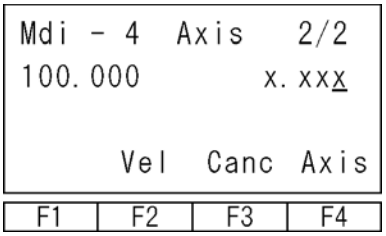


Transmit the data with the WRT key and move to position No. 4.

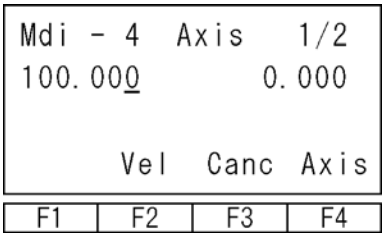


④ Data input for the fourth point

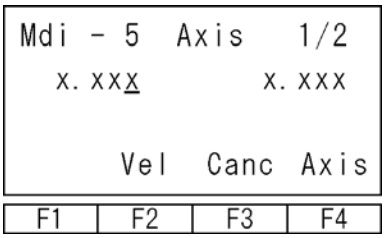
Input 100 for the first axis position data and press the return key.



Input 0 for the second position data and press the return key.

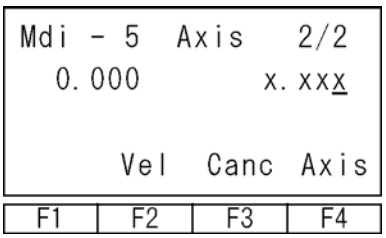


Transmit the data with the WRT key and move to position No. 5.

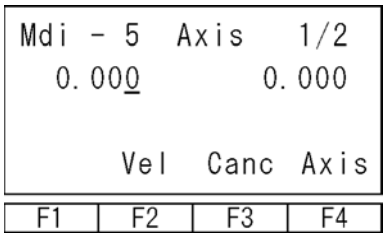


⑤ Data input for the fifth point

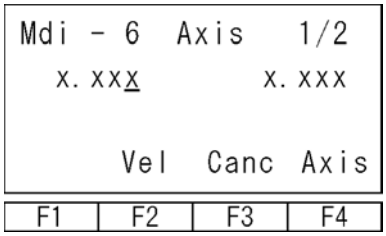
Input 0 for the first axis position data and press the return key.



Input 0 for the second axis position data and press the return key.

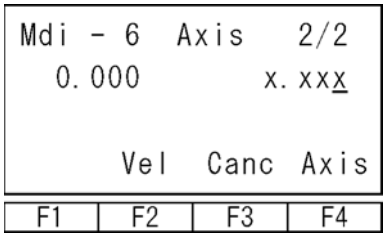


Transmit the data with the WRT key and move to position No. 6.

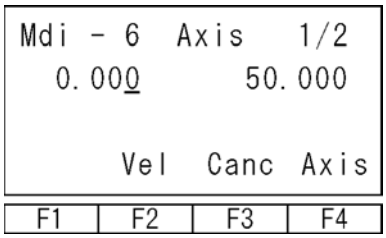


⑥ Data input for the sixth point

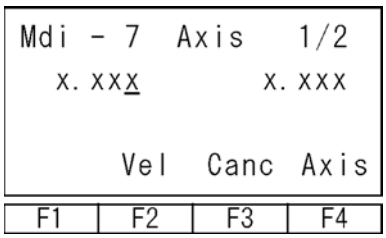
Input 0 for the first axis position data and press the return key.



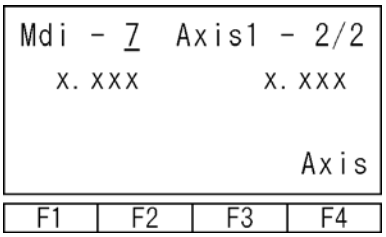
Input 50 for the second axis position data and press the return key.



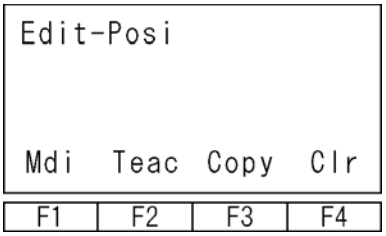
Transmit the data with the WRT key and move to position No.7.



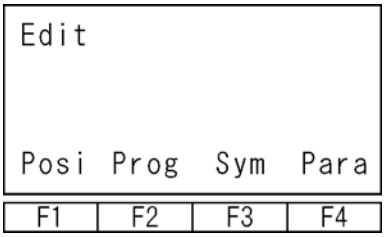
Finish editing, then write the data to Flash ROM.
The cursor moves to the position No. by pressing ESC key.



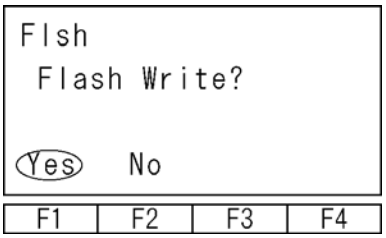
Return to the position edit screen by pressing the ESC key.



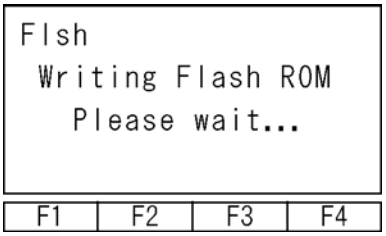
The edit mode screen will be appear by pressing the ESC key once more.



The Flash ROM writing screen will be appear by pressing the ESC key again.

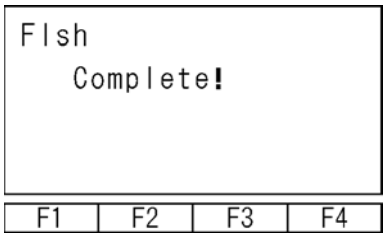


To write the data to Flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.

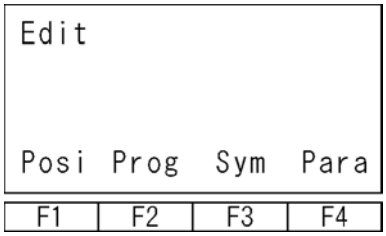


During Flash ROM writing, “Please Wait....” blinks.

*** Never shut off the power to the controller during Flash ROM writing.**



Go back to the edit screen by pressing the ESC key.



That's all for inputting basic position data.

9-2. Programming

Here, make a program by changing the data of the position data created in section 9-1.

Application Program List

No.	E	N	Cnd	Cmnd	Operand 1	Operand 2	Pst	Comment
1				HOME	11			
2				VEL	100			
3				MOVL	1			
4				MOVL	2			
5				MOVL	3			
6				MOVL	4			
7				MOVL	5			
8				MOVL	6			
9				EXIT				

This is the X-SEL program that was created in this chapter.
For the details of each command, please refer to the operating manual that comes with the controller.
Here, only input Cmnd (command) and Operand1 (operation 1) columns are used.

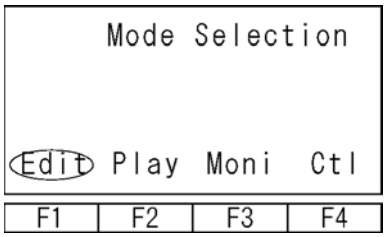
Caution for the HOME command:

For restart after homing temporary stop, execute it from the beginning of the homing sequence.

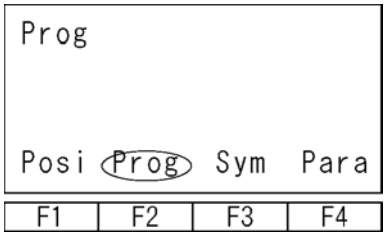
The homing operation of the ABS encoder axis becomes the movement to the multi-rotation data reset position.

When operation is reset during its execution in a mode other than the absolute reset mode of the PC compatible software/Teaching Pendant, the “real position soft limit error” may occur depending on the position. It is not recommended to execute homing at times other than during adjustment time of the absolute encoder axis.

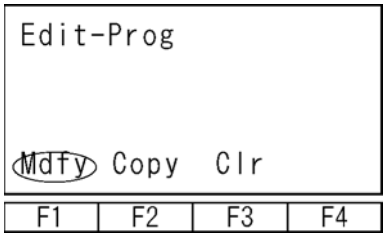
Use the HOME command only for the increment specification.



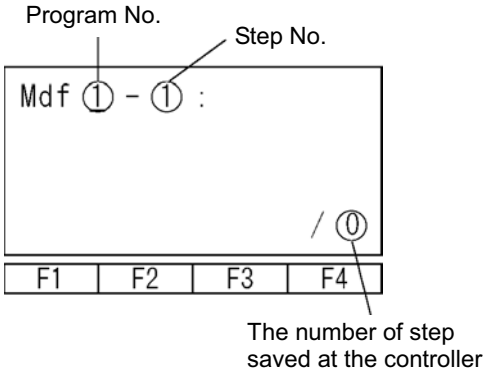
Select the F1 key (Edit) at the mode selection screen.



Select the F2 key (Prog) at the Edit Mode screen.



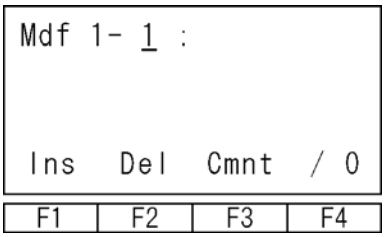
Select the F1 key (Mdfy) on the program edit and new creation screen.



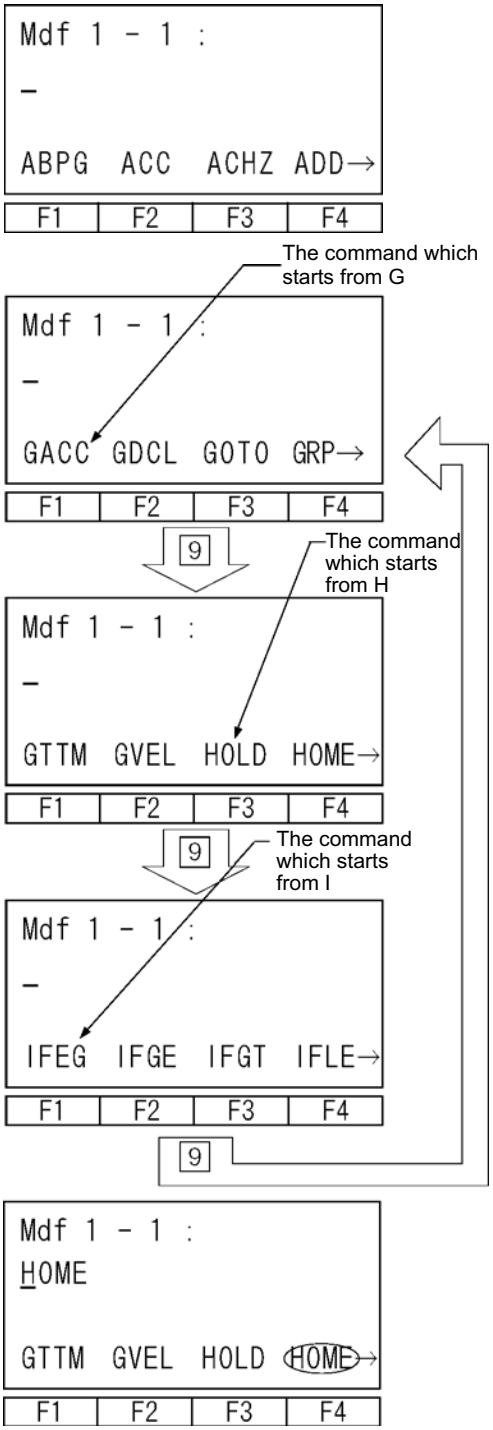
Change to the program No. input screen. The cursor is located at the program No. Move the cursor to the step No. with return key.

* If the program data is already input, write over (the data will be gone) or select the program No. which has no program data. The cursor location on program No. or step No. can be changed with PAGE UP · PAGE DOWN keys.

Also, you can change the program No. and step No., by pressing the return key after the 10 key input.



The Cursor moves to the appropriate step No. Press the return key.



Input commands.

Commands are displayed in the function key area.

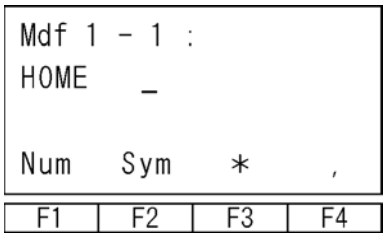
How to search the command

① When the cursor is located at commands input locations, commands are displayed in alphabetical order by pressing SF key.
② Alphabets are allocated on 10 keys. (ex. GHI are allocated to 9.) When the cursor is located at command input location, display the first command word which starts with each alphabet in the function key area each time by pressing the 10 key.
Display the command you'd like to input in the function key area with the steps of ① and ② above and press the corresponding function key.

How to search the command, HOME

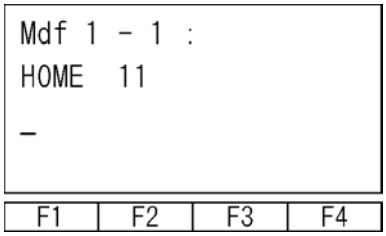
The commands which start with G, H, or I will be displayed by pressing the 9 key of the 10 keys. (Some commands can't be displayed by pressing one of the 10 keys. In this case, press the SF (shift) key and one of the 10 keys for more option.)

Display HOME in the function key area and press the F4 key (HOME). (If you want to backspace previous operation, press BS key.)
Press the return key.



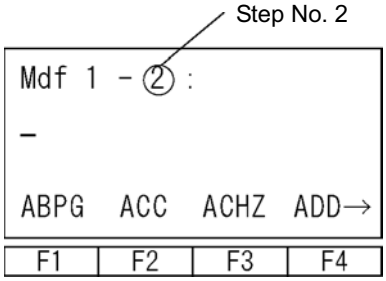
The cursor moves to operation 1.
Input 11 and press the return key.

When you redo an input
Move the cursor where you want to redo an input by pressing the ← key and return key. Write over or delete with BS (backspace) key. Or redo from step No. by using ESC key.

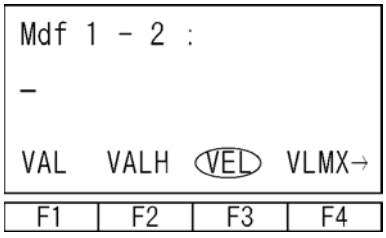


Transmit data to the controller by pressing the WRT key.
Step No. moves to 2.

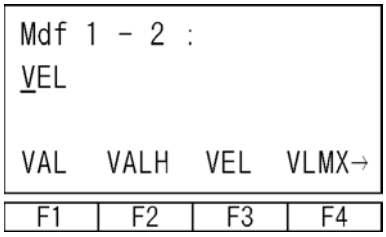
* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.



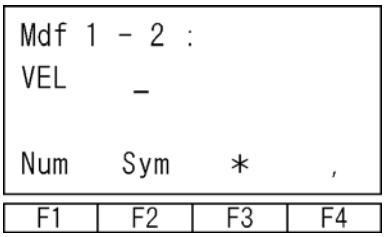
Press the 10 key, 2 or SF(shift) key to search VEL.



Select the F3 key (VEL).

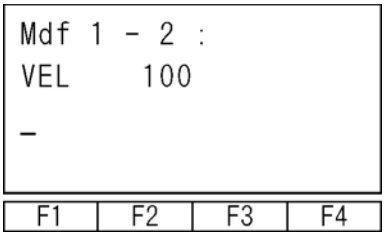


Press the return key.



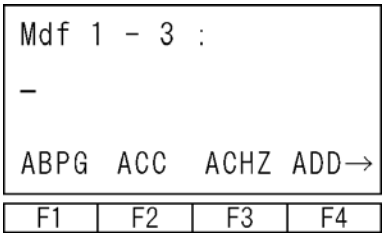
Here, input the velocity* as 100, and press the return key.

* Check the maximum velocity listed in the catalogs. When velocity is input into position data, priority is given there.

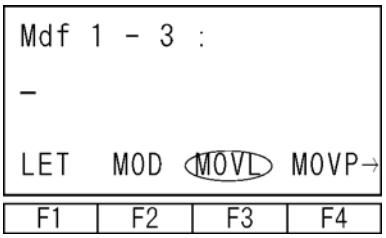


Transmit the data to the controller by pressing the WRT key.
The cursor moves to step No. 3.

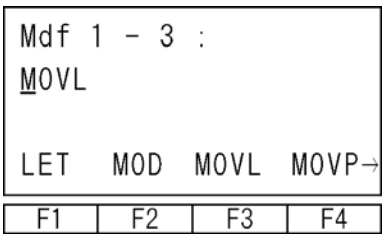
* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.



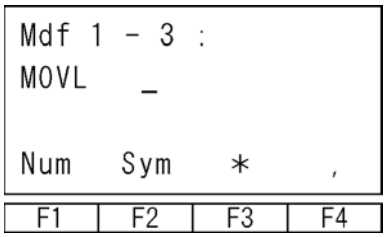
By using the 5 and SF(shift) keys, this will display the MOVL.



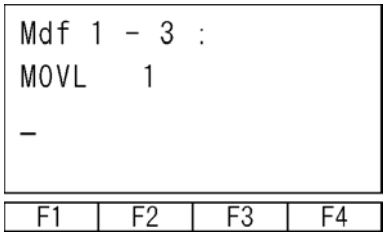
Select the F3 key (MOVL).



Press the return key.
The cursor moves to operation 1.

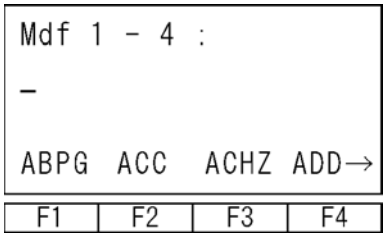


Input 1 on position No. and press the return key.

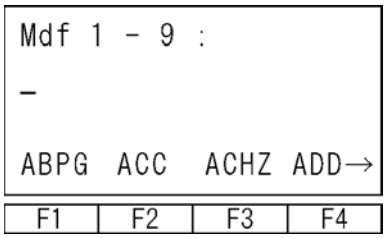


Transmit the data to the controller by pressing the WRT key.
The cursor moves to step No.4.

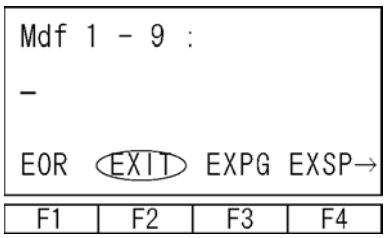
* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.



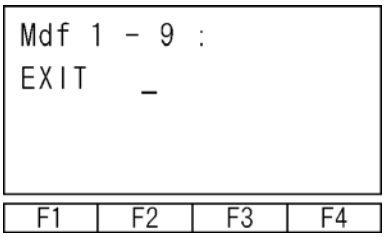
Input MOVL 2 ~ MOVL 6 program data into steps No. 4~8 by the same procedure and transmit the data to the controller.



Display EXIT in the function key area by using the 8 and SF keys.

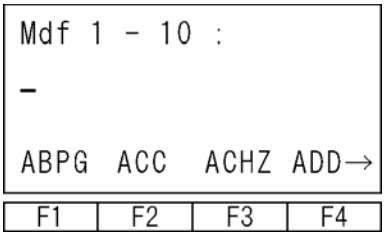


Select the F2 key (EXIT) and press the return key.

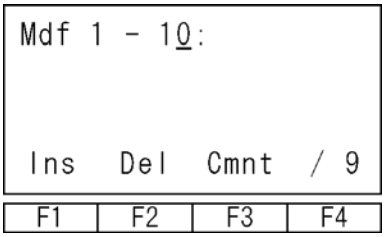


Transmit the data to the controller by pressing the WRT key.

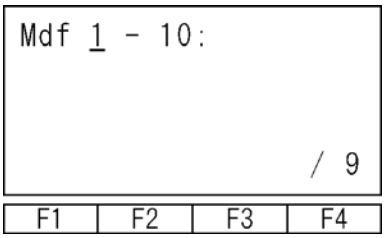
* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.



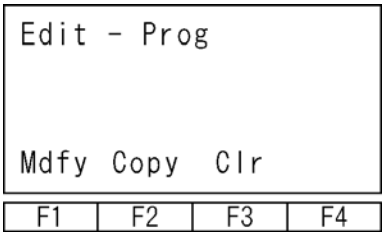
Finish editing the program and write the data to Flash ROM.
Press the ESC key.
(The cursor moves to the step No.)



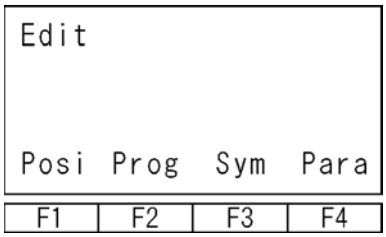
Press the ESC key.
(The cursor moves to the program No.)



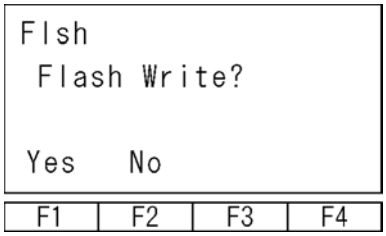
Press the ESC key.
Return to the program edit screen.



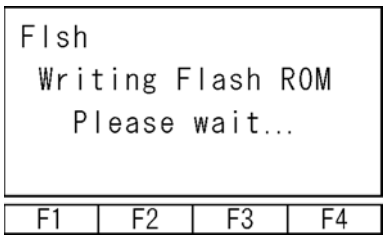
Press the ESC key.
Return to the edit screen.



Press the ESC key.

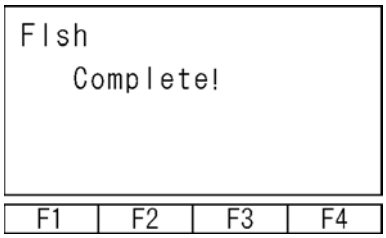


To write the data to Flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



During Flash ROM writing, “Please Wait....” blinks.

*** Never shut off the power to the controller during Flash ROM writing.**

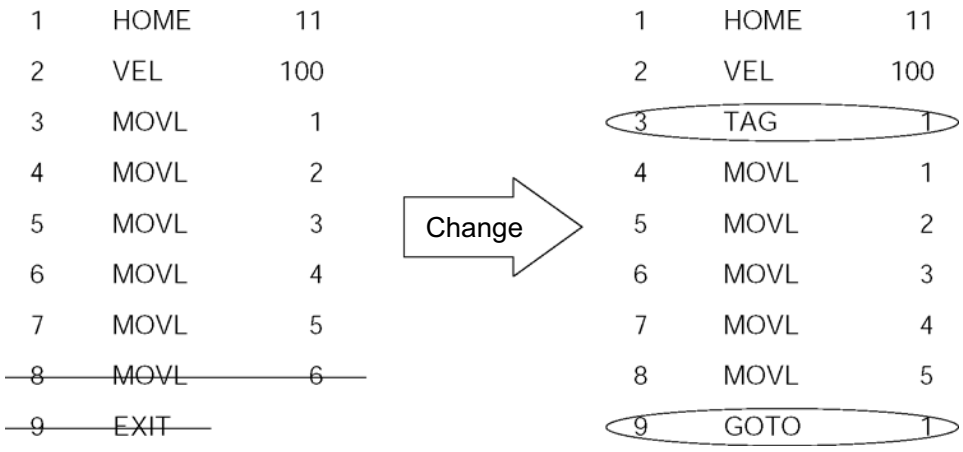


Flash ROM writing is complete.
Return to the edit screen with the ESC key.

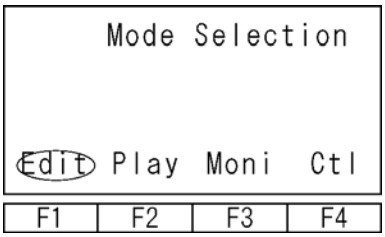
9-3. Changing Application Program

Change the program you made in the previous section (9-2).

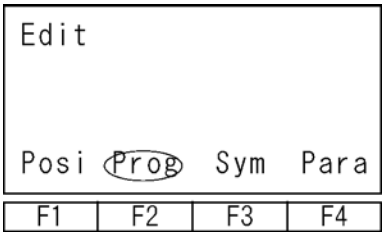
Insert and delete the program step to allow the same action to be repeated.



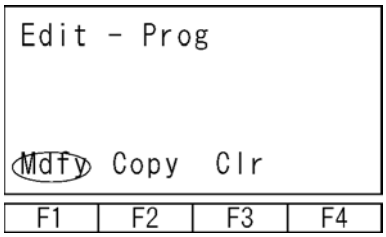
Insert “TAG 1” into step No.3, delete the line which displays “MOVL 6,” and write over “GOTO 1” replacing it with “EXIT.”



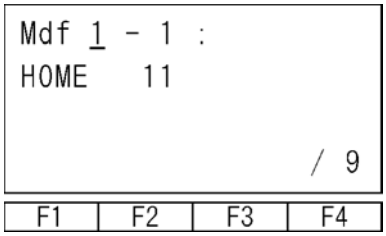
Select the F1 key (Edit) on the mode selection screen.



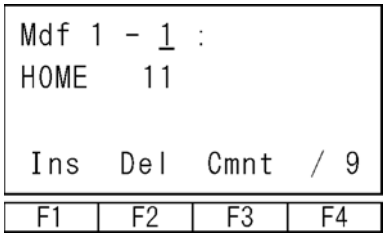
Press the F2 key (Prog) on the program mode screen.



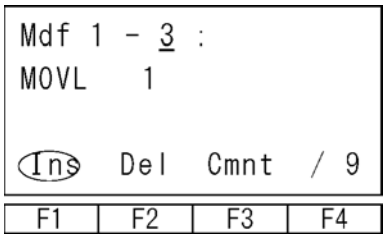
Select the F1 key (Mdfy) on the program edit and new creation screen.



Change to the program edit mode screen. Press the return key once and position the cursor at the step No.

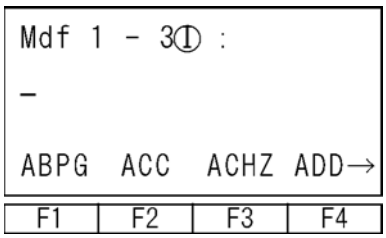


Insert a 1 line step between step No. 2 and 3. Input 3 by pressing “3” or display 3 by pressing the PAGE UP key twice.

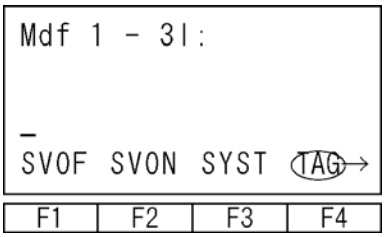


Select the F1 key (Ins).

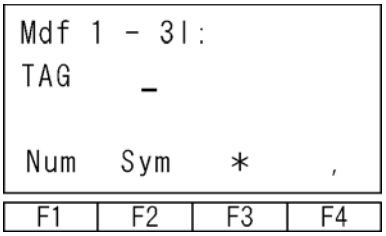
I, Insert of I will be displayed after step No. 3.



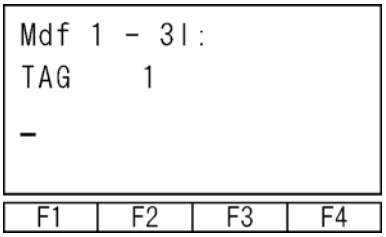
Display “TAG” by using the 1 key or the SF (shift) key.



Select the F4 key (TAG) and press the return key.

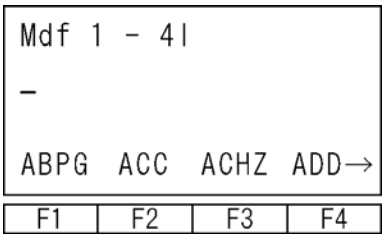


Input 1 into operation 1 and press the return key.

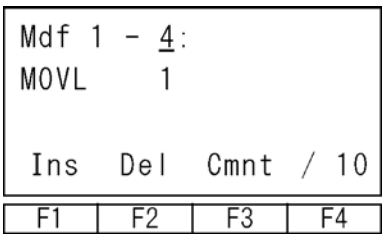


Transmit the data to the controller by pressing the WRT key.

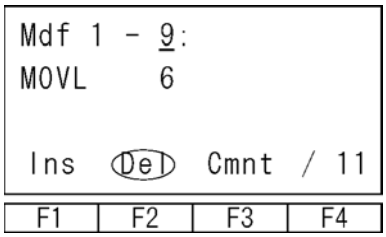
* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.



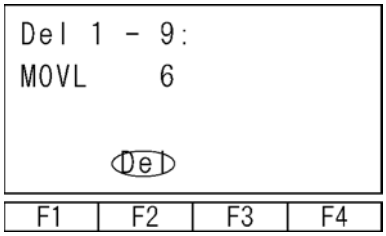
Display the step No. 4 screen by pressing the ESC key twice.



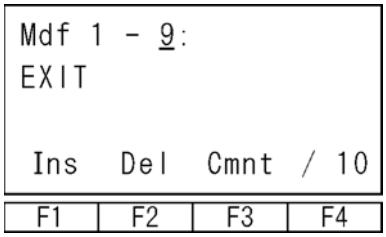
Delete the “MOVL 6.” Input 9 for the step No. by pressing the 9 key directly to the same cursor location or display the “MOVL 6” by pressing PAGE UP key 5 times.
(The cursor is located at step No.9.)



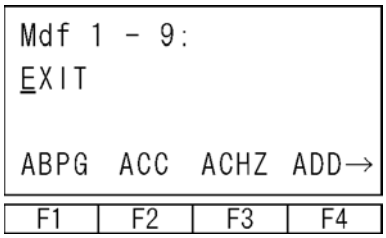
Press the F2 key (Del).



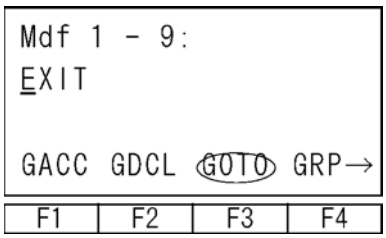
Press the F2 key (Del) one more time.
(If you wish to cancel deleting, press the ESC key.)



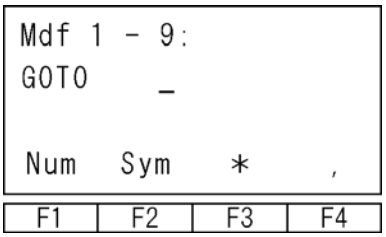
Press the return key.



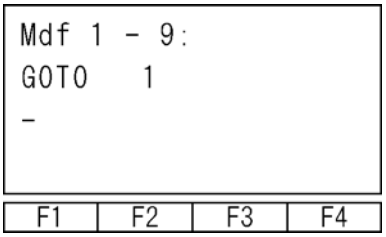
Display “GOTO” by using the 9 key or SF (shift) key.



Select the F3 key (GOTO) and press the return key.

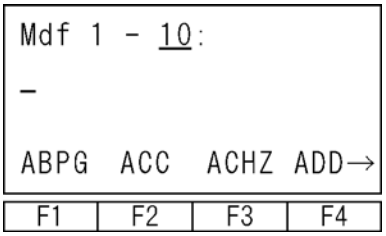


Input the same value you input at “TAG” operation 1 on operation 1. Here, input 1 and press the return key.

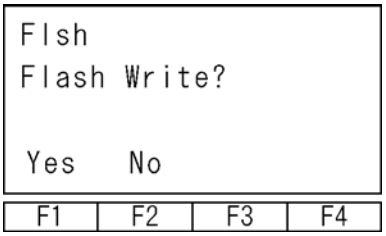


Transmit the data to the controller by pressing the WRT key.

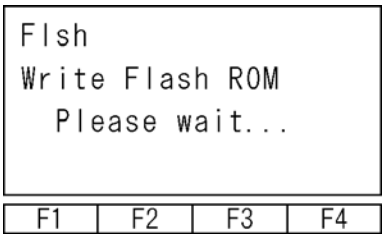
* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.



Press the ESC key several times and move to the Flash ROM writing screen.

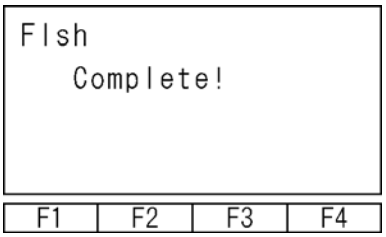


To write the data to Flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



During Flash ROM writing, “Please Wait....” blinks.

*** Never shut off the power to the controller during Flash ROM writing.**

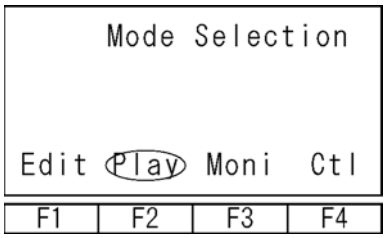


Flash ROM writing is complete.
Return to the edit screen with the ESC key.

10. Program Execution

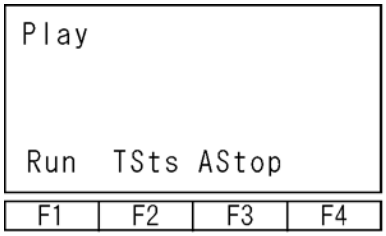
Execute the program made at the previous chapter.

10-1. Operation Confirmation



Play Mode Screen

Press the F2 (Play) key from the mode selection screen and move to the play mode screen.



There are 3 kinds of items at the play mode screen:

F1 (Run): Move to the program No. input screen to execute.

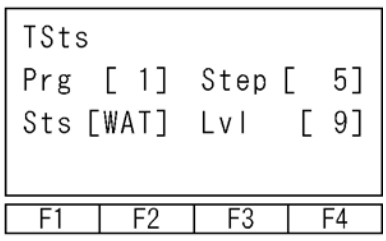
F2 (TSts): Move to the task status screen which is already executing.

F3 (AStop): Finish all programs which are executing.

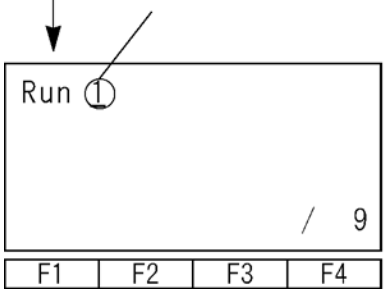
(F2 and F3 keys are function keys which are used after executing programs.)

Finish all programs

Task Status



Programs No.

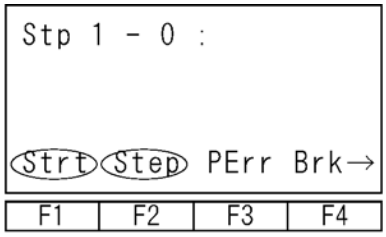


The cursor is located at the program No. Input the program No. you'd like to execute with the PAGE UP · PAGE DOWN keys and press the return key.

Move to the operation mode selection screen.

Select step by step execution or the continuance operation.

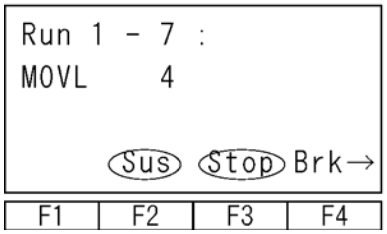
Operation Mode Selection



Start the continuance operation by pressing the F1 (Strt) key.

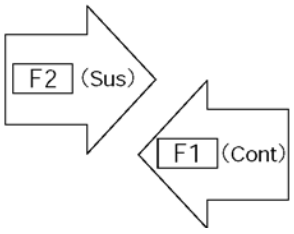
Start the operation by pressing the F2 (Step) key.

Continuance Operation Mode

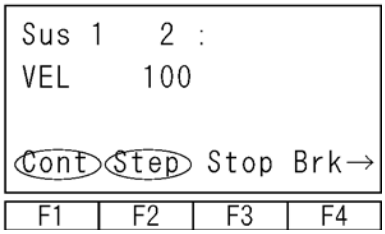


Display the current executing program step. (except continuance movement commands)

Switch to the step operation by pressing the F2 (Sus) key.
Select the finish operation by pressing the F3 (Stop) key.

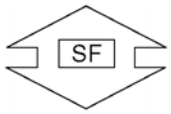


Step Operation Mode



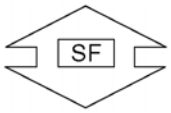
After displaying the current executing program step, display the next step.

Execute programs step by step, each time you press the F2 (Step) key.
Switch to continuance operation by pressing the F1 (Cont) key.
Select the finish operation by pressing the F3 (Stop) key.



The monitor under operation

F1 (Posi): Display Current Position
F2 (LFlg): Local Flag
F3 (LVar): Local Variable



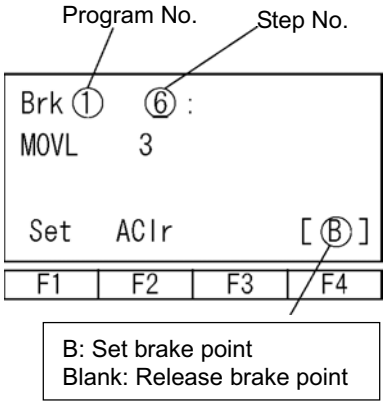
The monitor under operation

F1 (Posi): Display Current Position
F2 (LFlg): Local Flag
F3 (LVar): Local Variable

Note: When the teaching pendant is connected, it is in the “Safety Velocity Specified” state. Therefore, the setting of program and parameter doesn’t effect to maximum velocity and it is always under 250mm/sec.
For the switching safety velocity mode, please refer to “16-8. Safety Velocity.”

10-2. Setting of Brake Point

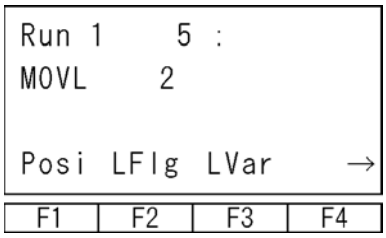
Brake point can be set with the continuance operation. Press the F4 (Brk) key in the operation mode selection screen or the operation mode screen.



Select the step No. to set brake point by pressing the PAGE UP · PAGE DOWN keys.
Execute setting and releasing the brake point each time you press the F1 (Set) key.
When you release all the set brake points, press F2 (Aclr) key.
When executing the continuance operation with the brake point, the program will be paused before executing commands for the step No. you set.
After pausing, press the F1 (Cont) key to continue executing rest of the program. Or execute the step operation by pressing F2 (Step) key.

10-3. Monitor under Operation

The current position of the actuators and data in the local area can be monitored during continuous operation.
Press the SF (shift) key at the continuance operation mode screen or the step operation mode screen.



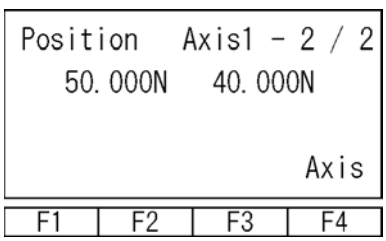
Monitor items will be displayed in the function key area.

F1 (Posi): Display Current Position
F2 (LFlg): Local Flag
F3 (LVar): Local Variable

(1) Display the Current Position

Display the current position of the actuators.
Select the F1 (Posi) key at the operation mode screen.

Mode Transition: PLAY – Run – Strt – Posi
Step – Posi



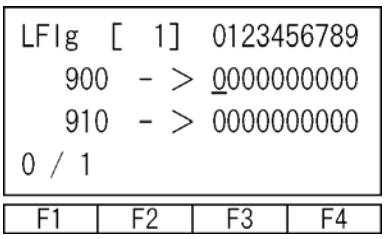
N/F, which is the end of position data indicates servo ON/OFF status.
N: servo ON, F: servo OFF

(2) Local Flag

This is the local flag On/OFF display. It can be switched ON/OFF.

Press the F2 (LFlg) key on the operation mode screen.

Mode Transition: PLAY — Run — Strt — LFlg / Step — LFlg

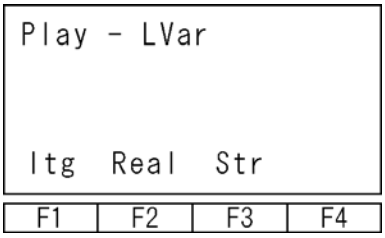


The local flag where the cursor is located can be switched ON/OFF each time by pressing the F1 (0/1) key.
The cursor location can be moved with the return key and ← key.
The screen displays 20 Flag Nos. at a time by pressing the PAGE UP · PAGE DOWN keys.

(3) Local Variable

Displays the contents of the local variables and the local strings. Moreover, values can be substituted for a local variable and the character sequence can be substituted for a local string.

Select the F3 (LVar) key on the operation mode screen.

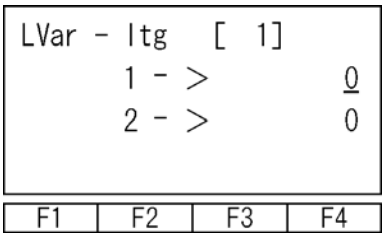


3 kinds of local variables are displayed:

F1 (Itg): Integer
F2 (Real): Real Number
F3 (Str): String

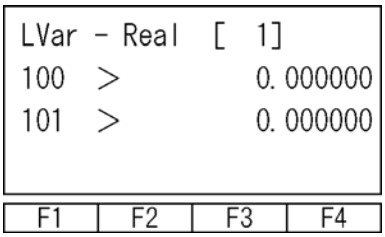
① Local Integer variable

Mode Transition: PLAY — Run — Strt — LVar — Itg / Step — LVar — Itg



② Local Real Variable

Mode Transition: PLAY — Run — Strt — LVar — Real / Cont — LVar — Real

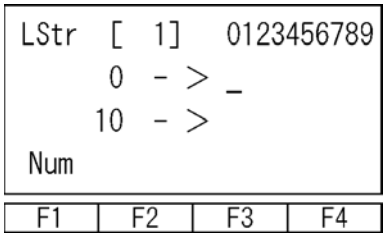


The cursor is located in the data area (contents of variable). You can substitute values by inputting value by pressing one of 10 keys and pressing the return key. Move the cursor location with the return key and ← key.

The variable No. can be changed with the PAGE UP · PAGE DOWN keys.

③ Local String

Mode Transition: PLAY—Run—Strt—LVar—Str
Run—Step—LVar—Str



The cursor is located in the data area (column). Input the ASCII code by pressing one of 10 keys and press return key to substitute letters. (Convert hexadecimal A~F to alphabet with the F1 (Alph/Num) key and then input substitution.)
Move the cursor location with the return key and ← key.
The PAGE UP · PAGE DOWN keys scrolls the cursor every 20 columns each time they are pressed .

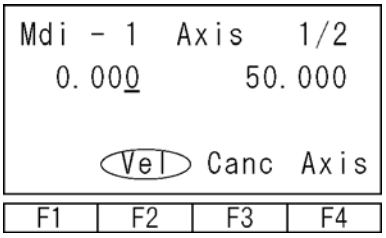
11. Position Edit

11-1. Mdi (Manual Direct Input)

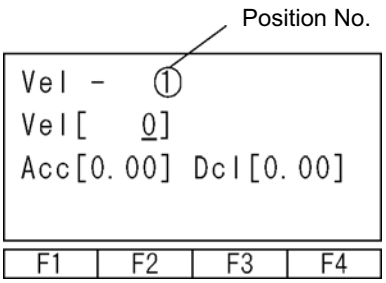
The input value of the position data can be entered with the 10 numeric keys.
For inputting input data for a coordinate by using the 10 numeric keys, please refer to “9. Simple Operation Procedures.”

How to input Vel (Velocity), Acc (Acceleration), and Dcl (Deceleration) on each position No.

Mdi (Manual Direct Input)
Transit to the Manual Direct Input screen: Edit → Posi → Mdi → Position No. Return

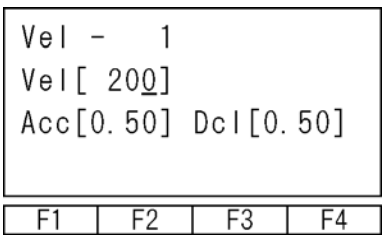


Vel is displayed at the function key area of the data input screen for each axis. Press the F2 (Vel) key.



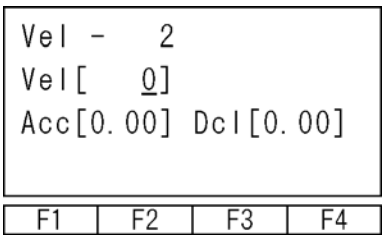
Vel · ACC · Dcl Input Screen

Move the cursor with the return key and input the value to the required place by using the 10 keys. Then press the return key.



After input, transmit the data to the controller with the WRT key.

* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.



The position No. will be incremented and the next input screen, Vel · Acc · Dcl, will be displayed.

11-2. Teach (Teaching)

Teaching is one way to input position data moving the actuator to an arbitrary position and getting that actuator's current position as data.
Methods for moving the actuators to a designated position are the jog, inching, and manual operation with a servo OFF status.

The fundamental flow of teaching is as follows:

① Move the actuator. (Jog operation · inching operation · manual movement with a servo OFF status)
Select position No. and axis No. for data input.

↓

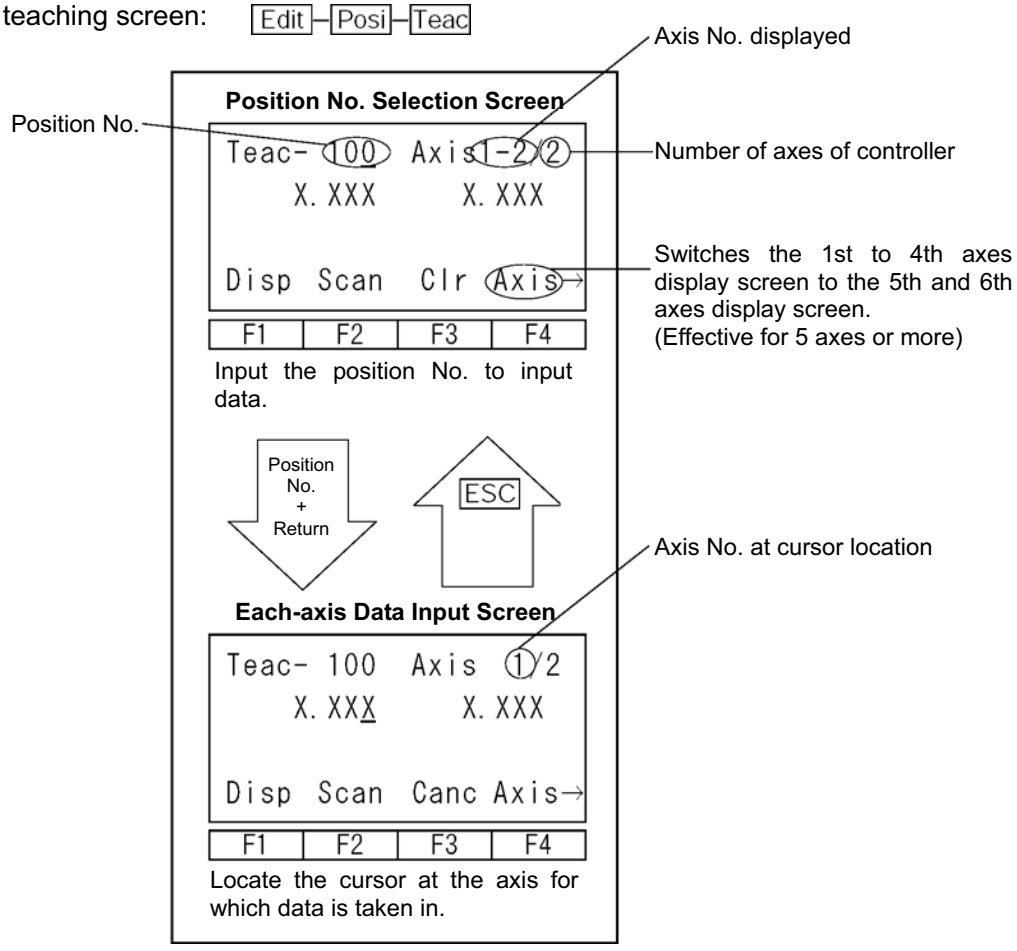
② Take the data of the current position of the actuator into the data input screen.

↓

③ Transmit the data to the controller.

Input the position data by teaching and repeating ①~③.

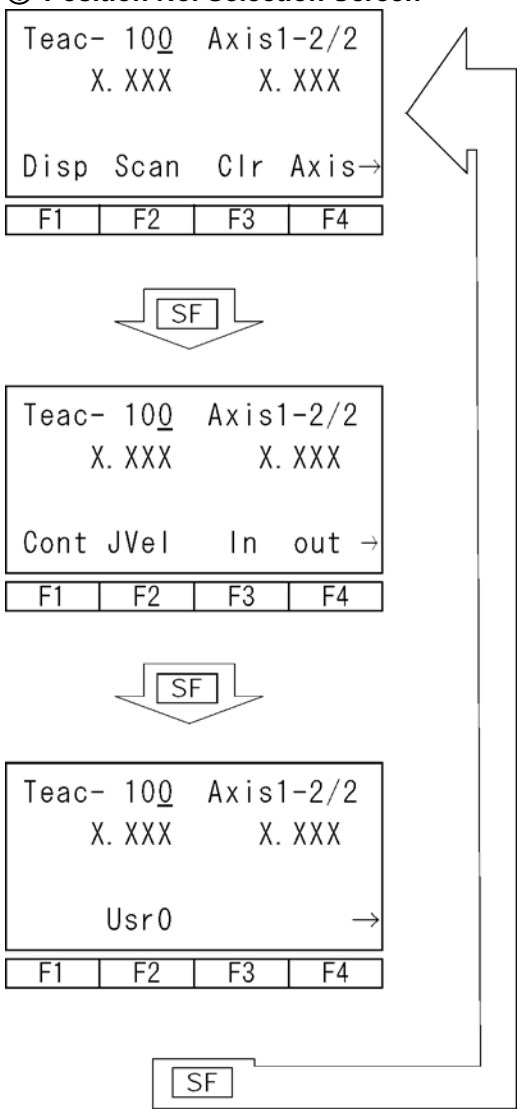
Teaching is transacted mainly at the teaching screen.
Transition to the teaching screen: Edit – Posi – Teac



(1) Teaching Screen

There is the position No. selection screen and each-axis data input screen for the teaching screen. Execute teaching of all axes simultaneously (take in current position · clear) on the position No. selection screen. Execute teaching of each axis at each-axis data input screen.)

① Position No. Selection Screen



Description of the function key

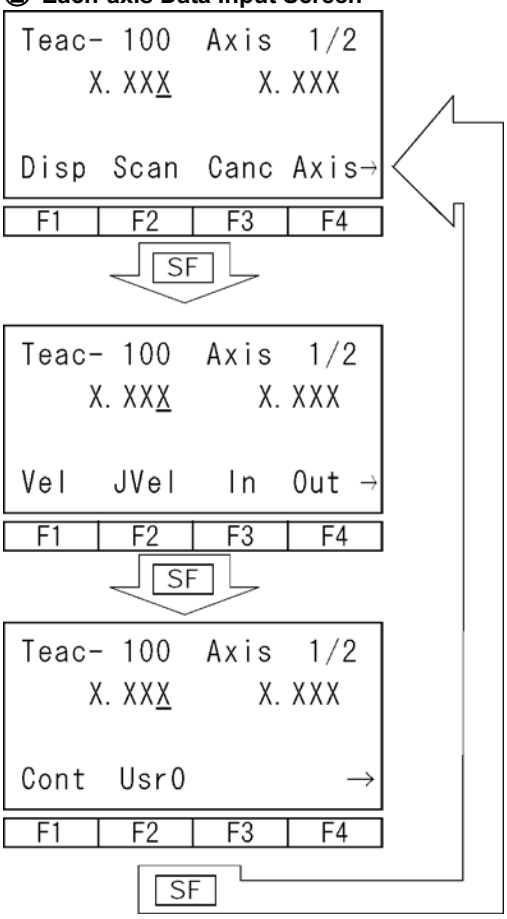
F1(Disp):	Switch the input data screen to the current position display.
F2(Scan):	Take the current positions of all axes into the input screen. (TP Ver 1.02 or later)
F3(Clr):	Clear the all-axis data of the selected position No. by pressing this key twice. Clear the controller's data without pressing the WRT key. (TP Ver. 1.02 or later)
F4(Axis):	Switch the 1st to 4th axes display screen to the 5th and 6th axes display screen. (Effective for 5 axes or more)

F1(Cont):	Execute continuance operation.
F2(JVel):	Set the jog velocity.
F3(In):	Monitor the input port.
F4(Out):	Monitor the output port.

F2(UsrO):	Turn ON/OFF the output ports (sequential 8 points at the maximum set to parameters). (It is required to preset the I/O parameters No. 74 and No. 75.)

Input the position No. with the 10 keys, and press the return key to move to the each-axis data input screen.

② Each-axis Data Input Screen



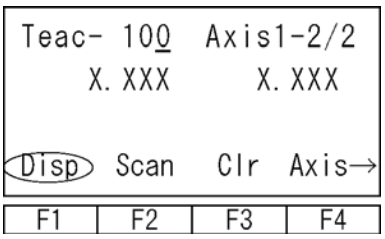
Description of the function key

F1(Disp):	Switch the input data screen to the current position display.
F2(Scan):	Take the current position of the axis at which the cursor is located into the input screen.
F3(Canc):	Clear the input data.
F4(Axis):	Switch the 1st to 4th axes display screen to the 5th and 6th axes display screen. (Effective for 5 axes or more)

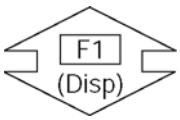
F1(Vel):	Input the data of velocity to each position No.
F2(JVel):	Set the jog velocity.
F3(In):	Monitor the input port.
F4(Out):	Monitor the output port.

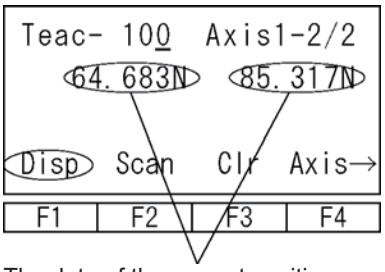
F1(Cont):	Move to the continuance transition mode.
F2(UsrO):	Turn ON/OFF the output ports (sequential 8 points at the maximum set to parameters). (It is required to preset the I/O parameters No. 74 and No. 75.)

For incremental specification, it is required to execute homing after supplying power before you start teaching. For Spurious Absolute Type, it is necessary to conduct a home-return operation before the teaching after the power is turned ON.



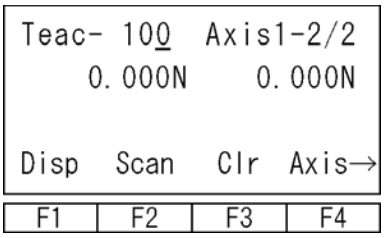
Turn the servo On by pressing the ON/OFF key in the teaching screen condition.
To confirm servo ON/OFF status, press the F1 (Disp) key.
All axes start homing by pressing the HOME key.





The data of the current position screen before homing doesn't have meaning.

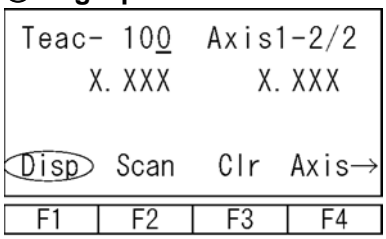
After homing is complete, execute teaching.

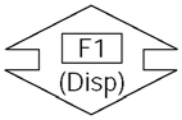


⚠ Note : For the Linear Servo actuator, LSAS-N10/N15 quasi absolute type, the actuator moves in a range of approximately 16mm from the stop position when a home return operation is conducted after the power is turned on to confirm the current position. Watch the actuator movement during operation.

(2) Movement of an actuator

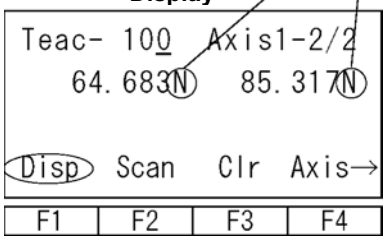
① Jog Operation





N: Servo ON
F: Servo OFF

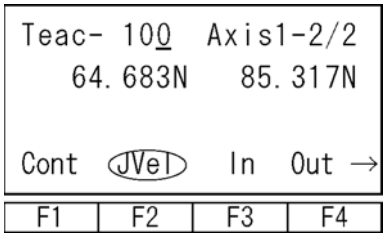
Current Position Display



(The above diagram is 2 axes specification; valid jog keys are 1→, 2→, ←1, and ←2.)

Turn the servo ON status by pressing the ON/OFF key in the teaching screen condition.
To confirm the servo ON/OFF status, press the F1 (Disp) key to display the current position.

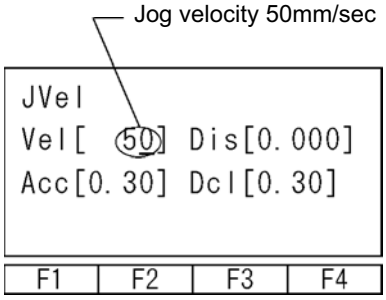
Press the 1→, 2→, 3→, 4→, ←1, ←2, ←3, and ←4 keys to move the actuator to a designated position. (1~4 indicate axis No. and the right direction arrows represent plus direction (forward) and the left direction arrows represent minus direction (backward)).
To execute jog operation for the 5th and 6th axes, press the F4 (Axis) key to switch the display to the 5th and 6th axes data display screen.
(1→: Plus direction for the 5th axis, ←1: Minus direction for the 5th axis, 2→: Plus direction for the 6th axis, ←2: Minus direction for the 6th axis.)



Changing the Jog Velocity

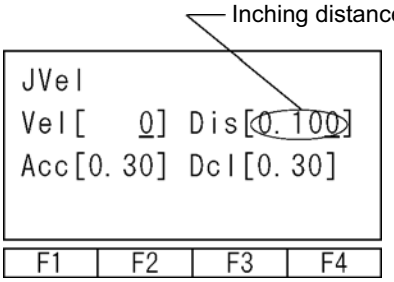
Change the actuator's moving velocity at the time of the jog operation.
Display "JVel" (jog velocity) on the Teaching screen and press the function key that it corresponds to. (Depending on the screen condition, you need to press SF (shift) key to display "JVel.")

Jog velocity 50mm/sec

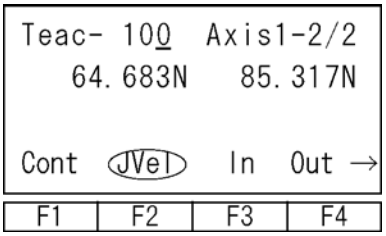


Input Vel (velocity), Acc (acceleration), and Dcl (deceleration) at the time of the jog operation with the 10 keys and press the return key. Set Dis (inching distance) 0.000.
You can also set the inching distance from this screen.
Return to the teaching screen with the ESC key and execute the jog operation.

② Inching Operation



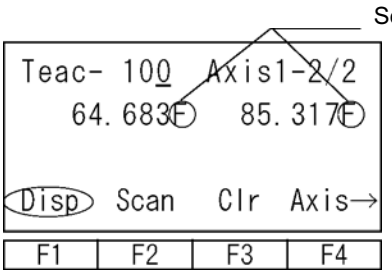
Set the inching distance. (the moving distance each time pressing jog key.) Input the value on Dis (inching distance) at the jog velocity change screen and press the return key.
Value input range is 0.001~1.000 (unit: mm).
Return to the teaching screen with the ESC key and execute the inching operation.



(The above diagram is 2 axes specification; valid jog keys are 1→, 2→, ←1, and ←2.)

Clicking jog key once moves one inching distance.
Clicking any of 1→ through 4→ makes inching movement in the coordinate plus direction, while clicking any of ←1 through ←4 makes inching movement in the coordinate minus direction.
Pressing and holding the jog key changes to jog operation. In approximately 1.6 seconds after the jog key is pressed, inching operation changes to jog operation and further continuing to press the key changes the jog velocity per second as follows:
1→10→50→100 mm/sec.

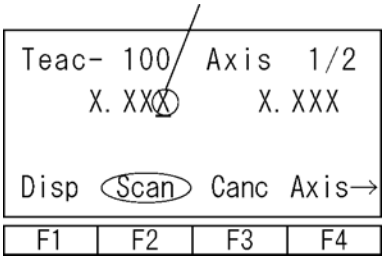
③ Manual Movement with Servo OFF Status



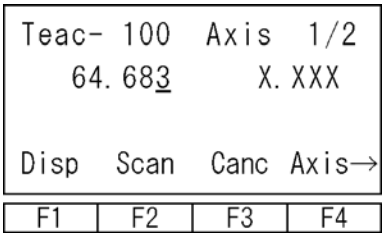
Press the ON/OFF key to turn the servo OFF.
To confirm the servo ON/OFF status, press the F1 (Disp) key.
Move the actuators to the designated position via manual mode.

(3) Take in the current position as a data

Take the selected actuator's location as position data into the teaching screen.



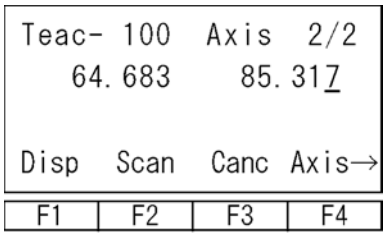
Input the position No. into which data is taken on the position No. selection screen with the 10 keys.
Or select position No. into which data is taken with the PAGE UP · PAGE DOWN keys on the data input screen.

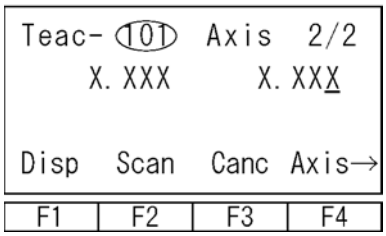


Take in the current position data of all axes by pressing the F2 (Scan) key on the position No. selection screen.
Take in the current position data of the axis where the cursor is located by pressing the F2 (Scan) key on the each-axis data input screen. (The data is executed per axis. The diagram on the left is for taking in data on the each-axis data input screen.

(4) Transmit to the Controller

Transmit the taken-in data to the controller.





Press the WRT key in the teaching screen condition.
Save the taken-in data to the controller memory.
Position No. will be increased 1 by pressing the WRT key.
You can only transmit 1 screen of data to the controller. You can't transmit plural position No. data at one time.

* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.

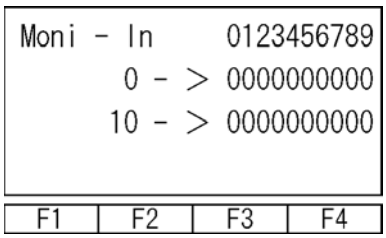
(5) I/O Monitor · Location Confirmation

During teaching operation, you can monitor the input and output ports. You can also confirm the location by moving an actuator to a to the location of the position data with teaching.

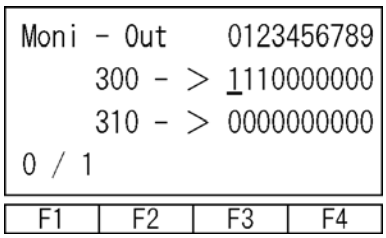
① Input / Output Monitor

Select In or Out from the function keys in the teaching screen condition.
In: Input port Out: Output port

Input Port



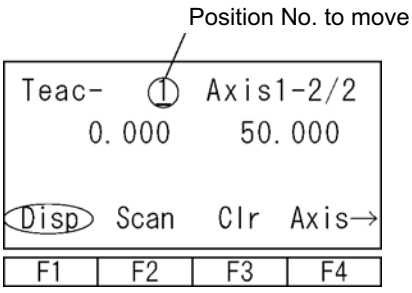
Output Port



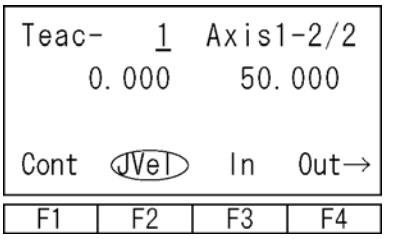
You can switch the status of the output port OFF/ON (0/1) where the cursor is located by pressing the F1 (0/1) key.
(OFF/ON (0/1) status is switched each time you press F1 key.)

② Moving

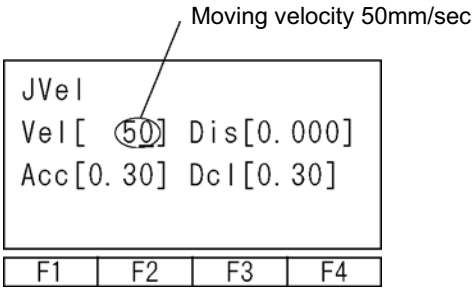
Move the actuator to the location of the position data transmitted to the controller.



Select position No. to move in the teaching screen condition.
Press the ON/OFF key to turn the servo ON.
To confirm the servo ON/OFF status, press the F1 (Disp) key.
It starts moving by pressing the MOVE key. To the Stop, press STOP key.



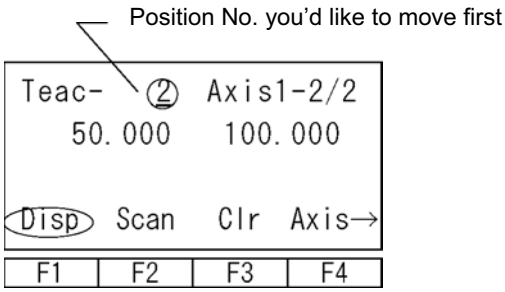
When you confirm or change the moving velocity, press F2 (JVel) key to move to the velocity changing screen.



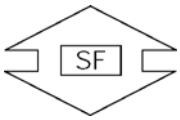
Input alteration data with 10 keys and press return key. After changing, return to the previous screen with ESC key.

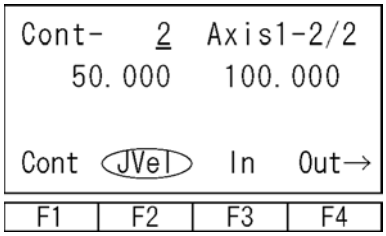
③ Continuous movement

Move the actuator continuously to the location of the position data transmitted to the controller.

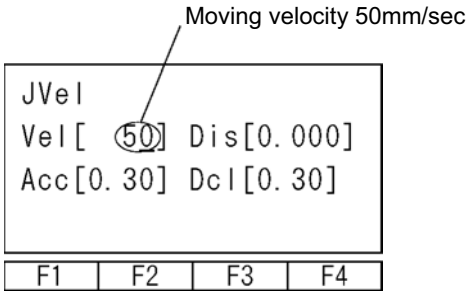


Select the position No. to move first in the teaching screen condition and press return key.
Press the ON/OFF key to turn the servo ON.
To confirm the servo ON/OFF status, press the F1 (Disp) key.

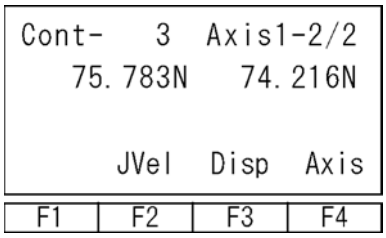




Press the F1 (Cont) key.
When you change the moving velocity, press the F2 (Jvel) key to move to the velocity change screen.



Input changed data with the 10 keys and press the return key. After changing, return to the previous screen with the ESC key.
(The moving velocity is set 50mm/sec at the diagram on the left.)

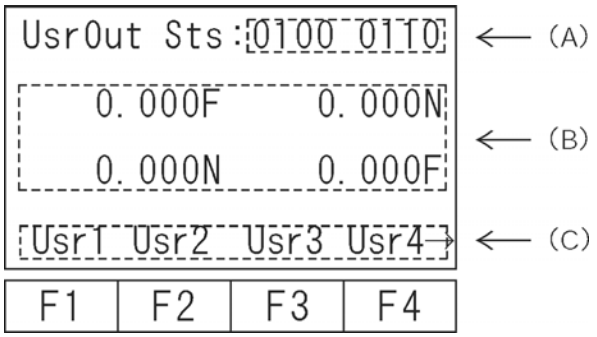


Continuous movement starts by pressing MOVE key. During continuous movement, the display changes to the current position display. To stop, press the STOP key.
To re-start continuous movement, press the MOVE key.

Note: Please take note that it may take a few seconds before movement start after the MOVE key is pressed. (The time elapsed until movement start varies according to the number of registered position data.)

(6) User-specified output port operation

The output ports set for the parameter can be easily turned ON/OFF.
Select UsrO among the function keys in a teaching screen condition.



(A) User-specified output port status
The conditions of user-specified output ports are displayed as “1” (=ON) and “0” (=OFF).
(The conditions are displayed from the first specified port for the number of specified ports.)

(B) Current position and servo ON/OFF
The current position and servo ON/OFF condition (“N”=ON, “F”=OFF) are displayed for each axis.

(C) Function for operation of user-specified output ports
This is the function for ON/OFF operation of user-specified output ports.
This function is allocated to “Usr1,” “Usr2,” “Usr3”… in this order from the first user-specified port for the number of specified ports.
(“Usr1” to “Usr4” and “Usr5” to “Usr8” are changed with the SF key.)
ON/OFF operation can be performed for each output port by pressing the function keys (F1 to F4) corresponding to “Usr1” to “Usr4” and “Usr5” to “Usr8.”
(When the port status display is “0” [OFF], the port ON command is given. When the port status display is “1” [ON], the port OFF command is given.)

① Setting of user-specified output port parameters

For the operation method for parameter setting, refer to “14. Parameter Edit.”
The first port No. and the number of ports are set with the following parameters:

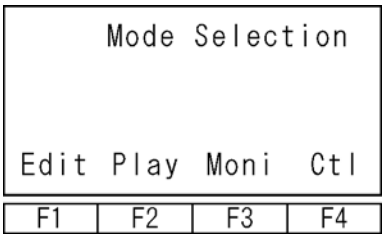
- Number of ports
  I/O parameter No. 74 “Qnt Prt Usr Out” (Number of output ports used by TP user [hand, etc.])
- First port No.
  I/O parameter No. 75 “Top No. Use Out” (First output port No. by TP user [hand, etc.])

(Setting example) When the first port No. is set to 308 and the number of ports is set to 8:

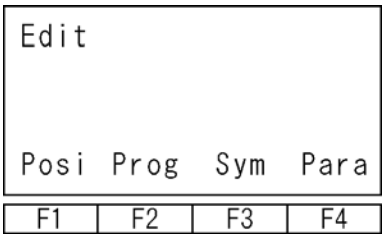
“Usr1” (F1 key) ····· Output port 308
“Usr2” (F2 key) ····· Output port 309
“Usr3” (F3 key) ····· Output port 310
“Usr4” (F4 key) ····· Output port 311
“Usr5” (F1 key) ····· Output port 312
“Usr6” (F2 key) ····· Output port 313
“Usr7” (F3 key) ····· Output port 314
“Usr8” (F4 key) ····· Output port 315

11-3. Example of Teaching Input

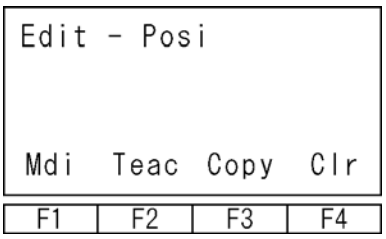
Entering the data into position No.10 using the jog and into position No.11 by manual operation with Servo OFF status.



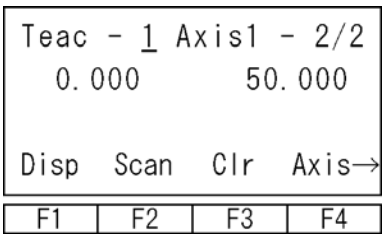
Select the F1 (Edit) key on the mode selection screen.



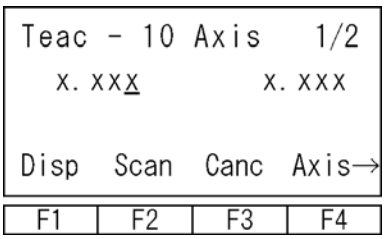
Select the F1 (Posi) key.



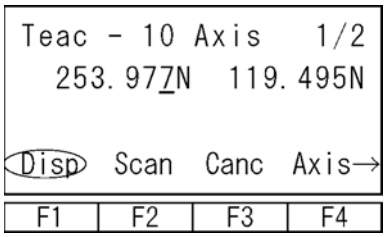
Select the F2 (Teac) key.



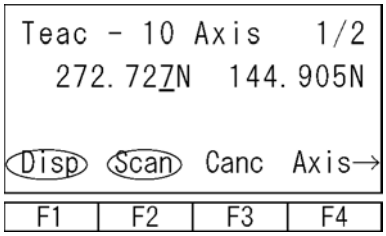
Input 10 to Position No. by using the PAGE UP · PAGE DOWN keys or the 10 keys and then the return key.



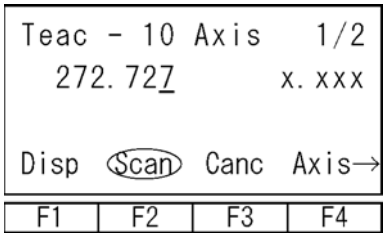
Turn the servo ON by pressing the ON/OFF key.



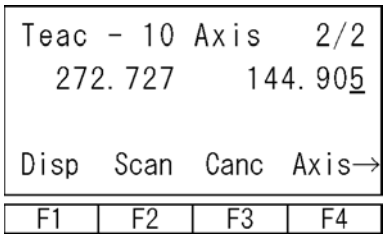
Move the actuator to the designated position by pressing the jog keys, ←1, 1→, ←2, and 2→.



Take in the current position data of the axis No. where the cursor is located by pressing the F2 (Scan) key.
Switch the display to the data input screen with the F1 (Disp) key. Confirm that the data has been taken in.

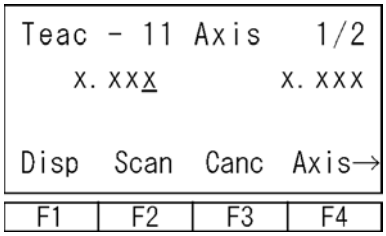


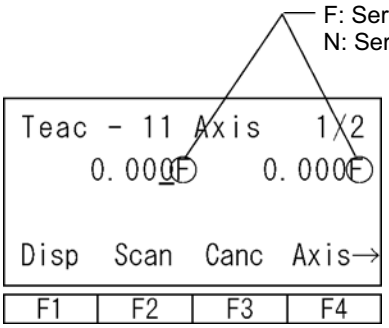
Press the return key to move the cursor to the next axis. Then press the F2 (Scan) key.



Transmit position data to the controller by pressing the WRT key.
The Position No. moves to 11.

* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.

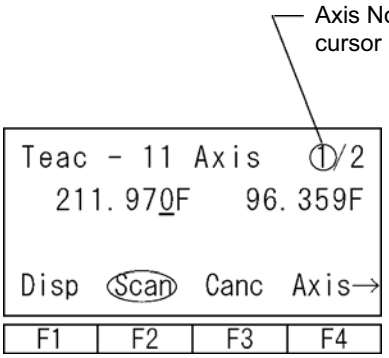




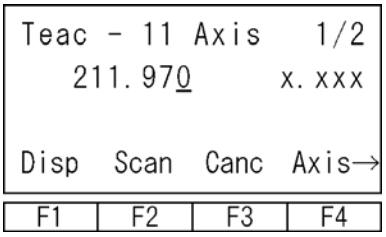
Turn the servo OFF by pressing the ON/OFF key.
Press the F1 (Disp) key to confirm the servo OFF status.
Move each axes to the designate position via manual mode.

Note: Be sure to confirm the status is servo OFF and then execute operation.

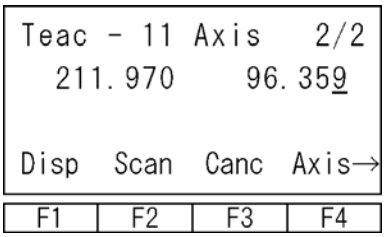
You have to release the brake for the Z axis to be moved by manual mode. When the brake is released for that reason, there is a possibility that the Z axis may fall by weight, such as a hand attached at the tip. Therefore, do not execute teaching to the Z axis via manual mode.



Take in the current position data of the axis No. where the cursor is located by pressing the F2 (Scan) key.

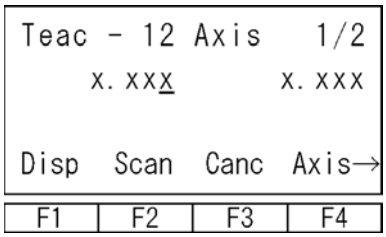


Press the return key and make the cursor move to the next axis. Then press the F2 (Scan) key.

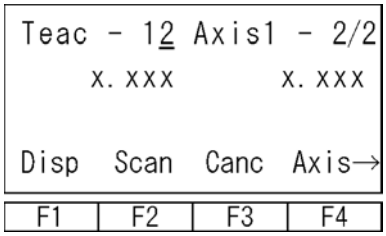


Transmit position data to the controller by pressing the WRT key.
The Position No. moves to 12.

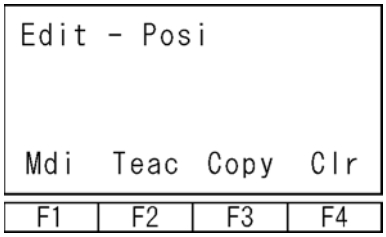
* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.



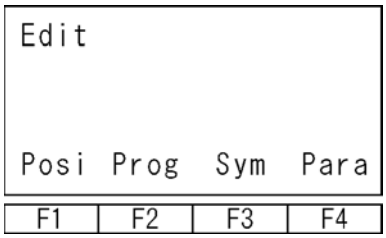
Finish the position data input by teaching.
Press the ESC key.



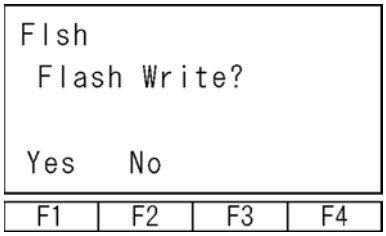
Press the ESC key.



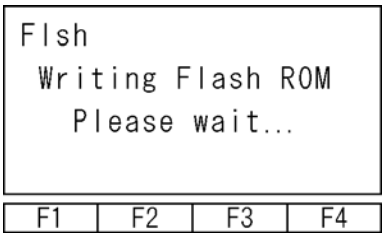
Press the ESC key.



Press the ESC key.

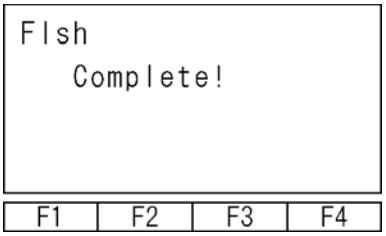


To write the data to Flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



During Flash ROM writing, “Please Wait....” blinks.

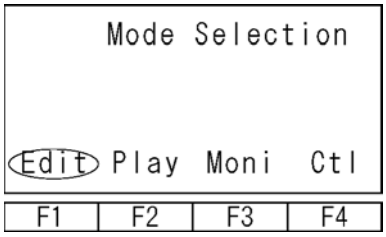
*** Never shut off the power to the controller during Flash ROM writing.**



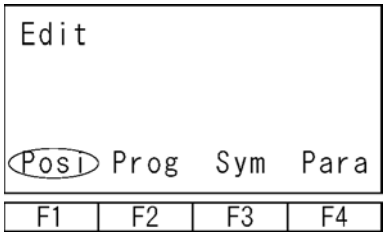
Return to the edit screen with the ESC key.

11-4. Position Data: Copy or Move

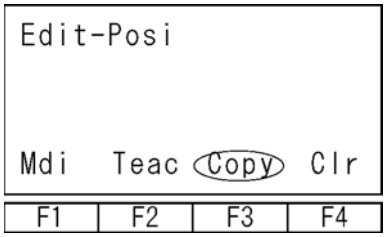
The following operating instructions are to copy or move the position data to another position No.



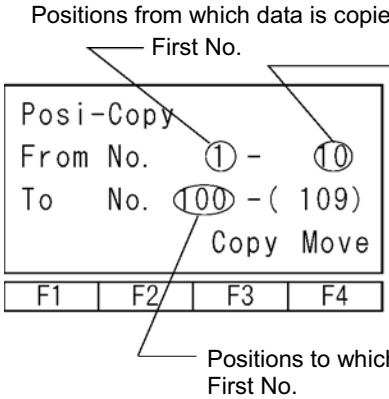
Select F1 (Edit) key on the mode selection screen.



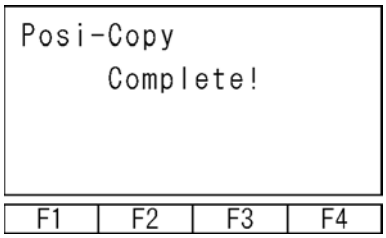
Select the F1 (Posi) key.



Select the F3 (Copy) key.



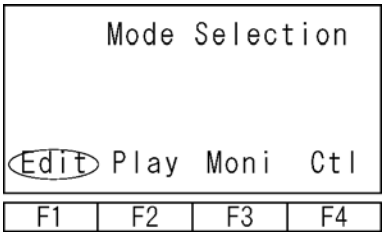
Input the first No. and the last No. of the positions from which data is copied or moved by using the 10 keys and press the return key.
Input the first No. of the positions to which data is copied or moved by using the 10 keys and press the return key.
To copy the data, press the F3 (Copy) key. To move the data, press the F4 (Move) key.



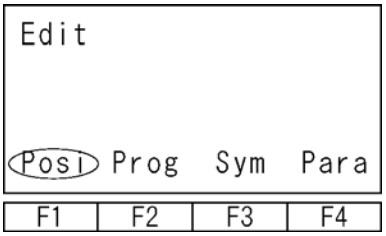
Return to the previous screen with the ESC key.
To write Flash ROM, press the ESC key several times to return to the Flash ROM writing screen.

11-5. Position Data: Clear

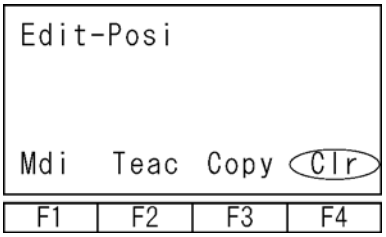
The following operating instructions are to clear the position data.



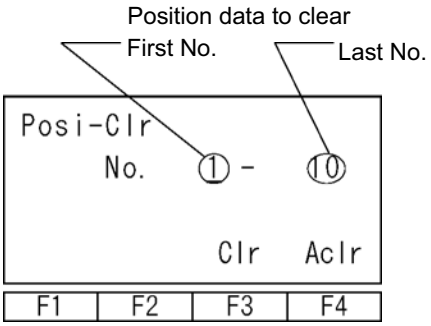
Select the F1 (Edit) key on the mode selection screen.



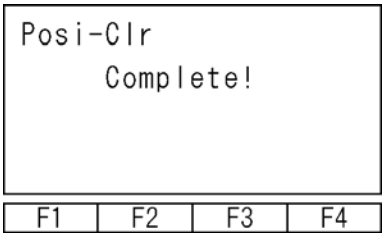
Select the F1 (Posi) key.



Select the F4 (Clr) key.



Input the first No. and the last No. of the position data to clear by using the 10 keys and press the return key.
To clear the selected position data, press the F3 (Clr) key.
To clear the data for all positions (No. 1 through No. 3000), press the F4 (AClr) key.



Return to the previous screen.
To write to Flash ROM, press the ESC key several times to return to the Flash ROM writing screen.

12. Program Edit

12-1. How to Input Program

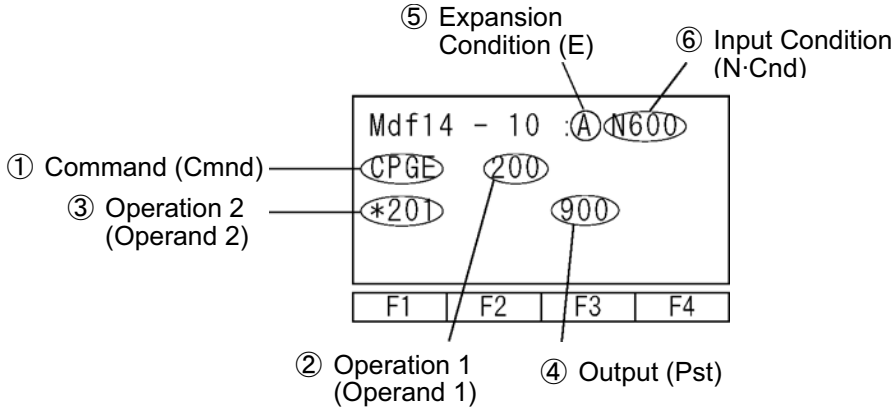
How to input Expansion Condition (E), Input Condition (N·Cnd), and Output (Pst)

The sequence of program inputs for the teaching pendant is different from the program edit screen of the PC software.
The sequence is as ① Command (Cmnd), ② Operation 1 (Operand 1), ③ Operation 2 (Operand 2), ④ Output (Pst), ⑤ Expansion Condition (E) and ⑥ Input Condition (N·Cnd).

PC Software Program Edit Screen

No.	E	N	Cnd	Cmnd	Operand 1	Operand 2	Pst	Comment
10	A	N	600	CPGE	200	∗201	900	

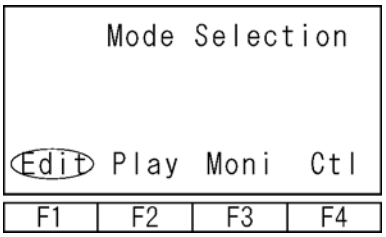
Teaching Pendant LCD Display



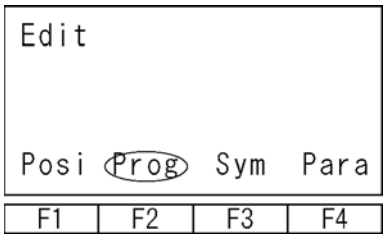
Input the program below as an example.
Program No. 2

No.	E	N	Cnd	Cmnd	Operand 1	Operand 2	Pst	Comment
1			601					
2	A	N	600	CPGE	200	∗201	900	

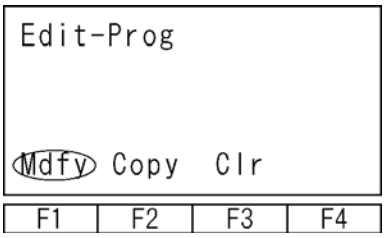
Input only the Input Condition at step No.1 and input data all except Comment at step No.2.



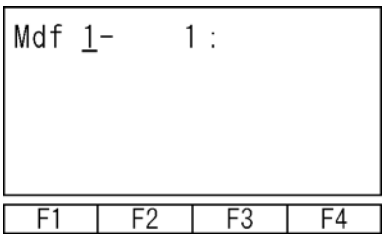
Select the F1 (Edit) key on the mode selection screen.



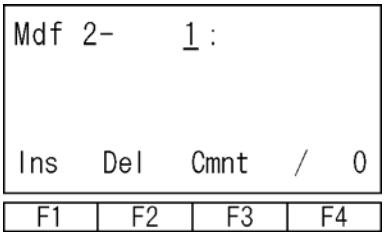
Select the F2 (Prog) key on the edit mode screen.



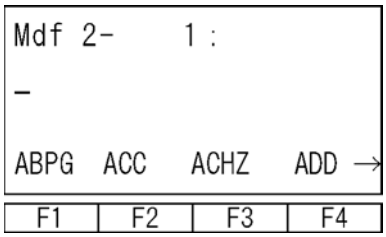
Select the F1 key (Mdfy) on the program edit and new creation screen.



Input the program No. by using the 10 keys and press the return key.

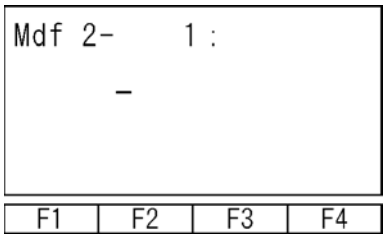


The cursor moves to step No.
Press the return key.



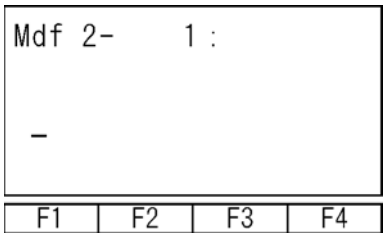
Input section of Cmnd

Press the return key.



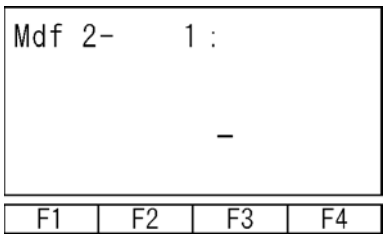
Input section of Operand 1

Press the return key.



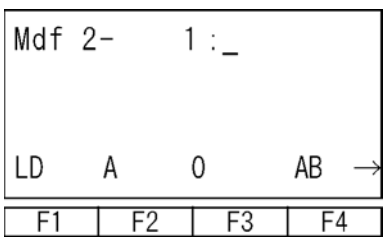
Input section of Operand 2

Press the return key.



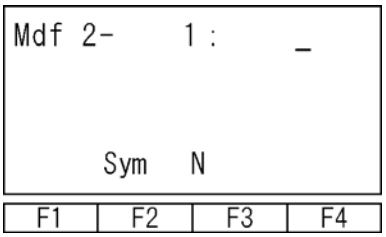
Input section of Pst

Press the return key.



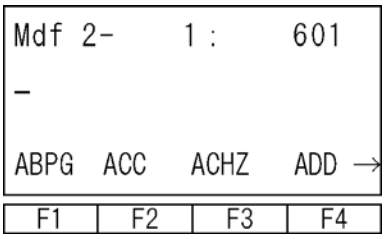
Input section of E

Press the return key.



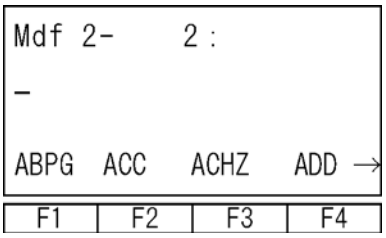
Input section of N·Cnd

Input “601” by using the 10 keys and press the return key.



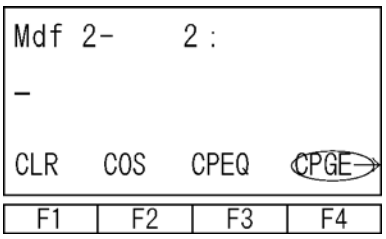
Transmit the data of step No.1 to the controller by pressing the WRT key.
Step No. moves to 2.

* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.

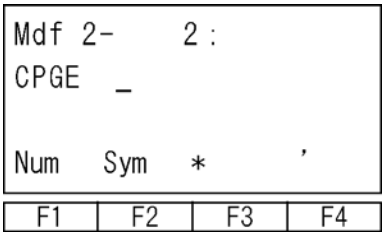


Input section of Cmnd

Display CPGE in the function key area by using the 7 key and SF key.
For searching commands, please refer to section “9-2. Programming.”



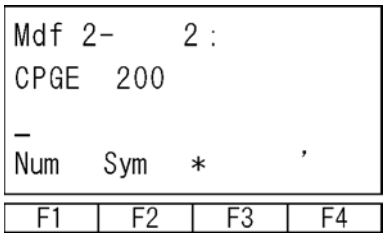
Select the F4 (CPGE) key and press return.



Input section of Operand 1

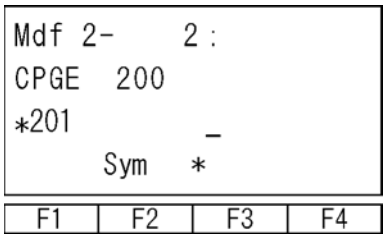
Input 200 by using the10 keys and press return.

When designating an indirect variable at Operand 1, select the F3(*) key first.
When inputting a string at Operand 1, press the F1 (Num) key to change to F1(Alph). Input the string with the F4 (‘) key and the 10 keys which become alphabet inputs.



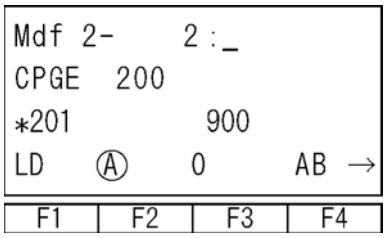
Input section of Operand 2 (Indirect variable designation)

Select the F3 (*) key first. Then input 201 by using the 10 keys and press the return key.
(When you input a string at Operand 2, use the same format as Operand1.)



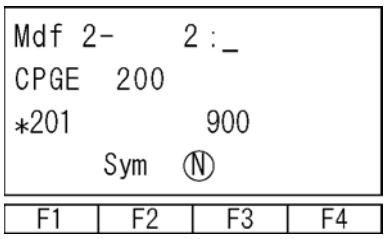
Input section of Pst

Input 900 by using the 10 keys and press the return key.
(When designating an indirect variable at Operand 1, select the 3 (*) key first.)



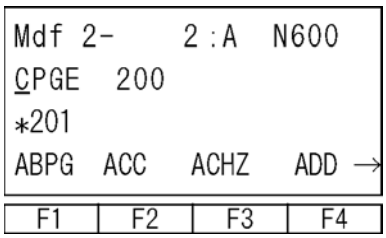
Input section of E

Select the F2 (A) key and press the return key.
(Input expansion condition of virtual ladder task on this screen with the function keys as well.)



Input section of N · Cnd

Select the F3 (N) key first. Input “600” by using the 10 keys and press the return key.



Transmit the data of step No. 2 to the controller by pressing the WRT key.
Step No. moves to 3.

* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.

Finish the program input. Return to the Flash ROM writing screen by using the ESC key.

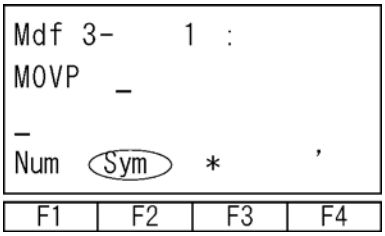
12-2. Symbol Input during Program Edit

Symbol can be input when the cursor is located at Operand 1 · 2 (operation 1· 2), Pst (output) and Cnd (input condition) in the “Sym” state displayed in the function key area.

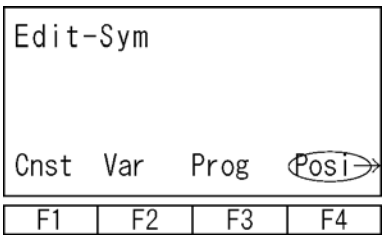
Example:
Input symbol of the program step below.

No.	E	N	Cnd	Cmnd	Operand 1	Operand 2	Pst	Comment
1				MOVL	TAIKIITI			

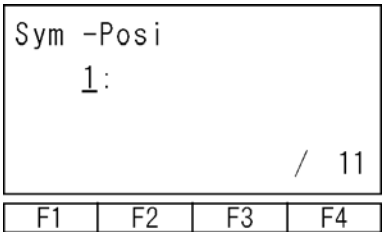
Symbolize position No. 10 as “TAIKIITI.”



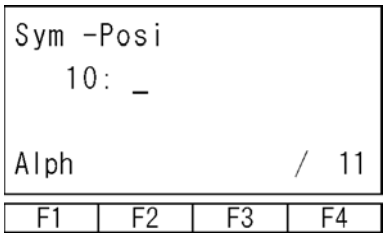
Select the F2 (Sym) key in the function key area within the state of the cursor that has been located in the Operand 1 section.
Move to the symbol edit screen.



Select items to edit the symbols with function keys. In this case, since we’re going to the edit the Position No., press the F4 (Posi) key.

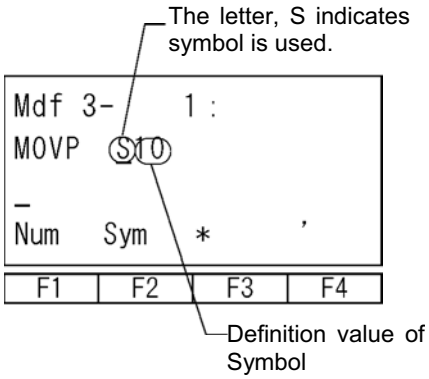


Input 10 for position No. by using the 10 keys and press the return key.



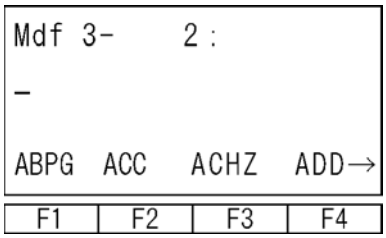
The 10 keys become alphabet inputs. Input “TAIKIITI.”
For the input procedure, please refer to the section “13. Symbol Edit.”

Transmit the symbol data to the controller by pressing the WRT key. Return to the edit screen.



The teaching pendant can’t display symbols as inputs. In this case, display “S10” instead of “TAIKIITI.”

In the state where the cursor is located in the symbolized section, if F2 (Sym) key is chosen, it will move to the symbol edit screen. The symbol can then be changed.



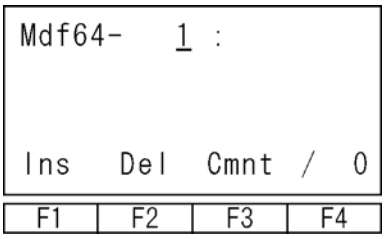
Transmit the data of this program step to the controller by pressing the WRT key.

To finish the program input, return to the Flash ROM writing screen by using the ESC key.

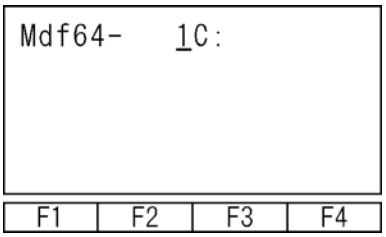
12-3. Single Line Comment Input

Turns a step from a program into a comment (invalid step) and you can input numbers, alphabets and signs (* · _).

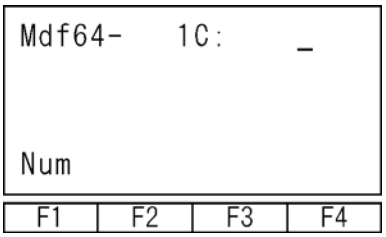
Mode Transition: Edit—Prog—Mdfy—Program No. return
Move the cursor to the step No. for comment input.



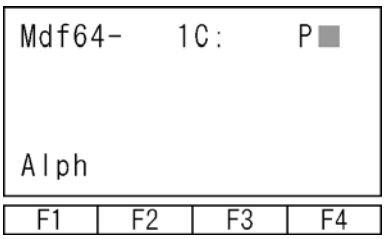
Press the F3 (Cmnt) key.



"C" will be displayed after the step No.
Press the return key.

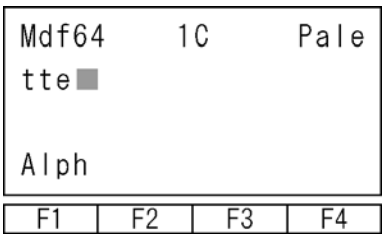


Each time you press the F1 key, the display of the F1 key area switches from "Alph" to 'Num'.

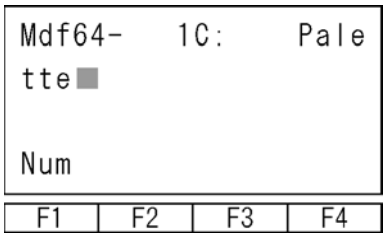


Alphabet input

Display "Alph" in the F1 key area.
Alphabets are allocated to each of the 10 keys.
Ex) Each time you press 6, display changes P→ Q→ R→p→q→r→P→ ..... Display the alphabet you'd like to input and press the return key. The example of the left displays "P."

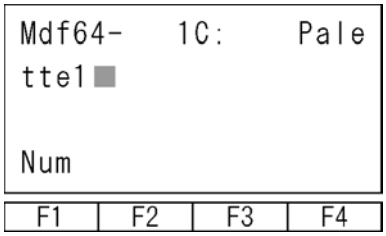


On the left is an example for inputting the word "Palette."

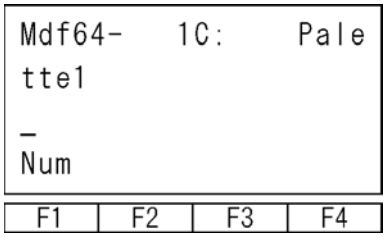


Input numerical value

Display “Num” in the F1 key area.
Input the numerical value by using the 10 keys.

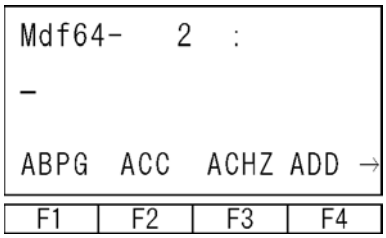


The diagram on the left is an example for inputting “1.”



After finishing the comment input, press the return key again.
Transmit the input data to the controller by pressing the WRT key.

* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.



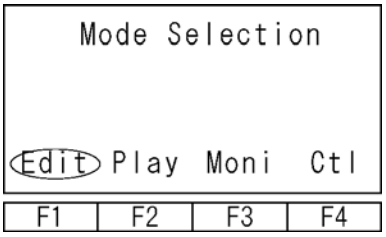
The screen moves to the next step No.

To finish the program input, return to the Flash Rom writing screen by using the ESC key.

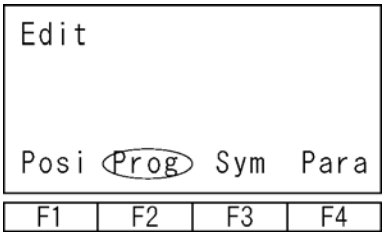
Note: Full size character data input by the PC software can’t be displayed on the teaching pendant.

12-4. Program: Copy or Move

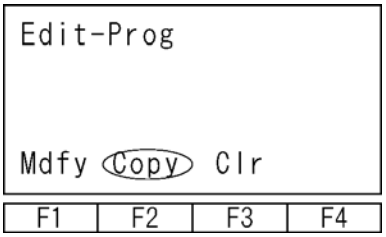
The following operating instructions are to copy or move a program to another program No.



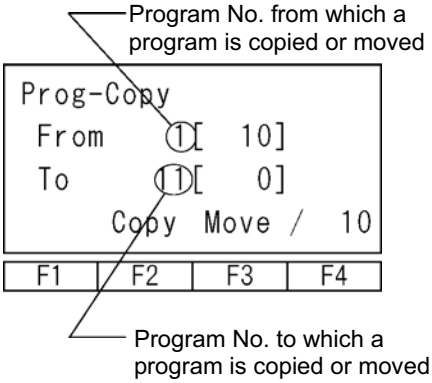
Select the F1 (Edit) key on the mode selection screen.



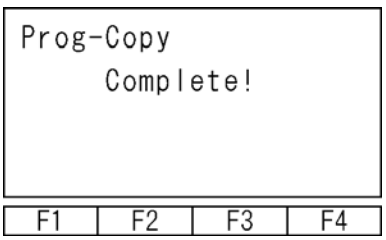
Select the F2 (Prog) key.



Select the F2 (Copy) key.



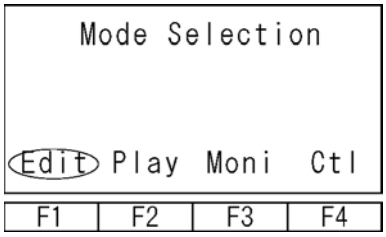
Input the program No. from which a program is copied or moved by using the 10 keys and press the return key.
Input the program No. to which a program is copied or moved by using the 10 keys and press the return key.
To copy the program, press the F2 (Copy) key. To move the program, press the F3 (Move) key.



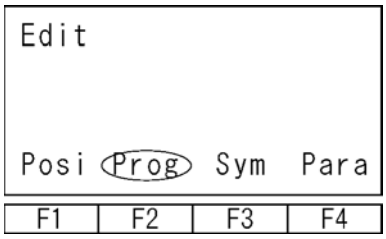
Return to the previous screen with the ESC key.
Furthermore, press the ESC key several times and return to the Flash ROM writing screen.

12-5. Program: Clear

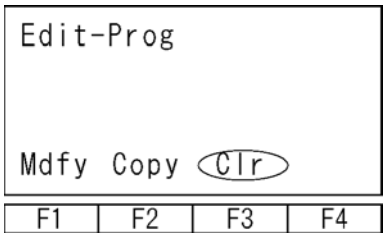
The following operating instructions are to clear a program.



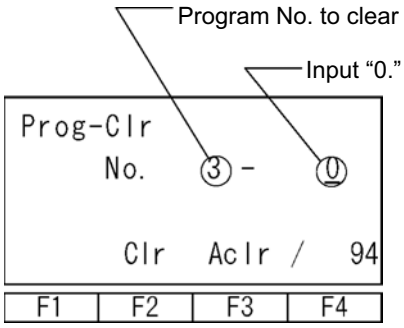
Select the F1 (Edit) key on the mode selection screen.



Select the F2 (Prog) key.

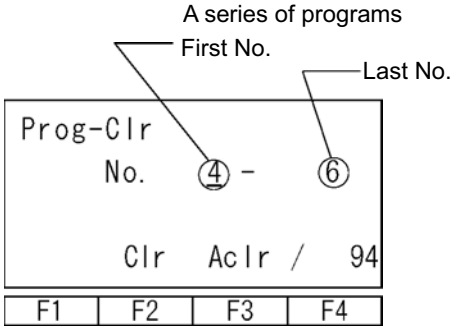


Select the F3 (Clr) key.



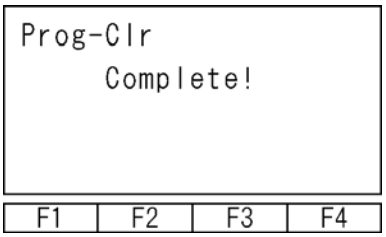
Input the program No. to clear by using the 10 keys and press the return key.

① To clear a single program, press the F2 (Clr) key. The program No. 3 will be cleared in the example diagram on the left.



② To clear a series of multiple programs, press the F2 (Clr) key. The programs No. 4, No. 5 and No. 6 will be cleared in the example diagram on the left.

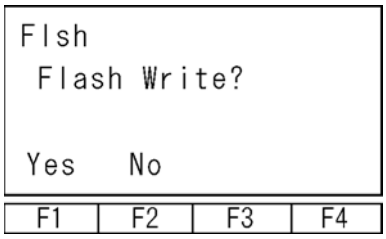
③ To clear all the programs (No. 1 through No. 64), press the F3 (Aclr) key.



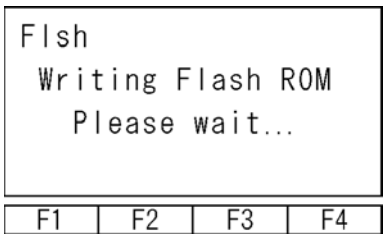
Return to the previous screen with the ESC key. Furthermore, press the ESC key several times and return to the Flash ROM screen.

12-6. Flash ROM Writing

The edit data will be cleared by restoring the power and executing software reset, only if the program edit data was transmitted to the controller.
To save the data after restoring the power and executing software reset, write the data to Flash ROM.
From the final editing screen, return to the Flash ROM writing screen with the ESC key.

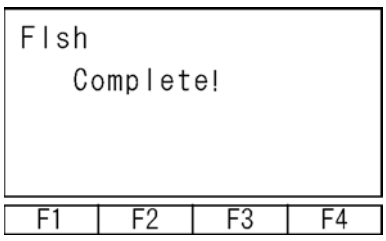


To write the data to Flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



During Flash ROM writing, “Please Wait....” blinks.

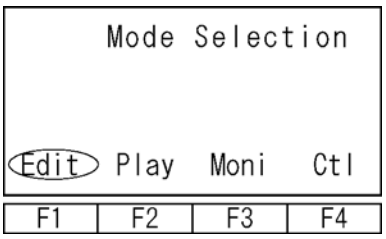
*** Never shut off the power to the controller during Flash ROM writing.**



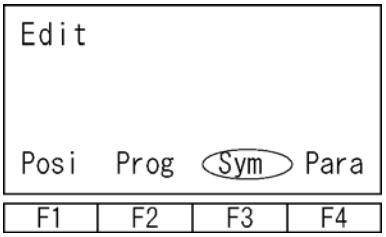
Flash ROM writing is complete.
Return to the edit screen with the ESC key.

13. Symbol Edit

Symbol (Names) can be applied to variables, input ports, flags, points, etc., in X-SEL controller.

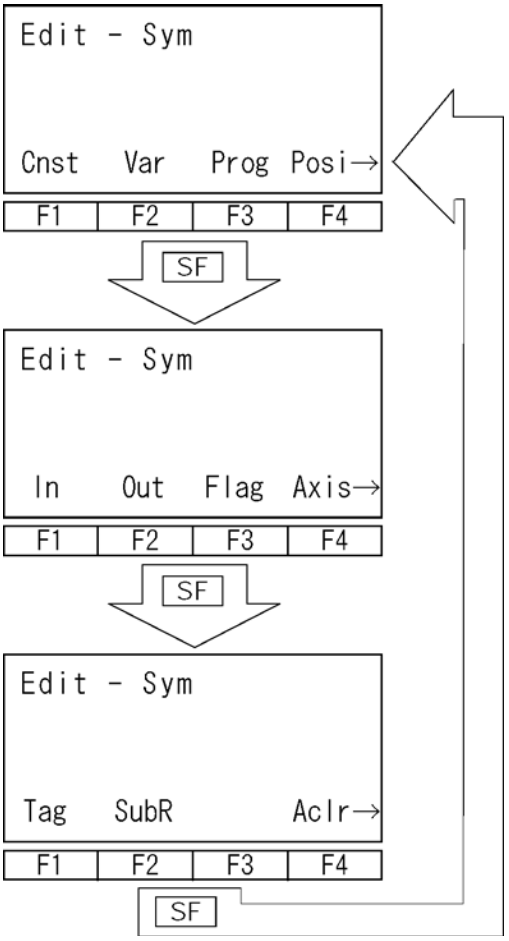


Select the F1 (Edit) key.



Select the F3 (Sym) key.

13-1. Symbol Edit Items



Symbolized items will be displayed in the function key area. Each time by pressing SF key, items are shifted and displayed.

Symbol Edit Items

Cnst:	Constant number
Var:	Variable
Prog:	Program No.
Posi:	Position No.

In:	Input port No.
Out:	Output port No.
Flag:	Flag No.
Axis:	Axis No.

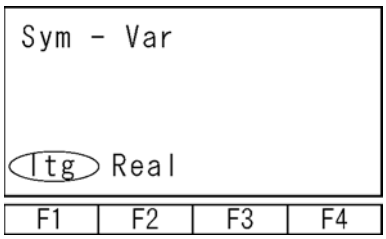
Tag:	Tag No.
SubR:	Subroutine No.
Aclr:	All clear Clear all the symbol data.

Display the list of items to symbolize by using the SF(shift) key and select with the function keys.

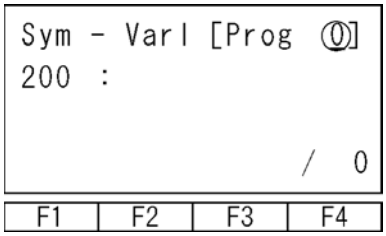
13-2. Input Example: Symbolize Local Integer Variable

Symbolize Variable No. 5 of program No. 3 to “Cnt5.” Press the F2 (Var) key.

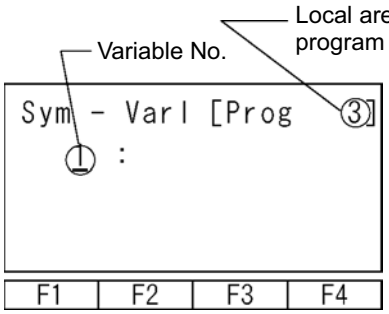
Mode Transition: Edit—Sym—Var



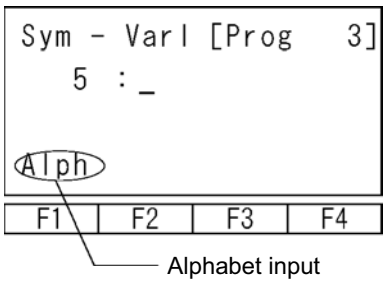
Select an integer or real number.
Press the F1 (Itg) key.
(Int: Integer, Real: Real number)



The cursor is located at program No.
Input the local area program No.
(To symbolize global area, leave 0.)
Input 3 and press the return key.



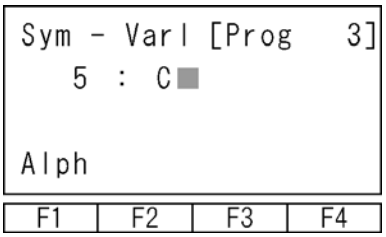
The cursor is located at variable No.
Input 5 and press the return key.



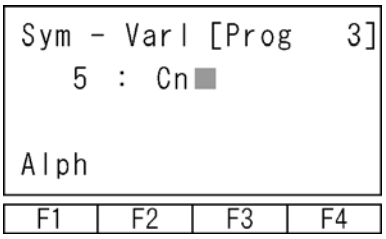
Input the symbol name “Cnt5.”

How to input

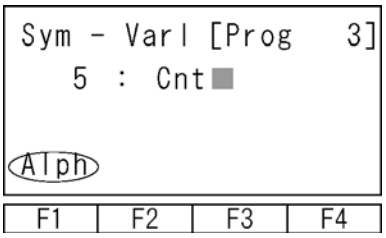
Alphabets are allocated to each of the 10 keys. Each time by pressing 7 of the 10 key, It changes A→B→C→a→b→c→A ....
Display “C” and press the return key.



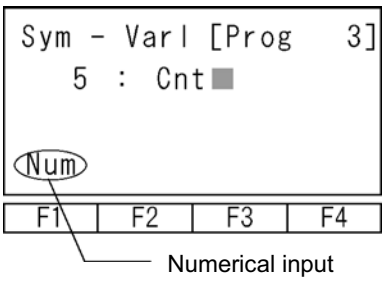
Press 5 several times to display “n.”
Press the return key.



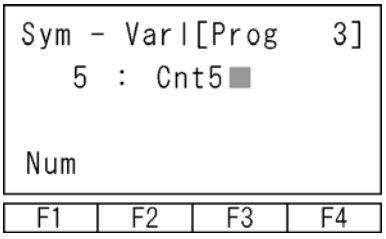
Press the 1 (10 keys) several times to display “t.”
Then press the return key.



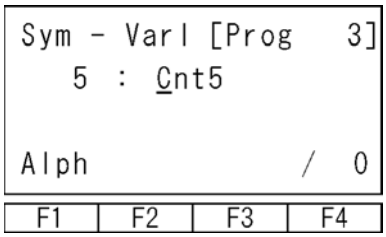
The F1 key area display changes to Num by pressing the F1 (Alph) key. It becomes a numerical input.



Input 5 by using the 10 keys.

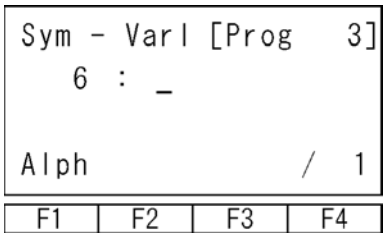


Press the return key to determine the symbol name.

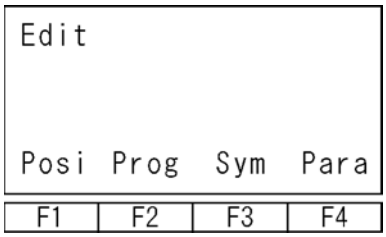


After determining symbol name, the cursor moves to the top letter.
If it's before determination, you can fix the letters one by one with the BS key.
After determination, the name is corrected by overwriting all the characters.
Transmit the symbol data to the controller by pressing the WRT key.

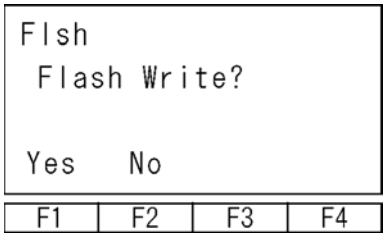
* If you change the screen with the PAGE UP · PAGE DOWN or ESC keys before transmitting the data, the input data will be invalid.



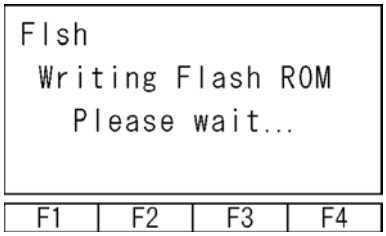
To finish edit, return to the edit screen with the ESC key.



Press the ESC key.

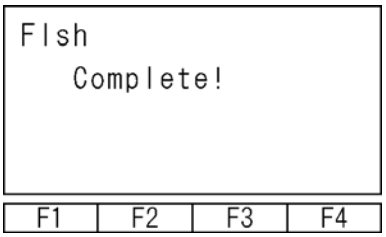


Press the F1 (Yes) to write the data to Flash ROM.
If not, press F2 (No) key.



During Flash ROM writing, "Please Wait...." blinks.

*** Never shut off the power to the controller during Flash ROM writing.**



Return to the edit screen with the ESC key.

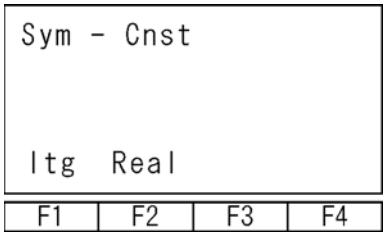
13-3. Symbol Edit Screen of Each Items

(1) Constant Number

Select the F1 (Cnst) key on the constant number symbol edit screen.

Mode Transition: Edit–Sym–Cnst

Selection of Integer Type · Real Number Type Constant Number



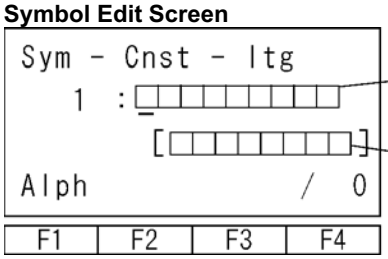
Select an integer or real number.

F1 (Itg): Integer
F2 (Real): Real Number

① Integer Type Constant Number

Mode Transition: Edit–Sym–Cnst–Itg

Integer Type Constant Number Symbol Edit Screen



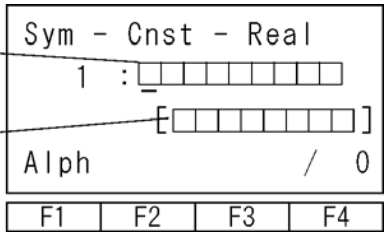
Input alphabet and number.

Input constant value.

② Real Number Type Constant Number

Mode Transition: Edit–Sym–Cnst–Real

Real Type Constant Number Symbol Edit Screen

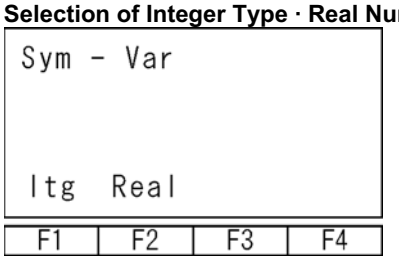


(2) Variable

Select the F2 (Var) key on the variable symbol edit screen.

Mode Transition: Edit–Sym–Var

Selection of Integer Type · Real Number Type Variable



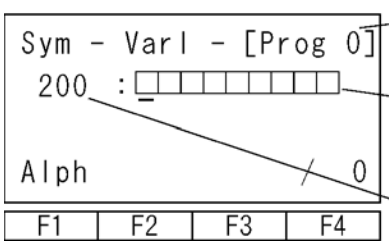
Select an integer or real number.

F1 (Itg): Integer
F2 (Real): Real Number

① Integer Type Variable No.

Mode Transition: Edit–Sym–Var–Itg

Integer Type Variable No. Symbol Edit Screen



Input program No. at local area. Input 0 at global area.

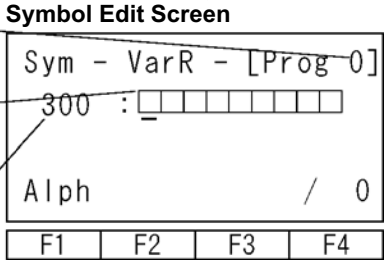
Input alphabet and number.

Input variable No. by PAGE UP · PAGE DOWN key or 10 keys

② Real Number Type Variable No.

Mode Transition: Edit–Sym–Var–Real

Real Number Type Variable No. Symbol Edit Screen

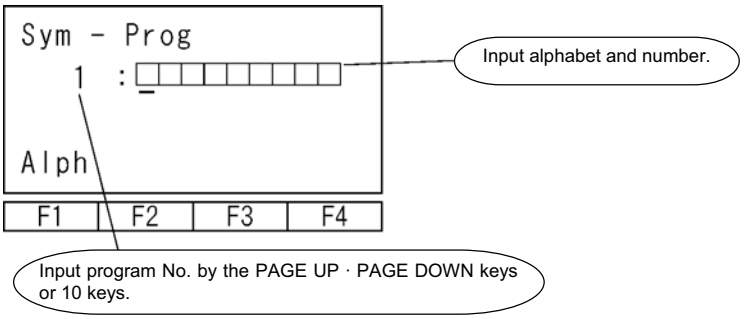


(3) Program

Select F3 (Prog) key on the symbol edit item screen.

Mode Transition: Edit—Sym—Prog

Program No. Symbol Edit Screen

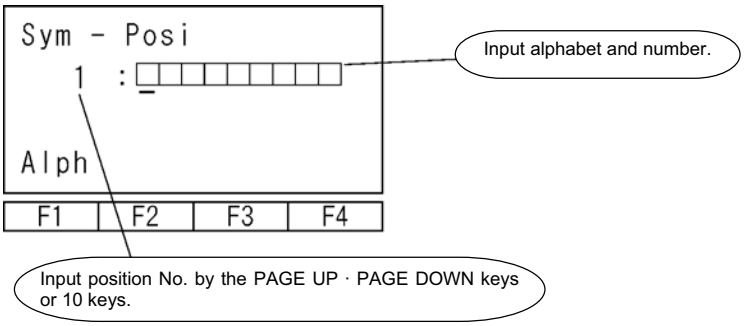


(4) Position

Select F4 (Posi) key on the symbol edit item screen.

Mode Transition: Edit—Sym—Posi

Position No. Symbol Edit Screen

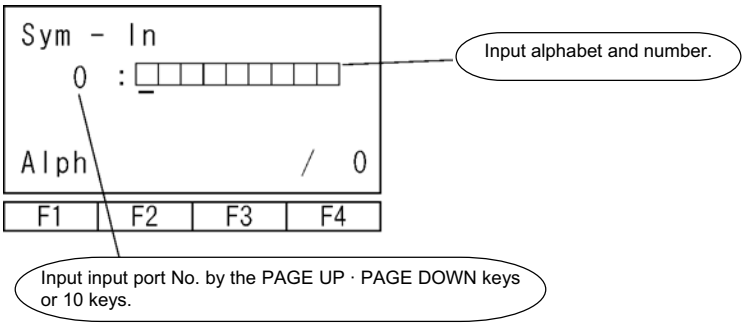


(5) Input Port

Select F1 (In) key on the symbol edit item screen.

Mode Transition: Edit—Sym—In

Input Port No. Symbol Edit Screen

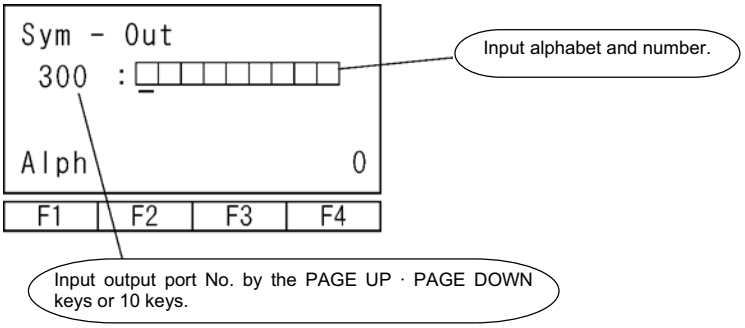


(6) Output Port

Select F2 (Out) key on the symbol edit item screen.

Mode Transition: Edit—Sym—Out

Output Port No. Symbol Edit Screen

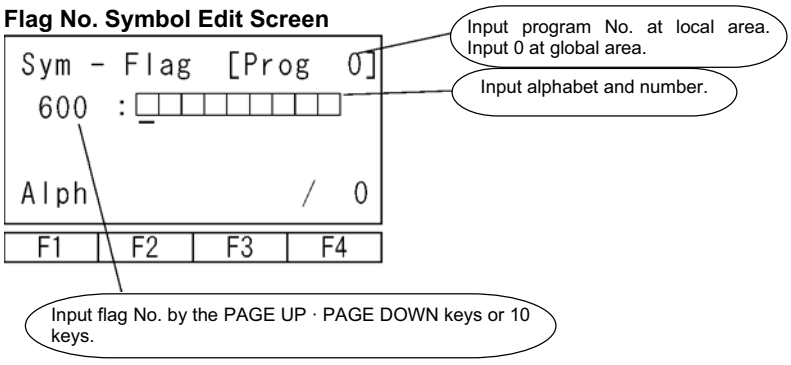


(7) Flag

Select F3 (Flag) key on the symbol edit item screen.

Mode Transition: Edit—Sym—Flag

Flag No. Symbol Edit Screen

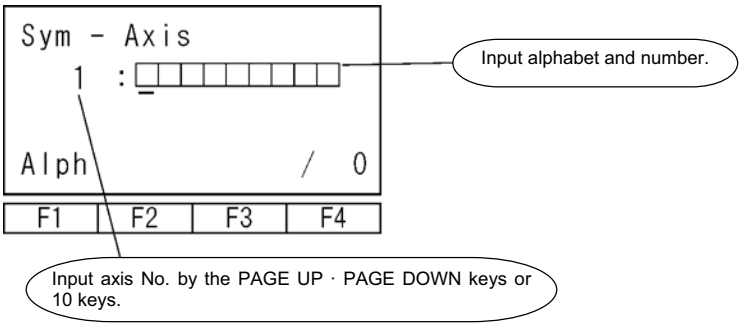


(8) Axis

Select F4 (Axis) key on the symbol edit item screen.

Mode Transition: Edit—Sym—Axis

Axis No. Symbol Edit Screen

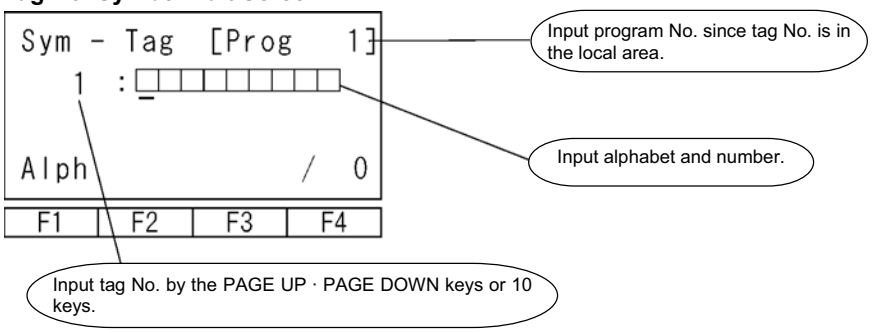


(9) Tag

Select F1 (Tag) key on the symbol edit item screen.

Mode Transition: Edit–Sym–Tag

Tag No. Symbol Edit Screen

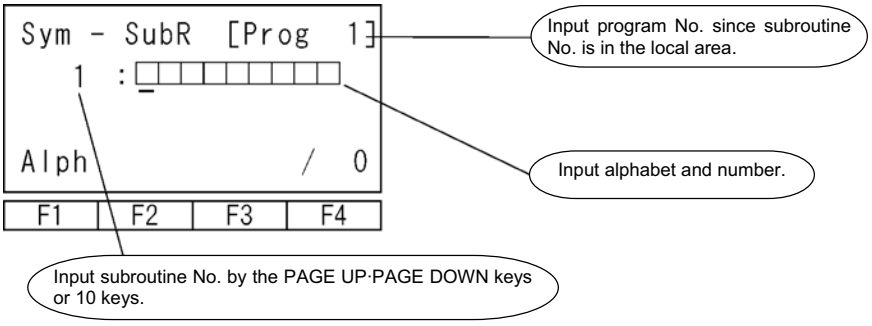


(10) Subroutine

Select F2 (SubR) key on the symbol edit item screen.

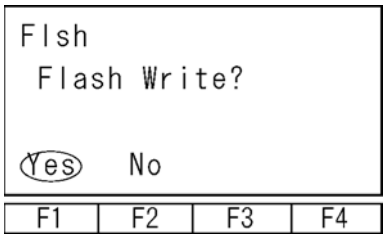
Mode flow: Edit–Sym–SubR

Subroutine No. Symbol Edit Screen

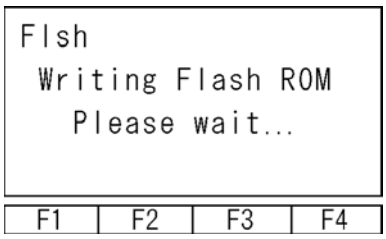


13-4 Flash ROM Writing

The edit data will be the by restoring power and executing software reset, only if the symbol edit data was transmitted to the controller.
To save the data after restoring the power and executing software reset, write the data to Flash ROM.
From the final editing screen, return to the Flash ROM writing screen with the ESC key.

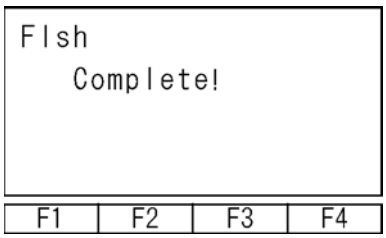


To write the data to Flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



During Flash ROM writing, “Please Wait....” blinks.

*** Never shut off the power to the controller during Flash ROM writing.**

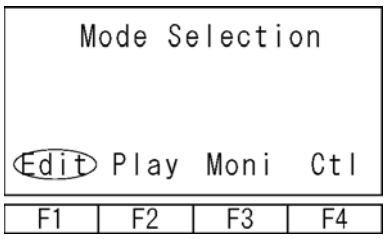


Flash ROM writing is complete.
Return to the edit screen with the ESC key.

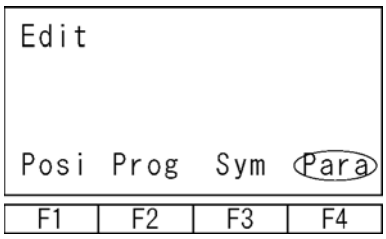
14. Parameter Edit

You can change the parameters corresponding to your system.
When you change the parameters by yourself, please note the parameter contents.

Parameters will be valid by restoring the power or executing software reset after Flash ROM writing.



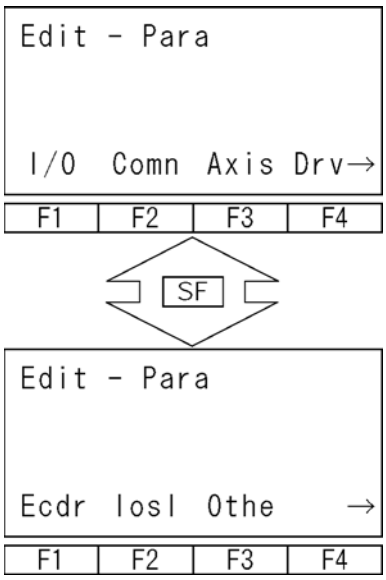
Select the F1 (Edit) key on the mode selection screen.



Select the F4 (Para) key on the edit screen.

14-1. Parameter Edit Items

Parameter items will be displayed in the function key area.
Each time by pressing the SF key, items will be shifted and displayed.



Parameter Edit Items

I/O:	I/O parameter
Comn:	All-axis common parameter
Axis:	Each-axis parameter
Drv:	Driver card parameter

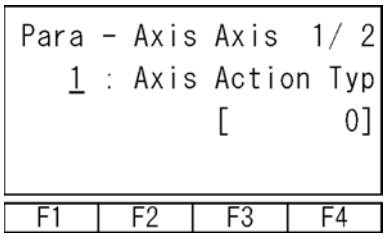
Ecdr:	Encoder parameter
IoSl:	I/O slot card parameter
Othe:	Other parameter

Select the parameter item to edit with function key.

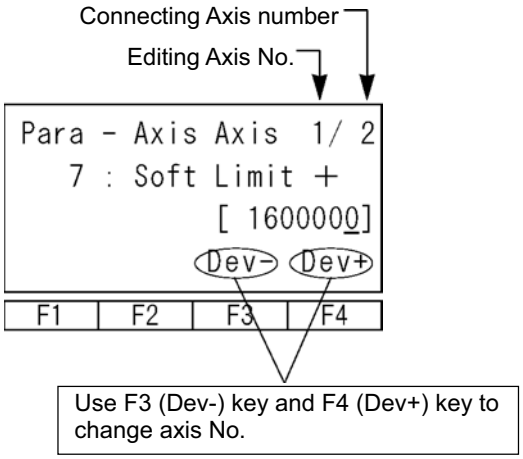
14-2. Input Example: Edit Each-Axis Parameter

Set the soft limit + for the first and second axis of each-axis parameter No.7, 300mm and 200mm.
Select the F3 (Axis) key on the screen of previous page, A.

Mode Transition: Edit → Para → Axis



The cursor is located at the parameter No.
Input 7 by using the10 keys and press the return key.

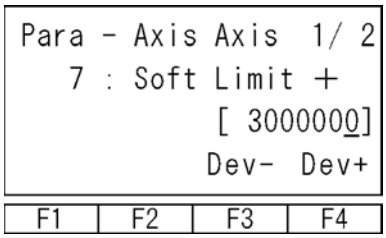


It becomes the soft limit + of each-axis parameter No.7 edit screen.

Input data of axis No. 1

Depending on the parameter items, set the parameter by axis or I/O board.
(Each-axis parameter, driver card parameter, encoder parameter, and I/O slot card parameter.)
Confirm that the screen is the first axis edit screen.

Input 300000 and press the return key.
(Unit: 0.001mm)

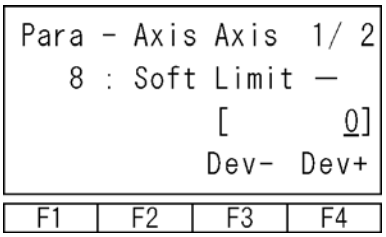


Transmit the parameter data to the controller by pressing the WRT key.

Note:

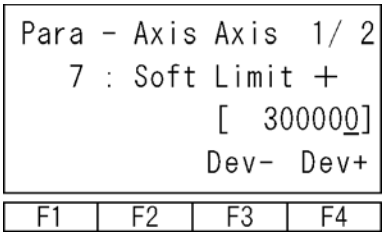
One transfer (WRT key) with the Teaching Pendant saves the data only on the current screen in memory. Therefore, it is required to input the parameter data and transfer it by axis (device).

Un-transmitted data will be invalid when switching the screen.

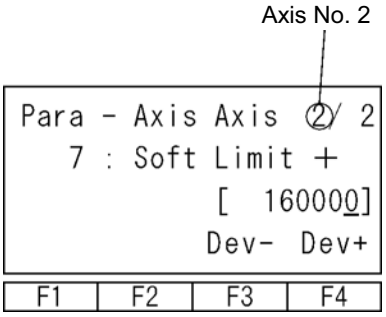


Input data of axis No. 2

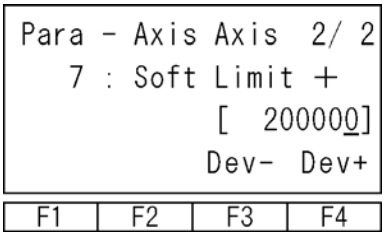
The display screen moves to parameter No. 8. Axis No. 2 of parameter No. 7 is not edited yet, so, return to the parameter No. 7 edit screen with the PAGE DOWN key.



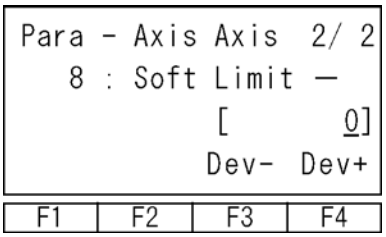
Change the axis No. to 2 by using the F4 (Dev+) key.



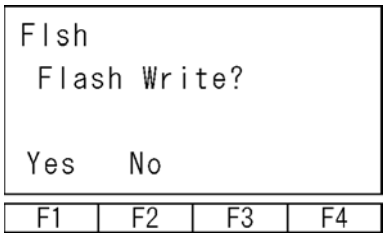
Input 200000 by using the 10 keys and press the return key.



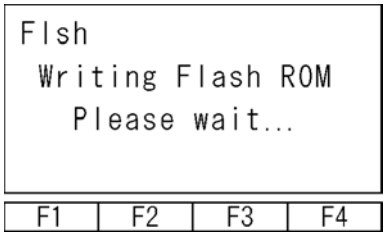
Transmit the parameter data to the controller by pressing the WRT key.



To continue editing each-axis parameter, move the cursor to the parameter No. and input the parameter No. to edit.
To finish each-axis parameter edit, return to the Flash ROM writing screen with the ESC key.

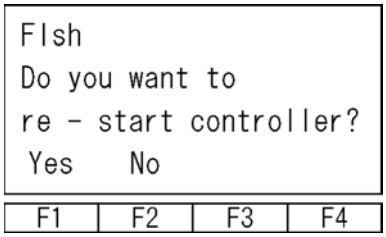


To write the data to Flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.

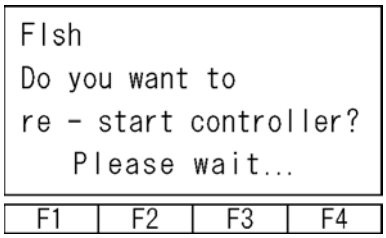


During Flash ROM writing, “Please Wait....” blinks.

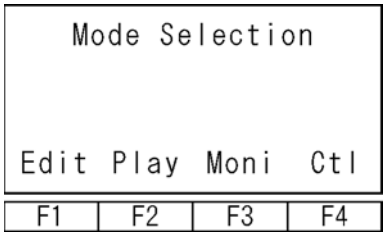
*** Never shut off the power to the controller during Flash ROM writing.**



After writing the data to Flash ROM, the screen changes to the software reset screen.
To have a valid changed parameter, execute a software reset. Press the F1 (Yes) key.



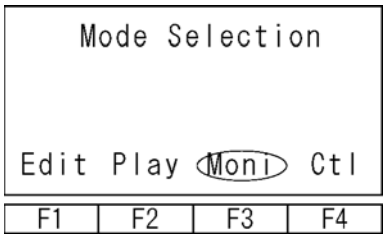
During software reset, “Please wait...” blinks.



When the software reset is complete, it returns to the mode selection screen.

15. Monitor

Monitor each status, global variable, port status, etc.

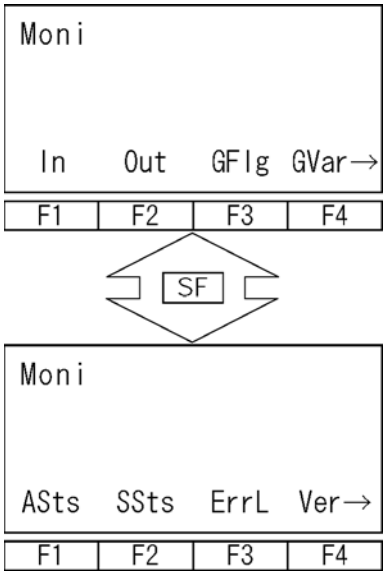


Select the F3 (Moni) key from The mode selection screen.

15-1. Monitor Items

Monitor items will be displayed in the function key area.
Each time by pressing the SF key, items will be shifted and displayed.

Monitor Items Screen



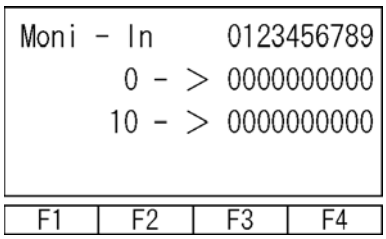
In:	Input port
Out:	Output port
GFlg:	Global flag
GVar:	Global variable

Asts:	Axis status
SSts:	System status
ErrL:	Error detail information
Ver:	Version information

Select the item to monitor with the function key.

15-2. Input Port

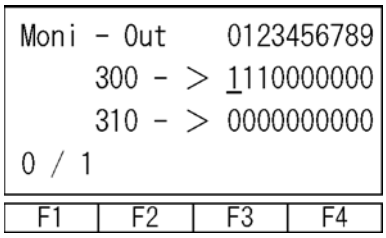
Display the ON/OFF status of input port.
Select the F1 (In) key on the monitor items screen.
Mode Transition: Moni ⟶ In



1: ON, 0: OFF
Each time the PAGE UP · PAGE DOWN keys are pressed, the 20 port numbers are scrolled.

15-3. Output Port

Displays the ON/OFF status of the output port. Also, it can switch the ON/OFF status of the output port.
Select F2 (Out) key on the monitor items screen.
Mode Transition: Moni ⟶ Out

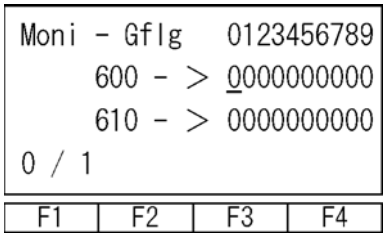


(The diagram above is the screen showing output port Nos. 300~302 ON.)

The output port where the cursor is located can be switched ON/OFF status each time by pressing the F1 (0/1) key.
1: ON, 0: OFF
The cursor location can be moved with return key or ← key.
Each time the PAGE UP · PAGE DOWN keys are pressed, 20 port numbers are scrolled.

15-4. Global Flag

Displays the ON/OFF status of global flag. Also, it can switch the ON/OFF status of the global flags.
Select the F3 (GFlg) key on the monitor items screen.
Mode Transition: Moni ⟶ GFlg

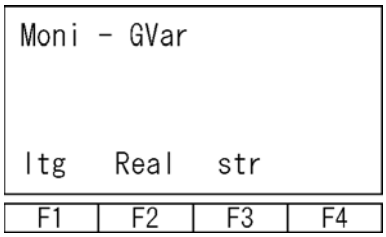


Global flags where the cursor is located can be switched ON/OFF each time by pressing the F1 (0/1) key.
1: ON, 0: OFF
The cursor location can be moved by return key or ← key.
Each time the PAGE UP · PAGE DOWN keys are pressed, 20 flags numbers are scrolled.

15-5. Global Variable

Displays the contents of global variable and global string. Also, a numeric value can be substituted for a global variable and letter string can be substituted for a global string.
Select the F4 (GVar) key on the monitor items screen.

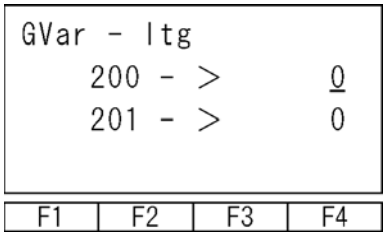
Mode Transition: Moni — GVar



3 kinds of global variables are displayed:
Itg: Integer Type (No. 200~299, No.1200~1299)
Real: Real Number Type (No. 300~399, No. 1300~1399)
Str: String (No. 300~999)

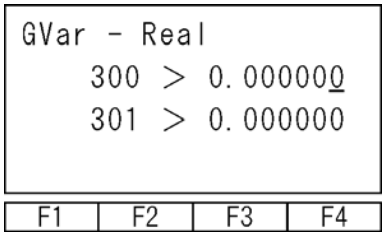
(1) Global Integer Type Variable

Mode Transition: Moni — GVar — Itg



(2) Global Real Number Type Variable

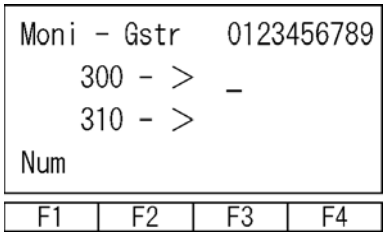
Mode Transition: Moni — GVar — Real



The cursor is located in the data column (variable content). To substitute a value, input numeric value by using the 10 keys and press the return key. The cursor location can be moved with the return key and ← key.
The variable No. can be changed with the PAGE UP · PAGE DOWN keys.

(3) Global String

Mode Transition: Moni — GVar — Str

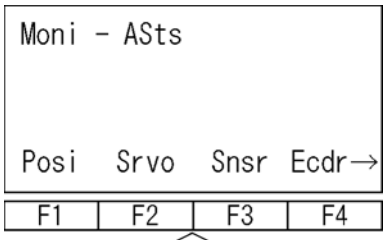


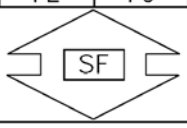
The cursor is located in the data column.
To substitute letters, input the ASCII code by using the 10 keys and press the return key. (Input hexadecimal, A~F after switching to Alph with the F1 (Alph/Num) key.)
The cursor location can be moved with the return key and ← key. Each time by pressing the PAGE UP · PAGE DOWN keys, the column scrolls 20 rows.

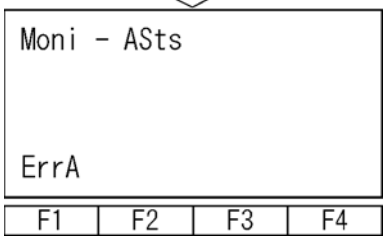
15-6. Axis Status

Displays the current position of each axis, servo status, sensor status, etc.
Select the F1 (ASts) key from the monitor items screen.

Mode Transition: Moni — ASts





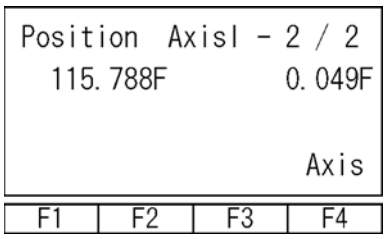


Posi:	Current Position
Srvo:	Servo Status
Snsr:	Sensor Input Status
Ecdr:	Encoder Status

ErrA:	Axis Related Error

(1) Current position

Mode Transition: Moni — ASts — Posi

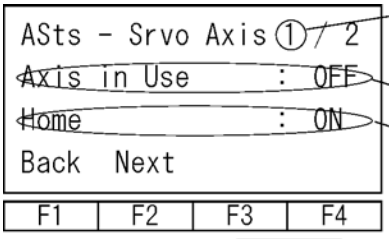


N: Servo ON

F: Servo OFF

(2) Servo status

Mode Transition: Moni — ASts — Srvo

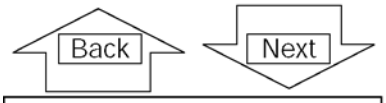


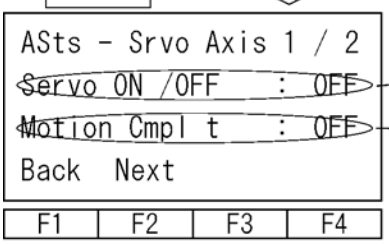
Axis No.

Axis No. can be switched with the PAGE UP · PAGE DOWN keys.

Servo ON axis in use

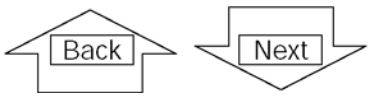
Homing

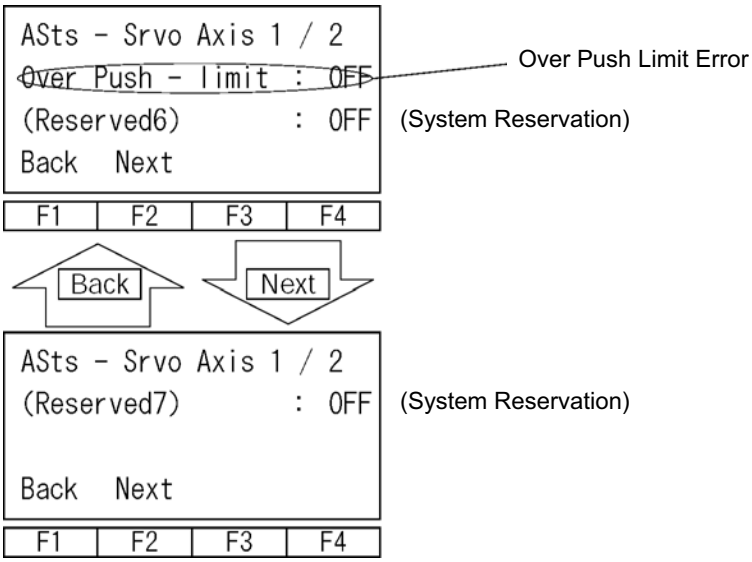




Servo

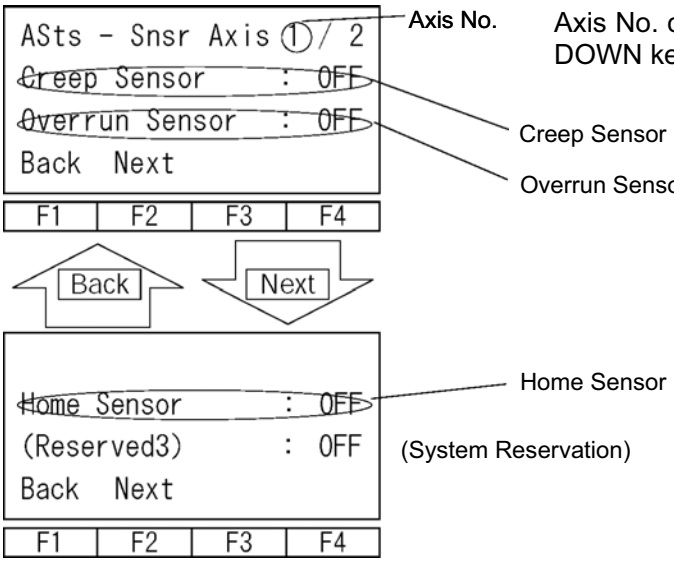
Moving Command Normal End





(3) Sensor Input Status

Mode Transition: Moni — ASts — Snsr

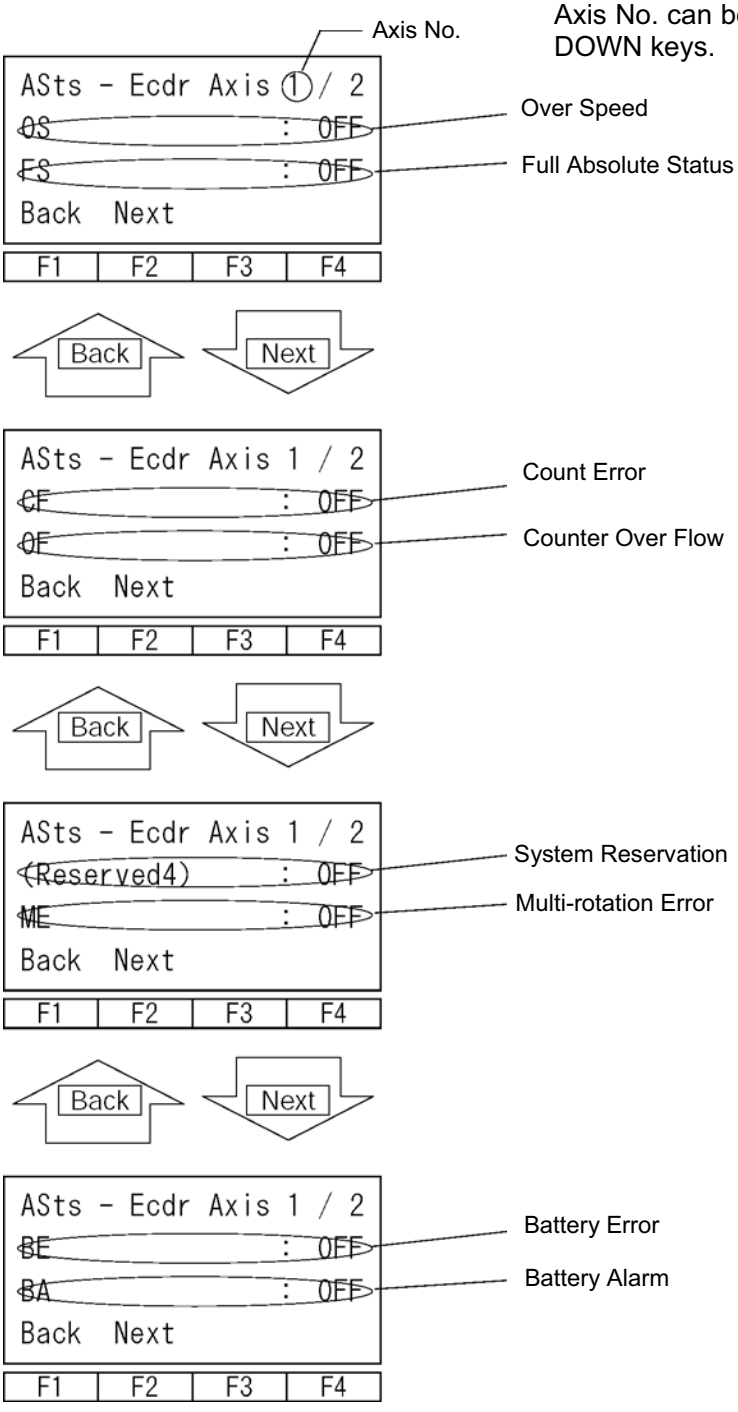


Axis No. can be switched with the PAGE UP · PAGE DOWN keys.

(4) Encoder Status

Mode Transition: Moni — ASts — Ecdr

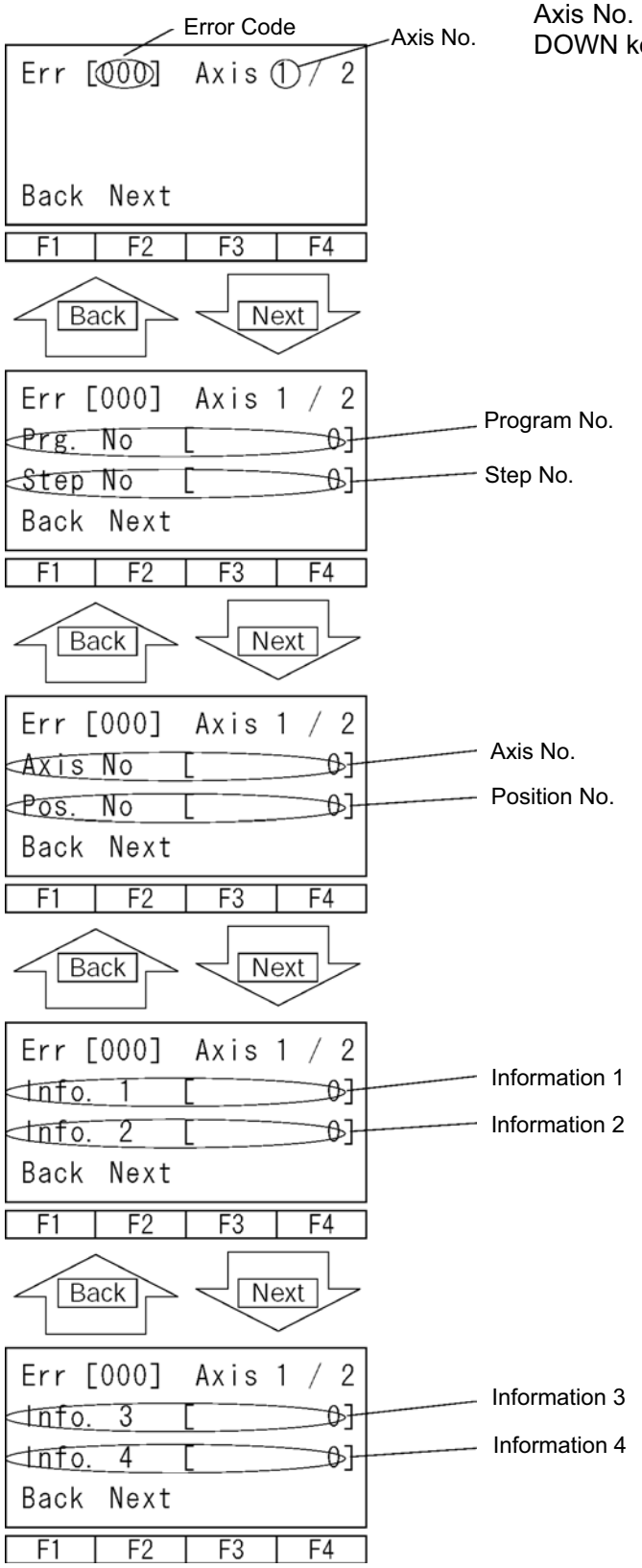
Axis No. can be switched with the PAGE UP · PAGE DOWN keys.



(5) Axis Related Error

Mode Transition: Moni — ASts — ErrA

Axis No. can be switched with the PAGE UP · PAGE DOWN keys.

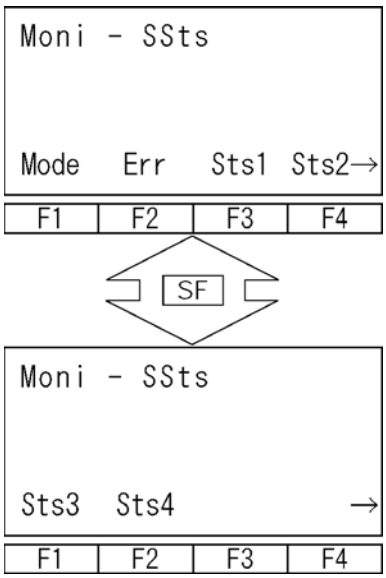


15-7. System Status

Display system status.

Select the F2 (SSts) key on the monitor items screen.

Mode Transition: Moni — SSts

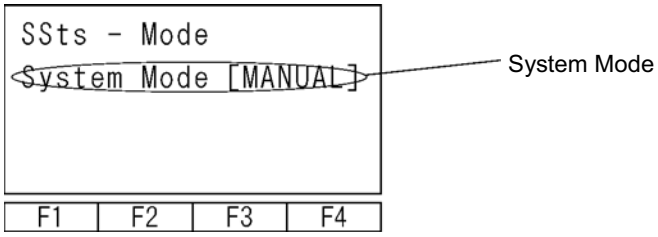


Mode: System Mode
Err: System Error
Sts1: System Status 1
Sts2: System Status 2

Sts3: System Status 3
Sts4: System Status 4

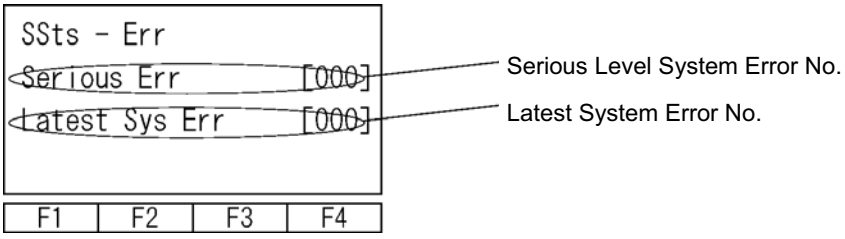
(1) System Mode

Mode Transition: Moni — SSts — Mode



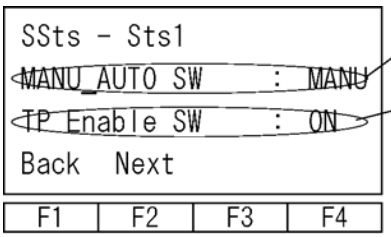
(2) System Error

Mode Transition: Moni — SSts — Err



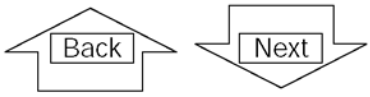
(3) System Status 1

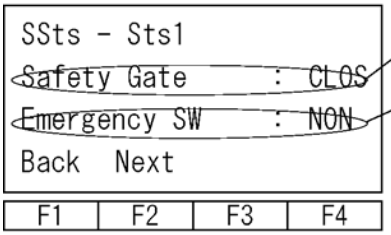
Mode Transition: Moni — SSts — Sts1



Operation Mode SW Status

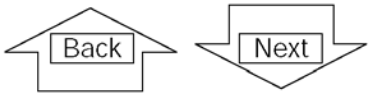
TP Enable SW Status

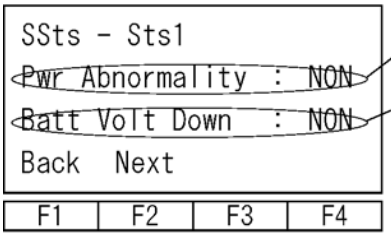




Safety Gate Status

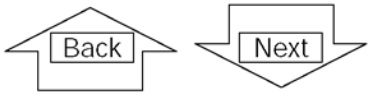
Emergency Stop SW Status

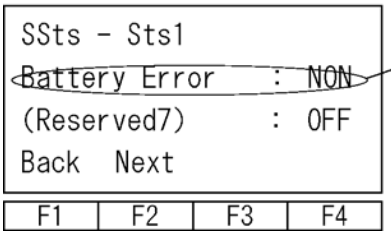




Power Abnormality Status

Battery Voltage Down Warning Status



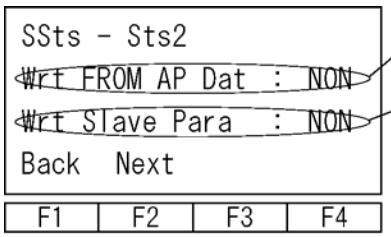


Battery Voltage Error Status

System Reservation

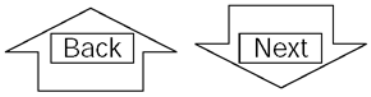
(4) System Status 2

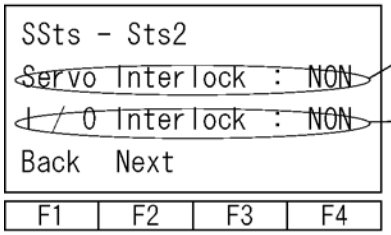
Mode Transition: Moni — SSts — Sts2



Application Data Flash ROM Write Status

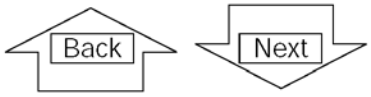
Slave Parameter Write Status

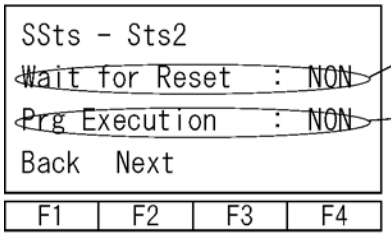




Servo Interlock Status

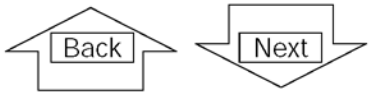
I/O Interlock Status

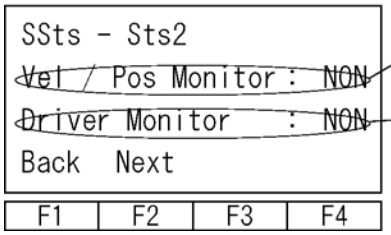




Wait for Reset Status

Program Execution Status



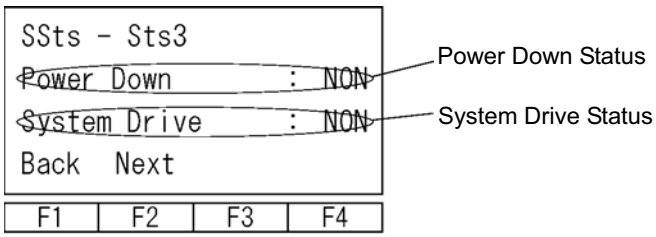


Velocity Command/ Position Pulse Monitor (Main) Status

Driver Monitor Status

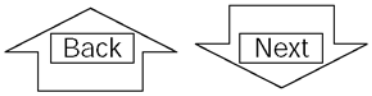
(5) System Status 3

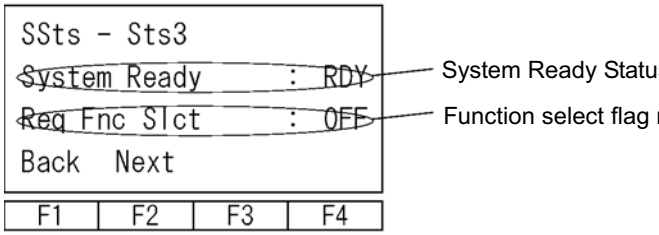
Mode Transition: Moni — SSts — Sts3



Power Down Status

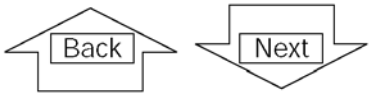
System Drive Status

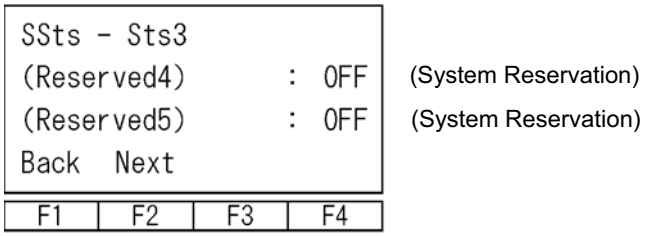




System Ready Status

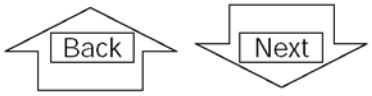
Function select flag request status

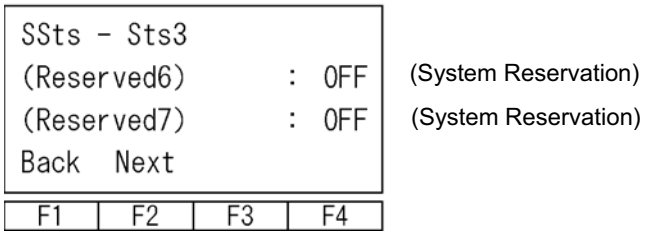




(System Reservation)

(System Reservation)





(System Reservation)

(System Reservation)

(6) System Status 4

Mode Transition: Moni — SSts — Sts4

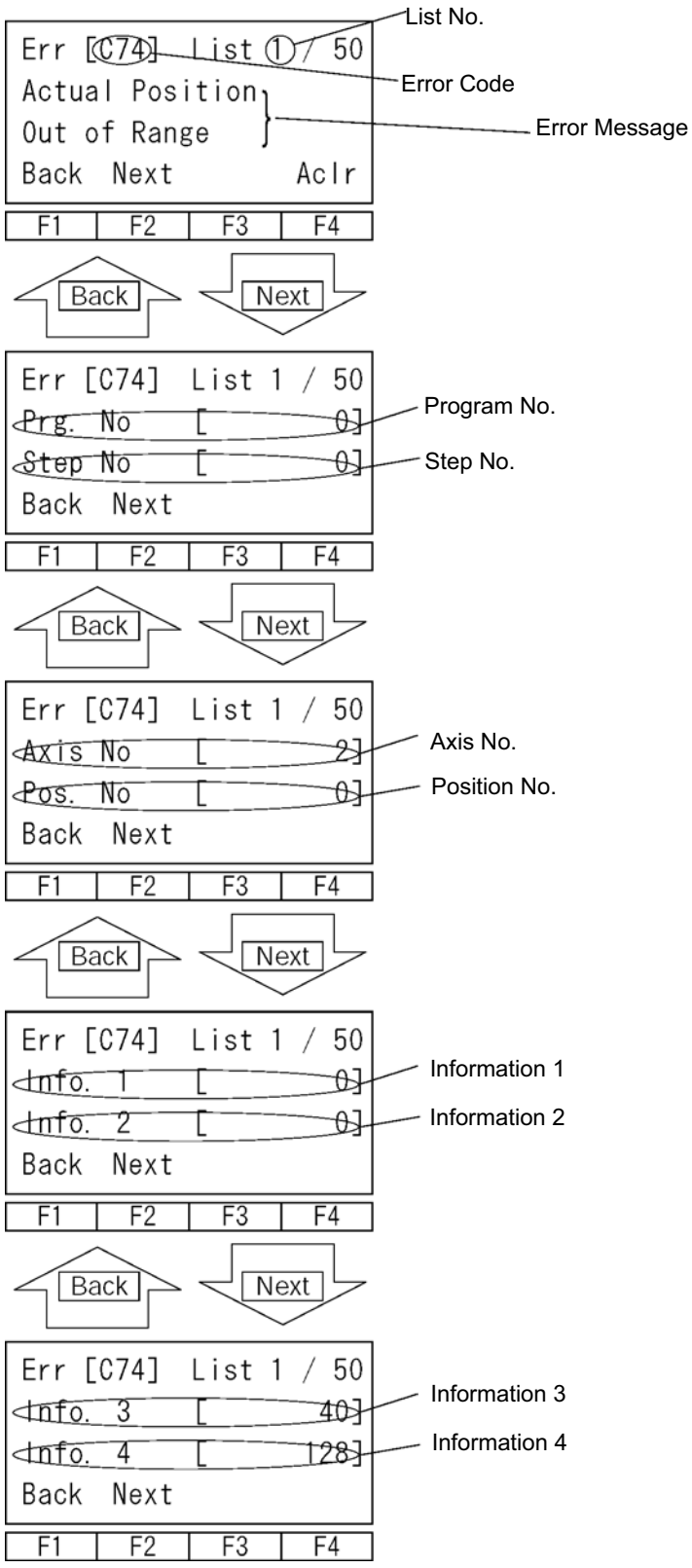
System status 4 is all reserved.
(System Reservation)

15-8. Error Detail Information

Displays the error detail information.

Select the F3 (ErrL) key on the monitor items screen.

Mode Transition: Moni — ErrL

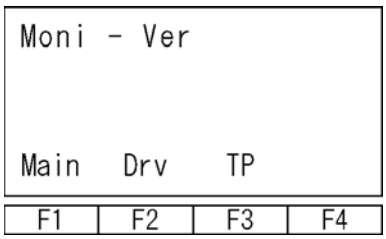


15-9. Version Information

Displays version information.

Select the F4 (Ver) key on the monitor items screen.

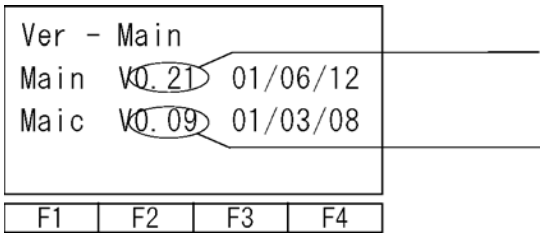
Mode Transition: Moni — Ver



Main: Main
Drv: Driver
TP: Teaching Pendant

(1) Main

Mode Transition: Moni — Ver — Main

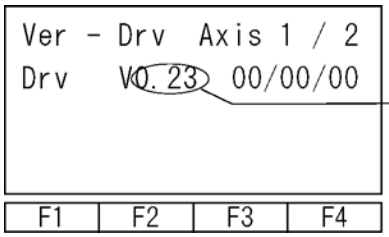


Controller Main Application Version

Controller Main Core Version

(2) Driver

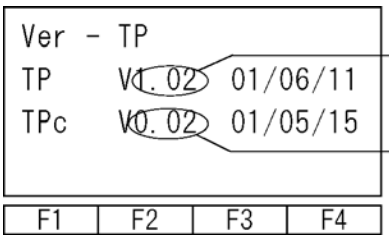
Mode Transition: Moni — Ver — Drv



Driver CPU Version

(3) Teaching Pendant

Mode Transition: Moni — Ver — TP

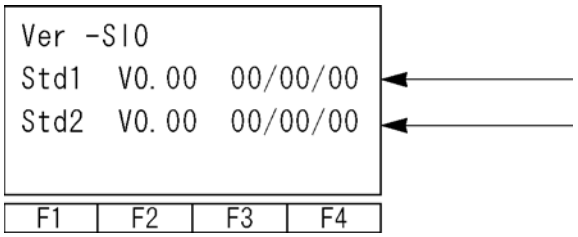


Teaching Pendant Application Version

Teaching Pendant Core Version

(4) Mount SIO (Controller P/Q type only)

Mode Transition: Moni → Ver → SIO



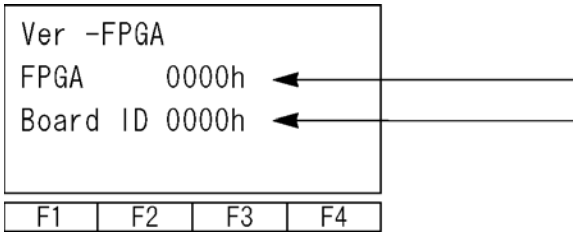
Channel 1 Version

Channel 2 Version

* "Nonuse" is displayed for the channel with the I/O parameters No. 201 and No. 213 set to "Nonuse."

(5) FPGA

Mode Transition: Moni → Ver → FPGA

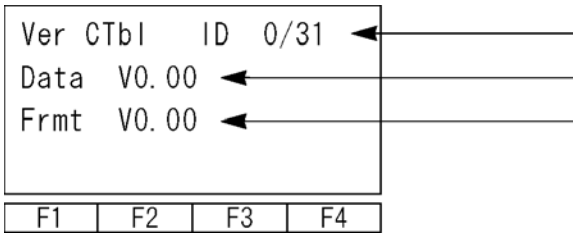


FPGA Version (HEX)

Board ID (HEX)

(6) Control Constant Table Management Information

Mode Transition: Moni → Ver → CTbl



Currently Displayed Table ID/Largest Table ID

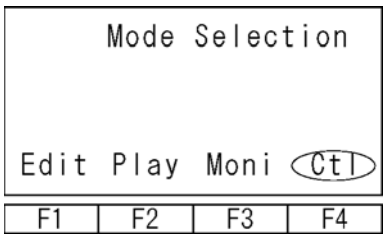
Data Version

Format Version

* Change the table ID to display with the PAGE UP · PAGE DOWN keys.

16. Controller

How to execute operation related to the controller such as a software reset and an error reset.

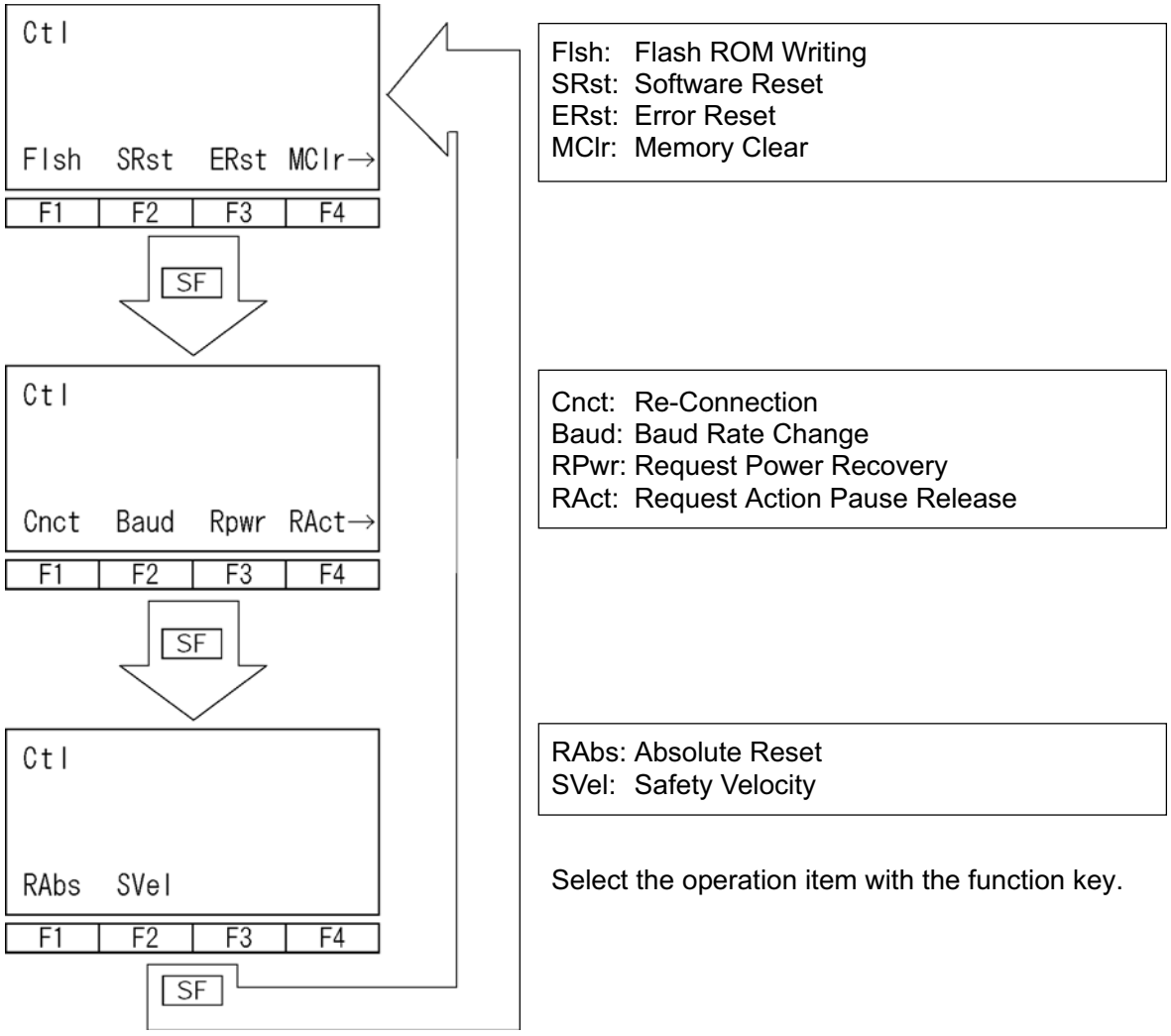


Select the F4 (Ctl) key on the mode selection screen.

Controller operation items are displayed in the function key area.

16-1. Controller Items

Each time by pressing the SF key, operation items will be shifted and displayed.



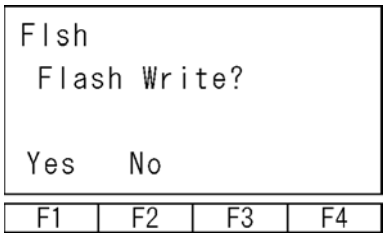
Select the operation item with the function key.

16-2. Flash ROM Writing

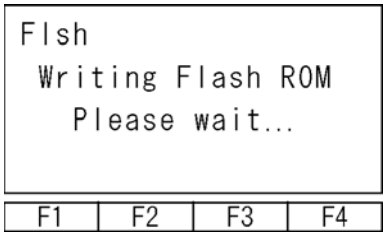
After clearing the data from Flash ROM, write data which is saved in controller memory to Flash ROM.

Select the F1(Flsh) key on the controller item screen.

Mode Transition: Ctl ⊣ Flsh

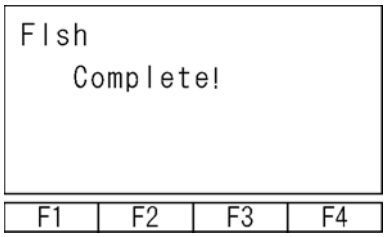


To write the data to Flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key. The screen returns to the controller item screen.



During Flash ROM writing, “Please Wait....” blinks.

*** Never shut off the power to the controller during Flash ROM writing.**



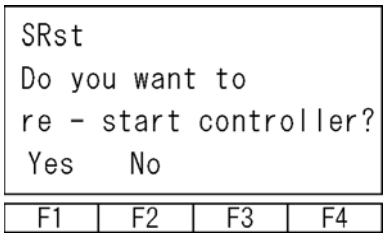
Return to the controller item screen with the ESC key.

16-3. Software Reset

Executes software reset of the controller. The data which is not written to Flash ROM will be cleared.

Select the F2 (SRst) key on the controller item screen.

Mode Transition: Ctl → SRst



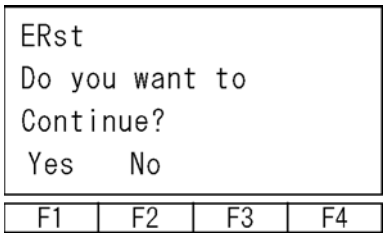
To execute a software reset, press the F1 (Yes) key.
If not, press the F2 (No) key. The screen returns to the mode selection screen.

16-4. Error Reset

Executes error reset of the controller. Reset the message-level and action-release-level errors. If the cause of the error is not solved, the error will reoccur again.

Select the F3 (ERst) key on the controller item screen.

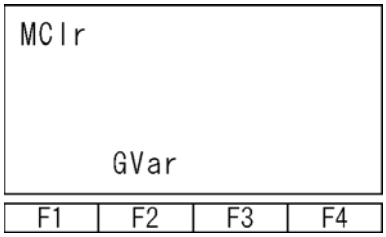
Mode Transition: Ctl → ERst



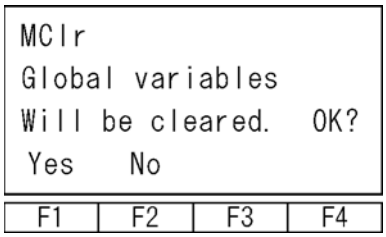
To execute an error reset, press the F1 (Yes) key.
If not, press the F2 (No) key.
The screen returns to the controller item screen.

16-5. Memory Clear

Zero clears the global variable.
Select the F4(MClr) key on the controller item screen.
Mode Transition: Ctl ⊣ MClr



Press the F1 (Gvar) key.

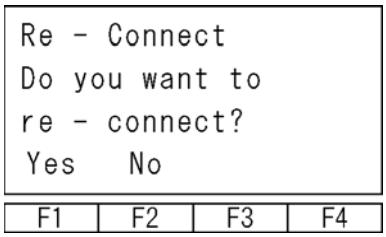


To clear memory, press the F1 (Yes) key.
If not, press the F2 (No) key. The screen returns to the previous screen.

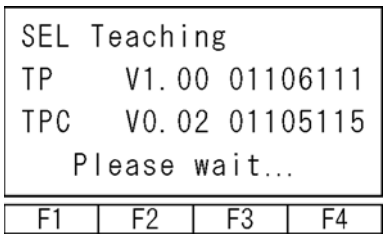
Returns to the previous screen with the ESC key.

16-6. Re-Connection

Re-connect to the controller. In a communicable state, the off-line mode can be moved to the on-line mode.
Select the F1(Cnct) key on the controller item screen.
Mode Transition: Ctl ⊣ Cnct



To re-connect, press the F1 (Yes) key.
If not, press the F2 (No) key. It will return to the previous screen.

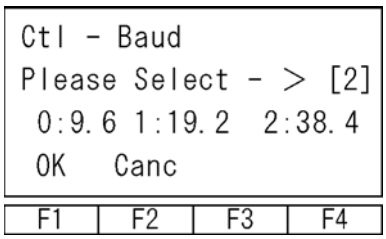


During re-connection, “Please wait...” blinks.

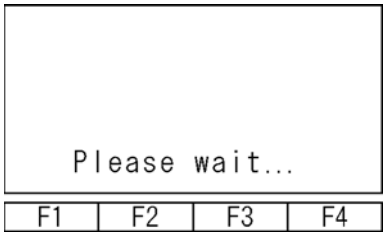
After a re-connection completes, it returns to the mode selection screen.

16-7. Baud Rate Change

Changes the communication baud rate between the controller and the teaching pendant.
Select the F2 (Baud) key on the controller item screen.
Mode Transition: Ctl ⊣ Baud



Input values corresponding to the baud rate by using the 10 keys and press the return key.
0: 9.6 1: 19.2 2: 38.4 [bps]
To change the baud rate, press the F1 (OK) key.
To cancel, press F2 (Canc) key. It returns to the previous screen.

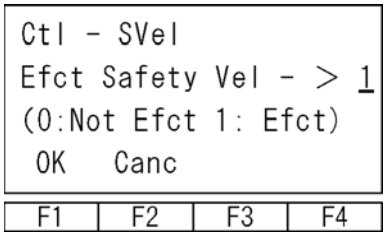


During baud rate change, “Please wait.... “ blinks.

Return to the baud rate change screen.

16-8. Safety Velocity

Switches the safety velocity limit status at manual mode.
Select the F2 (SVel) key on the controller item screen.
Mode Transition: Ctl ⊣ SVel



Input 1 or 0 by using the 10 keys and press the return key.
1: Safety Velocity Limit Effect
The fastest velocity is under 250mm/sec. The setting of the programs and parameters do not affect it.
0: Safety Velocity Limit does not Effect
There in no safety velocity limit.

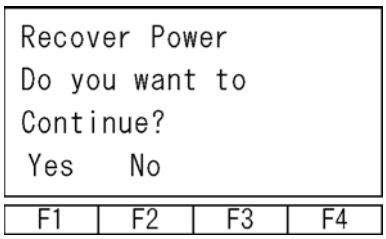
To switch the safety velocity limit status, press the F1 (OK) key.
To cancel, press the F2 (Canc) key.

16-9. Driver Power Recovery Request

Requests to recover driver power to the controller.

Select the F3 (RPwrl) key on the controller item screen.

Mode Transition: Ctl ⊣ RPwr



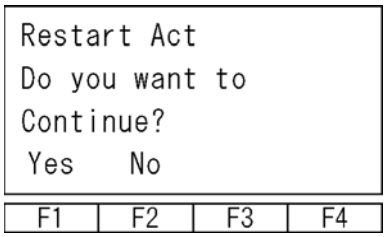
To execute driver power recovery request, press the F1 (Yes) key. Return to the previous screen.
If not, press the F2 (No) key. Return to the previous screen.

16-10. Action Pause Release Request

Request to release action pause to the controller.

Select the F4 (RAct) key on the controller item screen.

Mode Transition: Ctl ⊣ RAct



To execute a action pause release request, press the F1 (Yes) key. Return to the previous screen.
If not, press the F2 (No) key. Return to the previous screen.

16-11. Driver Power Recovery Request (RPwr) and Action Pause Release Request (Ract)

(1) Driver Power Recovery Request

① How to execute Driver Power Recovery Request

Execute Driver Power Recovery Request by any of the following:

- Set 1 in I/O parameter No.44 (Input Select Function 014 = Driver Power Cut-off Release Input) and ON edge input on Input port No.14.
- From the software menu, execute Controller → Driver Power Recovery Request.
- From the mode selection screen of the teaching pendant, select Ctl (Controller operation) → RPwr (Driver Power Recovery Request) and execute.

② Case which requires executing Driver Power Recovery Request

Only the following case requires executing Driver Power Recovery Request:

- When you set 1 in I/O parameter No.44, Driver Power Cut-off cause occurs → Recover after the main cause of cut-off is solved.

(2) Action Pause Release Request:

① How to execute Action Pause Release Request

Execute Action Pause Release Request by any of the following:

- Set 1 in I/O parameter No. 35 (input selection function 005 = Action Pause Release Signal) and ON edge input on input port No.5.
- From the software menu, execute Controller (C) → Action Pause Release Request (L).
- From the mode selection screen of the teaching pendant, select Ctl (Controller operation) → Ract (Action Pause Release Request) and execute.

② Case which requires Action Pause Release Request

Each of the following cases requires executing Action Pause Release Request.

- When you set 2 on other parameter No.9 (Deadman SW recovery type = action continuation recovery [during automatic operation only]), stop according to dead man SW during automatic operation → recover after releasing stop (action pause release).
- When you set 2 on other parameter No.10 (emergency stop recovery type = action continuation recovery [during automatic operation only]), emergency stop during automatic operation → recover after emergency stop release (action pause release).
- When you set 2 on other parameter No.11 (safety gate OPEN time recovery type = action continuation recovery [during automatic operation only]), safety gate OPEN during automatic operation → recovery after safety gate CLOSE (action pause release).
- When you set 1 on I/O parameter No.36 (input selection function 006 = pausing action signal), OFF level input on input port No.6 during automatic operation (pausing action) → recover after ON level input on Input port No.6 (action pause release).

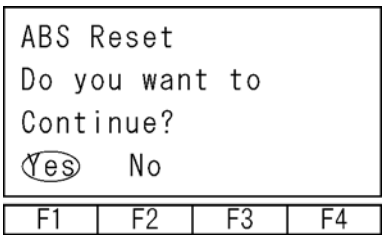
* If case (1) ② and (2) ② occur at the same time, you need to first execute Driver Power Recovery Request. After completing it, execute the Action Pause Release Request.

16-12. Absolute Reset

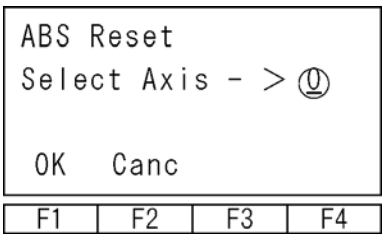
Executes absolute data reset.

Select the F1 (RAbs) key on the controller item screen.

Mode Transition: Ctl → RAbs

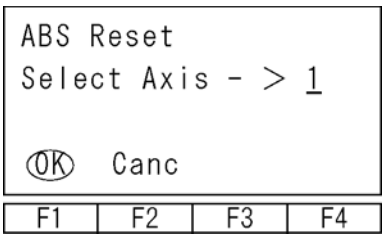


To execute absolute reset, press the F1 (Yes) key.
If not, press the F2 (No) key. Return to the previous screen.

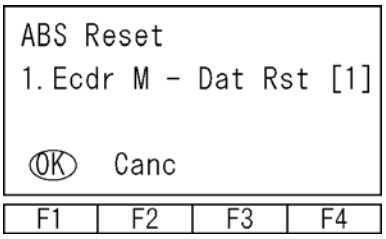


Axis No. Input

Input the axis No. for executing absolute reset by using the 10 keys and press the return key.

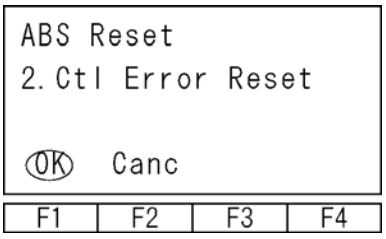


To continue absolute reset, press the F1 (OK) key.
To cancel, press the F2 (Canc) key.
To cancel on screens ①~⑥ (see below), press the F2 (Canc) key.



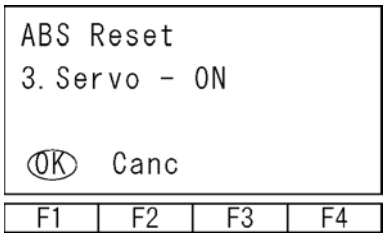
① Encoder multi-rotation data reset 1

Press the F1 (OK) key.



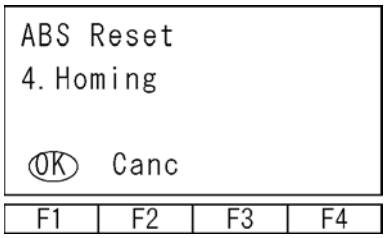
② Controller error reset

Press the F1 (OK) key.



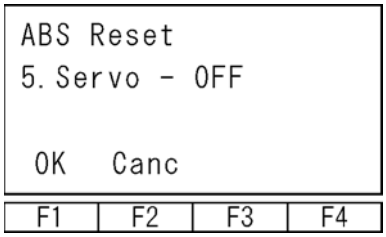
③ Servo ON

F1 (OK) key.



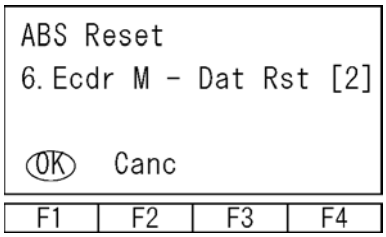
④ Homing

F1 (OK) key.



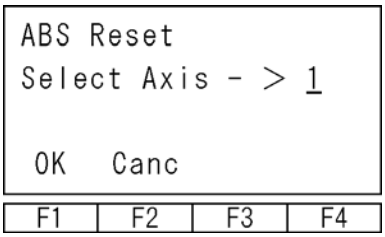
⑤ Servo OFF

You can execute absolute reset with the teaching pendant application version 1.02 or later and driver CPU ver 0.23 or later with servo ON status. Do not press the F1 (OK) key but press the PAGE UP key. Then move to "⑥ Encoder multi-rotation data reset 2."

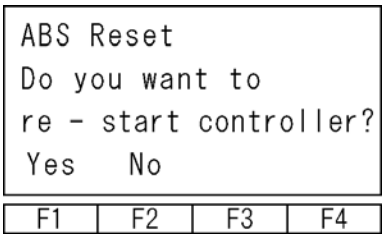


⑥ Encoder multi-rotation data reset 2

Press the F1 (OK) key.



Return to the axis No. input screen.
To execute absolute reset on other axes, input axis No. here and press the F1 (OK) key. Repeat ①~⑥.
To finish absolute reset, press the ESC key.



Move to the software reset screen.
Press F1 (Yes) key to execute software reset.
After the software reset, return to the mode selection screen.

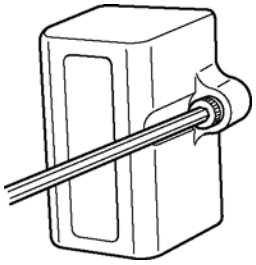
That's all for the absolute reset operation.

16-13. Procedures for Resetting Absolute-Battery Voltage-Down Warning Error

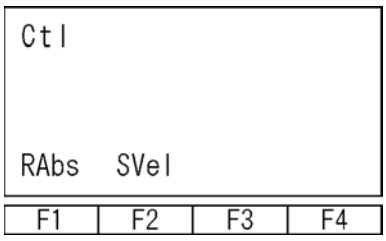
When the absolute-encoder-battery voltage-down warning error (error code A03) occurs or a battery with no error occurring is replaced, the encoder error and software are reset. Homing in the absolute reset procedures does not have to be attempted again.
Keep the controller's main power ON until the following procedures have been completed:

① Turn the servo OFF for all the axes for error resetting. (Use the ON/OFF key on the teaching screen.)

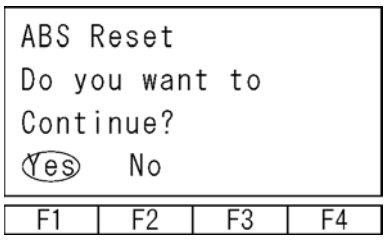
② Replace the batteries of the axes for error resetting.
When the voltage of absolute data holding batteries decreases, replace them together with the battery unit.



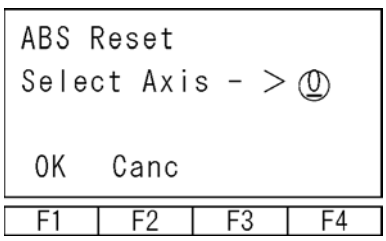
Remove the bolt fixing the battery unit on the front panel with an hexagonal wrench, as shown at the left.
Pull it out as it is toward you.
Replace the battery unit with a new one.



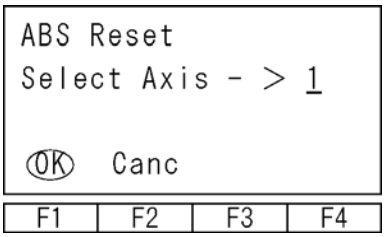
③ Select the F1 (RAbs) key from the controller items screen.



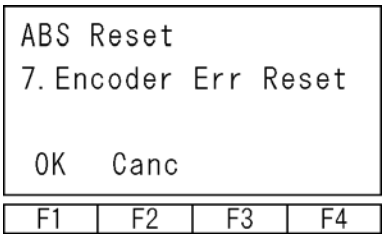
④ To reset the encoder error, press the F1 (Yes) key.
If not, press the F2 (No) key. Return to the previous screen.



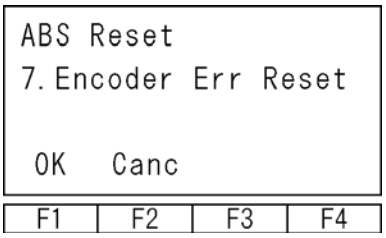
⑤ Axis No. Input
Input the axis No. for an encoder error reset with the 10 keys and press the return key.



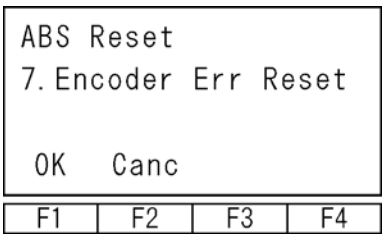
⑥ To continue the encoder error reset, press the F1 (OK) key.
To cancel the encoder error reset, press the F2 (Canc) key.



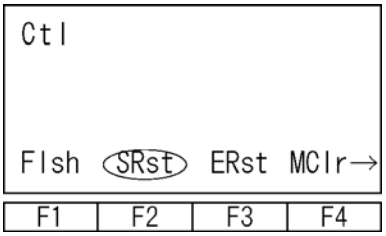
⑦ Press the PAGE UP/PAGE DOWN key several times to display “7. Encoder Err Reset” screen.



⑧ To reset the encoder error, press the F1 (OK) key. (To cancel the encoder error reset, press the F2 (Canc) key.)



⑨ When also resetting the encoder error reset for another axis, press the F2 (Canc) key. Return to the screen of ⑥ above and press the return key. Repeat the steps of ⑥~⑨ above in the same manner.
To complete the encoder error reset, press the ESC key.



⑩ Reset software.
Display “SRst” in the function key area with the SF key.
Press the F2 (SRst) key.
For the following operations, refer to “16-3. Software Reset.”

Supplement: Synchro Specification Absolute Reset

The following are descriptions about the absolute reset methods for synchro specification axes.
The products ordered as the synchro specification are shipped after setting parameters to the synchro specification. However, change the parameters when executing an absolute reset.

1. Synchro Axes

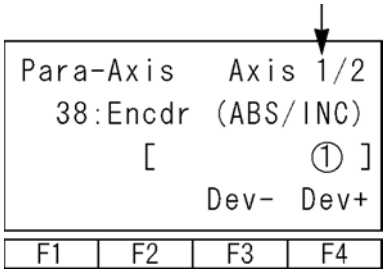
Synchro axes are comprised of the master axis (main axis) and the slave axis (sub-axis). The axis of which the number is smaller becomes the master axis.
Program commands are valid only for the master axis. (Commands to the slave axis are prohibited.)
As the absolute reset methods, there is the standard procedure and the special procedure. Which procedure to be used is determined by the “each-axis parameter No. 38 encoder ABS/INC type” values for the master and slave axes.

“Each-Axis Parameter No. 38 Encoder ABS/INC Type” Values		Absolute Reset Methods
Master Axis	Slave Axis	
1	1	Special procedure
1	0	Standard procedure
0	0	

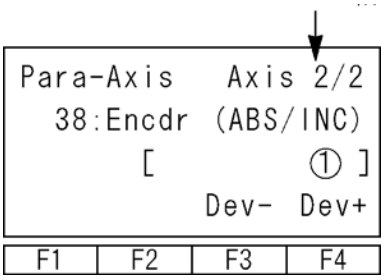
(When the value is 0 for both the master axis and the slave axis, both the axes are of the increment specification.)

Example 1) When special procedure is executed for 2-axis controller:
Mode Transition: Edit → Para → Axis

Master axis with a smaller axis No.

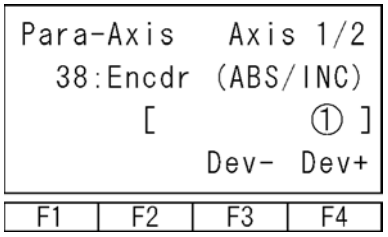


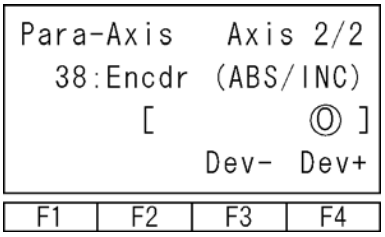
Slave axis



Note: To change the axis No., use the F3 (Dev-) key or F4 (Dev+) key.

Example 2) When standard procedure is executed for 2-axis controller:





2. Location Adjustment of Synchro Axes Sliders

Align the synchro axes sliders. (Physical parallel adjustment)

(1) Adjust the relative locations between the sliders of the master and slave axes and connect them while the axes are not connected to the controller via cables (controller main power OFF).

(2) If location adjustment cannot be made while the axes are not connected to the controller via cables (such as with the brake), follow the steps below.

① Disconnect the sliders temporarily and connect the axes to the controller via cables.

② Record the current values of the “each-axis parameter No. 65 synchro other axis No.” for the master and slave axes. (Record them to return to their original values in a later process.)

③ To cancel the synchro function temporarily, input 0 to the “each-axis parameter No. 65 synchro other axis No.” for both the master and slave axes, and execute the data transfer to the controller, Flash ROM writing and controller restart (software reset) in this order.

④ Execute an absolute reset (standard procedure) for each of the master and slave axes as a single axis.

⑤ Adjust the relative locations of the sliders by jog operation, etc., and connect them.

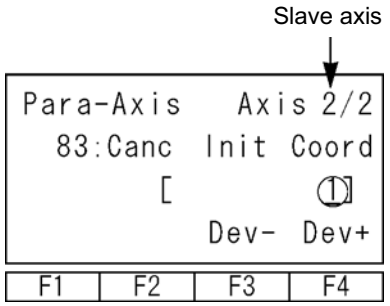
⑥ Input the values recorded in ② above to the “each-axis parameter No. 65 synchro other axis No.” for the master and slave axes, and execute the data transfer to the controller, Flash ROM writing and controller restart (software reset) in this order.

3. Special Procedure Absolute Reset

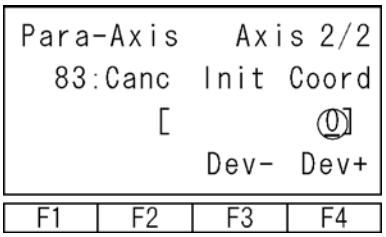
In the case of “each-axis parameter No. 38 encoder ABS/INC type”: master axis = 1 and slave axis = 1:

(1) Record the current value of the “each-axis parameter No. 83 ABS synchro slave axis coordinate initialization cancel” for the slave axis. (Record it to return to the original value in a later process.)

Mode Transition: Edit → Para → Axis

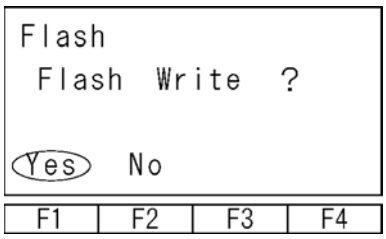


(2) Input 0 for the “each-axis parameter No. 83 ABS synchro slave axis coordinate initialization cancel” for the slave axis.

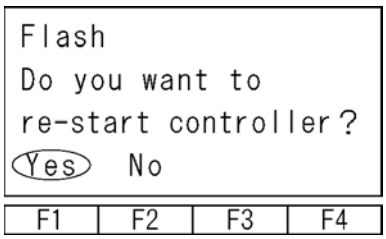


Input 0 with the 10 keys and press the return key.

Press the ESC key several times to move to the Flash ROM writing screen.



Write the data to Flash ROM.
Press the F1 (Yes) key.

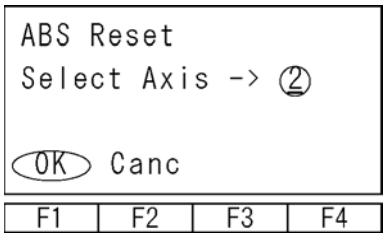


Execute restart (software reset).
Press the F1 (Yes) key.

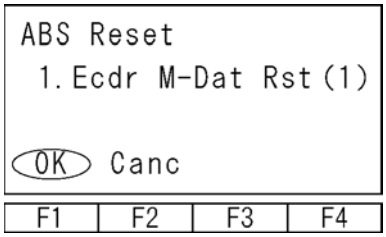
(3) Execute an absolute reset according to the following special procedure (forced operation by ignoring the screen steps):

Mode Transition: Ctl → RAbs

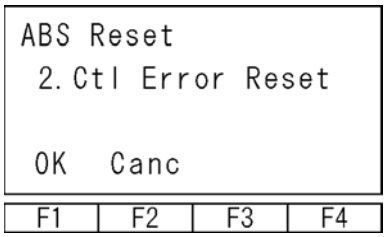
① Execute the “encoder multi-rotation data reset 1“ for the slave axis.



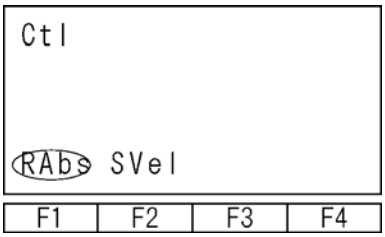
Input the axis No. of the slave axis and press the return key.
Press the F1 (OK) key.



Press the F1 (OK) key.

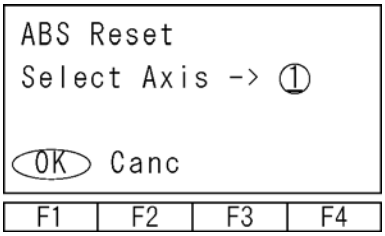


Exit from the absolute reset mode temporarily with the ESC key, without pressing the F1 (OK) key.

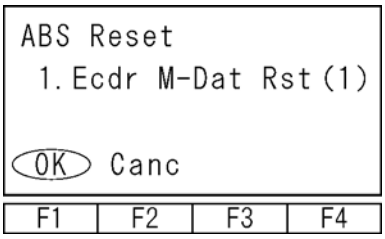


Press the F1 (RAbs) key to return to the absolute reset mode.

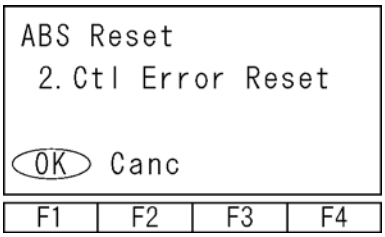
② Execute an absolute reset for the master axis according to the screen steps.



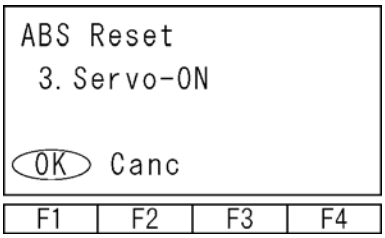
Input the axis No. of the mater axis and press the return key.
Press the F1 (OK) key.



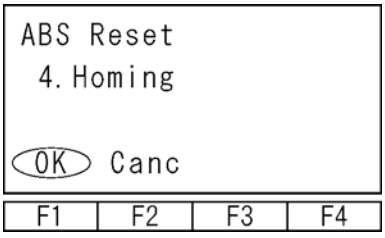
Press the F1 (OK) key.



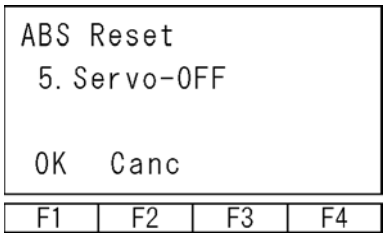
Press the F1 (OK) key.



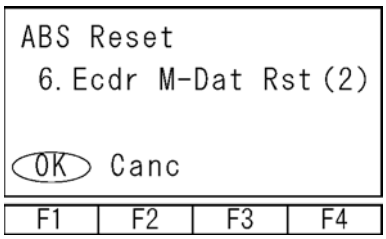
Press the F1 (OK) key.



Execute homing.
Press the F1 (OK) key.

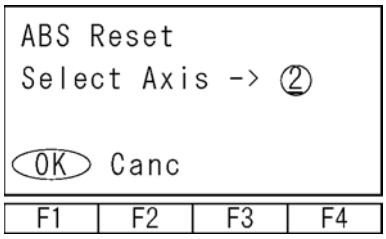


Press the PAGE UP key to advance the screen, without pressing the F1 (OK) key.

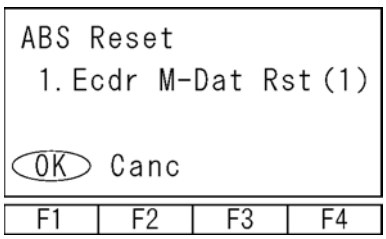


Press the F1 (OK) key.

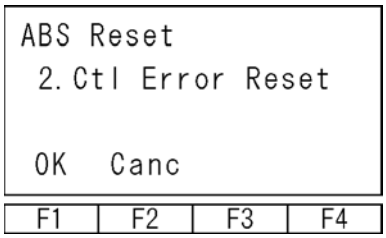
③ Execute the “encoder multi-rotation data reset 1” for the slave axis again.



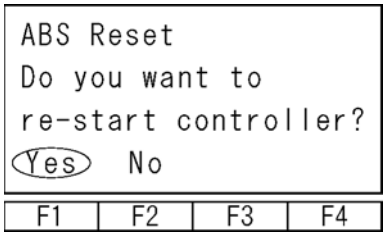
Input the axis No. of the slave axis again and press the return key.
Press the F1 (OK) key.



Press the F1 (OK) key.



Exit from the absolute reset mode with the ESC key, without pressing the F1 (OK) key.

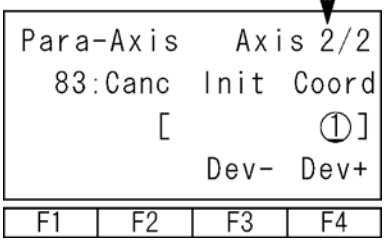


Restart the controller.
Press the F1 (Yes) key.

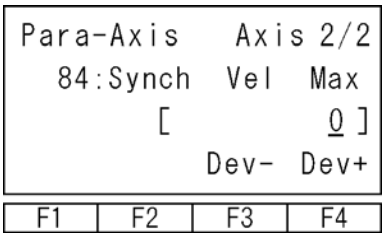
Return the slave-axis value for the “each-axis parameter No. 83 synchro slave axis coordinate initialization cancel” to the original value.

Mode Transition: Edit → Para → Axis

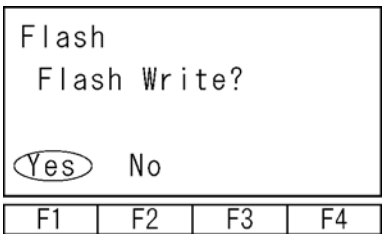
Slave axis



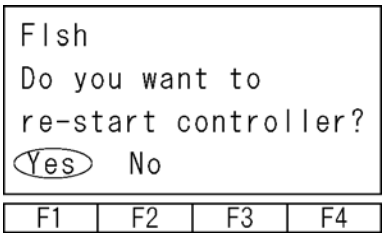
Press the WRT key to transfer the data.



Advance to the next parameter screen. Move to the Flash ROM writing screen with the ESC key.



Write the data to Flash ROM.
Press the F1 (Yes) key.

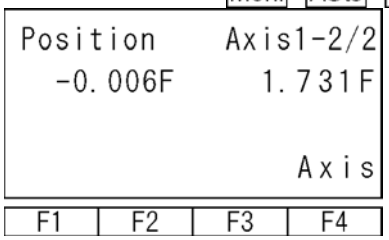


Restart the controller.
Press the F1 (Yes) key.

(5) Set the preset home value to uniform the coordinate values of the master and slave axes.

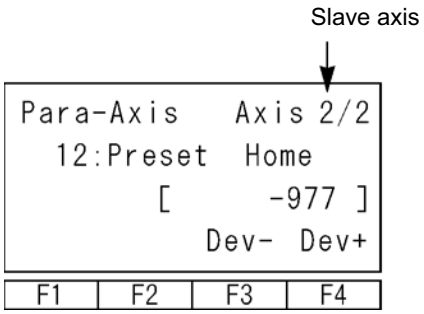
① If the controller 7 segment display is “rdy” while the servo is OFF, read the displayed current positions of the master and slave axes.
(If the error No. C74 real position soft limit over error occurs, reset the error. When “rdy” is displayed, the current positions can be read.)

Mode Transition: Moni → ASts → Posi



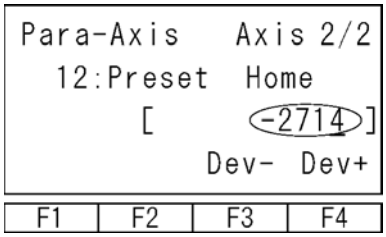
* If the servo is turned ON at this stage, error No. D0A driver overload error, error No. C6B deviation overflow error, error No. CA5 stop deviation overflow error, etc., occurs.

② Calculate the following:
Each-axis parameter No. 12 preset home value for slave axis [0.001 mm]
+ ((displayed current position value for master axis [mm] - displayed current position value for slave axis [mm]) × 1000)

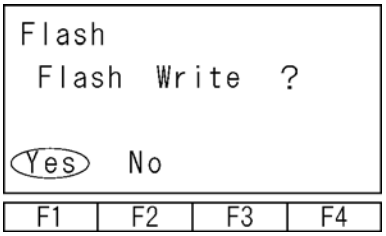


In this example:
-977 + ((-0.006-1.731) × 1000)) = -2714

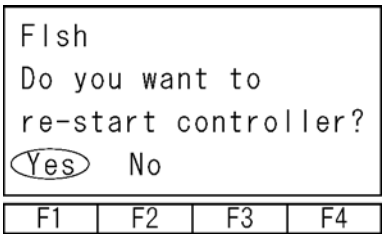
③ Input the calculation result in ② above to the “each-axis parameter No. 12 preset home value” for the slave axis.



After pressing the return key, press the WRT key to transfer the data.
Move to the Flash ROM writing screen with the ESC key.



Write the data to Flash ROM.
Press the F1 (Yes) key.

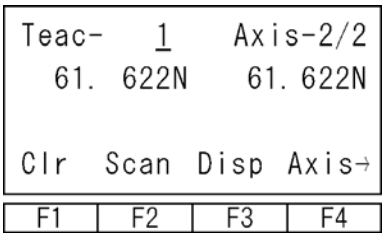


Restart the controller.
Press the F1 (Yes) key.

(7) Display the current positions on the teaching screen.

After turning the servo ON, execute action check by jogging. (Master axis operation)

Mode Transition: Edit → Poji → Teac



To switch the current position screen to the input data screen, press the F3 (Disp) key.
To turn the servo ON/OFF, use the ON/OFF key.

If the error No. D0A driver overload error, error No. C6B deviation overflow error, error No. CA5 stop deviation overflow error, etc., occurs, check the following items:

- If the current position of the master axis is greatly different from that of the slave axis, setting in (5) may be wrong.
- Confirm that there are no input errors or change omissions as for the parameters below.
  “Each-axis parameter No. 65 synchro other axis No.”
  “Each-axis parameter No. 83 ABS synchro slave axis coordinate initialization cancel”
- Confirm that slider actions are not restrained.

4. Standard Procedure Absolute Reset

In the case of “each-axis parameter No. 38 encoder ABS/INC type:” master axis = 1 and slave axis = 0:
After “2. Location Adjustment of Synchro Axes Sliders,” execute a normal absolute reset only for the master axis.
For the operating method, refer to the Teaching Pendant Instruction Manual.

Note: The synchro axis for which the standard procedure absolute reset has been executed does not have the function of correcting the slider displacement during power OFF after the servo is turned ON.

◎ About Error Level Management

Error level	Origin of System Error Assignment	Error No. (HEX)	Indication (7SEG, DISPLAY, etc.)	Error list	Error LED output	Program operation		Error reset	Note
						Other parameter No. 4 = 0	Other parameter No. 4 = 1		
Secret level	MAIN Application	800 - 88F		○					Special maintenance error level
	MAIN Core	890 - 8AF							
	PC	8B0 - 8DF							
	TP	8E0 - 8FF							
Message level	MAIN Application	900 - 93F	○	△ (Battery-related and field-bus-related errors are registered in the error list.)				Yes	Indicates Status, Input Error, etc.
	MAIN Core	940 - 97F							
	PC	980 - 9AF							
	PC (Update tool)	9B0 - 9BF							
	TP	9C0 - 9FF							
	Flash ACK Time Out	A00 - A6F							
	MAIN Core	A70 - A9F							
	PC	AA0 - ACF							
	TP	AD0 - AFF							
Action Release level	MAIN Application	B00 - B9F	○	○		Release the program at the source. (Errors other than axis-related errors become release factors only in an error-occurring moment.)	Release all the programs except for the “I/O processing program at action-abort time.” (Errors other than axis-related errors become release factors only in an error-occurring moment.)	Yes	Errors interfering with action. For any minor errors with a level lower than this, error release is attempted with the auto-reset function at the external active command (SIO/PIO) receipt.
	MAIN Core	BA0 - BBF							
	PC	BC0 - BDF							
	TP	BE0 - BFF							
	MAIN Application	C00 - CCF							
	MAIN Core	CD0 - CDF							
	PC	CE0 - CEF							
	TP	CF0 - CFF							
Cold start level	MAIN Application	D00 - D8F	○	○		Release the program at the source. * However, release all the programs except for the “I/O processing program at action-abort time” when driving-power-down requiring errors (initialization error, power error, etc.) occur.	Release all the programs except for the “I/O processing program at action-abort time.”	No	Need to turn ON power again. (CPU and OS will operate normally.)
	MAIN Core	D90 - DAF							
	PC	DB0 - DCF							
	PC (Update tool)	DD0 - DDF							
	TP	DE0 - DFF							
	MAIN Application	E00 - E8F							
	MAIN Core	E90 - EBF							
	PC	EC0 - EDF							
	TP	EE0 - EFF							
System failure level	MAIN Application	FF0 - FBF	○	○	○	All release		No	Need to turn ON power. (CPU and OS will not operate.)
	MAIN Core	FC0 - FCF							
	PC	FD0 - FDF							
	TP	FE0 - FEF							

TP: Teaching Pendant, PC: PC software

X-SEL Teaching Pendant Error List (Application Part)

(It is an error peculiar to a Teaching Pendant. Refer to the instruction manual of X-SEL controller for the error of a controller.)

Error No.	Error message	The explanation, solution, etc.
9C0	Input data error	Input data error. Check the input data.
9C1	Input data too small	Too-small input data. Check the allowable input range.
9C2	Input data too large	Too-large input data. Check the allowable input range.
9C3	SEL Cmnd Input Error	SEL command input error. Invalid data is input for the SEL command.
9C4	Inputting Conditions are not allowed	Input-condition input prohibition error. The input condition is used in the step where use of such condition is not allowed.
9C5	Input Condition Data Error	Input condition data error. An invalid value is input for the input condition.
9C6	Input Condition is out of range	Input condition out-of-range error. A value out of the input range is input for the input condition.
9C7	No Input Condition yet	Input-condition no input error. No input condition is input in the step where such condition is essential.
9C8	Undefined Symbol (Input Condition)	Undefined symbol (input condition) use error. An undefined symbol is used for the input condition.
9C9	Operand not inputted (Oprnd1)	Operand 1 no input error. The operand 1 is not input in the step where the operand 1 is essential.
9CA	Operand not inputted (Oprnd2)	Operand 2 no input error. The operand 2 is not input in the step where the operand 2 is essential.
9CB	Operand not inputted (Oprnd3)	Operand 3 no input error. The operand 3 is not input in the step where the operand 3 is essential.
9CC	Inputting Oprnd is not allowed (Oprnd1)	Operand 1 input prohibition error. The operand 1 is used in the step where use of the operand 1 is prohibited.
9CD	Inputting Oprnd is not allowed (Oprnd2)	Operand 2 input prohibition error. The operand 2 is used in the step where use of the operand 2 is prohibited.
9CE	Inputting Oprnd is not allowed (Oprnd3)	Operand 3 input prohibition error. The operand 3 is used in the step where use of the operand 3 is prohibited.
9CF	Operand1 is invalid	Operand 1 data error. An invalid data is input for the operand 1. Check the data.
9D0	Operand2 is invalid	Operand 2 data error. An invalid data is input for the operand 2. Check the data.
9D1	Operand3 is invalid	Operand 3 data error. An invalid data is input for the operand 3. Check the data.
9D2	Inputted Operand is out of range (Oprnd1)	Operand 1 input out-of-range error. A value out of the allowable input range is input for the operand 1.
9D3	Inputted Operand is out of range (Oprnd2)	Operand 2 input out-of-range error. A value out of the allowable input range is input for the operand 2.
9D4	Inputted Operand is out of range (Oprnd3)	Operand 3 input out-of-range error. A value out of the allowable input range is input for the operand 3.
9D5	Undefined symbol (Oprnd1)	Operand 1 undefined symbol use error. An undefined symbol is used for the operand 1.

9D6	Undefined symbol (Oprnd2)	Operand 2 undefined symbol use error. An undefined symbol is used for the operand 2.
9D7	Undefined symbol (Oprnd3)	Operand 3 undefined symbol use error. An undefined symbol is used for the operand 3.
9D8	Symbol type error (Oprnd1)	Operand 1 symbol type error. A symbol of the type not allowable for the operand 1 or outside of the scope is used.
9D9	Symbol type error (Oprnd2)	Operand 2 symbol type error. A symbol of the type not allowable for the operand 2 or outside of the scope is used.
9DA	Symbol type error (Oprnd3)	Operand 3 symbol type error. A symbol of the type not allowable for the operand 3 or outside of the scope is used.
9DB	Symbol type error (Input Condition)	Input-condition symbol type error. A symbol of the type not allowable for the input condition or outside of the scope is used.
9DC	Invalid Symbol String	Symbol string error. An invalid character is used at the head of the symbol or in the character string.
9DD	Multiple declaration of a Symbol	Symbol multiple declaration error. The same symbol has multiple definitions.
9DE	Symbol value not inputted	Symbol value no input error. No symbol-defined value is input.
9E0	Servo OFF while in Action	Servo OFF while in action. An action command is given to the axis with the servo OFF. Turn on the servo first.
9E1	Not yet Homed MOVE	Movement/continuous movement prohibition error at not-yet-homed time. Complete homing first.
9E2	Not yet Homed TEACH	Teaching prohibition error at not-yet-homed time. Complete homing first.
9E3	Function not Supported	Unsupported function error. An unsupported function is attempted to execute.
9E4	Encoder type error	Encoder type error. Check the ABS/INC type (each-axis parameter No. 38) of the operation target axis.
9E5	Axis number error	Axis No. error. The specification of the axis No. is invalid.
9E6	No effective axis	No effective axis error. There is no effective axis that can be edited and operated. Check the effective axis pattern (all-axis common parameter No. 1).
9E7	EEPROM write error (1)	EEPROM write error.
9E8	EEPROM write error (3)	EEPROM write error.
9E9	EEPROM read error (4)	EEPROM read error.
9EA	EEPROM read error (5)	EEPROM read error.
9EB	Password error	Password error. The password is invalid.
9EC	Position Data has been changed.	Movement/continuous movement prohibition error at position data change time. After writing the changed data in the controller, make a reattempt.

9ED	Can not edit while running program (TP)	Program edit prohibition error while running. Editing operation cannot be performed for the running program. Exit from the program first.
9EE	Too many Symbol Definitions	Excessive number of symbol definitions.
9EF	Can not reset M-Dat when servo is ON.	Absolute encoder multi-rotation data reset prohibition error at servo ON time.
DE0	Receive Data Invalid	Received data string error (TP). The received data has an error. When it is not eliminated even through re-connection, contact the manufacturer.
DE1	Header Logic Error (IAI Protocol Send)	IAI protocol send data header logic error
DE2	Command ID Logic Err (IAI Protocol Send)	IAI protocol send data command ID logic error
DE3	Receive Data Error (IAI Protocol Recv)	IAI protocol receive data error
DE4	Response Time-out (IAI Protocol Recv)	IAI protocol response time-out error
DE5	Overrun Error (Master Mode)	Overrun error (in Master mode)
DE6	Framing Error (Master Mode)	Framing error (in Master mode)
DE7	Parity Error (Master Mode)	Parity error (in Master mode)
DE8	Send Que Overflow (Master Mode)	SCI send queue overflow (in Master mode)
DE9	Receive Que Overflow (Master Mode)	SCI receive queue overflow (in Master mode)
DEA	Send Buffer Overflow (IAI Protocol Send)	IAI protocol send buffer overflow
DEB	Receive Buffer Overflow (Master Mode)	IAI protocol receive buffer overflow (in Master mode)
DEC	Send Que Overflow (IAI Protocol Send)	IAI protocol send queue overflow
DED	Receive Que Overflow (IAI Protocol Recv)	IAI protocol receive queue overflow
DEE	CTL Not Connected	Controller no connection error. Communications cannot be established or an unsupported controller is connected.

X-SEL Teaching Pendant Error List (Core Part)

(It is an error peculiar to a Teaching Pendant. Refer to the instruction manual of X-SEL controller for the error of a controller.)

Error No.	Error message	The explanation, solution, etc.
AE0	Overrun error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AE1	Framing error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AE2	SCI break detection error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AE3	Parity error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AE4	Motorola S checksum error	The update program file has an error. Check the file.
AE5	Motorola S record format error	The update program file has an error. Check the file.
AE6	Motorola S load address error	The update program file has an error. Check the file.
AE7	Motorola S write address over error	The update program file has an error. Check the file.
AE8	Flash ROM timing limit excess error (write)	Flash ROM write has timed out (during update).
AE9	Flash ROM timing limit excess error (erase)	Flash ROM erase has timed out (during update).
AEA	Flash ROM verify error	Flash ROM erase/write is invalid (during update).
AEB	Flash ROM ACK time-out	Flash ROM erase/write is invalid (during update).
AEC	IAI protocol header error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AED	IAI protocol checksum error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AEE	IAI protocol terminal ID error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AEF	IAI protocol command ID error	There is a communication error. Check noise, connecting equipment, communication setting, etc.

Change History

Revision Date	Revision Description
2012.11	Ninth Edition • Contents changed in Safety Guide • List of Support Models added • “Change History” added to the last page

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