X-SEL
CONTROLLER

X-SEL
IX Series
Teaching Pendant
Instruction Manual Ver. 2.0

IAI Corporation

1. Introduction 1

2. Before Use 1

3. Safety Precautions 2

4. Warranty Term and Coverage 3

5. Connection to Controller 4

6. Functions and Specifications of Teaching Pendant 6
   6-1. Main operation keys and their functions 6

7. Mode Flow Chart 9

8. Data Storage Method 14
   8-1. Factory setting: When system memory backup battery is used 14
   8-2. When system memory backup battery is not used 15
   8-3. Cautions 16

9. Simple Operating Procedures 17
   9-1. Creation of position data 18
   9-2. Creation of program 25
   9-3. Change of application program 35

10. Program Execution 40
   10-1. Operation check 40
   10-2. Setting of break point 42
   10-3. Monitor while in running 42

11. Position Editing 45
   11-1. Mdi (numeric input) 45
   11-2. Teac (teaching) 46
   11-3. Jog movement direction and coordinate system 49
   11-4. Actuator operation 54
   11-5. Teaching input example 65
   11-6. Copy and movement of position data 71
   11-7. Deletion of position data 72

12. Program Editing 73
   12-1. Program input method 73
   12-2. Symbol input during program editing 78
   12-3. One-line comment input 80
   12-4. Copy and movement of program 82
   12-5. Deletion of program 83
   12-6. Flash ROM writing 85

13. Coordinate System Data Editing 86
13-1. Editing of work coordinate system data 87
13-2. Editing of tool coordinate ststem data 90
13-3. Editing of simple interference check zone 93

14. Symbol Editing 98
14-1. Symbol editing items 98
14-2. Input example: Symbolization of local integer variables 99
14-3. Symbol edit screen for each item 103
14-4. Flash ROM writing 107

15. Parameter Editing 108
15-1. Parameter editing items 108
15-2. Input example: Editing of axis-specific parameters 109

16. Monitoring 112
16-1. Monitor items 112
16-2. Input ports 113
16-3. Output ports 113
16-4. Global flags 113
16-5. Global variables 114
16-6. Axis status 115
16-7. System status 119
16-8. Error detail information 122
16-9. Version information 123

17. Controller 124
17-1. Controller items 124
17-2. Flash ROM writing 125
17-3. Software reset 126
17-4. Error reset 126
17-5. Memory clear 127
17-6. Reconnection 127
17-7. Baud rate change 128
17-8. Safety velocity 128
17-9. Driving power recovery request 129
17-10. Action restart request 129
17-11. Driving power recovery request (RPwr) and action restart request (RAct) 130
17-12. Absolute reset 131

APPENDIX 143
Error Level Control 143
X-SEL Teaching Pendant Error List (Application Part) 144
X-SEL Teaching Pendant Error List (Core Part) 147

1. Introduction

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 on 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 maximum velocity achieved by the program startup from the Teaching Pendant becomes 250 mm/sec or lower for CP motion and 3% or less for PTP motion. 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 "17-8. Safety velocity."
- The display screens in this Manual are of the Teaching Pendant Application Part Ver. 1.13 or later.
- To confirm the version, please refer to "16-9 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 Term and Coverage

The Teaching Pendant you purchased has been delivered upon completion of our strict shipping test.

We shall warrantee this product as follows:

1. Warranty term

The warranty term shall be either of the following terms, whichever is reached first.

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

2. Warranty coverage

Where a defective condition occurs during proper use conditions and obviously under the responsibility of the manufacturer, within the term above, we shall repair the product without charge. However, any items that apply to the following are excluded from the warranty coverage:

- Defects resulting from changes over time such as natural color fading of paint
- Defects resulting from use wear of consumable parts (such as a cable)
- Defects resulting from sensory phenomena such as generated noise that have no functional effects
- Defects resulting from mishandling or improper use
- Defects resulting from an inadequacy or error in maintenance and inspection
- Defects resulting from the use of any part other than our genuine parts
- Defects resulting from a modification not approved by us or our dealers
- Defects resulting from Acts of God, accident, fire, etc.

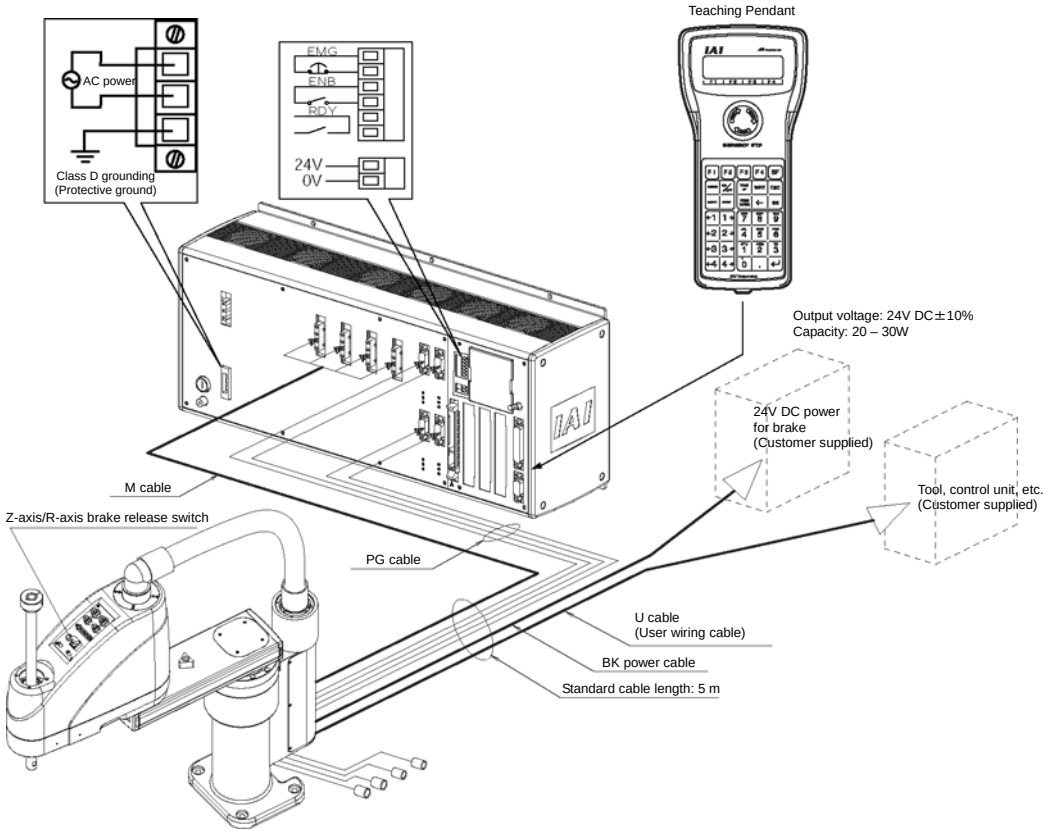
Only a delivered product shall be singly warranted, and no damage induced by the defect of the delivery product can be warranted. For repair, transport the product to our factory.

3. Service coverage

The cost of a delivered product does not include expenses for program creation and engineer dispatching. Therefore, the following are charged separately even within the warranty term:

- Maintenance and inspection
- Technical guidance and technical training in operating instructions
- Technical guidance and technical training on program-related matters such as program creation

5. Connection to Controller



① Connect the actuator, I/O 24V DC power source and system I/O to the controller, in advance. 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 flipping the MODE switch of the controller to MANU, turn on the power to the controller.

Teaching Pendant

LCD display

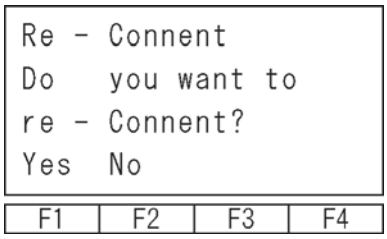
SEL Teaching
TP V1.13 05/01/15
TPC V0.02 01/05/15
Please wait...
F1 F2 F3 F4

It displays the version of the Teaching Pendant and moves to the Mode Selection screen.

Err [DEE]
CTL Not Connented
Back Next
F1 F2 F3 F4

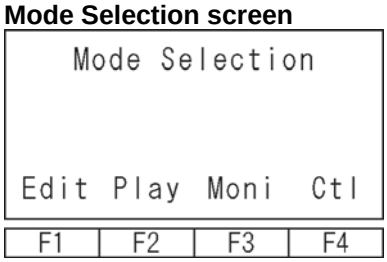
When the MODE switch is flipped to AUTO, the Teaching Pendant is not connected to the controller and the screen at the left is displayed. Press the ESC key to make it a reconnection display.

Reconnection screen



Flip the MODE switch to MANU, and press the F1 (Yes) key to reconnect the controller.

Mode Selection screen



This is the basic screen for all operations.

CAUTIONS

If “OPEN 1” (channel 1 shared for the Teaching Pendant) is executed within a SEL program in the MANU mode, the serial port channel 1 will be opened as follows, according to the servo not in use or in use:

<MANU mode, servo not in use>

	Before execution of “OPEN 1”	After execution of “OPEN 1”
Connection of channel 1	Connection to Teaching Pendant	Forced movement to SEL program connection (Message error) Program is executing

Error occurring after “OPEN 1” execution: Error No. A5D “SCIF open error during non-AUTO mode”

<MANU mode, servo in use>

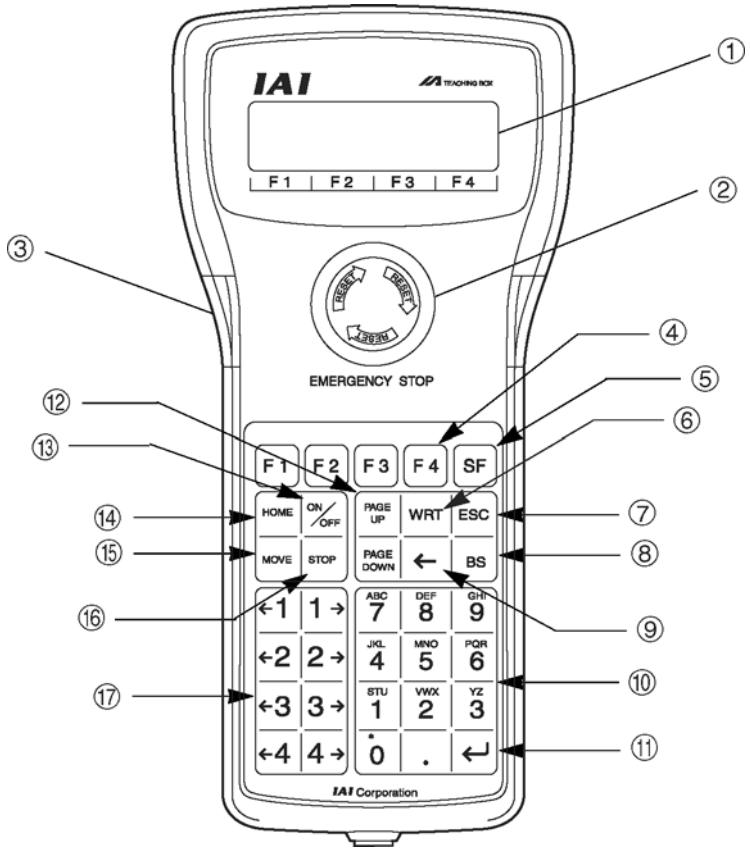
	Before execution of “OPEN 1”	After execution of “OPEN 1”
Connection of channel 1	Connection to Teaching Pendant ⇨	Connection to Teaching Pendant (Cold start error) Program is ending

Error occurring after “OPEN 1” execution: Error No. E.89 “SCIF open error during non-AUTO mode (servo ON)

The above “CAUTIONS” pertain to all others than “Manu Mode with I/O parameter No. 90 = 2 (IAI protocol).

6. Functions and Specifications of Teaching Pendant

6-1. Main operation keys and their functions



① LCD display

It displays the program or operation monitor up to 4 lines of 20 characters.

② EMERGENCY STOP button

It makes an emergency stop.

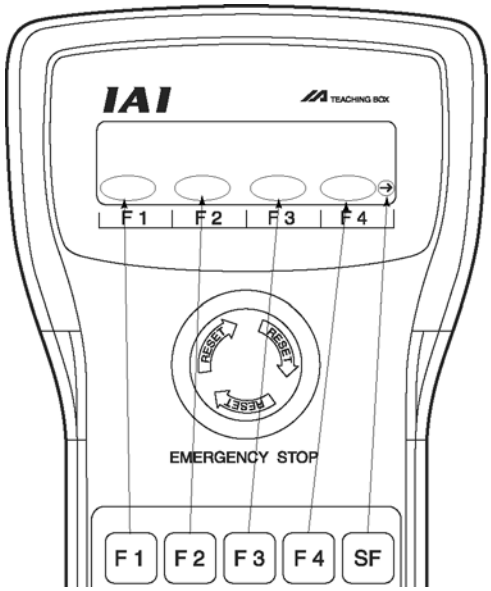
③ Deadman switch (option)

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

If you press only one side or do not press both sides, key operation for Servo OFF -> Servo ON does not work.

When servo is ON, this switch is under the state of both-sides pressed. However, when you release the switch, the operation is finished and the panel window 7 seg LED displays “dsf. ”

④ F1 F2 F3 and F4 keys (function keys)
These keys correspond to each item in the LCD display (function key section).



⑤ SF key (shift key)
When there are 5 or more selectable functions ("→" is displayed at the right part of the function key section), the display items in the function key section are shifted.

⑥ WRT key (write key)
It transfers edited data to the controller. (Stores data in the memory of the controller.)
It transfers only data that is displayed in the LCD display. (Cannot transfer data by merging more than one position No., program step No., etc.)

⑦ ESC key (escape key)
It returns the current condition to the previous condition.
When this key is used during data input, the input data is canceled.

⑧ BS key (backspace key)
It clears the last input character during data input.
It clears the data at the cursor position in other cases.

⑨ ← key (cursor backward key)
It moves the cursor backward. It is the reverse of the Return key function.

⑩ Ten-key numeric pad
Numeric values, alphabetic letters, and symbols can be input with the ten-key numeric pad.
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 section. (Alph: alphabet symbol input, Num: numeric value input)

⑪ [↵] key (return key)
It is used to confirm the input data or move the cursor forward.

⑫ [PAGE UP] and [PAGE DOWN] keys (page-up key, page-down key)
These keys increment or decrement the editing/display item No. (position No., program No., step No., etc.).

⑬ [ON/OFF] key
It switches servo ON or OFF of axes. (It is valid within the Teac mode area.)

⑭ [HOME] key
Reserved.

⑮ [MOVE] key
It starts actuator movement or continuous movement. (It is valid in the Teac mode area with the servo ON.)

⑯ [STOP] key
It stops actuator movement or continuous movement.

⑰ [←1] [1→] [←2] [2→] [←3] [3→] [←4] [4→] (Jog keys)

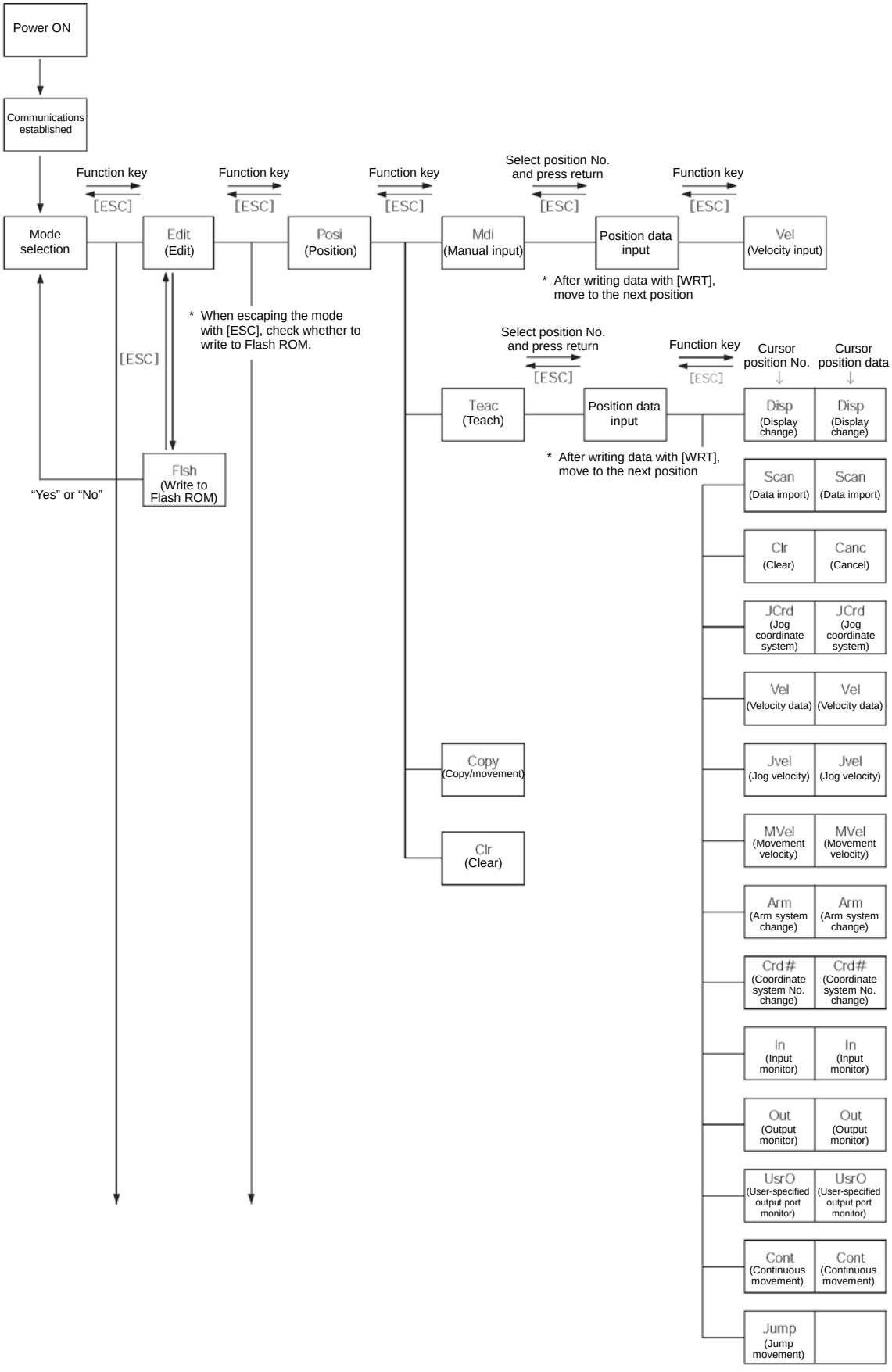
[←1]	Minus direction jog movement for the 1st axis
[1→]	Plus direction jog movement for the 1st axis
[←2]	Minus direction jog movement for the 2nd axis
[2→]	Plus direction jog movement for the 2nd axis
[←3]	Minus direction jog movement for the 3rd axis
[3→]	Plus direction jog movement for the 3rd axis
[←4]	Minus direction jog movement for the 4th axis
[4→]	Plus direction jog movement for the 4th axis

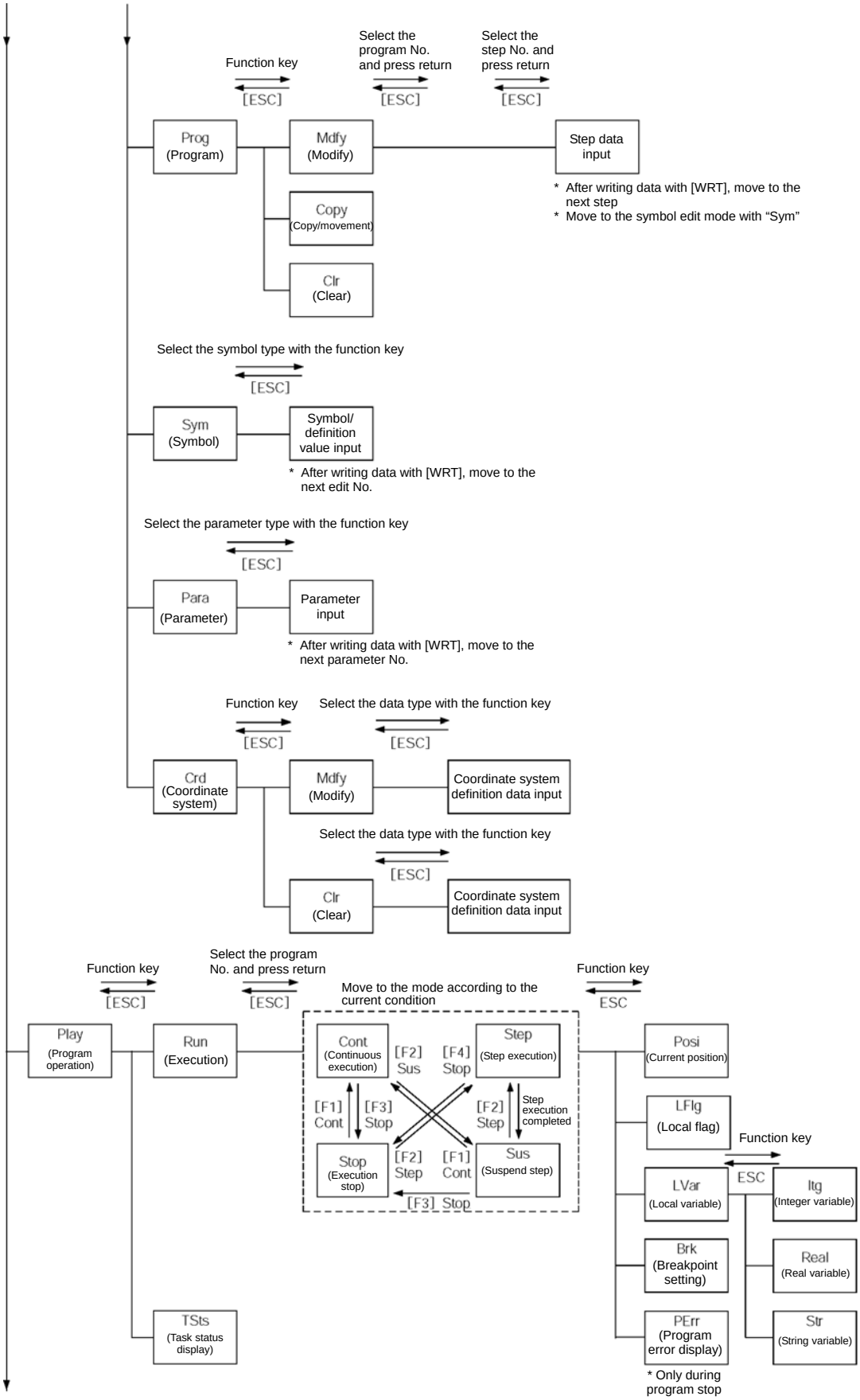
(It is valid in the Teac mode area with the servo ON.)

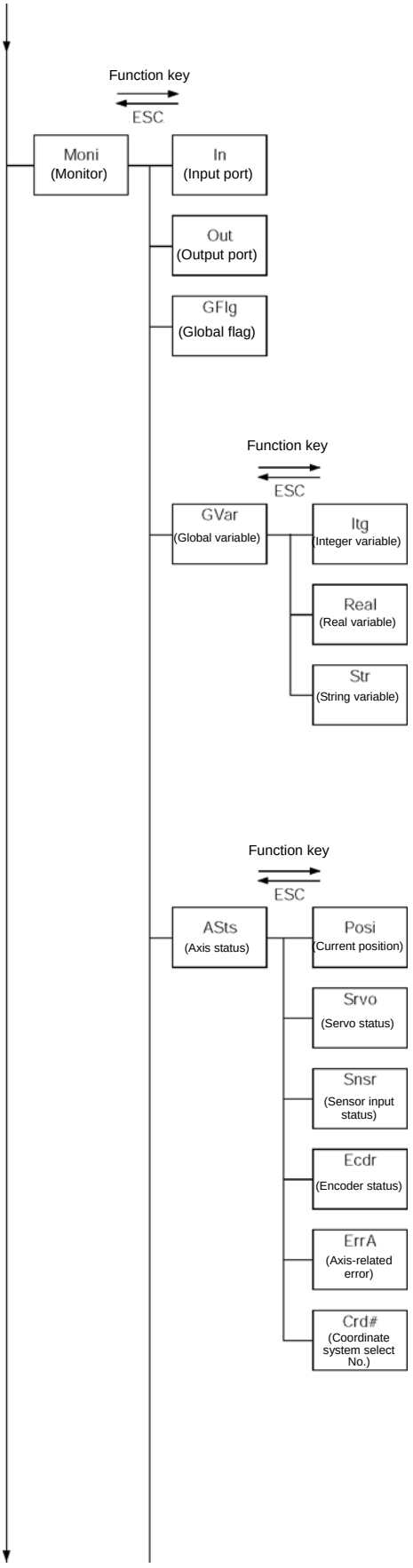
Cautions

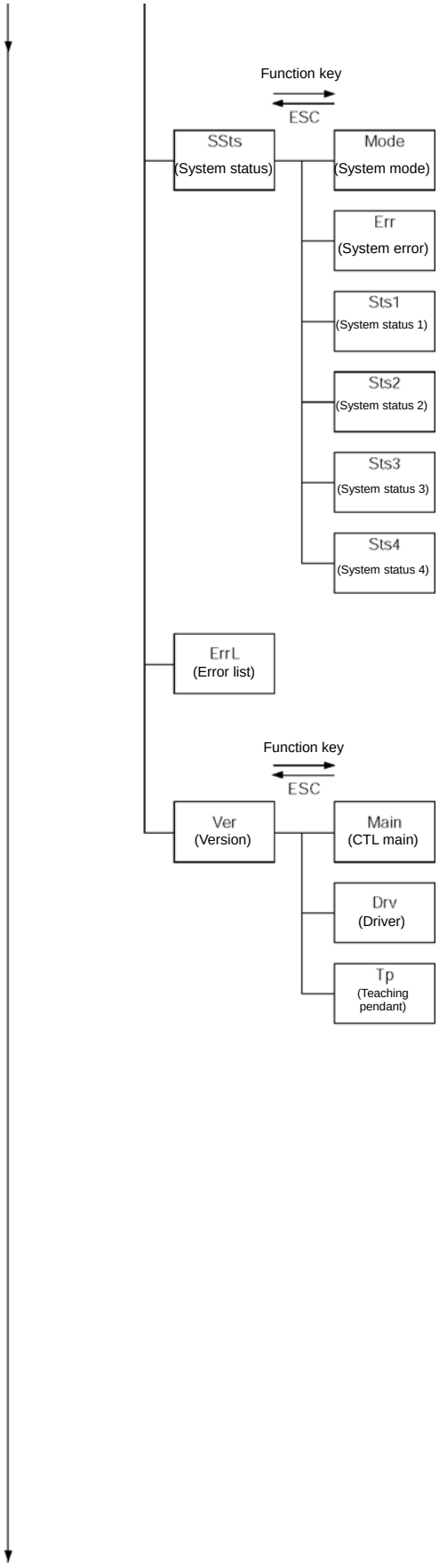
- Such jog actions with the JOG button are also valid for any not-homed axes. However, coordinate values in this case have no meaning. Therefore, be extremely careful about interference with the stroke end.
- If jog operation is performed to the axis in action under the operation-button-acceptable condition,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

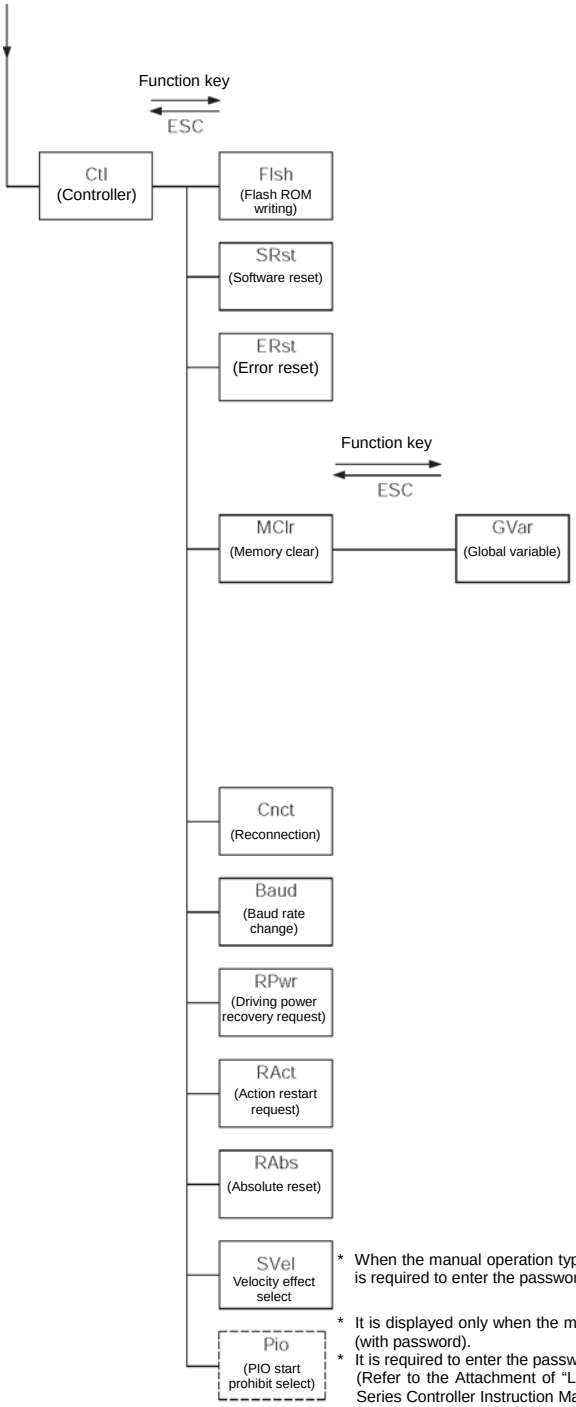
7. Mode Flow Chart




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/movement)
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 parameter No.
Function key
[ESC]
Select the data type with the function key
[ESC]
Crd (Coordinate system)
Mdfy (Modify)
Coordinate system definition data input
Select the data type with the function key
[ESC]
Clr (Clear)
Coordinate system definition data input
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)
Brk (Breakpoint setting)
Real (Real variable)
PErr (Program error display)
Str (String variable)
* 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)
Crd#
(Coordinate system select No.)

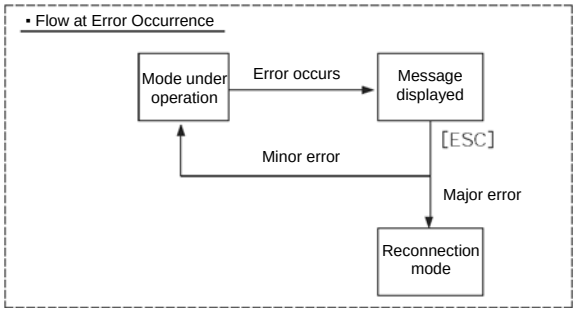

Function key
ESC
SSts
(System status)
Mode
(System mode)
Err
(System error)
Sts1
(System status 1)
Sts2
(System status 2)
Sts3
(System status 3)
Sts4
(System status 4)
ErrL
(Error list)
Function key
ESC
Ver
(Version)
Main
(CTL main)
Drv
(Driver)
Tp
(Teaching pendant)



* When the manual operation type parameter equals edit and start selection (with password), it is required to enter the password at setting change time.

* It is displayed only when the manual operation type parameter equals edit and start selection (with password).

* It is required to enter the password at setting change time.
(Refer to the Attachment of “List of Parameters” and “8. Manual Operation Types” in the IX Series Controller Instruction Manual.)

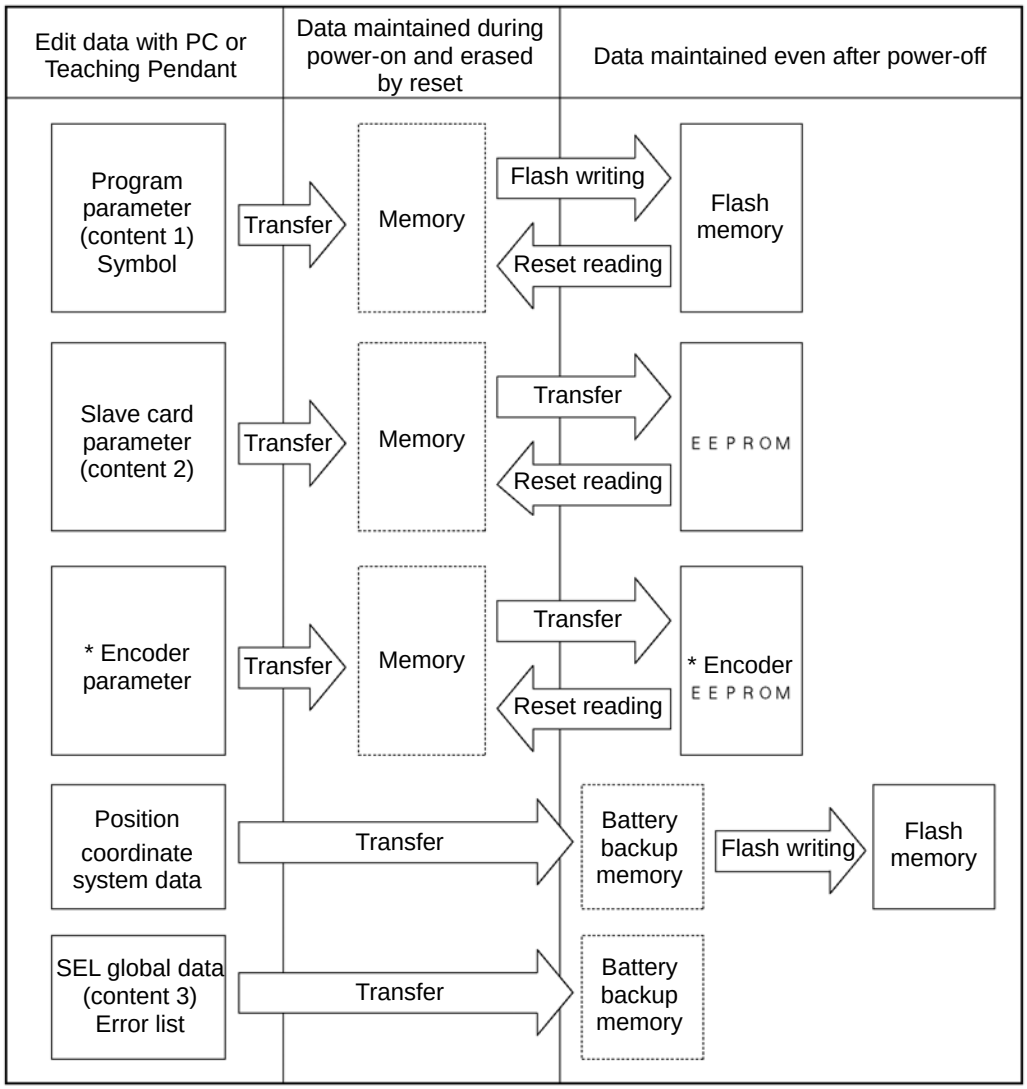


8. Data Storage Method

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. Factory setting: When system memory backup battery is used

Other parameter No. 20 = 2 (Backup battery installed)



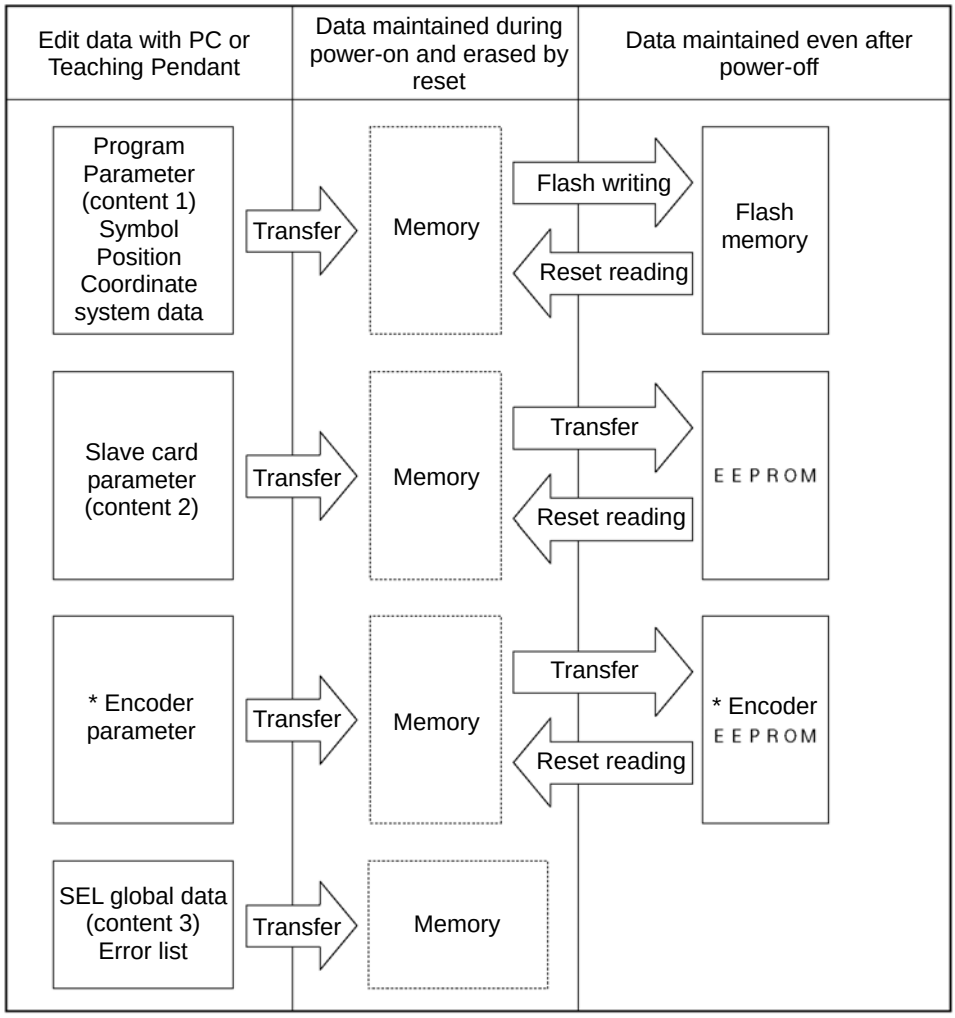
* Encoder parameters are not stored within the controller but in the EEPROM of the actuator's encoder itself. They are read into the controller at power-on or software-reset time.

Since the program, parameter, and symbol are 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 parameters
Content 2: Driver card and IO slot card (power-supply system card) parameters
Content 3: Flags, variables, strings

8-2. When system memory backup battery is not used

Other parameter No. 20 = 0 (Backup battery not installed)



Since the program, parameter, symbol, position, and coordinate system data are 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: The SEL global data cannot be maintained when the backup battery is not installed.

8-3. Cautions

Cautions in data transfer and flash writing

Never turn off the main power during data transfer and flash writing.

Failure to do so may result in inoperability of the controller due to data loss.

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

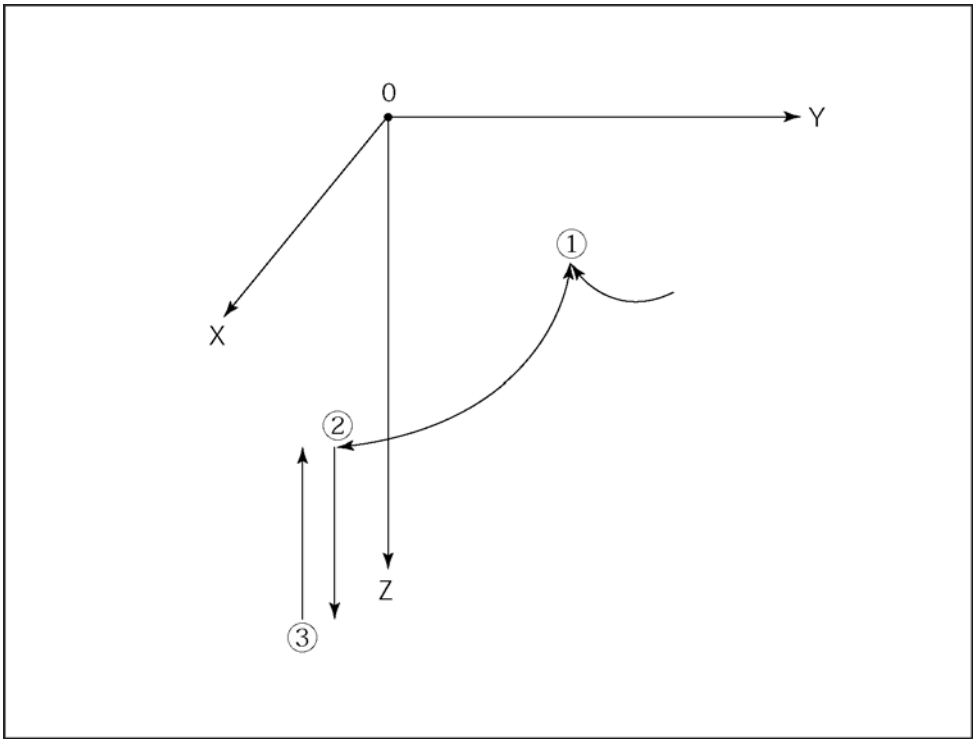
When the parameter file is transferred to the controller, the encoder parameters are transferred to EEPROM of the encoder (excluding manufacturing information and function information).

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 Operating Procedures

In this section, a program and position data are created.



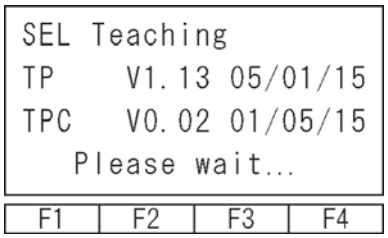
Position Data (① to ③)

9-1. Creation of position data

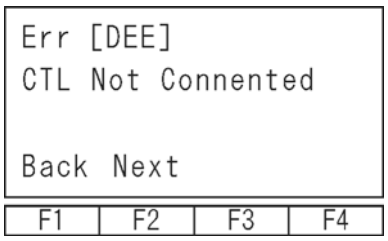
Input the position data of 3 points as shown in the position data list below.

No.	Axis1	Axis2	Axis3	Axis4	Vel	Acc	Dcl
1	0.000	300.000	0.000	0.000			
2	200.000	225.000	0.000	90.000			
3	x.xxx	x.xxx	150.000	x.xxx			

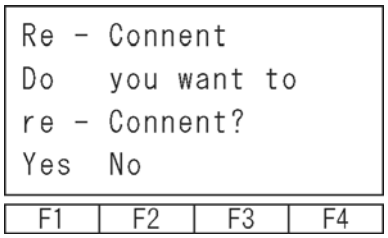
Connect the Teaching Pendant to the controller and flip the MODE switch to MANU.
Turn on the power to the controller.



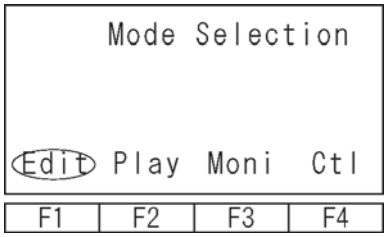
The version of the Teaching Pendant is displayed and the screen moves to the Mode Selection screen. (To the following page)



When the MODE switch is flipped to AUTO, the Teaching Pendant is not connected to the controller and the screen at the left is displayed. Press the ESC key to make it a reconnection display.



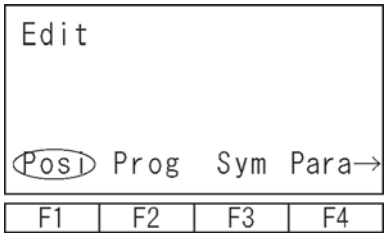
Flip the MODE switch to MANU, and press the F1 (Yes) key for reconnection.



Mode Selection screen

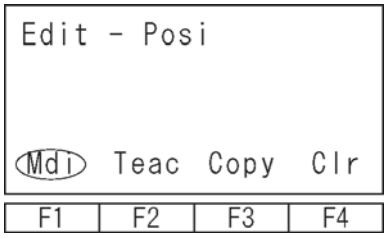
This screen becomes the basic screen for all operations.
Press the F1 (Edit) key.

* When you make a selection error or input error, press the ESC key to return to the last screen and continue operation. Pressing the ESC key once or several times during any operation can return to the basic screen shown above without fail.



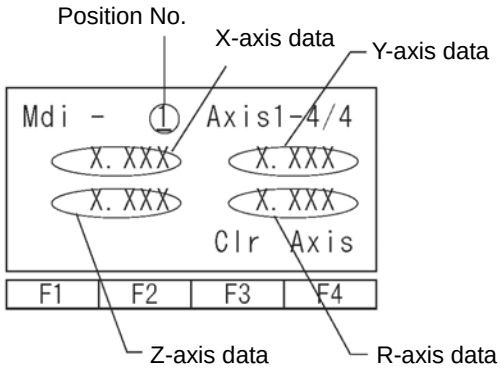
Edit mode screen

Press the F1 (Posi) key.



Edit-Posi (position data edit) screen

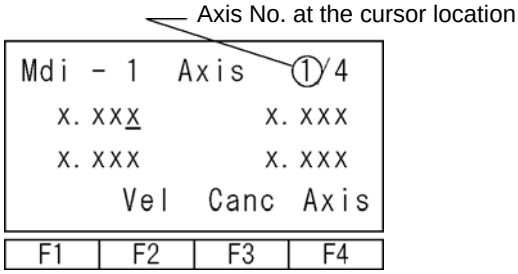
Press the F1 (Mdi) key.



Position No. input mode

The cursor is located at the position No.
When no data is input, X.XXX is displayed. Press the return key to move the cursor to the section of the position data for the X-axis.

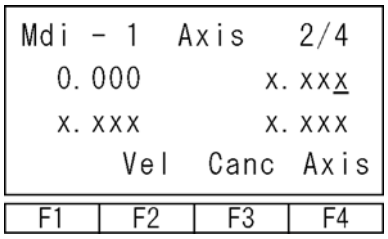
* When data is already input, overwrite it (the original data is lost) or use the PAGE UP and PAGE DOWN keys to move to the screen with X.XXX displayed and input data.
  Pressing the F3 (Clr) key twice clears the input data for all axes. This key clears the controller's data even if the WRT key is not pressed.



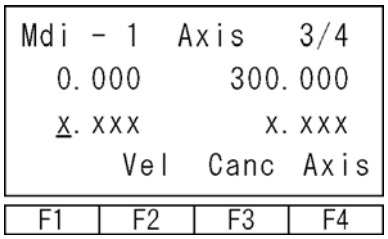
① Data input for 1st point

Enter a numeric value of 0 and press the return key. 0.000 is displayed, the axis No. changes to 2, and the cursor moves to the section for the Y-axis position data.

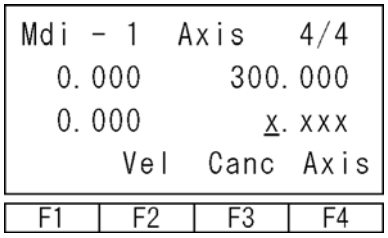
* The position data can be input up to a 4-digit integral number and three digits to the right of the decimal. Since the range varies according to the actuator's model, check it in the catalog etc.



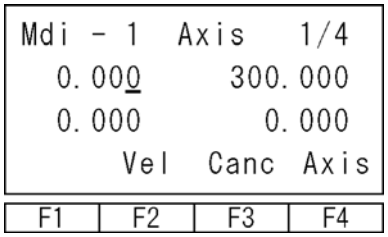
Enter 300 for the Y-axis position data and press the return key. (* Every time the return key is pressed, the cursor position moves. When you make an input error, move the cursor to the location where you have made the error and overwrite the data.)
The input data can also be returned to X.XXX with the F3 (Canc) key.



Enter 0 for the Z-axis position data and press the return key.

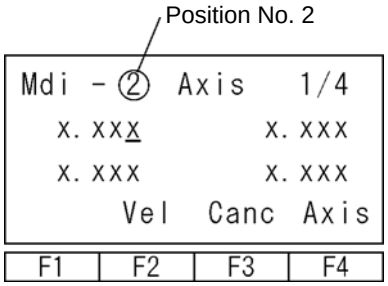


Enter 0 for the R-axis position data and press the return key.



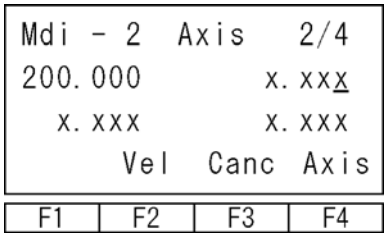
When the data is transferred with the WRT key, the position No. is incremented by 1 and becomes 2.

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

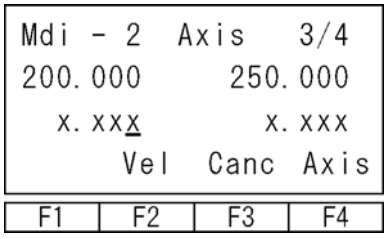


② Data input for 2nd point

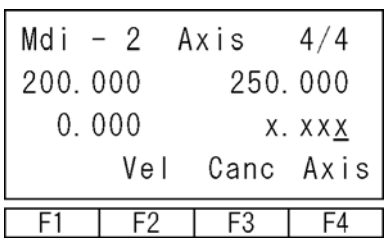
Enter 200 for the X-axis position data and press the return key.



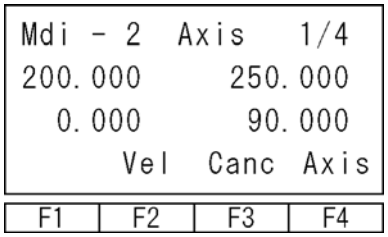
The cursor moves to the section for the Y-axis position data. Enter 250 and press the return key.



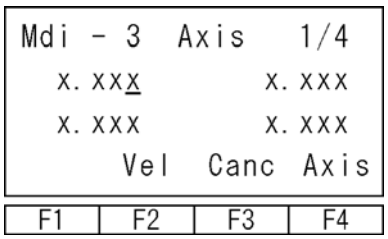
Enter 0 for the Z-axis position data and press the return key.



Enter 90 for the R-axis position data and press the return key.

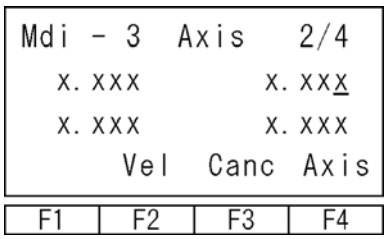


Transfer the data with the WRT key and advance the position No. to 3.

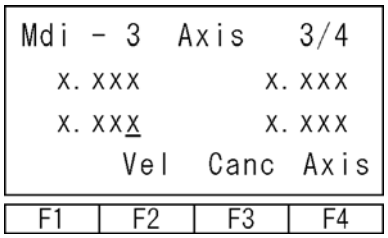


③ Data input for 3rd point

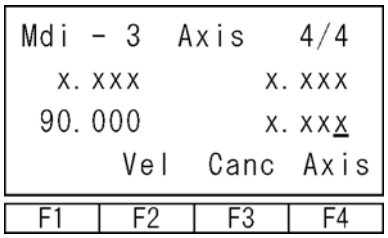
Press the return key since the X-axis position data is left blank.



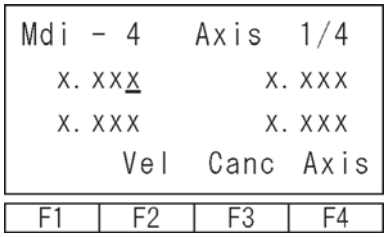
Press the return key since the Y-axis position data is also left blank.



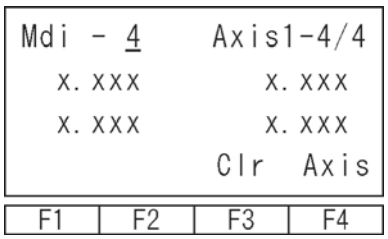
Enter 90 for the Z-axis position data and press the return key.



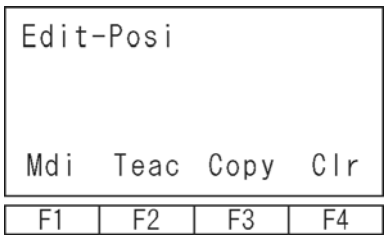
Transfer the data with the WRT key and advance the position No. to 4.



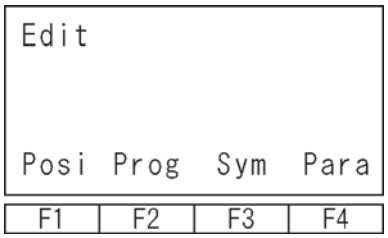
Complete position editing and write the data in flash ROM.
Pressing the ESC key moves the cursor to the location of the position No.



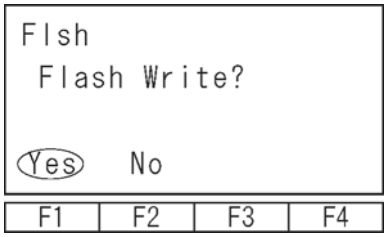
Pressing the ESC key returns the screen to the Edit-Posi screen.



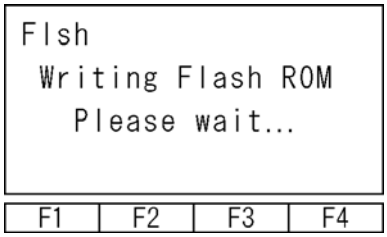
Pressing the ESC key again moves to the Edit mode screen.



Pressing the ESC key once more moves to the Flsh screen.

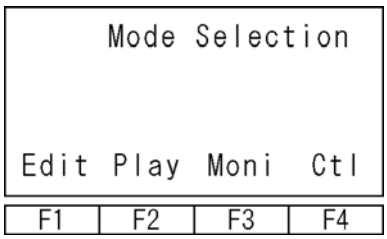


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



The message “Please wait…” flashes during flash ROM writing.

* Never turn off the power to the Controller at this time.



The screen returns to the Mode Selection screen.

With the above, input of the basic position data is completed.

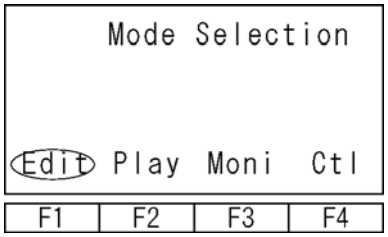
9-2. Creation of program

The program to move the position data created in 9-1. is created.

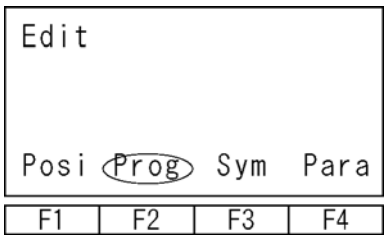
Application Program List

No.	n	Cnd	Cmnd	Operand 1	Operand 2	Pst
1			ACCS	50		
2			DCLS	50		
3			VELS	100		
4			PTPL			
5			MOVP	1		
6			MOVP	2		
7			MOVP	3		
8			MOVP	2		
9			MOVP	1		
10			EXIT			

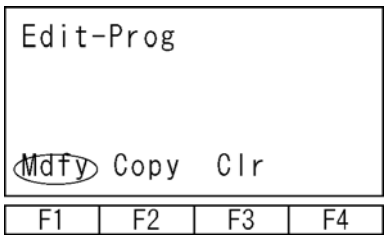
In this section, the X-SEL program is input.
For further information on the meaning and usage of each command, refer to the Instruction Manual attached to the controller.
Only Cmnd (command) and Operand1 (operation 1) are input here.



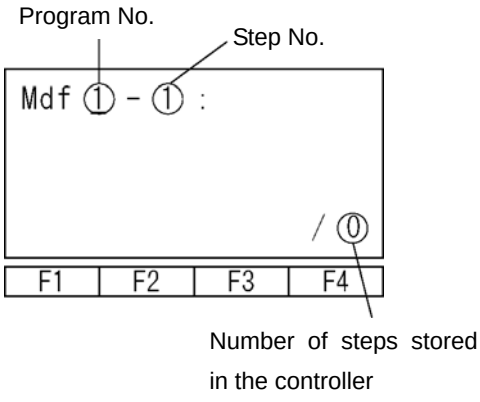
Select the F1 (Edit) key on the Mode Selection screen.



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

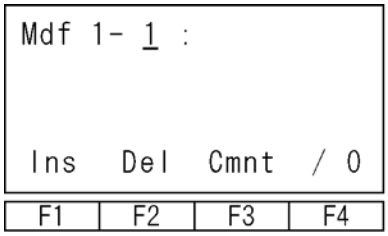


Select the F1 (Mdfy) key on the Edit-Prog (program edit and new creation) screen.

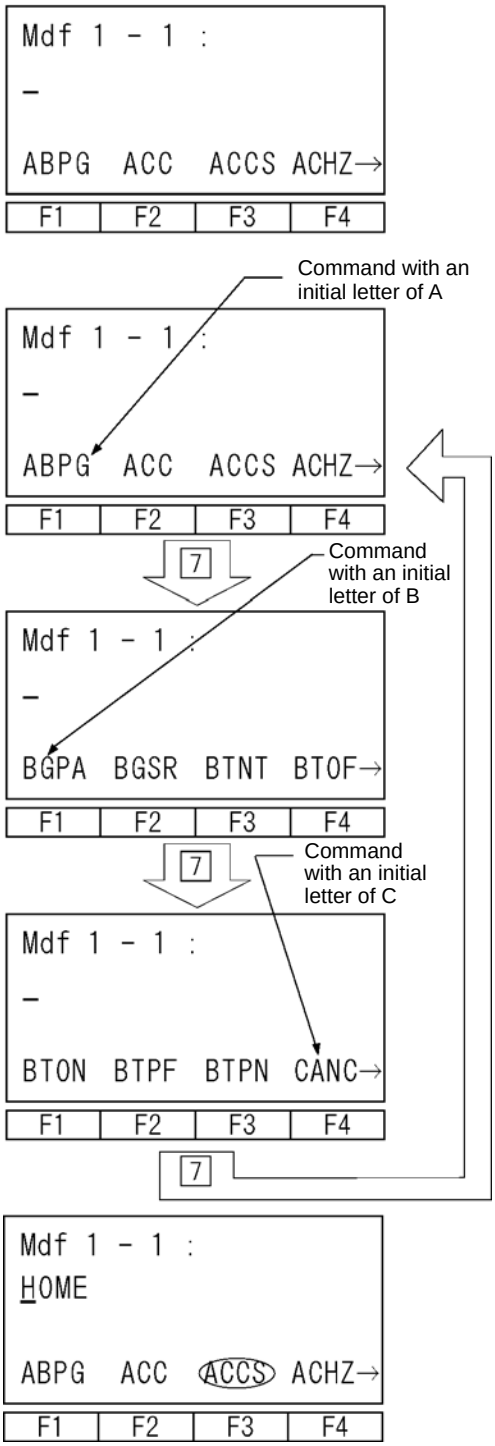


The screen changes to the program No. input mode screen. The cursor is located at the program No. Press the return key to move the cursor to the location of the step No.

* When the program's data is already input, overwrite it (the original data is lost) or select the program No. with no data input. The program No. or step No. over which the cursor is located can be changed with the PAGE UP and PAGE DOWN keys. In addition, pressing the return key after inputting a numeric value with the ten-key numeric pad can change the program No. or step No.



The cursor has moved to the location of the step No.
Press the return key.



Enter commands.

Commands are displayed in the function key section.

Command search method

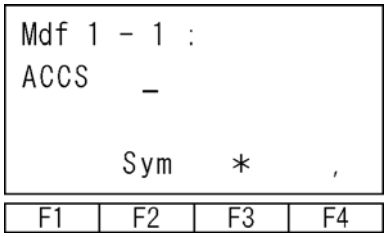
① When the cursor is at the location for command input, pressing the SF key displays commands in alphabetical order.

② Letters/alphabetic letters are located for each of the ten keys (such as ABC allocated to the 7 key). Every time a key of the ten-key numeric pad is pressed when the cursor is located at the command input section, the first command of which the initial letter is the relevant alphabetic letter is displayed in the function key section.
Display the command for input in the function key section with the steps of ① and ② above and press the corresponding function key.

Search for command ACCS

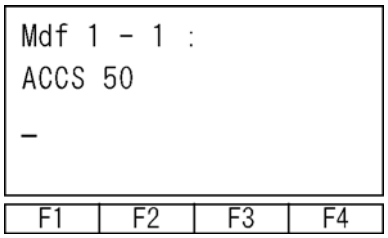
Pressing the 7 key displays the commands with the initial letters of A, B, and C. (Some commands cannot be displayed only by pressing a key of the ten-key numeric pad. In such cases, display the command by using both the ten-key and the SF key.

After displaying ACCS in the function key section, press the F3 (ACCS) key. (To return the command input field to blank, press the BS key.)
Press the return key.



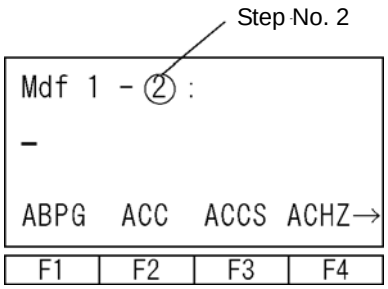
The cursor moves to operation 1. Set 50% of the maximum PTP acceleration.
Enter 50 and press the return key.

To reattempt input:
Move the cursor to the change location with the ← or return key.
Overwrite the data or delete it with the BS key.
Or, reattempt from the step No. with the ESC key.

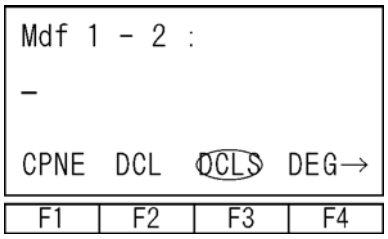


Press the WRT key to transfer the data to the controller. The step No. advances to 2.

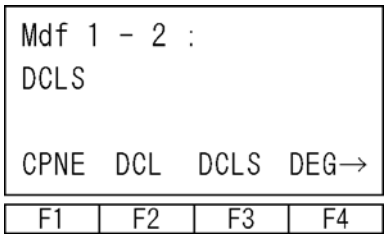
* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.



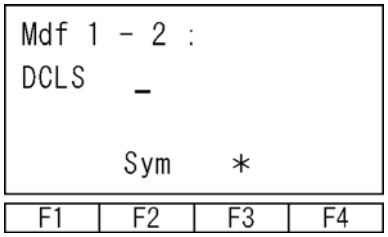
Press 8 of the ten-key numeric pad or the SF key to search DCLS.



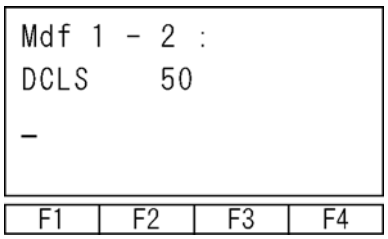
Select the F3 (DCLS) key.



Press the return key.

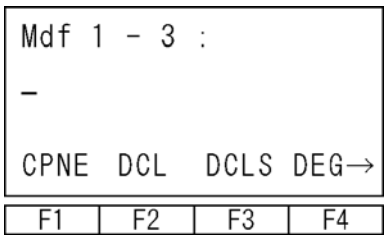


Set 50% of the maximum PTP deceleration.
Enter 50 and press the return key.

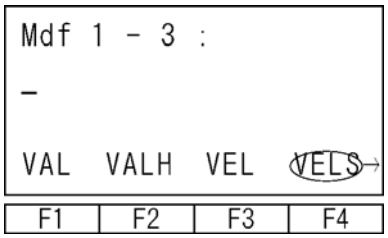


Press the WRT key to transfer the data to the controller.
The step No. advances to 3.

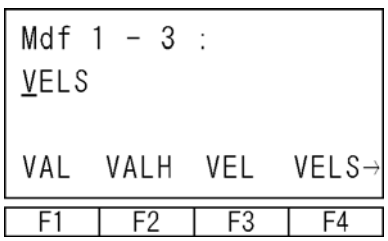
* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.



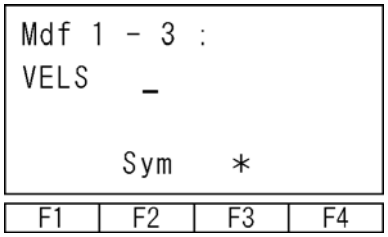
Display VELS with 2 of the ten-key numeric pad.



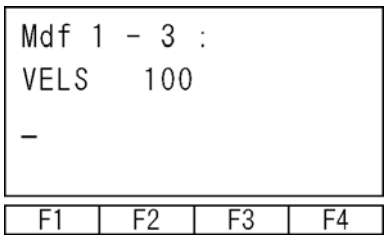
Select the F4 (VELS) key.



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

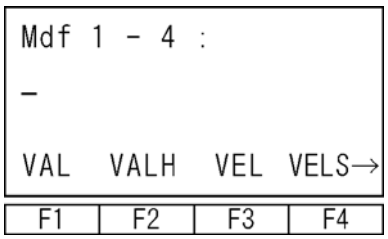


Set 100% of the maximum PTP velocity.
Enter 100 and press the return key.

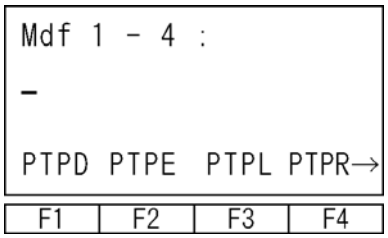


Press the WRT key to transfer the data to the controller.
The step No. advances to 4.

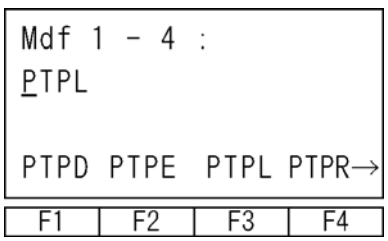
* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.



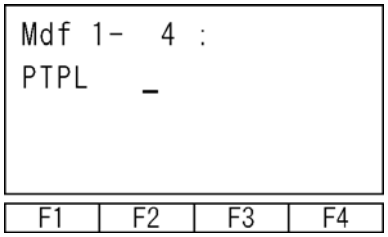
Display PTPL with 6 of the ten-key numeric pad and the SF key.



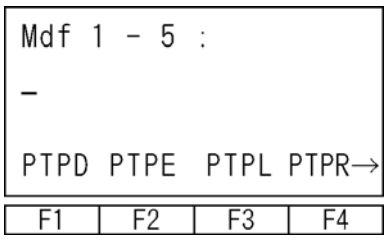
Select the F3 (PTPL) key.



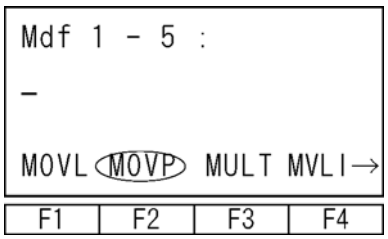
Press the return key.



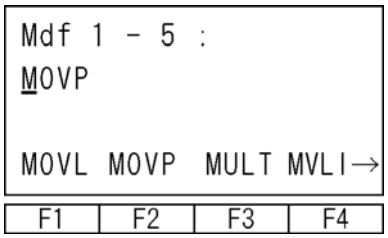
Press the WRT key to transfer the data to the controller.
The step No. advances to 5.



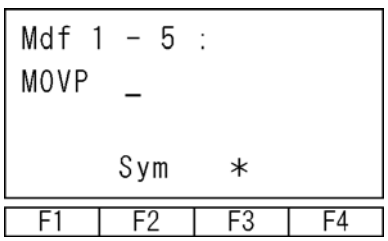
Display MOVP with 5 of the ten-key numeric pad and the SF key.



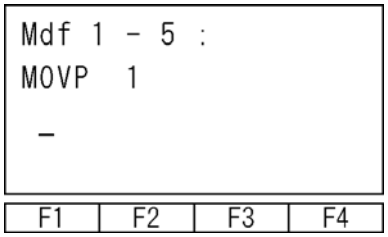
Select the F2 (MOVP) key.



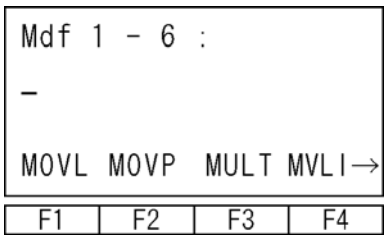
Press the return key.
The cursor moves to operation 1.



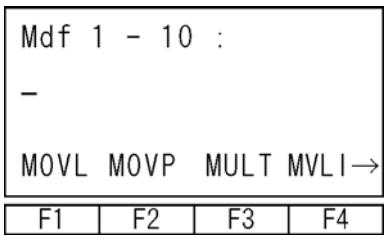
Enter 1 of the position No. 1 and press the return key.



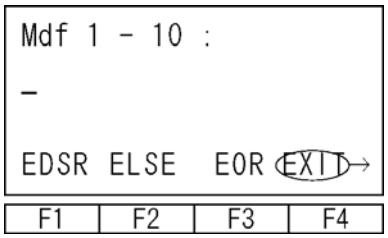
Press the WRT key to transfer the data to the controller.
The step No. advances to 6.



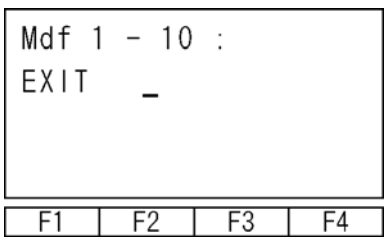
Input the program data of MOVP 2, MOVP 3, MOVP 2 and MOVP 1 for the steps No. 6 to No. 9 according to the same procedures and transfer the data to the controller.



Display EXIT in the function key section with 8 of the ten-key numeric pad and the SF key.

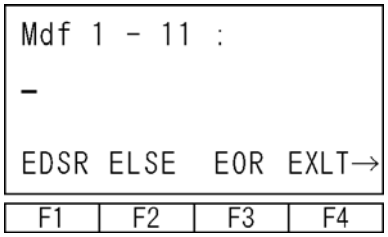


Select the F4 (EXIT) key and press the return key.

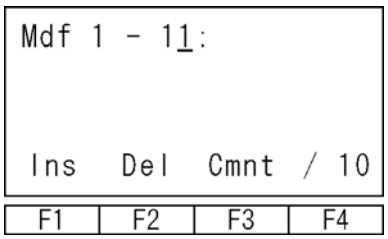


Press the WRT key to transfer the data to the controller.

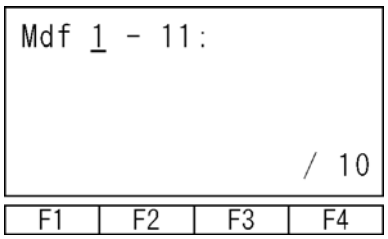
* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.



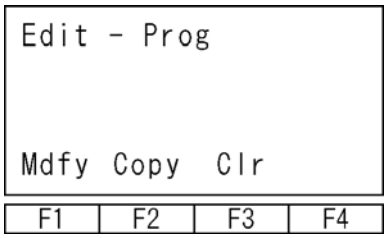
Complete the program editing and write the data in flash ROM.
Press the ESC key.
(The cursor moves to the location for step No.)



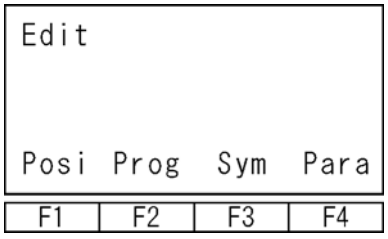
Press the ESC key.
(The cursor moves to the location for program No.)



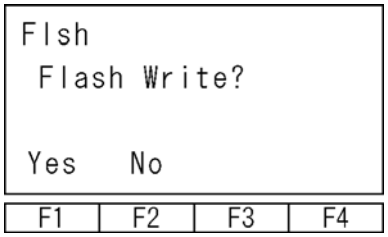
Press the ESC key.
Return to the Edit-Prog screen.



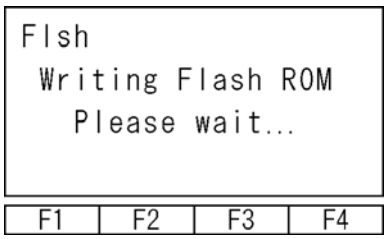
Press the ESC key.
Return to the Edit screen.



Press the ESC key.

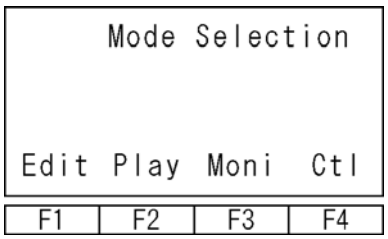


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



The message “Please wait…” flashes during flash ROM writing.

* Never turn off the power to the controller at this time.

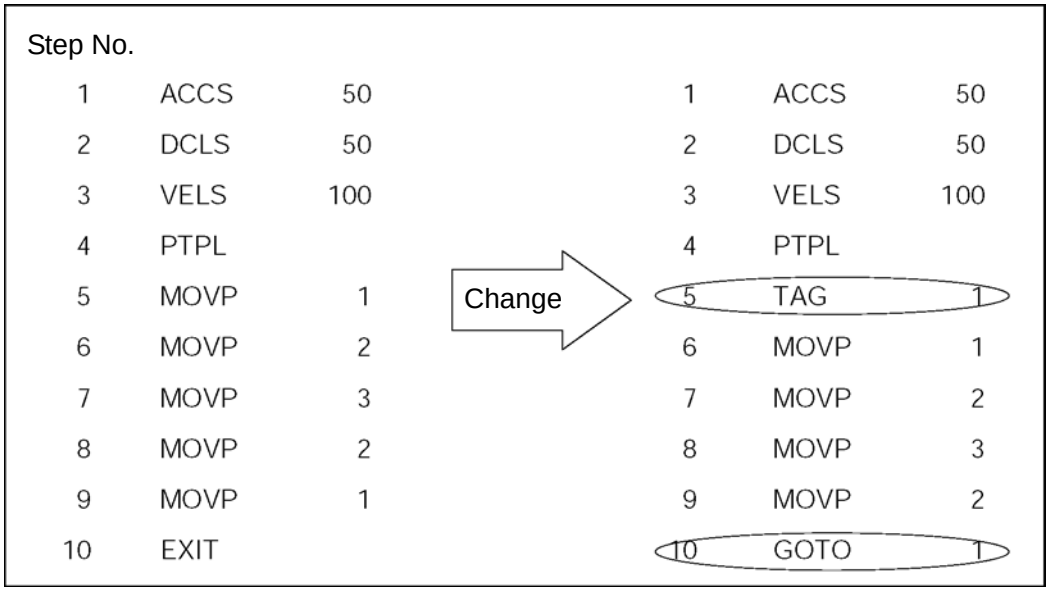


When flash ROM writing is completed, the screen returns to the Mode Selection screen.

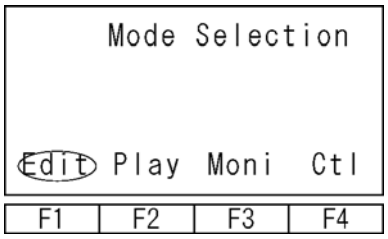
9-3. Change of application program

The program created in the preceding section (9-2) is changed.

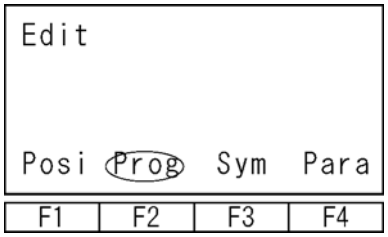
A program step is inserted or deleted to allow the same operation to be repeated.



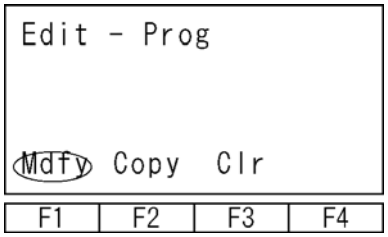
(Insert “TAG 1” into step No. 5, delete “MOVP 1” from step No. 9 and overwrite “EXIT” with “GOGO 1.”)



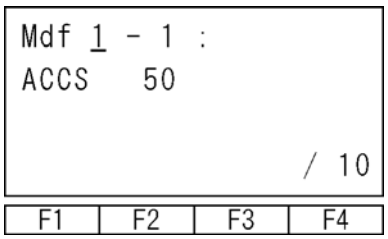
Select the F1 (Edit) key on the Mode Selection screen.



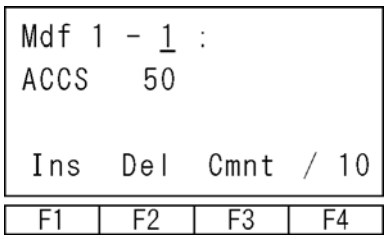
Press the F2 (Prog) key on the Edit mode screen.



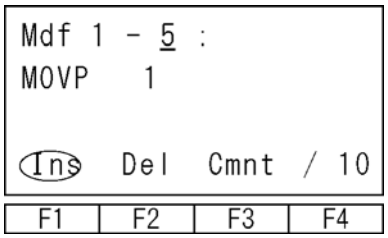
Select the F1 (Mdfy) key on the Edit-Prog screen.



The display changes to the program edit mode screen. Press the return key once to move the cursor to the location for step No.

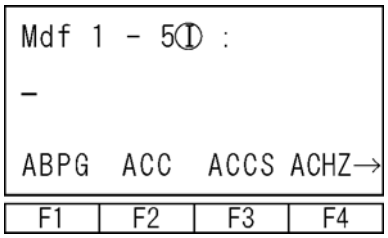


Insert one-line step between the program steps No. 4 and No. 5. Enter 5 with the ten-key numeric pad or press the PAGE UP key 4 times to display 5.

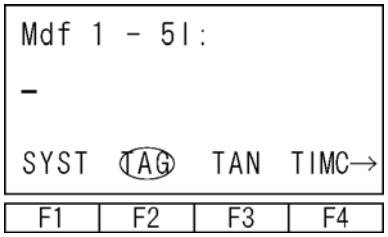


Select the F1 (Ins) key.

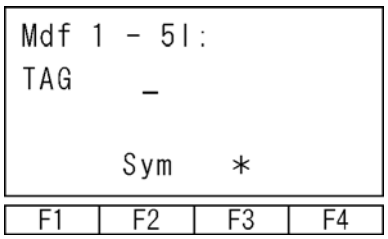
"I" of "Insert" is displayed after step No. 5.



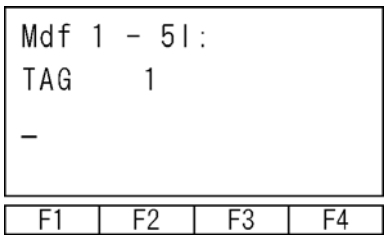
Display "TAG" with 1 of the ten-key numeric pad or the SF key.



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

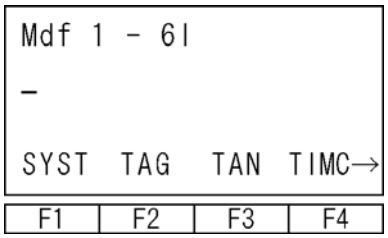


Enter a numeric value of 1 for operation 1 and press the return key.

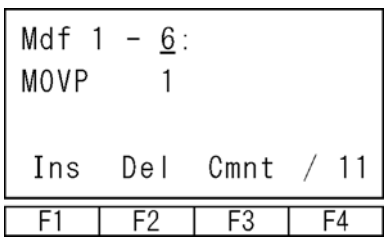


Press the WRT key to transfer the program data to the controller.

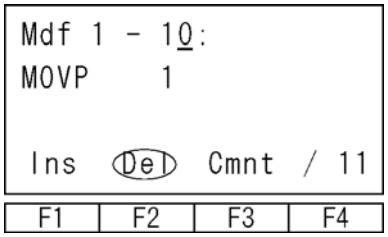
* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.



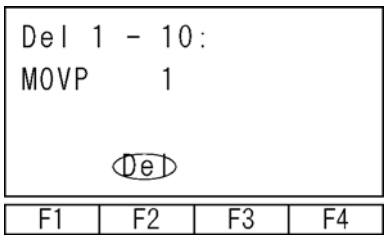
Press the ESC key twice to display the screen for step No. 6.



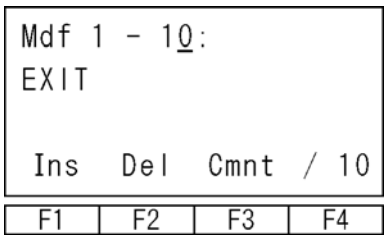
Then, delete “MOVP 1” from pre-modification step No. 9. Enter 10 for the step No. directly with the ten-key numeric pad while keeping the cursor position, or press the PAGE UP key 4 times to display “MOVP 1.”
(Cursor located at step No. 10)



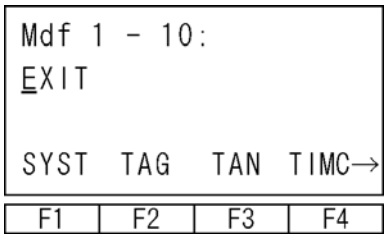
Press the F2 (Del) key.



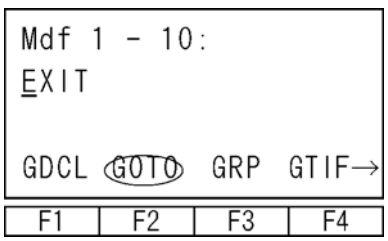
Press the F2 (Del) key again.
(When canceling deletion, press the ESC key.)



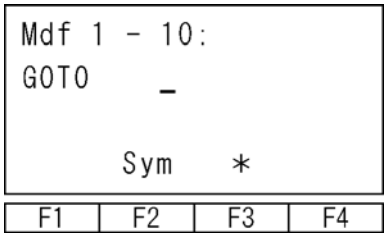
Press the return key to move the cursor to the location of commands.



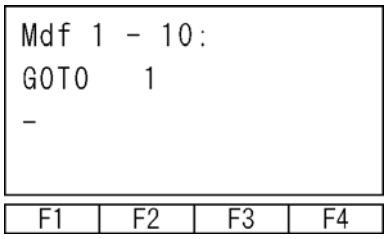
Display “GOTO” with 9 of the ten-key numeric pad or the SF key.



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

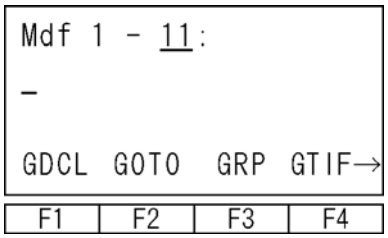


Enter the same numeric value as the one input for “TAG” operation 1 for operation 1. Enter 1 here and press the return key.

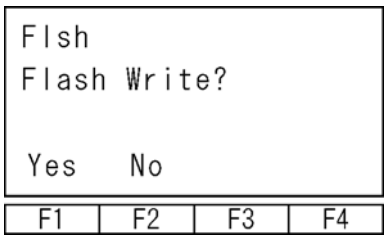


Press the WRT key to transfer the program data to the controller.

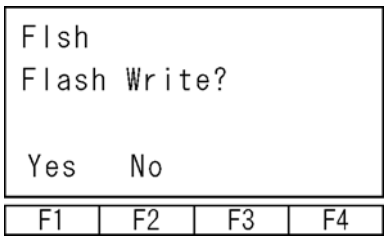
* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.



Press the ESC key several times to move to the Flsh screen.

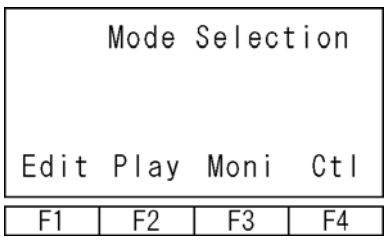


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



The message “Please wait…” flashes during flash ROM writing.

* Never turn off the power to the controller at this time.

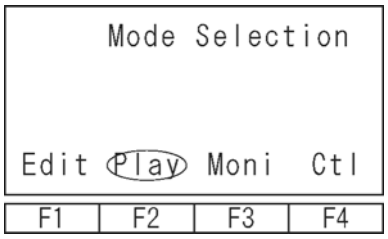


When flash ROM writing is completed, the screen returns to the Mode Selection screen.

10. Program Execution

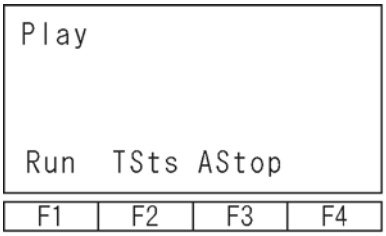
Now, operate the program created in “9. Simple Operating Procedures.”

10-1. Operation check



Play mode screen

Press the F2 (Play) key to move to the Play mode screen.



The following 3 items on the Play mode screen exist.

F1 (Run): Moves to the screen for inputting the program No. to execute.

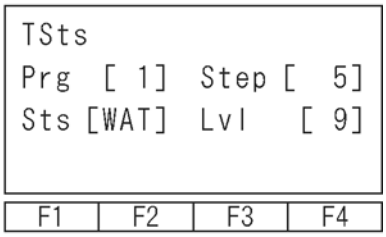
F2 (TSts): Moves to screen for monitoring the status of the task in execution.

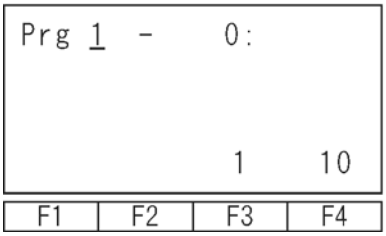
F3 (AStop): Completes all programs in execution.

(The F2 and F3 keys are function keys to be used after program execution.)

All programs completed

Task status

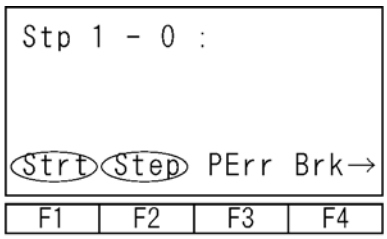




The cursor is located at the program No.
Enter the program No. to execute with the ten-key numeric pad or the PAGE UP and PAGE DOWN keys, and confirm it with the return key.

The screen has moved to the Run mode selection screen.
Select whether to make a run by 1 step of the program or to make a continuous run.

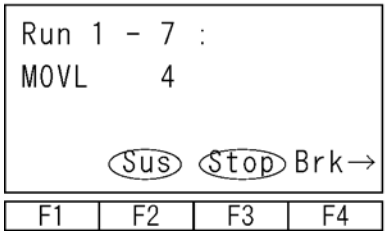
Run mode selection

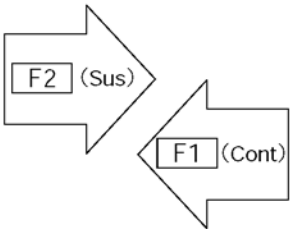


Start a continuous run with the F1 (Strt) key.

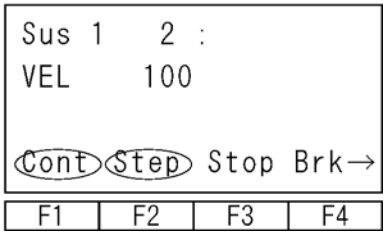
Start a step run with the F2 (Step) key.

Continuous run mode



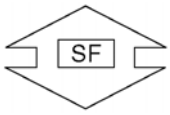


Step run mode



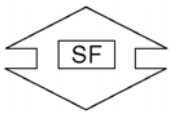
The program step currently in execution is displayed (excluding the continuous movement system command).
Pressing the F2 (Sus) key changes to a step run.
Pressing the F3 (Stop) key completes running.

After the program step currently in execution has been displayed, the next step is displayed.
Every time the F2 (Step) key is pressed, the program is executed by 1 step.
Pressing the F1 (Cont) key changes to a continuous run.
Pressing the F3 (Stop) key completes running.



Monitor while in running

F1 (Posi):	Current position display
F2 (LFlg):	Local flags
F3 (LVar):	Local variables



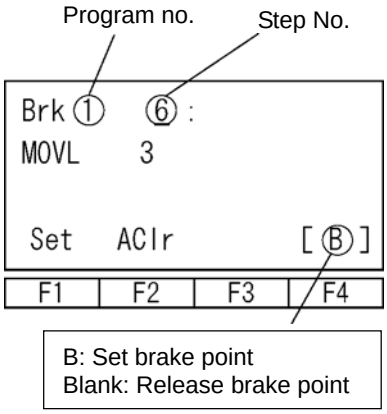
Monitor while in running

F1 (Posi):	Current position display
F2 (LFlg):	Local flags
F3 (LVar):	Local variables

Note: While the Teaching Pendant is left connected, it is in the “Safety Velocity Specified” state. Therefore, the maximum velocity always becomes 250 mm/sec or lower for CP motion and 3% or less for PTP motion regardless of the program and parameter setting.
For the selection of the safety velocity between “Effect” and “Not Effect”, refer to “17-8. Safety velocity.”

10-2. Setting of break point

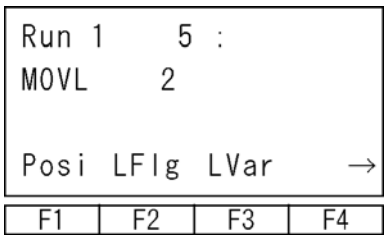
The break points in a continuous run can be set.
Press the F4 (Brk) key on the Run mode selection screen or Run mode screen.



Select the step No. to set the break point with the PAGE UP and PAGE DOWN keys.
Every time the F1 (Set) key is pressed, the break point is set or cleared.
When clearing all the set break points, press the F2 (AClr) key.
When setting the break point and making a continuous run, the program temporarily stops before the execution of the command of the set step No.
To restart a continuous run after the stop, press the F1 (Cont) key. Pressing the F2 (Step) key makes a step run.

10-3. Monitor while in running

The actuator's current positions or data in the local area can be monitored while in a continuous run or step run.
Press the SF key on the continuous run mode or step run mode screen.

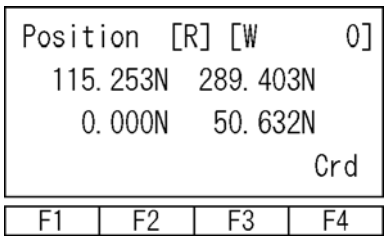


Monitor items are displayed in the function key section.
F1 (Posi): Current position display
F2 (LFlg): Local flags
F3 (LVar): Local variables

(1) Current position display

The current positions of the actuator are displayed.
Select the F1 (Posi) key on the Run mode screen.

Mode flow: PLAY — Run — Strt — Posi
Cont — Posi



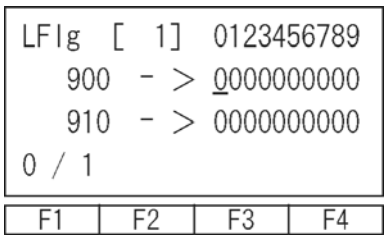
N/F at the end of the position data indicates the servo ON/OFF condition.
N: Servo ON, F: Servo OFF

(2) Local flags

The ON/OFF conditions of local flags are displayed. The conditions of local flags can be changed between ON and OFF.

Select the F2 (LFlg) key on the Run mode screen.

Mode flow: PLAY → Run → Strt → LFlg
Run → Cont → LFlg



Every time the F1 (0/1) key is pressed, the local flag where the cursor is located can be changed between ON and OFF.

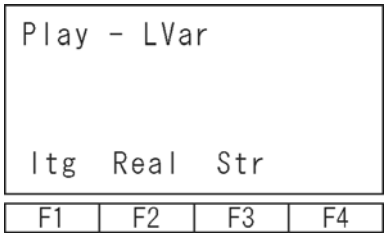
Move the cursor with the return key or ← key.

Every time the PAGE UP or PAGE DOWN key is pressed, the flag Nos. are shifted by 20 and displayed.

(3) Local variables

The local variable/local string descriptions are displayed. In addition, a numeric value can be assigned to the local variable while a character string can be assigned to the local string.

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

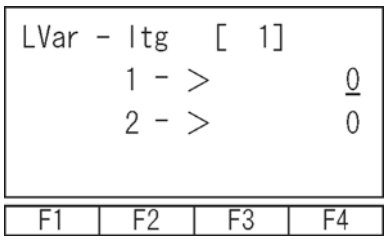


Local variables are displayed by dividing them into the following 3 types:

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

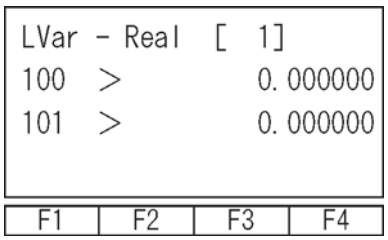
① Local integer variable

Mode flow: PLAY → Run → Strt → LVar → Itg
Run → Cont → LVar → Itg



② Local real variable

Mode flow: PLAY → Run → Strt → LVar → Real
Run → Cont → LVar → Real

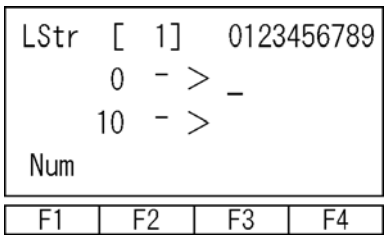


The cursor is located at the data (variable description). Entering a numeric value with the ten-key numeric pad and pressing the return key can assign a value. Move the cursor with the return key or ← key.

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

③ Local string

Mode flow: PLAY → Run → Strt → LVar → Str
Run → Cont → LVar → Str



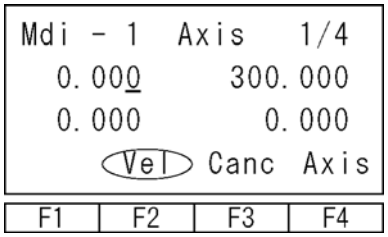
The cursor is located at the data (column). Entering an ASCII code with the ten-key numeric pad and pressing the return key can assign characters. (A to F of hexadecimal notation can be input by changing Num to Alph with the F1 [Alph/Num] key.)
Move the cursor with the return key or ← key.
The PAGE UP and PAGE DOWN keys display the column Nos. by shifting the numbers by 20.

11. Position Editing

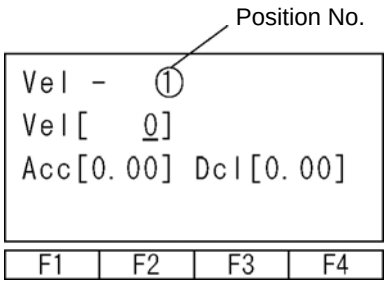
11-1. Mdi (numeric input)

Method of inputting a numeric value with the ten-key numeric pad for position data
For the data input of the coordinate position with the ten-key numeric pad, refer to “9. Simple Operating Procedures.”

Method of inputting Vel (velocity), Acc (acceleration), and Dcl (deceleration) for each position No.
Example of Mdi (numeric input):
Mode flow to numeric input screen: [Edit]–[Posi]–[Mdi]– Position No. + return

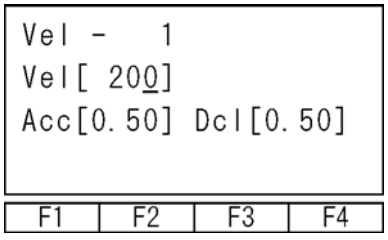


Vel is displayed in the function key section on the data input screen for each axis. Press the F2 (Vel) key.



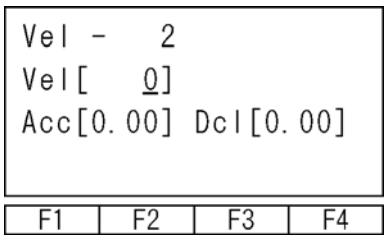
Vel, Acc, and Dcl input screen

Move the cursor with the return key, enter data in a required section with the ten-key numeric pad, and press the return key.



After entering data, press the WRT key to transfer the data to the controller.

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.



The position No. is incremented and the next Vel, Acc, and Dcl input screen is displayed.

11-2. Teac (teaching)

Teaching (method in which an actuator is moved to any given position and the current positions of the actuator are incorporated as data) is the method for inputting position data.
As the methods of moving the actuator to any given position, jog operation, inching operation, and manual operation in an emergency stop condition exist.

The basic flow of teaching is as follows:

① Move the actuator. (Jog operation, inching operation, or manual operation in a servo OFF condition) Select the position No. and axis No. for data input.

↓

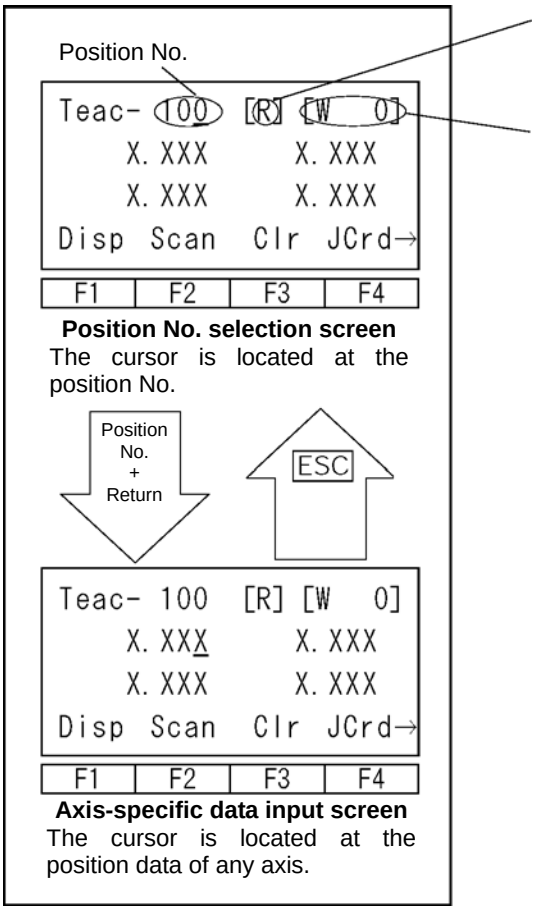
② Incorporate the current positions of the actuator onto the teaching screen.

↓

③ Transfer the data to the controller.

Repeat the steps of ① through ③ above to input the position data by teaching.

Teaching is executed mainly on the teaching screen.
Mode flow to teaching screen: Edit–Posi–Teac



Indicates the current arm system.

R: Right arm, L: Left arm

Indicates the coordinate system for jog operation.

[W n]: Work coordinate system

n: Work coordinate system No.

([W 0]: Base coordinate system)

[T n]: Tool coordinate system

n: Tool coordinate system No.

[A]: Each axis system

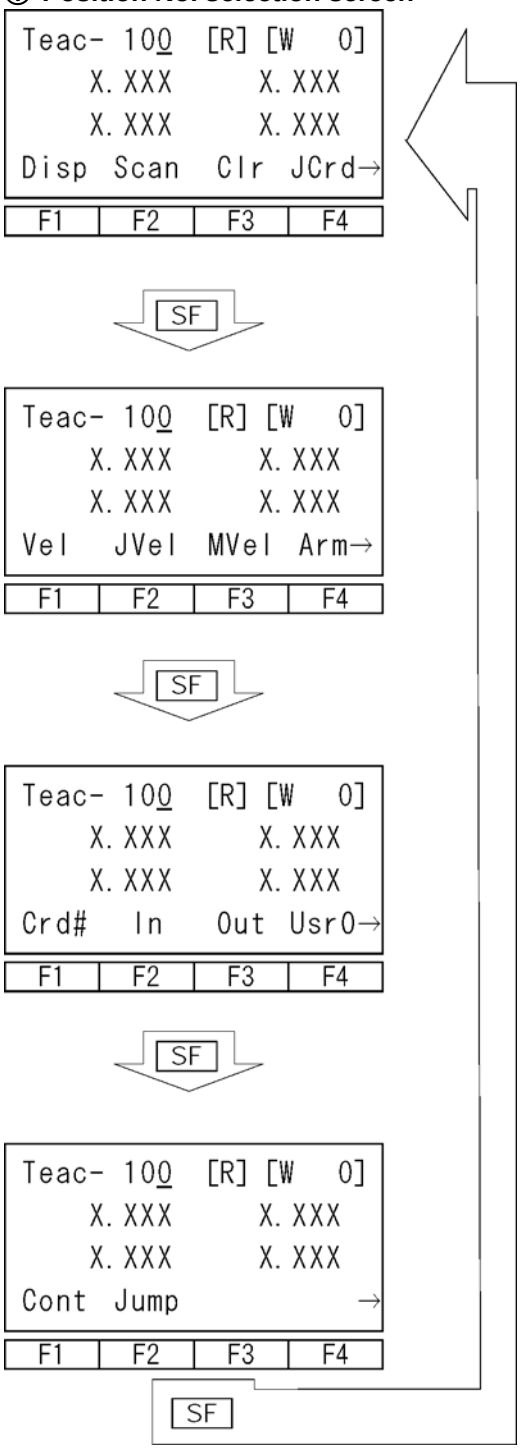
Caution

It is required to perform teaching with the same work coordinates system selection No., tool coordinate system selection No. and arm system as those for actual operation.
If any is different, positioning cannot be performed as intended.

(1) Teaching screen

The teaching screen consists of two screens including 'position No. selection screen' and 'axis-specific data input screen.
On the position No. selection screen, teaching (current-position incorporation/clear) is given to all axes simultaneously. On the axis-specific data input screen, teaching is given on an axis basis.

① Position No. selection screen



Function key descriptions

F1(Disp):	It switches the display between the input data screen and the current position display.
F2(Scan):	It incorporates the current positions of all axes onto the screen.
F3(Clr):	It clears the all-axis data of the position No. selected.
F4(JCrd):	It changes the coordinate system for jog operation.

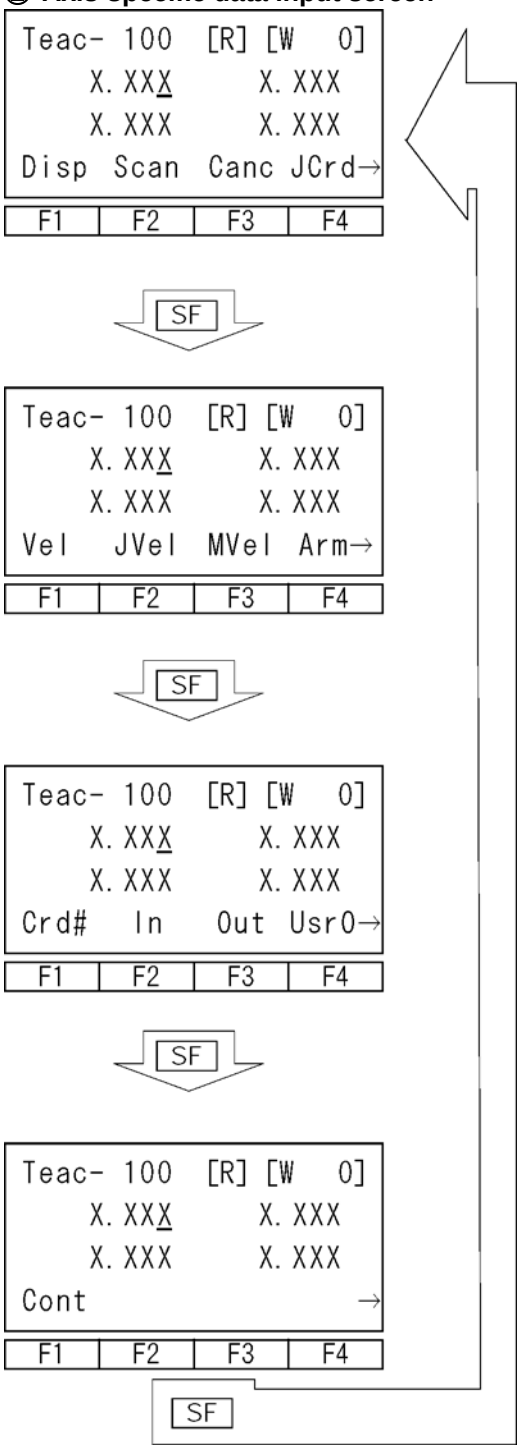
F1(Vel):	It inputs data of velocity, etc., for each position No.
F2(JVel):	It sets the jog velocity, etc.
F3(MVel):	It sets movement velocity in the continuous movement mode (Cont) or with the MOVE key.
F4(Arm):	It changes the arm system. (Servo ON status required in advance) Note: The arm operates.

F1(Crd#):	It selects the coordinate system No.
F2(In):	It monitors input ports.
F3(Out):	It monitors output ports.
F4(UsrO):	It turns ON/OFF the output ports (sequential 8 points at the maximum set to parameters). (It is required to set the I/O parameters No. 74 and No. 75.)

F1(Cont):	It moves to the continuous movement mode.
F2(Jump):	It sets jump movement. (Teaching Pendant Application Part Ver. 1.13 or later)

Enter the position No. with the ten-key numeric pad, and press the return key to move to the axis-specific data input screen.

② Axis-specific data input screen



Function key descriptions

F1(Disp):	It switches the display between the input data screen and the current position display.
F2(Scan):	It incorporates the current positions of all axes onto the screen. (Teaching Pendant Ver. 1.02 or later)
F3(Canc):	It clears the all-axis data of the position No. selected.
F4(JCrd):	It changes the coordinate system for jog operation.

F1(Vel):	It inputs data of velocity, etc., for each position No.
F2(JVel):	It sets the jog velocity, etc.
F3(MVel):	It sets movement velocity in the continuous movement mode (Cont) or with the MOVE key.
F4(Arm):	It changes the arm system. (Servo ON status required in advance) Note: The arm operates.

F1(Crd#):	It selects the coordinate system No.
F2(In):	It monitors input ports.
F3(Out):	It monitors output ports.
F4(UsrO):	It turns ON/OFF the output ports (sequential 8 points at the maximum set to parameters). (It is required to set the I/O parameters No. 74 and No. 75.)

F1(Cont):	It moves to the continuous movement mode.

11-3. Jog movement direction and coordinate system

(1) Jog keys and movement directions

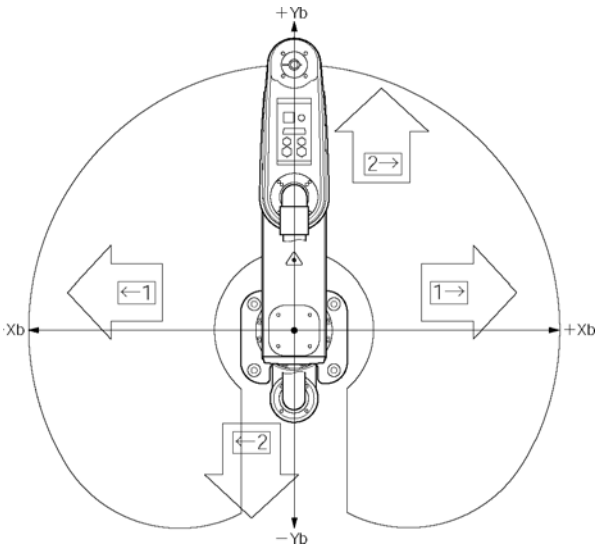
The movement direction during jog operation changes according to the coordinate system No. selected.

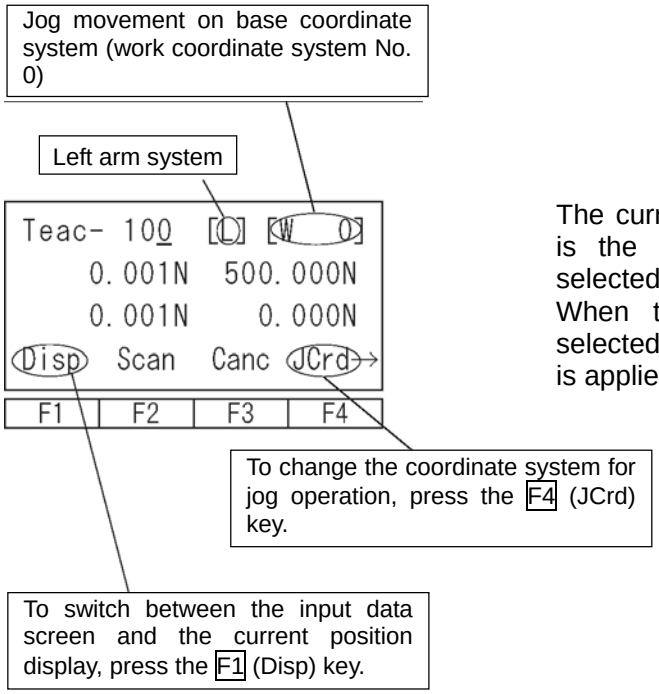
The status before shipment is the base coordinate system (work coordinate system No. 0) and tool coordinate system No. 0.

For the setting of coordinate system data, refer to “13. Coordinate System Data Editing.”

① Jog movement on base coordinate system

The jog keys and movement directions on the base coordinate system are as shown below.



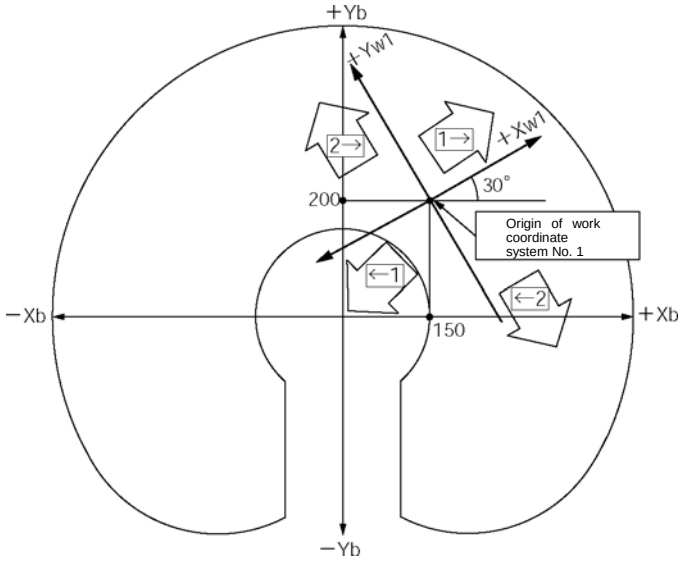


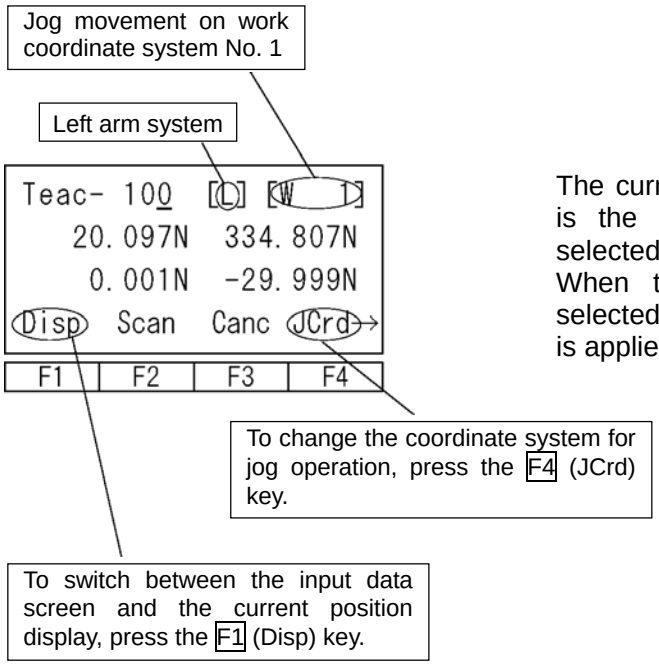
The current position display on the teaching screen is the position on the work coordinate system selected.

When the tool coordinate system No. is also selected, the coordinate value of the tool tip position is applied.

② Jog movement on work coordinate system

Example) The jog keys and movement directions on the work coordinate system No. 1 are as shown below. The offset values from the work coordinate system No. 1 become Xofw1 = 150, Yofw1 = 200, Zofw1 = 0, and Rofw1 = 30.

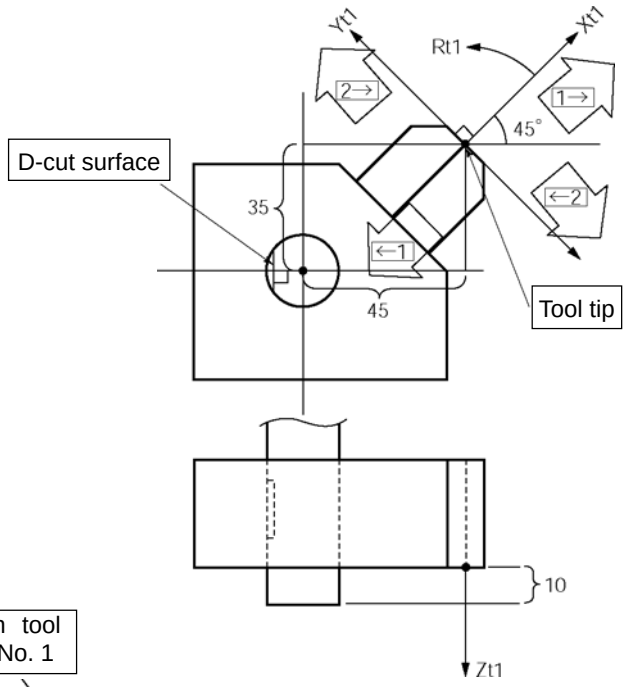


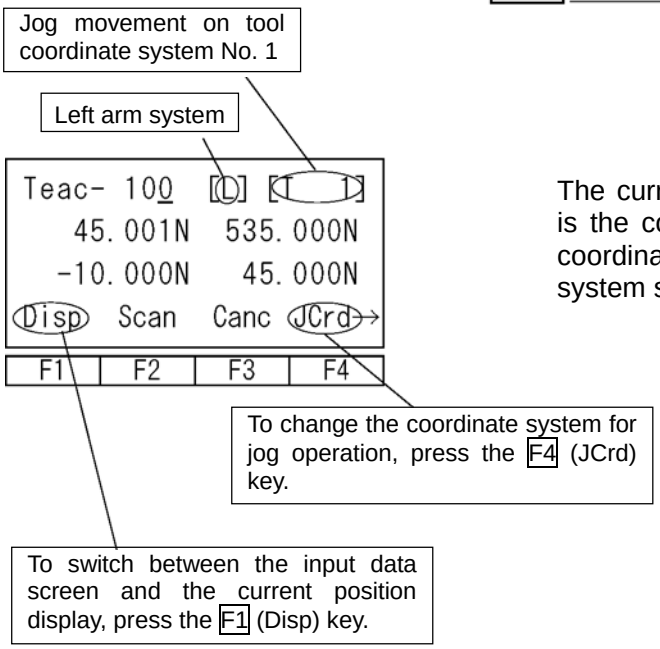


The current position display on the teaching screen is the position on the work coordinate system selected.
When the tool coordinate system No. is also selected, the coordinate value of the tool tip position is applied.

③ Jog movement on tool coordinate system

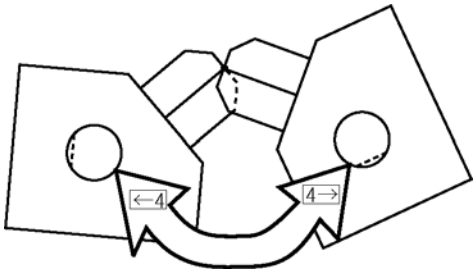
Example) The jog keys and movement directions on the tool coordinate system No. 1 are as shown below. The offset values from the tool coordinate system No. 1 become Xoft1 = 45, Yoft1 = 35, Zoft1 = -10, and Roft1 = 45.





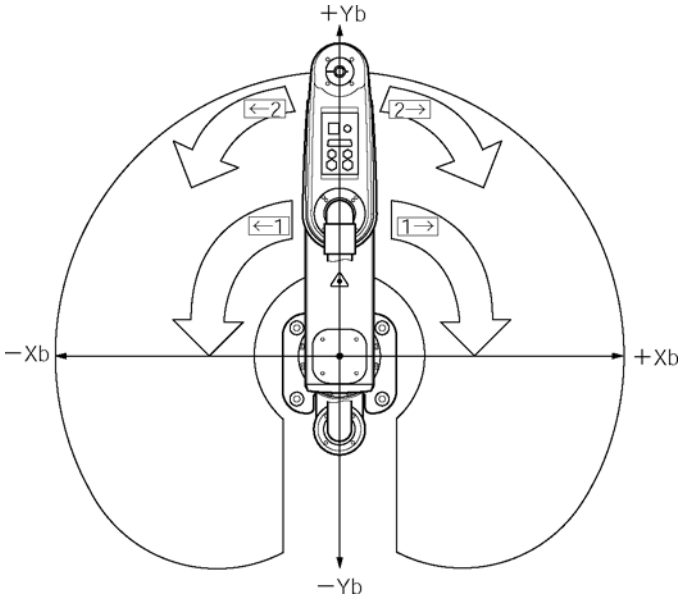
The current position display on the teaching screen is the coordinate position of the tool tip of the tool coordinate system No. on the work coordinate system selected.

Pressing the jog key for the 4th axis (R axis) performs rotary movement centering on the tool tip as shown below.

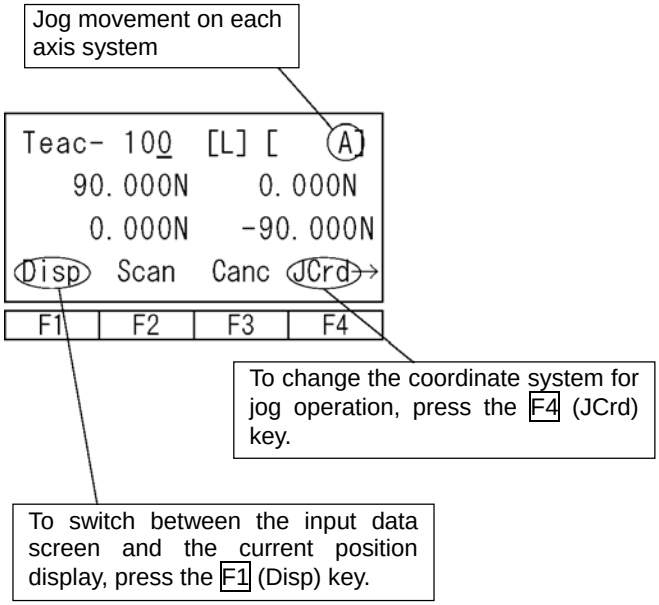


④ Jog movement on each axis system (jog movement on each arm)

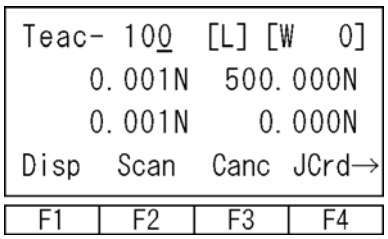
Each arm, jog keys and movement directions are as shown below.



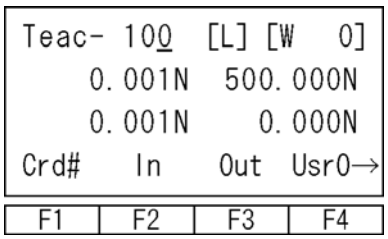
In the case of each axis system, the position display on the teaching screen cannot be incorporated.



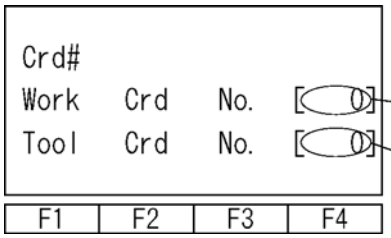
(2) Selection of coordinate system No.



Use the SF key to display Crd# on the teaching screen.

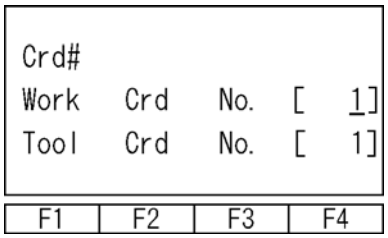


Press the F1 (Crd#) key.

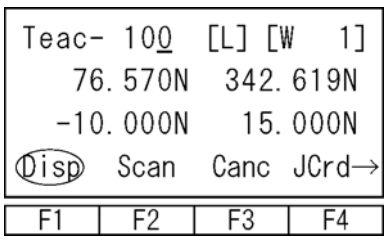


Enter the work coordinate system No.

Enter the tool coordinate system No.



This is a screen displayed when the work coordinate system No. 1 and the tool coordinate system No. 1 are selected.
Press the ESC key to return to the teaching screen.

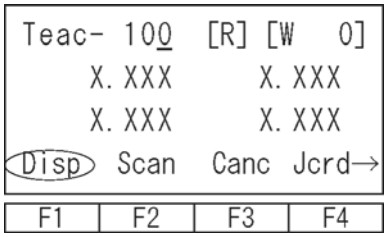


The coordinate values displayed indicate the tool tip position of the tool coordinate system No. 1 on the work coordinate system No. 1.

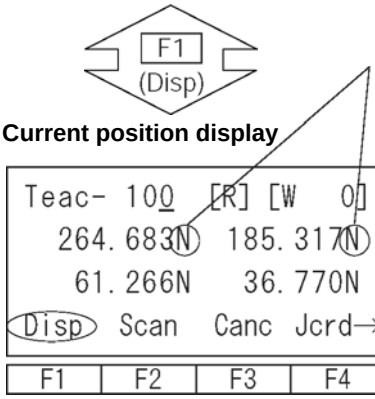
11-4. Actuator operation

Jog the actuator or move it to the input (transferred) position data by using the Teaching Pendant.
Operate the actuator on the teaching screen.
Mode flow to teaching screen: Edit — Posi — Teac

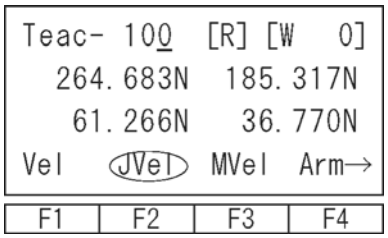
(1) Jog operation



Press the ON/OFF key in a teaching screen condition to turn the servo ON.
To check the servo ON/OFF status, press the F1 (Disp) key to display the current position.

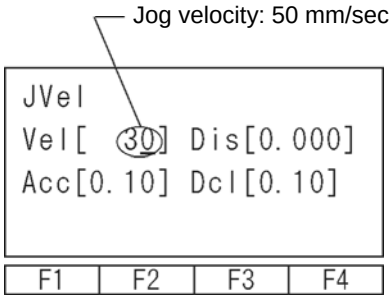


Before operation, check the jog operation coordinate system selected.
Press the 1→ 2→ 3→ 4→ ←1 ←2 ←3 ←4 keys to move the actuator to any given position. (1 to 4 indicates axis No., the right arrow indicates the coordinate plus direction, and the left arrow indicates the minus direction.)



Change of jog velocity

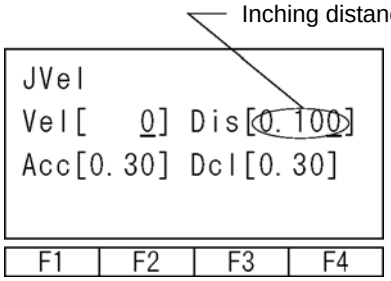
The actuator movement velocity under jog operation is changed.
Display “Jvel” (jog velocity) in the function key section on the teaching screen and press the corresponding function key.
(“Jvel” is not displayed without pressing the SF key depending on the screen condition.)



Enter Vel (velocity), Acc (acceleration), and Dcl (deceleration) under jog operation with the ten-key numeric pad and press the return key. Dis (inching distance) should be 0.000. In addition, the inching distance can also be set from this screen.
Return to the teaching screen with the ESC key and execute jog operation.

(2) Inching operation

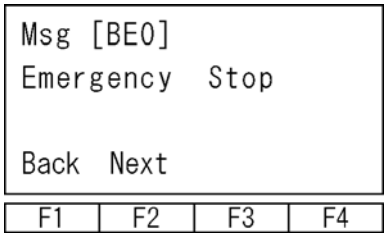
Mode flow: Edit — Posi — Teac — Jvel



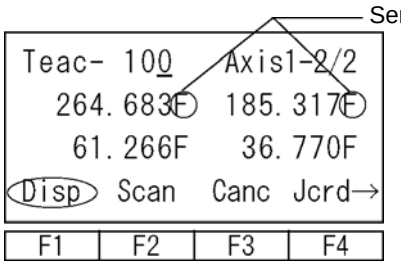
Set the inching distance (travel made every time the JOG key is pressed once).
Enter a numeric value for Dis (inching distance) with the ten-key numeric pad on the jog velocity change screen. The numeric input range is between 0.001 and 1.000 (unit: mm). Return to the teaching screen with the ESC key to execute inching operation.
Clicking the jog key once makes 1-inching distance movement.
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 under emergency stop condition

Press the EMERGENCY STOP button key in a teaching screen condition to turn the servo OFF.



Emergency stop input screen
Press the ESC key to return to the teaching screen.



Move the actuator to any given position manually.

To move the Z-axis or R-axis manually, the brake must be released. Consequently, the Z-axis may drop under the weight of the hand attached to the tip when the brake is released. Do not perform teaching by manual movement of the Z-axis or R-axis.

⚠ Danger

Be sure to perform manual teaching while the EMERGENCY STOP button is being pressed.

(4) Arm system change

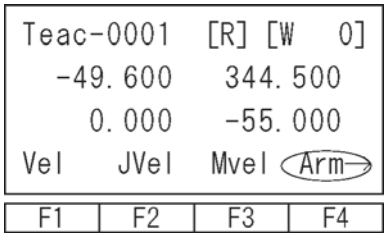
Change the current arm system over to the opposite arm system. (Right arm → left arm, left arm → right arm)

The 1st arm does not move and the 2nd arm moves in such a way that it becomes straightened with the 1st arm.

Change the arm system on the teaching screen.

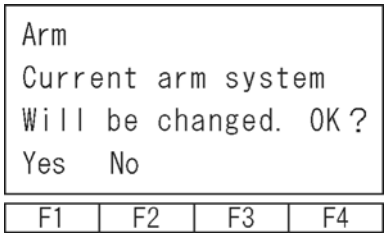
Mode flow to teaching screen: Edit — Posi — Teac

Press the SF key to display “Arm” in the function key section.



Press the F4 (Arm) key.

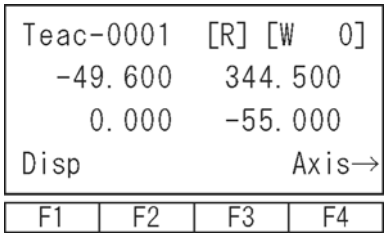
Note: When the version of the Teaching Pendant Application Part is earlier than 1.13, pressing the F4 (Arm) key starts to move the 2nd arm.



Select whether or not to change the arm system. (Teaching Pendant Application Part Ver. 1.13 or later)

To execute: Press the F1 (Yes) key. The 2nd arm starts to move.

Not to execute: Press the F2 (No) key. The screen returns to the previous screen.

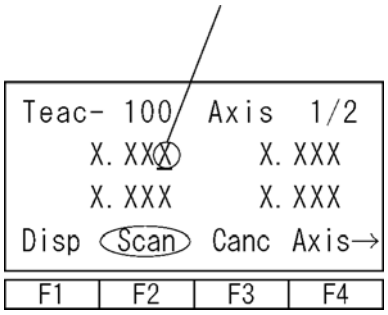


When the F1 (Yes) key is pressed, the display changes over to the screen under movement and the 2nd arm moves until it becomes straightened with the 1st arm.

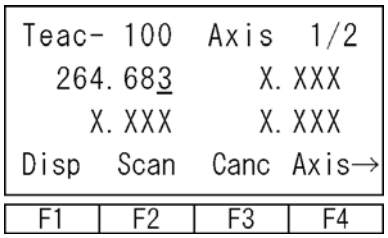
(5) Incorporation of current positions as data

Check the work coordinate system No., tool coordinate system No., and arm system currently selected. (Mode flow: Edit – Posi – Teac – Crd#)

The selected actuator's location is incorporated as position data onto the teaching screen.



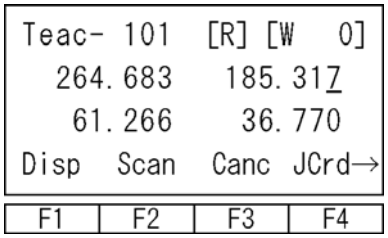
Enter the position No. into which data is incorporated with the ten-key numeric pad on the position No. selection screen, and press the return key.
Or, select the position No. into which data is incorporated with the PAGE UP and PAGE DOWN keys on the data input screen.

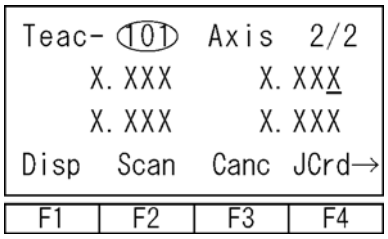


On the position No. selection screen, pressing the F2 (Scan) key incorporates the current position data for all axes.
On the axis-specific data input screen, pressing the F2 (Scan) key incorporates the current position data of the axis over which the cursor is located. (The data is incorporated on an axis basis. The left figure indicates the case of data incorporation on the axis-specific data input screen.)

(6) Transfer to controller

The incorporated data is transferred to the controller.





Press the WRT key in a teaching screen condition.
Store the incorporated data in the controller's memory.
Pressing the WRT key increments the position No. by 1.
What can be transferred to the controller is the data on one display screen. It is not possible to transfer the data of more than one position No. at a time.

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

(7) I/O monitoring

Input and output ports can be monitored during teaching operation.

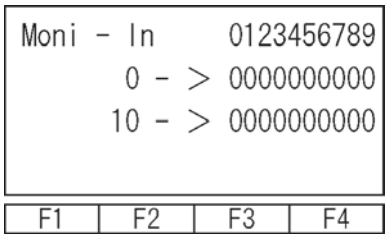
① I/O monitoring

Select In or Out among the function keys in a teaching screen condition.

In: Input ports Out: Output ports

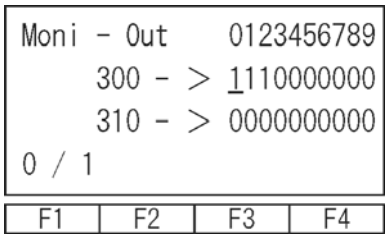
Mode flow: [Edit] — [Posi] — [Teac] — [In]

Input ports



Mode flow: [Edit] — [Posi] — [Teac] — [Out]

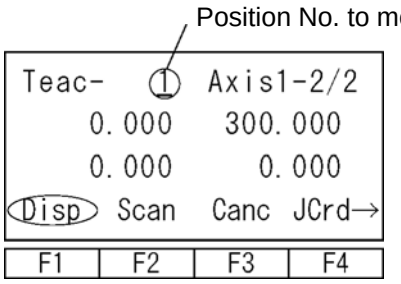
Output ports



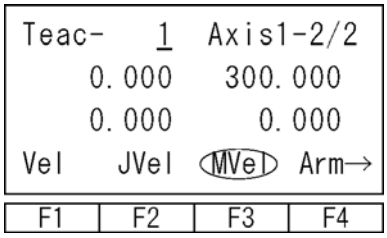
Pressing the [F1] (0/1) key can turn OFF/ON (0/1) the output port at the cursor location. Every time the [F1] key is pressed, the port is changed between OFF and ON (0 and 1).

(8) Movement

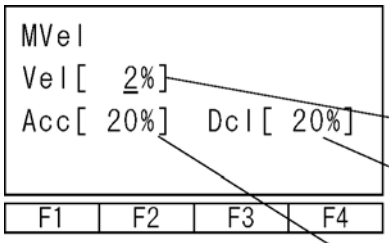
The actuator is moved to the location of the position data transferred to the controller.
(Check the location of the teaching position data.)
Mode flow to teaching screen: Edit — Posi — Teac



Select the position No. you want to move in a teaching screen condition.
Press the ON/OFF key to turn the servo ON.
To check the servo ON/OFF status, press the F1 (Disp) key.
Pressing the MOVE key starts movement. To stop movement halfway, press the STOP key.



When checking or changing the movement velocity, press the F3 (MVel) key to move to the screen for changing the velocity, etc.



Enter the change data with the ten-key numeric pad and press the return key. After changing, return to the previous screen with the ESC key.

Ratio to maximum PTP velocity (axis-specific parameter No. 28)

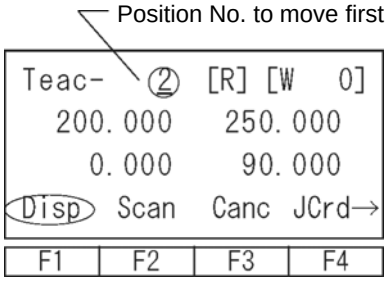
Ratio to maximum PTP acceleration (axis-specific parameter No. 135)

Ratio to maximum PTP deceleration (axis-specific parameter No. 134)

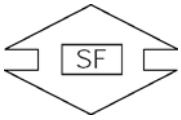
(9) Continuous movement

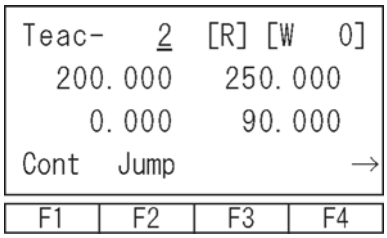
The actuator is continuously moved to the location of the position data transferred to the controller.

Mode flow to teaching screen: Edit — Posi — Teac

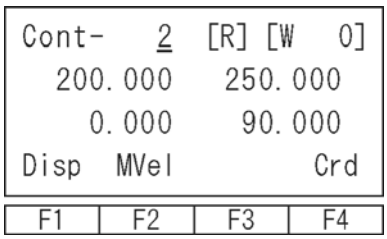


Select the position No. to which you want to move the actuator first in a teaching screen condition, and press the return key.
Press the ON/OFF key to turn the servo ON.
To check the servo ON/OFF status, press the F1 (Disp) key.

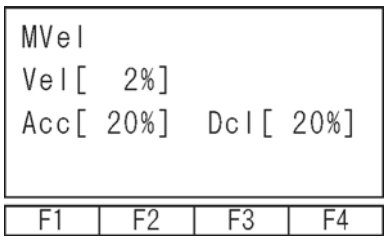


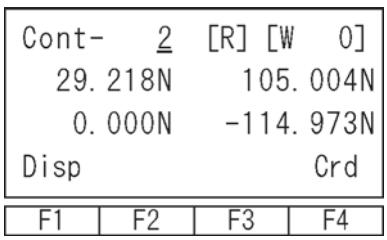


Press the F1 (Cont) key.



When checking and changing the movement velocity, press the F2 (Mvel) key to move to the screen for changing the velocity, etc.



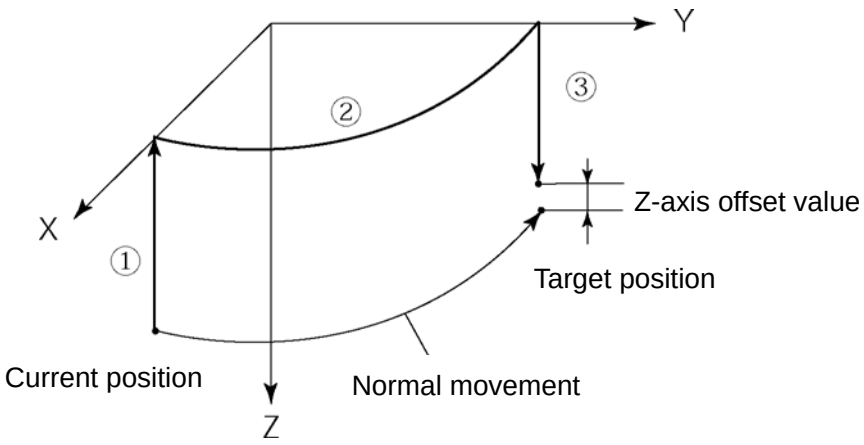


Pressing the MOVE key starts the actuator's continuous movement.

Pressing the F1 (Disp) key displays the current target position data.

(10) Jump movement

The actuator is moved to the location of the position data transferred to the controller by jump motion (arch motion). Before/after normal movement or continuous movement, the Z-axis is moved up and down.
(Supported by Teaching Pendant Application Part Ver. 1.13 or later)



Motion sequence

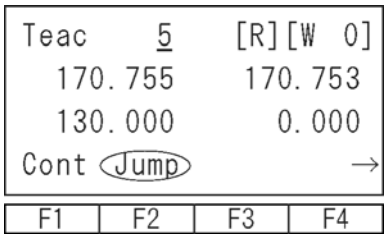
① Raise the Z-axis from the current position to the top position (Z = 0). (Motion of the Z-axis only)

② Movement is performed to above the target position by PTP motion while the Z-axis stays at the top position. (Motion of the X-axis, Y-axis and R-axis only)

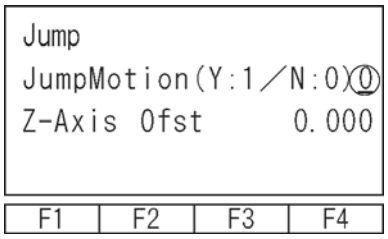
③ Lowering is performed to the target position. (Motion of the Z-axis only). When the Z-axis offset value is set, the Z-axis stops before (above) the target position by the same amount.

Z-axis offset value: Specify how many millimeters before the target position to stop the Z-axis. No minus value can be input.

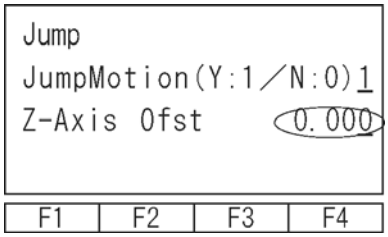
Setting of jump movement is performed on the teaching screen.
Mode flow to teaching screen: Edit — Posi — Teac
Press the SF key to display “Jump” in the function key section.



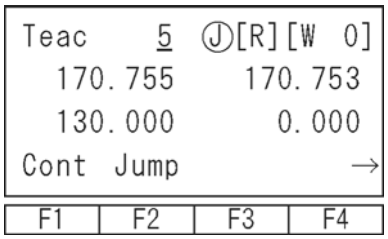
Press the F2 (Jump) key.



Enter 1 to make jump motion effective or 0 to make it ineffective, and press the return key.



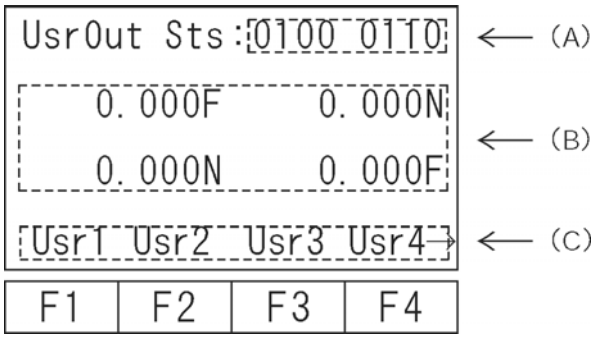
Enter the Z-axis offset value.
Enter the offset value (mm) from the Z-axis target position coordinate and press the return key.
The set value is effective until the Teaching Pendant is reset or reconnected.



Press the ESC key to return to the teaching screen.
Selecting the target position No. and pressing the MOVE key start jump motion.
“J” is displayed at the right side of the position No. while jump motion is effective.

(11) 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.
Mode flow: [Edit] — [Posi] — [Teac] — [UsrO]



(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 the specified ports.)

(B) Current position and servo ON/OFF display
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 Editing.”

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.

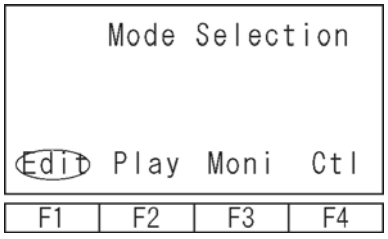
  I/O parameter No. 75 “Top No. Use Out” (First output port No. by TP user [hand, etc.])

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

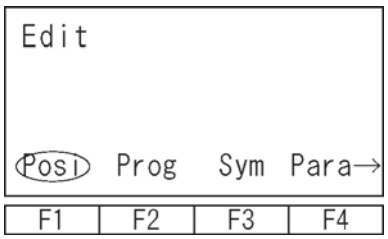
“Usr1” (F1 key)·····Output port 308
“Usr2” (F2 key)·····Output port 309
“Usr3” (F3 key)·····Output port 310
“Usr4” (F4 key)·····Output port 311
“Usr5” (F1 key)·····Output port 312
“Usr6” (F2 key)·····Output port 313
“Usr7” (F3 key)·····Output port 314
“Usr8” (F4 key)·····Output port 315

11-5. Teaching input example

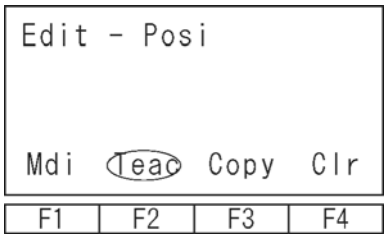
Data is input for the position No. 10 by jog operation and for the position No. 11 by manual operation under servo OFF.



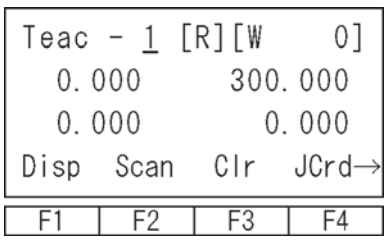
Select the F1 (Edit) key on the Mode Selection screen.



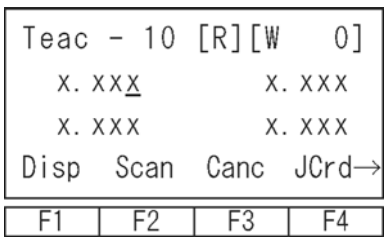
Select the F1 (Posi) key.



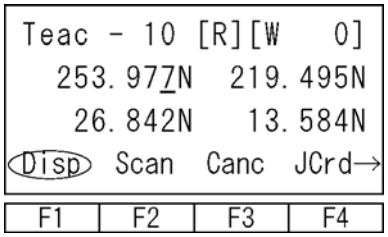
Select the F2 (Teac) key.



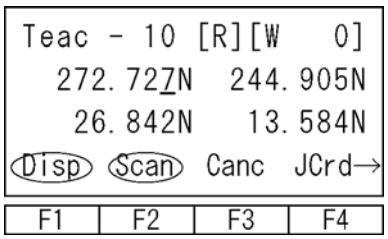
Enter 10 for the position No. with the PAGE UP and PAGE DOWN keys or the ten-key numeric pad and confirm it with the return key.



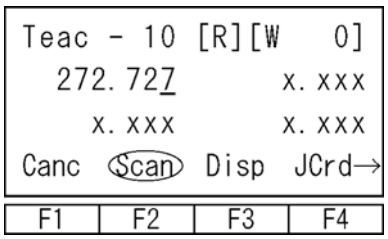
Press the ON/OFF key to turn the servo ON.



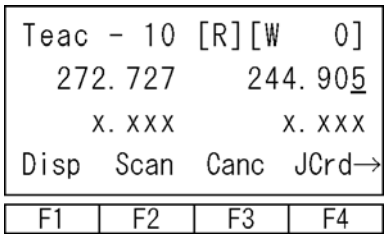
Press the jog key ←1 1→ ←2 2→ to move the robot to any given position.



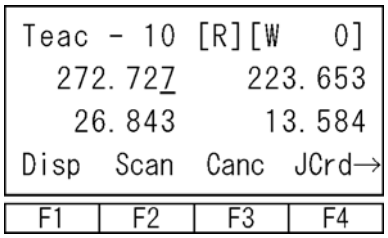
Pressing the F2 (Scan) key incorporates the current position of the axis No. over which the cursor is located onto the input screen.
Change the screen over to the data input screen with the F1 (Disp) key. Confirm that the data has been incorporated.



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

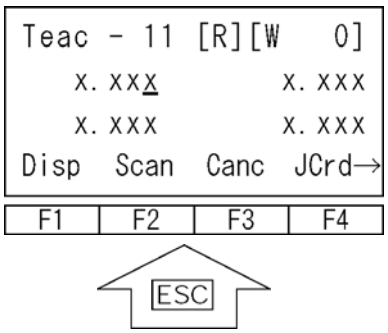


Incorporate the data of the Z-axis and R-axis in the same way.

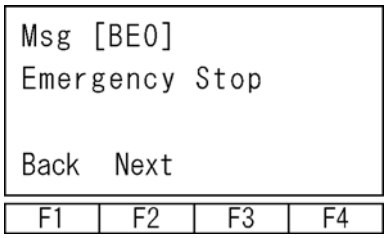


Press the WRT key to transfer the position data to the controller.
The position No. advances to 11.

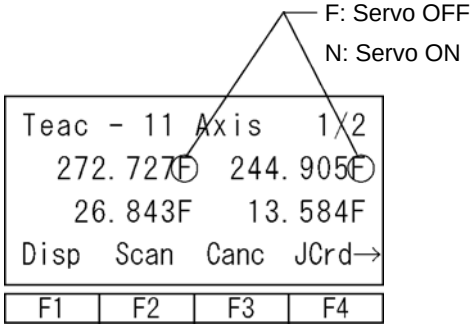
* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.



Press the EMERGENCY STOP button to turn the servo OFF.



Press the ESC key to return from the Emergency Stop input screen to the previous screen.

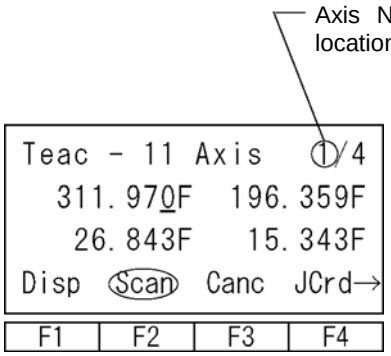


Confirm the servo OFF with the F1 (Disp) key.
Move each axis to any given position manually.

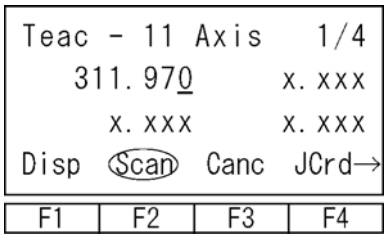
⚠ Danger

Be sure to perform manual teaching while the EMERGENCY STOP button is being pressed.

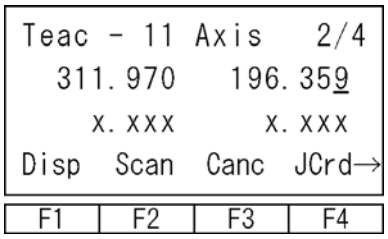
To move the Z-axis or R-axis manually, the brake must be released. Consequently, the Z-axis may drop under the weight of the hand attached to the tip when the brake is released. Do not perform teaching by manual movement of the Z-axis or R-axis.



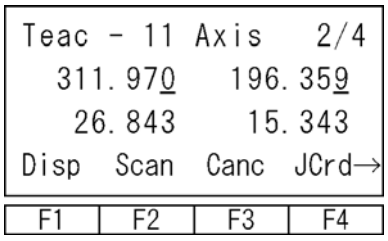
Pressing the F2 (Scan) key incorporates the current position of the axis No. over which the cursor is located onto the input screen.



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

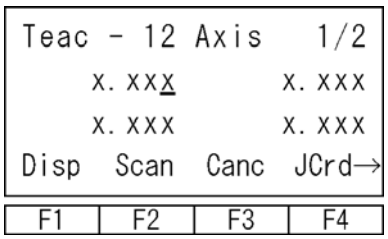


Incorporate the data of the Z-axis and R-axis in the same way.

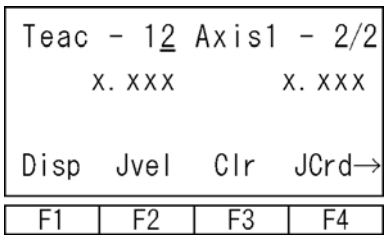


Press the WRT key to transfer the position data to the controller.
The position No. advances to 12.

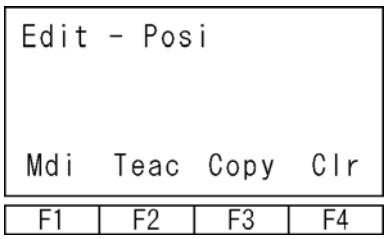
* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.



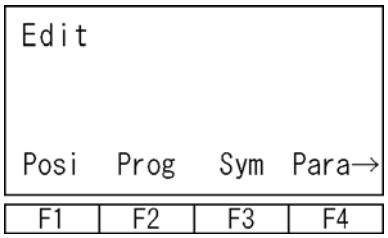
Complete the position data input by teaching.
Press the ESC key.



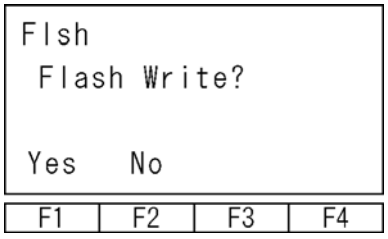
Press the ESC key.



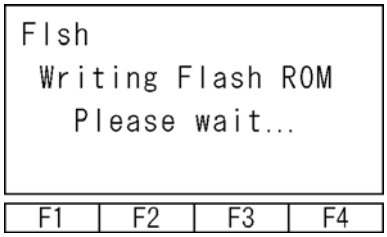
Press the ESC key.



Press the ESC key.

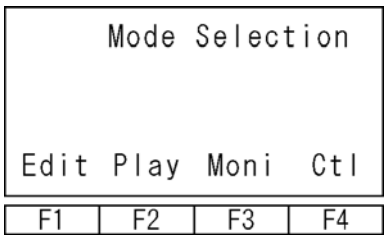


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



The message “Please wait…” flashes during flash ROM writing.

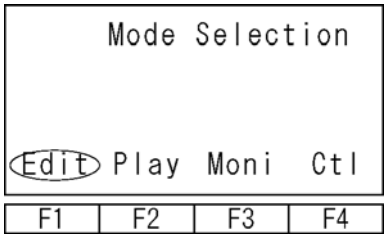
* Never turn off the power to the Controller at this time.



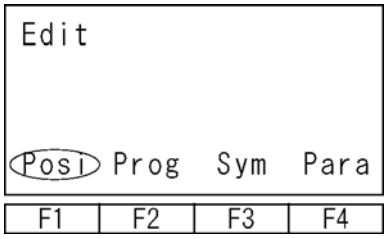
The screen returns to the Mode Selection screen.

11-6. Copy and movement of position data

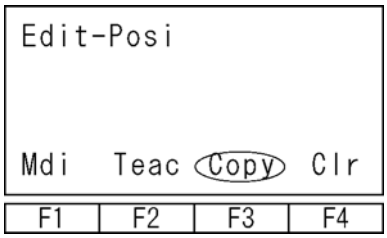
The following operating instructions are to copy or move the position data to another position No.



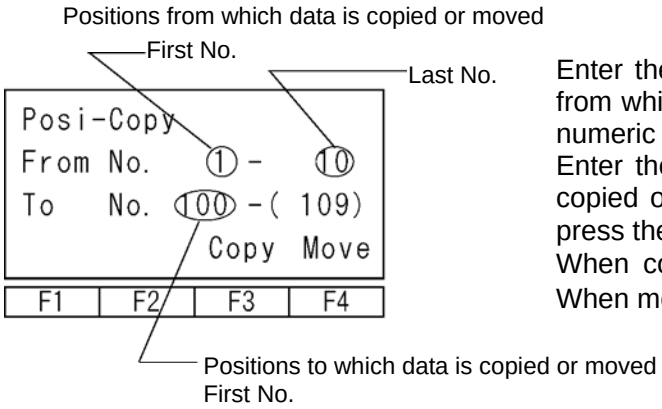
Select the F1 (Edit) key on the Mode Selection screen.



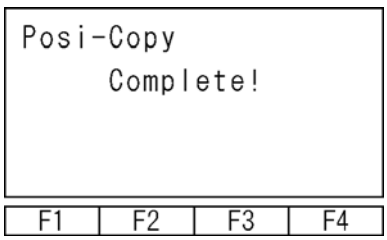
Select the F1 (Posi) key.



Select the F3 (Copy) key.



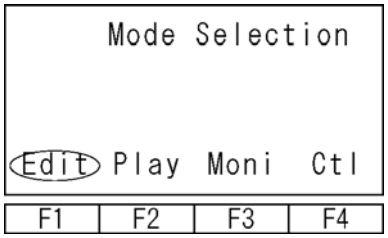
Enter the first No. and the last No. of the positions from which data is copied or moved with the ten-key numeric pad and press the return key.
Enter the first No. of the positions to which data is copied or moved with the ten-key numeric pad and press the return key.
When copying the data, press the F3 (Copy) key.
When moving the data, press the F4 (Move) key.



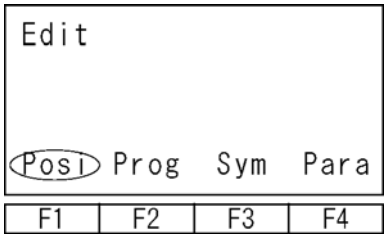
Press the ESC key to return to the previous screen.
When writing the data in flash ROM, press the ESC key several times to return to the Flsh screen.

11-7. Deletion of position data

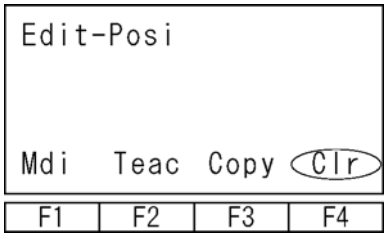
The following operating instructions are to delete the position data.



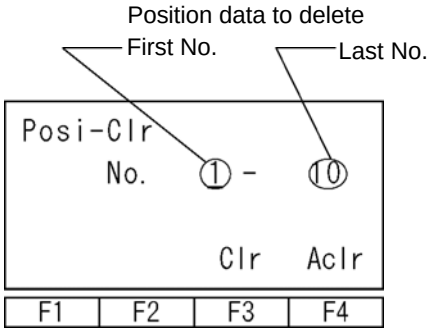
Select the F1 (Edit) key on the Mode Selection screen.



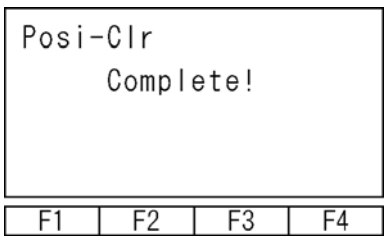
Select the F1 (Posi) key.



Select the F4 (Clr) key.



Enter the first No. and the last No. of the position data to delete with the ten-key numeric pad and press the return key.
When deleting the selected position data, press the F3 (Clr) key.
When deleting the data for all positions (No. 1 through No. 3000), press the F4(AClr) key.



Press the ESC key to return to the previous screen.
When writing the data in flash ROM, press the ESC key several times to return to the Flsh screen.

12. Program Editing

12-1. Program input method

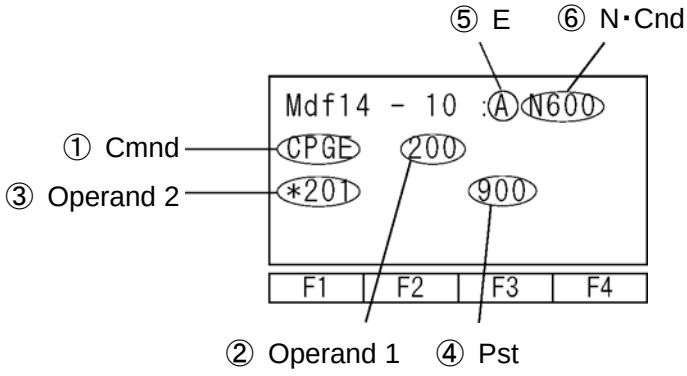
Procedures for input of extension condition (E), input condition (N･Cnd) and output (Pst)

The program input sequence with the Teaching Pendant is different from that on the program edit screen of the PC-compatible software.
The sequence is as follows: ① command (Cmnd), ② operation 1 (Operand 1), ③ operation 2 (Operand 2), ④ output (Pst), ⑤ extension condition (E) and ⑥ input condition (N･Cnd).

Program edit screen of PC-compatible software

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

LCD display of Teaching Pendant

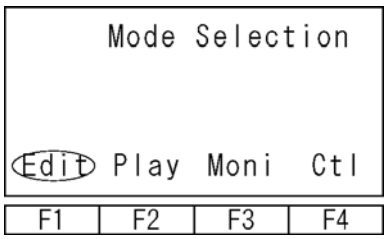


Input the program following the program steps below.

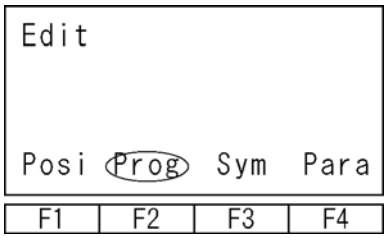
Program No. 2

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

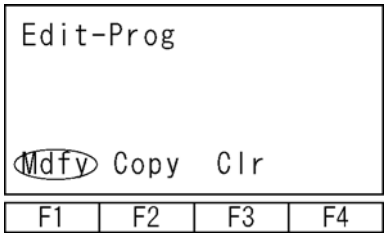
The program step No. 1 is used to input the input condition only and No. 2 is used to input all but comments.



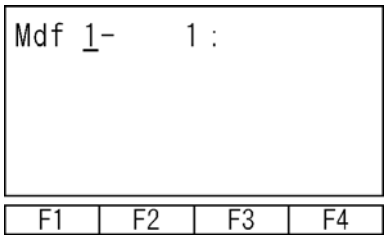
Select the F1 (Edit) key on the Mode Selection screen.



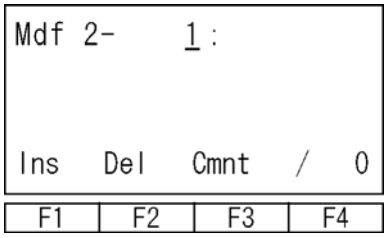
Select the F2 (Prog) key on the Edit mode screen.



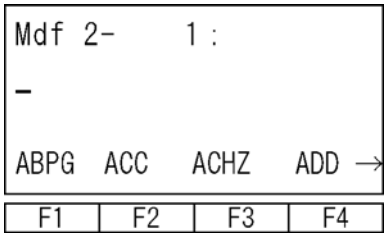
Select the F1 (Mdfy) key on the Edit-Prog screen.



Enter the program No. with the ten-key numeric pad and press the return key.

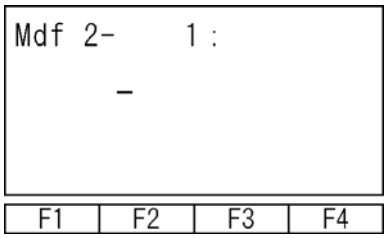


The cursor has moved to the location of the step No. Press the return key.



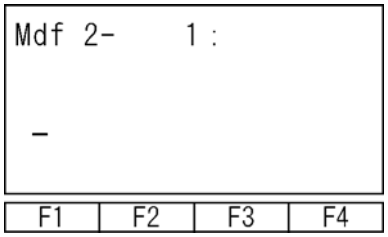
Input section for Cmnd

Press the return key.



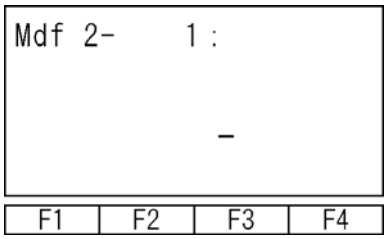
Input section for Operand 1

Press the return key.



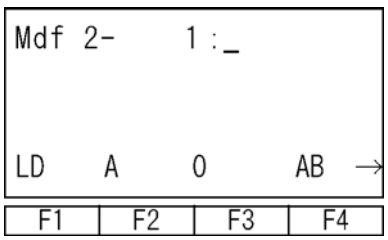
Input section for Operand 2

Press the return key.



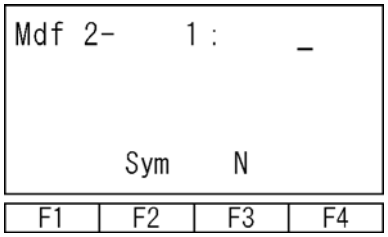
Input section for Pst

Press the return key.



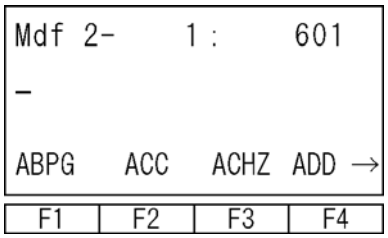
Input section for E

Press the return key.



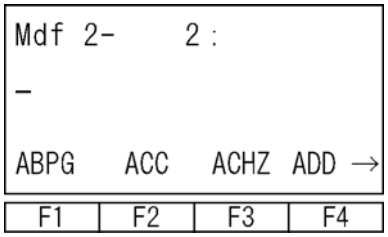
Input section for N·Cnd

Enter 601 with the ten-key numeric pad and press the return key.



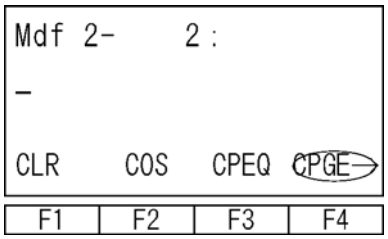
Press the WRT key to transfer the data of step No. 1 to the controller.
The step No. advances to 2.

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

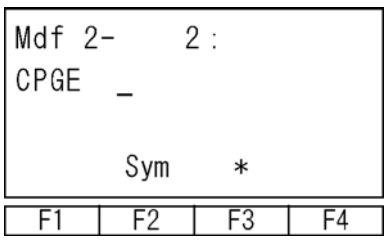


Input section for Cmnd

Display CPGE in the function key section with 7 of the ten-key numeric pad and the SF key.
For the command search method, refer to “9-2. Creation of program.”



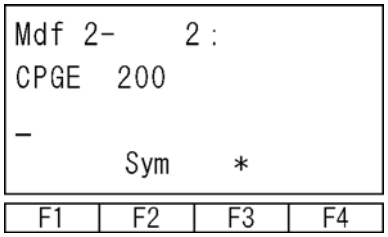
Select the F4 (CPGE) key and press the return key.



Input section for Operand 1

Enter 200 with the ten-key numeric pad and press the return key.

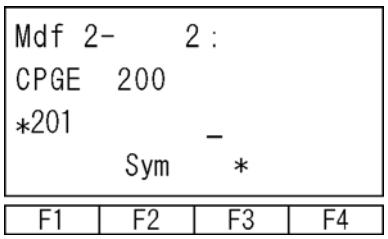
When specifying a variable to Operand 1 indirectly, select the F3 (*) key first.
When inputting a string to Operand 1, Press the F1 (Num) key to change to F1 (Alph). Input the string with the F4 (‘) key and the ten-key numeric pad now functioning for alphabetic input.



Input section for Operand 2
(variable indirect specification)

Select the F3 (*) key first, enter 201 with the ten-key numeric pad, and press the return key.

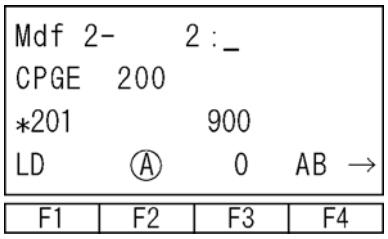
When inputting a string to Operand 2, follow the procedure of Operand 1.



Input section for Pst

Enter 900 with the ten-key numeric pad and press the return key.

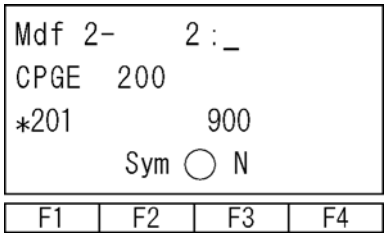
When specifying a variable to Operand 1 indirectly, select the F3 (*) key first.



Input section for E

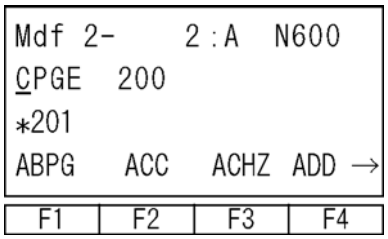
Select the F2 (A) key and press the return key.

Input the extension condition of virtual ladder task to this screen by the function keys as well.



Input section for N·Cnd

Select F3 (N) key first, enter 600 with the ten-key numeric pad, and press the return key.



Press the WRT key to transfer the data of step No. 2 to the controller.
The step No. advances to 3.

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

Complete the program input. Return to the Flsh screen with the ESC key.

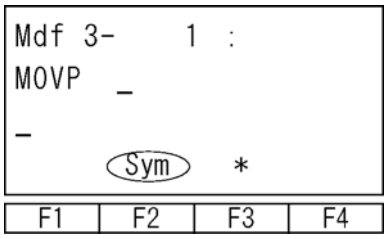
12-2. Symbol input during program editing

Symbols can be input when the cursor is located at Operand 1/Operand 2 (operation 1/2), Pst (output), or Cnd (input condition) and “Sym” is displayed in the function key section.

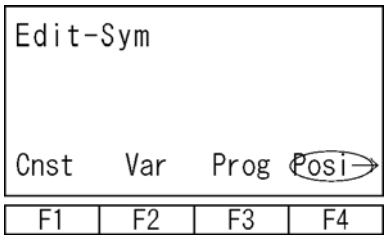
Input example)
Symbol input in the following program step:

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

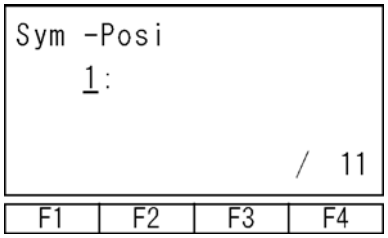
The position No. 10 is symbolized by “TAIKIITI.”



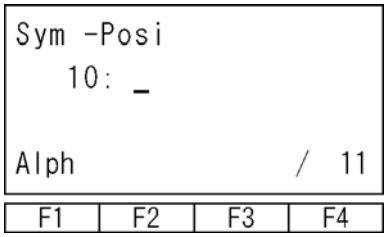
Select the F2 (Sym) key in the function key section when the cursor is located at Operand 1. The screen moves to the Edit-Sym screen.



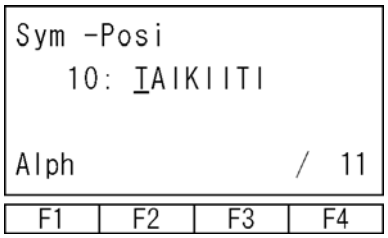
Select the item for symbol editing with a function key. In this case, select the F4 (Posi) key to edit the position No.



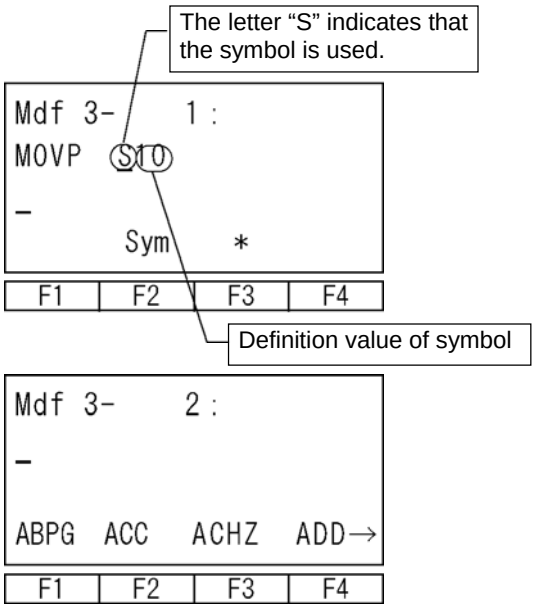
Enter 10 for the position No. with the ten-key numeric pad and press the return key.



The ten-key numeric pad now functions for alphabetic input.
Enter “TAIKIITI.”
For the input method, refer to “13. Symbol Editing.”



Press the WRT key to transfer the symbol data to the controller. The display returns to the previous edit screen.



The Teaching Pendant cannot display the input symbol as it is in relation to the LCD display.
In this case, “S10” is displayed instead of “TAIKIITI.”

> Selecting the F2 (Sym) key when the cursor is located at the already-symbolized item moves to the symbol edit screen. The symbol can then be changed.

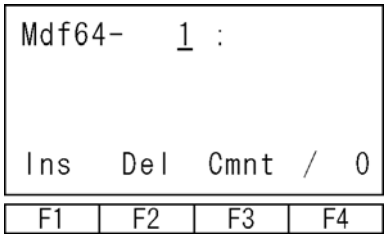
Press the WRT key to transfer the data in this program step to the controller.

When completing the program input, return to the Flsh screen with the ESC key.

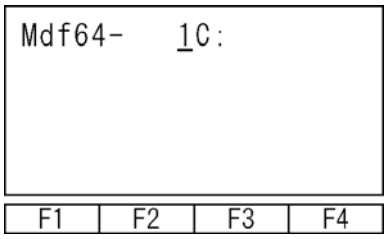
12-3. One-line comment input

A comment is input for the program step (invalid step) with numeric values, alphabetic letters, and symbols (*, ・, and _).
Mode flow: Edit—Prog—Mdfy—Program No. + return

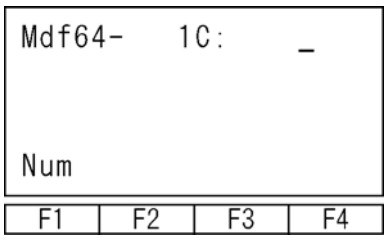
Move the cursor to the step No. for comment input.



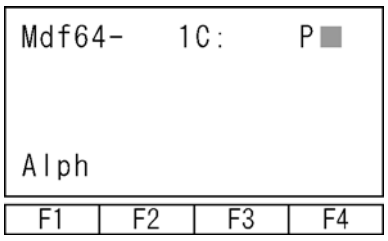
Press the F3 (Cmnt) key.



"C" is displayed next to the step No.
Press the return key.

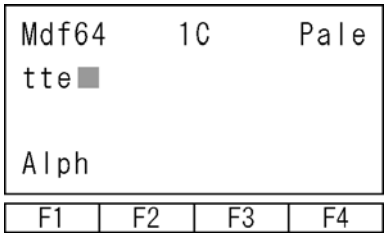


Every time the F1 key is pressed, the display in the F1 key field is changed between "Alph" and "Num."

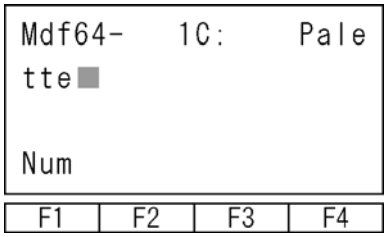


Alphabetic input

Display "Alph" in the F1 key field.
Alphabetic letters are allocated for each key of the ten-key numeric pad.
Example) Every time 6 of the ten-key numeric pad is pressed, the display changes as follows: P→Q→R→p→q→r→P→…. Display the alphabetic letters for input and confirm it with the return key. The left figure displays "P."

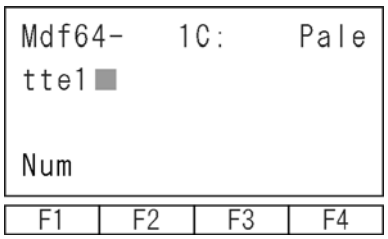


The figure at the left is the display example when "Palette" is input.

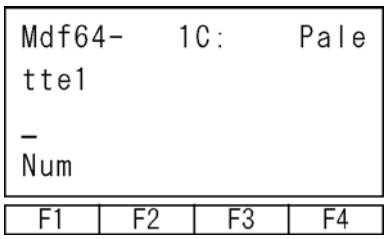


Numeric input

Press the F1 key to display “Num.”
Enter a numeric value with the ten-key numeric pad.

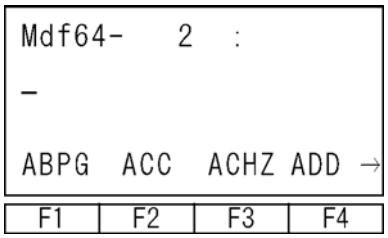


The figure at the left is the display example when “1” is input continuously after “Palette.”



After completing comment input, press the return key again.
Press the WRT key to transfer the input data to the controller.

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.



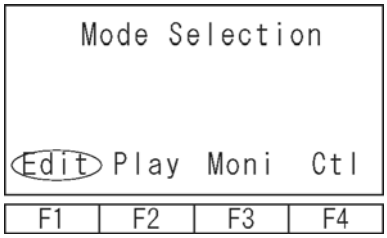
The screen advances to the next step No.

When completing program input, return to the Flsh screen with the ESC key.

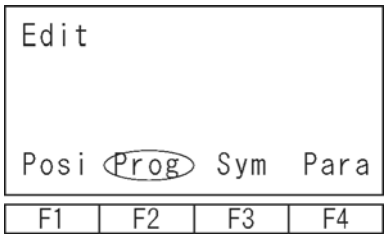
Note: The data of double byte characters input with PC-compatible software cannot be displayed on the Teaching Pendant.

12-4. Copy and movement of program

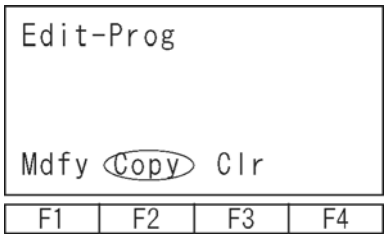
The following operating instructions are to copy or move a program to another program No.:



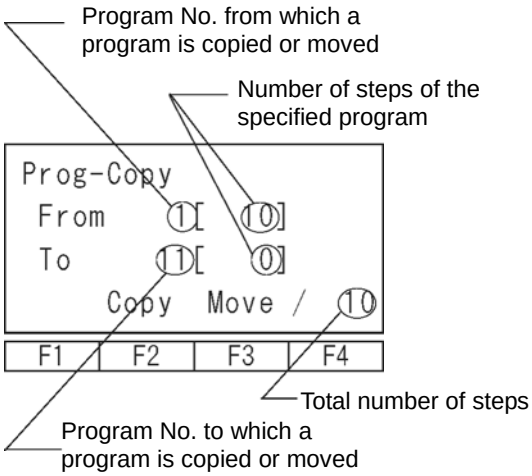
Select the F1 (Edit) key on the Mode Selection screen.



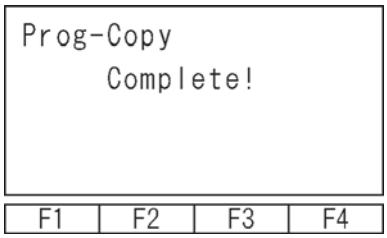
Select the F2 (Prog) key.



Select the F2 (Copy) key.



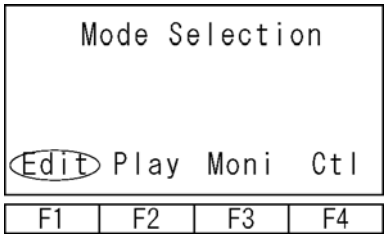
Enter the program No. from which a program is copied or moved with the ten-key numeric pad and press the return key.
Enter the program No. to which a program is copied or moved with the ten-key numeric pad and press the return key.
When copying the data, press the F2 (Copy) key.
When moving the data, press the F3 (Move) key.



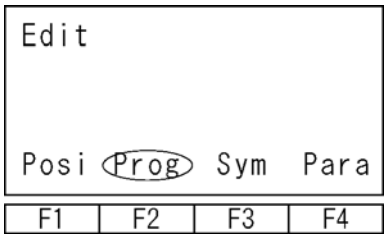
Press the ESC key to return to the previous screen.
Then, press the ESC key several times to return to the Flsh screen.

12-5. Deletion of program

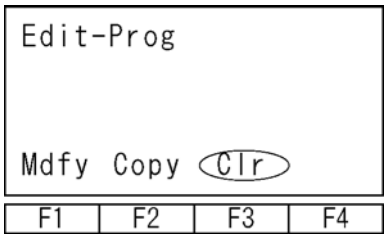
The following operating instructions are to delete a program:



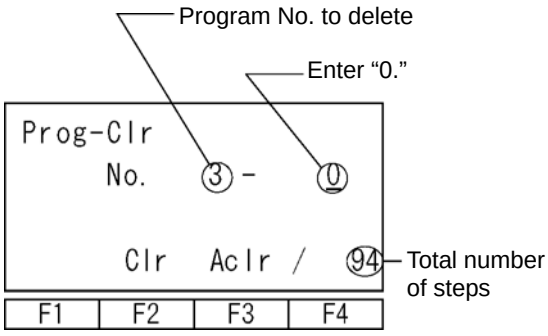
Select the F1 (Edit) key on the Mode Selection screen.



Select the F2 (Prog) key.

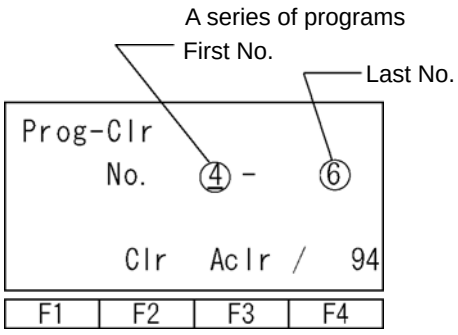


Select the F2 (Clr) key.



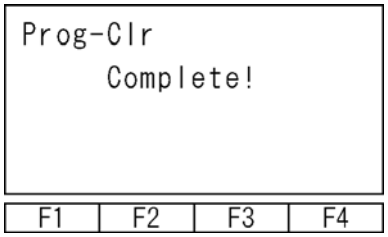
Enter the program No. to delete with the ten-key numeric pad and press the return key.

① When deleting one program, pressing the F2 (Clr) key in the example on the left deletes the program No. 3.



② When deleting a series of multiple programs, pressing the F2 (Clr) key in the example on the left deletes the programs No. 4, No. 5 and No. 6.

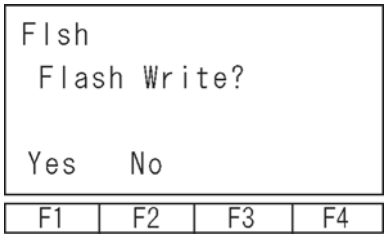
③ When deleting all the programs (No. 1 to No. 64), press the F3 (Aclr) key.



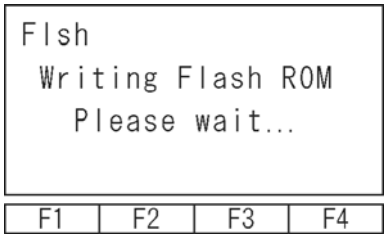
Press the ESC key to return to the previous screen. Then, press the ESC key several times to return to the Flsh screen.

12-6. Flash ROM writing

If data is only transferred to the controller after program editing, the edited program is erased when the power is turned on again or software is reset.
To maintain the edited data even if the power is turned on again or software is reset, the data is written in flash ROM.
Return to the Flsh screen with the ESC key from the edit completion screen.

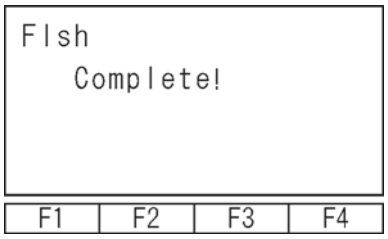


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



The message “Please wait…” flashes during flash ROM writing.

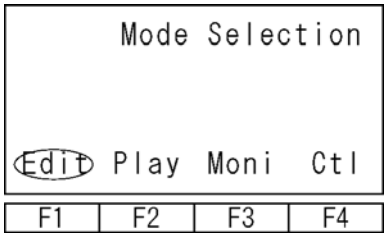
* Never turn off the power to the Controller at this time.



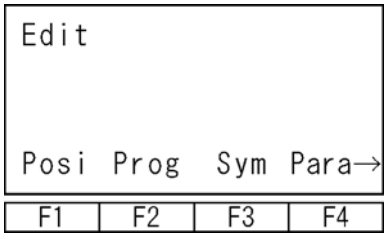
Flash ROM writing is completed.
Press the ESC key to return to the Edit screen.

13. Coordinate System Data Editing

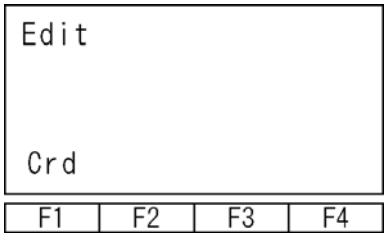
As the coordinate system data of the IX series, there are the work coordinate system data, tool coordinate system data and simple interference check zone.



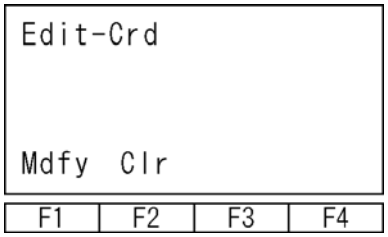
Select the F1 (Edit) key on the Mode Selection screen.



Press the SF key on the Edit mode screen to display Crd.

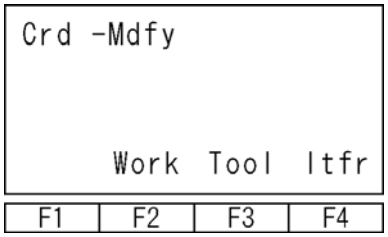


Press the F1 (Crd) key.



Select the F1 (Mdfy) key.

Coordinate system data selection screen



Select the coordinate system to be edited from this screen.

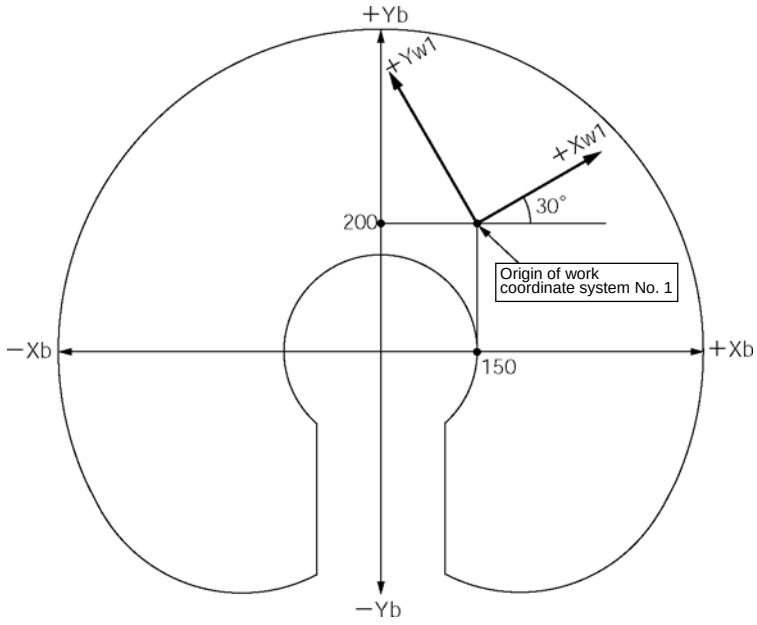
F2 (Work) key: Work coordinate system

F3 (Tool) key: Tool coordinate system

F4 (Itfr) key: Simple interference check zone

13-1. Editing of work coordinate system data

As an input example of the work coordinate system data, a coordinate system as shown below is set for the work coordinate system No. 1.
(Motion range at the arm length 500-type stroke)



The offset values from the work coordinate system No. 1 are Xofw1 = 150, Yofw1 = 200, Zofw1 = 0 and Rofw1 = 30.

Mode flow: Edit → Crd → Mdfy → Work

Work- 1 Axis1-4/4	
0.000	0.000
0.000	0.000

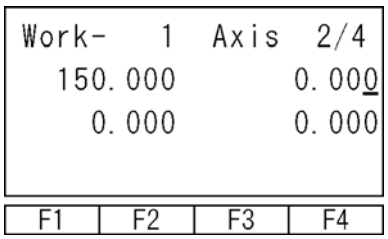
F1	F2	F3	F4

This is the work coordinate system No. selection screen.
The cursor is located at the work coordinate system No.
To select the work coordinate system No., enter the No. with the ten-key numeric pad or the PAGE UP and PAGE DOWN keys, and confirm it with the return key.
This example indicates the setting of the work coordinate system No. 1.
Press the return key as it is.

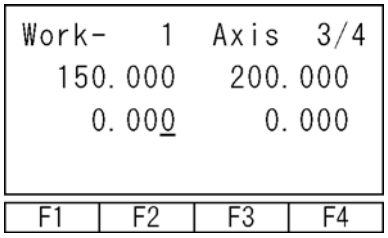
Work- 1 Axis 1/4	
0.000	0.000
0.000	0.000

F1	F2	F3	F4

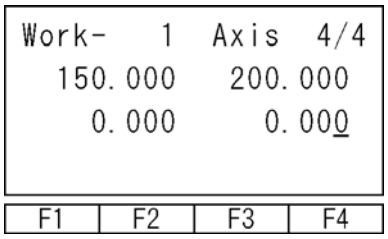
The cursor is located at the X-axis offset value data.
Enter 150 and press the return key.



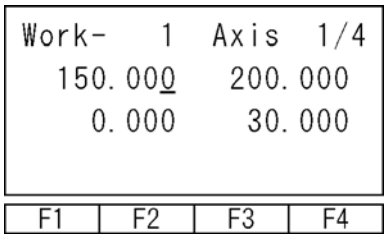
The cursor is located at the Y-axis offset value data.
Enter 200 and press the return key.



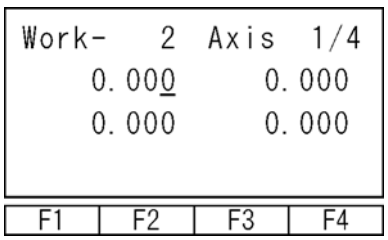
The cursor is located at the Z-axis offset value data.
Enter 0 and press the return key.



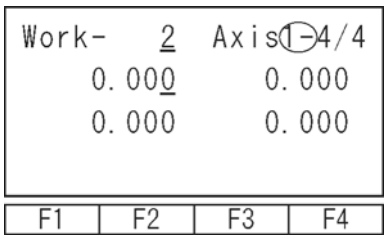
The cursor is located at the R-axis offset value data.
Enter 30 and press the return key.



Transfer the data with the WRT key.
The screen advances to the edit screen for the work coordinate system No. 2.

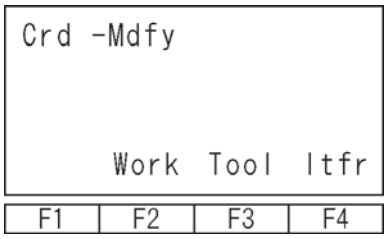


Complete editing of the work coordinate system data and write data in flash ROM.
Pressing the ESC key moves the cursor to the location of the work coordinate system No.

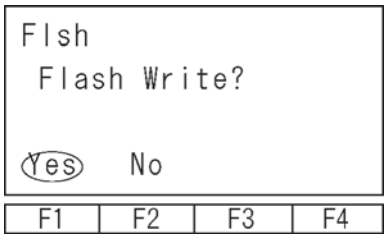


Pressing the ESC key returns the cursor to the coordinate system data selection screen.

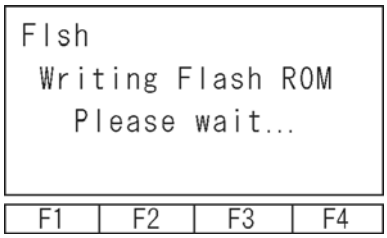
Coordinate system data selection screen



Pressing the ESC key again returns to the Flsh screen.
(Return by 3 screens)

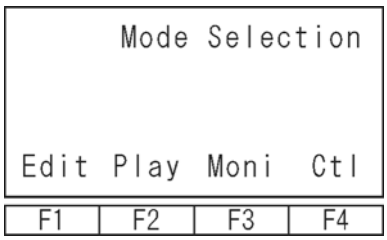


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



The message “Please wait…” flashes during flash ROM writing.

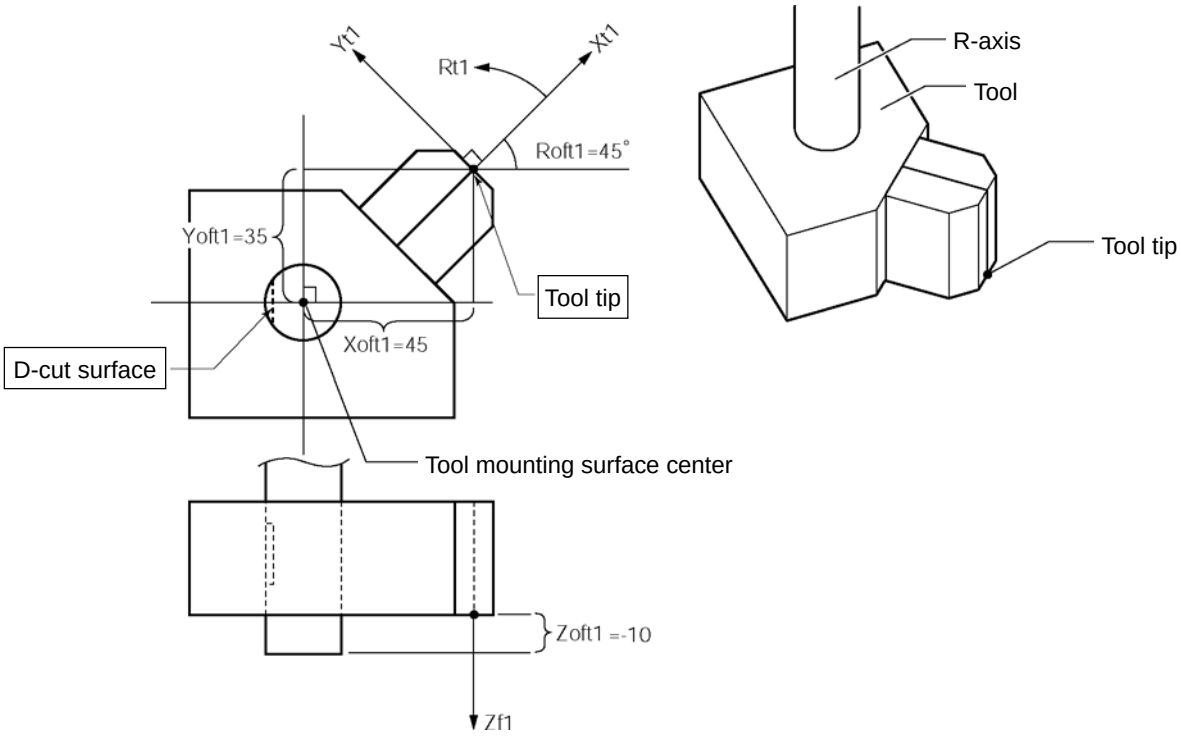
* Never turn off the power to the Controller at this time.



The screen returns to the Mode Selection screen.

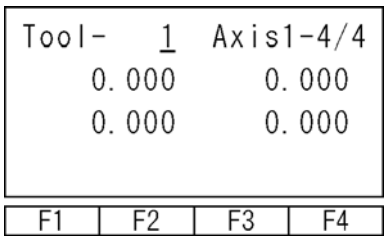
13-2. Editing of tool coordinate system data

As an input example of the tool coordinate system data, a tool as shown below is set for the tool coordinate system No. 1.

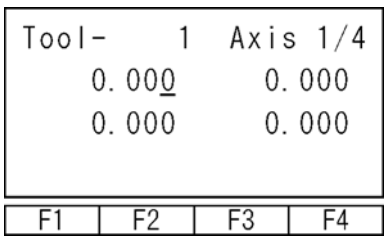


The offset values from the tool coordinate system No. 1 become Xoft1 = 45, Yoft1 = 35, Zoft1 = -10 and Roft1 = 45.

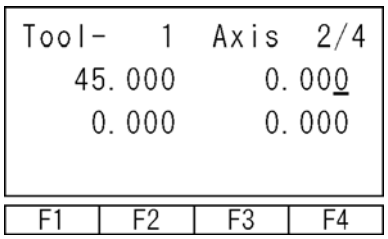
Mode flow: Edit → Crd → Mdfy → Tool



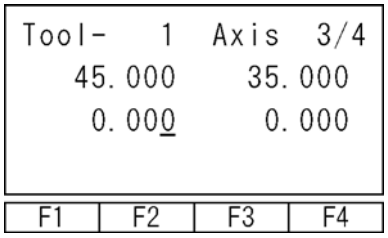
This is the tool coordinate system No. selection screen.
The cursor is located at the tool coordinate system No.
To select the work coordinate system No., enter the No. with the ten-key numeric pad or the PAGE UP and PAGE DOWN keys, and confirm it with the return key.
This example indicates the setting of the tool coordinate system No. 1.
Press the return key as it is.



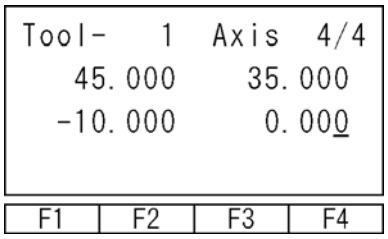
The cursor is located at the X-axis offset value data.
Enter 45 and press the return key.



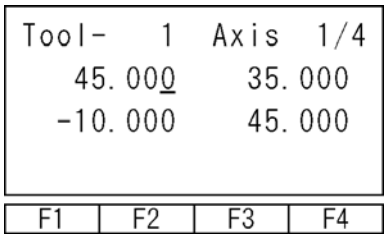
The cursor is located at the Y-axis offset value data.
Enter 35 and press the return key.



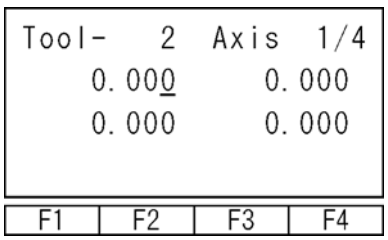
The cursor is located at the Z-axis offset value data.
Enter -10 and press the return key.



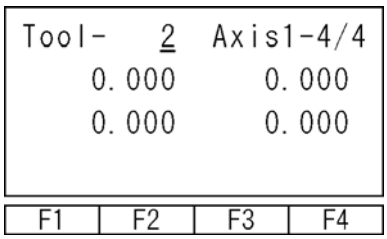
The cursor is located at the R-axis offset value data.
Enter 45 and press the return key.



Transfer the data with the WRT key.
The screen advances to the edit screen for the tool coordinate system No. 2.

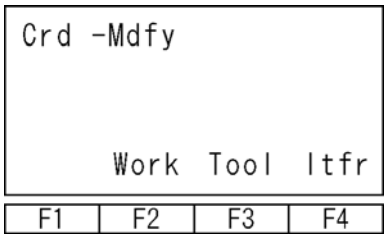


Complete editing of the tool coordinate system data and write data in flash ROM.
Pressing the ESC key moves the cursor to the location of the tool coordinate system No.

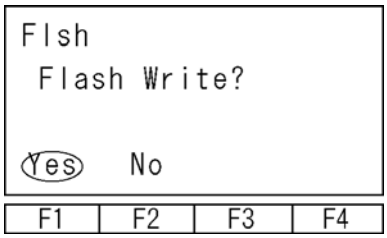


Pressing the ESC key returns the cursor to the coordinate system data selection screen.

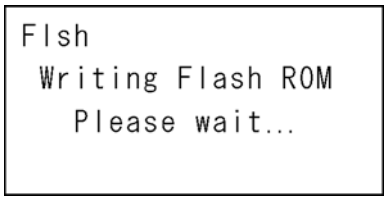
Coordinate system data selection screen



Pressing the ESC key again returns to the Flsh screen.
(Return by 3 screens)

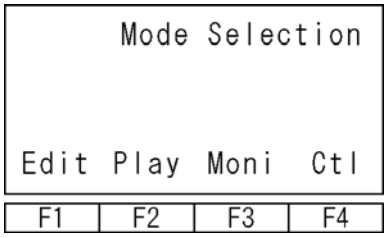


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



The message “Please wait…” flashes during flash ROM writing.

* Never turn off the power to the Controller at this time.



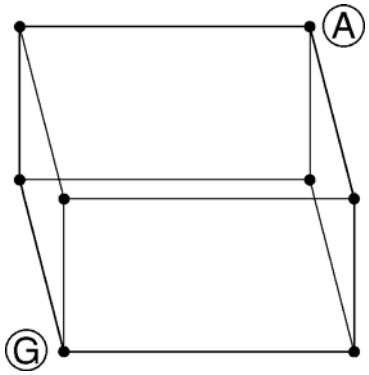
The screen returns to the Mode Selection screen.

13-3. Editing of simple interference check zone

It is required to input the following 3 items to set the simple interference check zone:

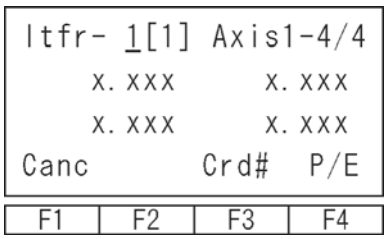
- 2-point position data to define the zone. (Input the values of the base coordinate system.)
- Output port No. or global flag No. for output during zone invasion.
- Error type at zone invasion time. (0: No error-handling, 1: Message level error, 2: Motion reset level error.)

As an input example of the simple interference check zone, a zone as shown below is set for the simple interference check zone No. 1.

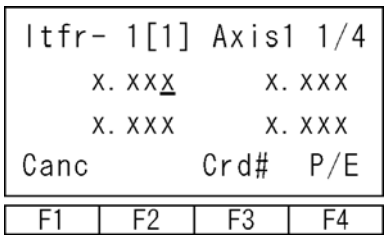


Base coordinate values of Ⓐ: Xb = 475, Yb = -50, Zb = 150, Rb = 0
Base coordinate values of Ⓖ: Xb = 400, Yb = 50, Zb = 200, Rb = 180
Output port for output during zone invasion: No. 311
Error type at zone invasion time: 1

Mode flow: Edit → Crd → Mdfy → Itfr

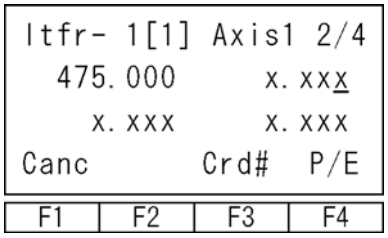


This is the simple interference check zone No. selection screen.
The cursor is located at the simple interference check zone No.
To select the simple interference check zone No., enter the No. with the ten-key numeric pad or the PAGE UP and PAGE DOWN keys, and confirm it with the return key.
This example indicates the setting of the simple interference check zone No. 1.
Press the return key as it is.

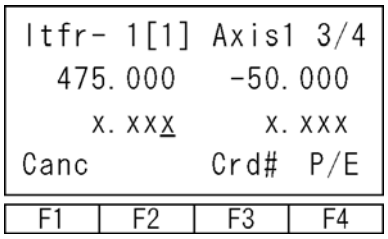


Input of base coordinate values of Ⓐ

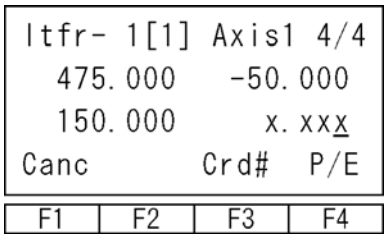
The cursor is located at the X-axis data.
Enter 475 and press the return key.



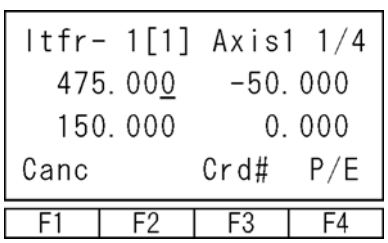
The cursor is located at the Y-axis data.
Enter -50 and press the return key.



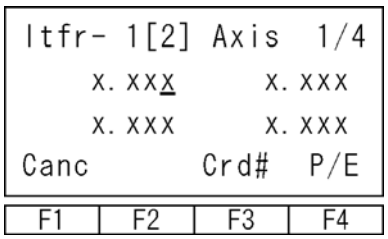
The cursor is located at the Z-axis offset value data.
Enter 150 and press the return key.



The cursor is located at the R-axis offset value data.
Enter 0 and press the return key.

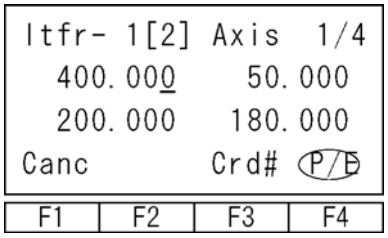


Press the F3 (Crd#) key to input the other position data.



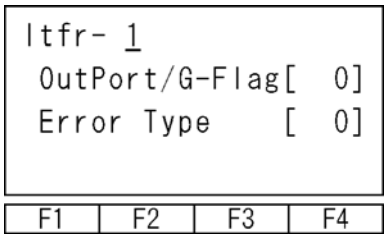
Input of base coordinate values of Ⓖ

Enter the base coordinate values of Ⓖ in the same way as A.



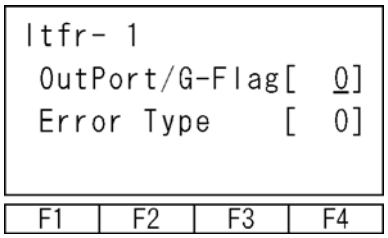
Set the output port/global flag and error type

Press the F4 (P/E) key.

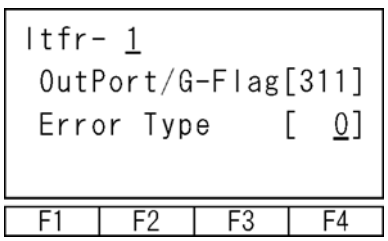


Output port/global flag No. and error type input screen

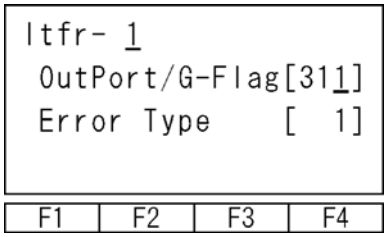
Press the return key.



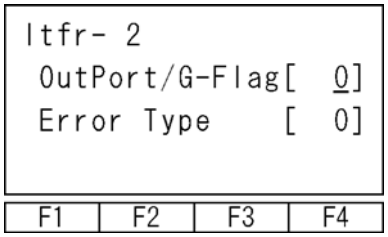
Enter the output port No. 311 and press the return key.



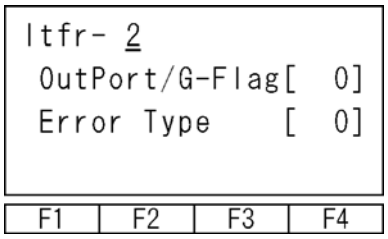
Enter the error type 1 and press the return key.



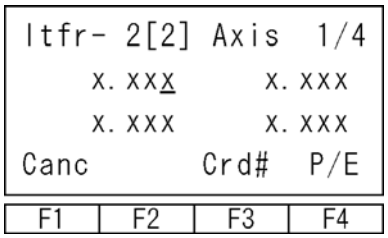
Transfer the data with the WRT key.
The screen advances to the edit screen for the simple interference check zone No. 2.
When the axial pattern of Ⓐ does not agree with that of Ⓖ, the “9FO” error occurs.
When the axial pattern of Ⓐ and Ⓖ is 0, the “9F1” error occurs if the output port or error type is specified.



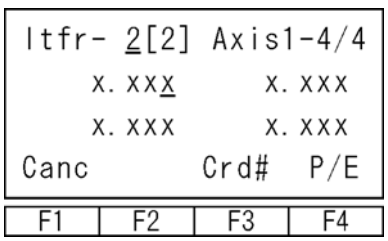
Complete editing of the tool coordinate system data and write the data in flash ROM.
Pressing the ESC key moves the cursor to the location of the simple interference check zone No.



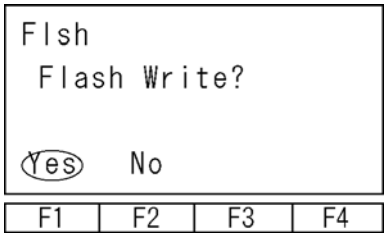
Pressing the ESC key returns the cursor to the coordinate value input screen.



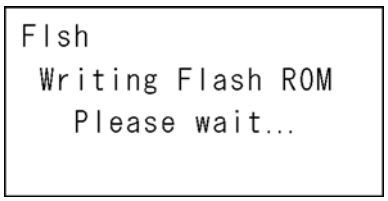
Pressing the ESC key moves the cursor to the location of the tool coordinate system No.



Pressing the ESC key again returns to the Flsh screen.
(Return by 4 screens)

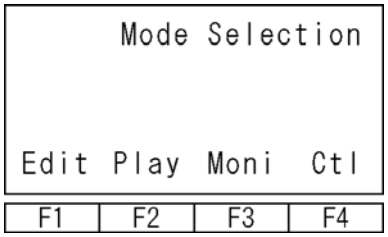


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



The message “Please wait…” flashes during flash ROM writing.

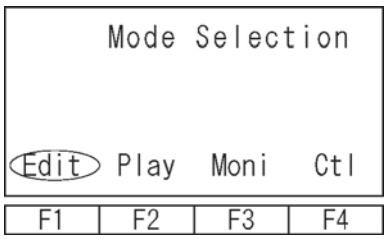
* Never turn off the power to the Controller at this time.



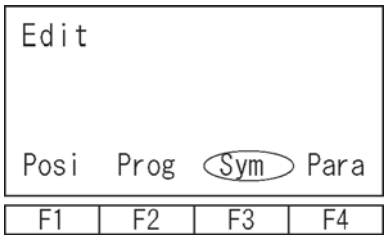
The screen returns to the Mode Selection screen.

14. Symbol Editing

For the X-SEL Controller, symbols (names) can be given to variables, input ports, flags, points, etc.

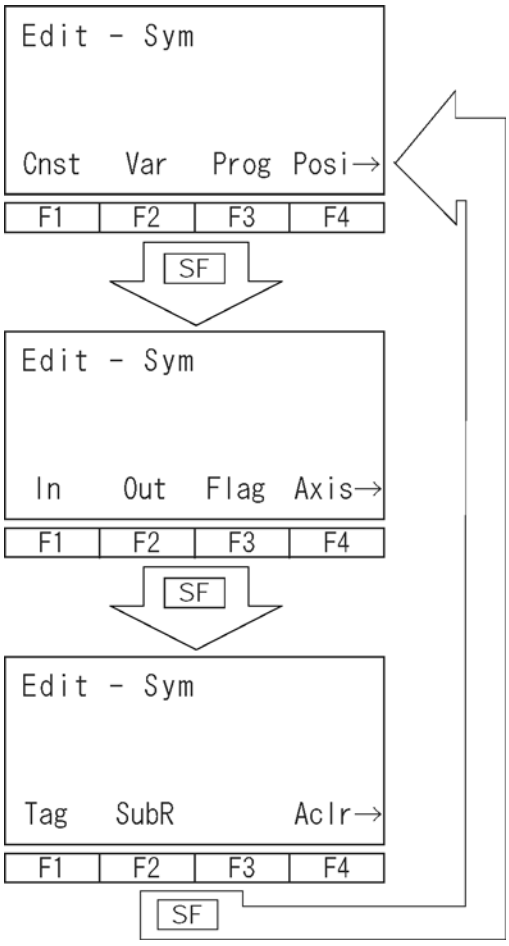


Select the F1 (Edit) key.



Select the F3 (Sym) key.

14-1. Symbol editing items



The items to be symbolized are displayed in the function key section. Every time the SF key is pressed, the items are shifted and displayed.

Symbol editing items

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

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

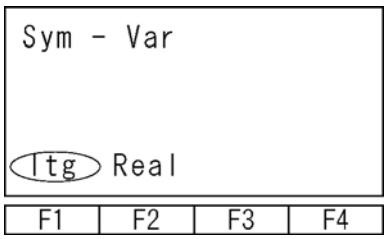
Tag:	Tag No.
SubR:	Subroutine No.
Aclr:	All clear It clears all the symbol data.

Display the items to be symbolized with the SF key and select with the function key.

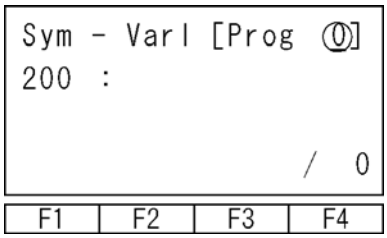
14-2. Input example: Symbolization of local integer variables

The local variable No. 5 of the program No. 3 is symbolized by “Cnt5.” Press the F2 (Var) key.

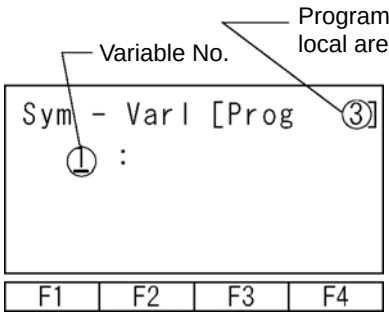
Mode flow: Edit → Sym → Var



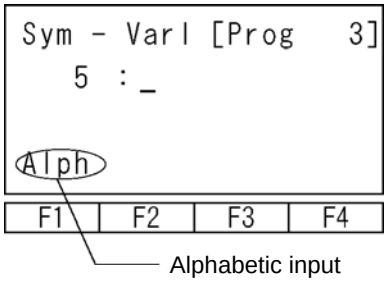
Select the integer or real number.
Press the F1 (Itg) key.
(Itg: Integer, Real: Real number)



The cursor is located at the program No.
Enter the program No. in the local area.
(When symbolizing the global area, the number is left 0 as it is.)
Enter 3 and press the return key.



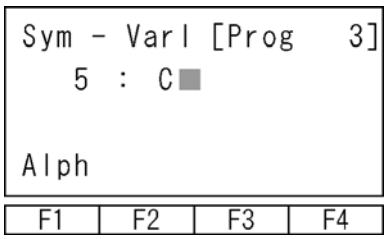
The cursor is located at the variable No.
Enter 5 and press the return key.



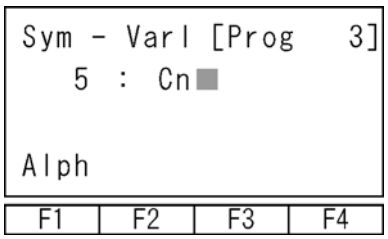
Enter the symbol name “Cnt5.”

Input method

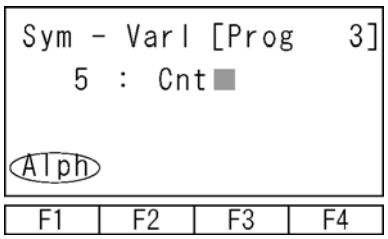
Alphabetic letters are allocated for each key of the ten-key numeric pad. Every time 7 of the ten-key numeric pad is pressed, the display is changed as follows: A→B→C→a→b→c→A→….
Display “C” and press the return key.



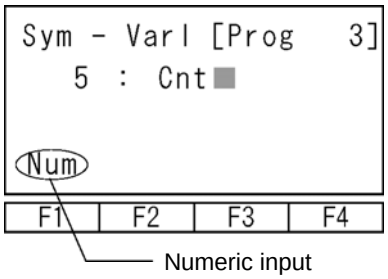
Then, press 5 of the ten-key numeric pad several times to display “n,” and press the return key.



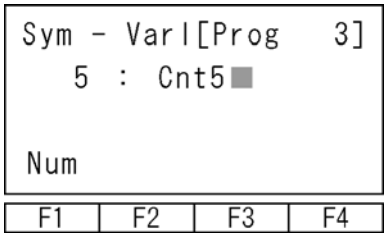
Then, press 1 of the ten-key numeric pad several times to display “t,” and press the return key.



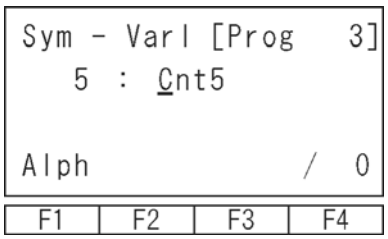
Pressing the F1 (Alph) key changes the display in the F1 key field to Num for numeric input.



Enter 5 with the ten-key numeric pad.

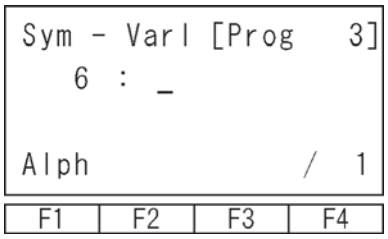


Press the return key to confirm the symbol name.

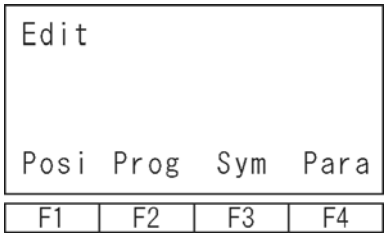


When the name is confirmed, the cursor moves to the first character.
Before confirmation, the name can be corrected by one character with the BS key.
After confirmation, the name is corrected by overwriting all the characters.
Press the WRT key to transfer the symbol data to the controller.

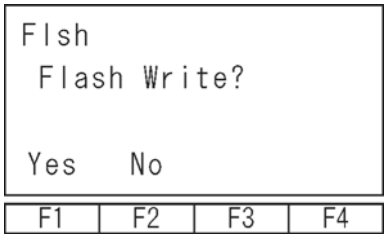
* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.



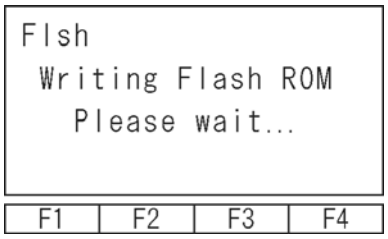
When completing editing, return to the Edit screen with the ESC key.



Press the ESC key.

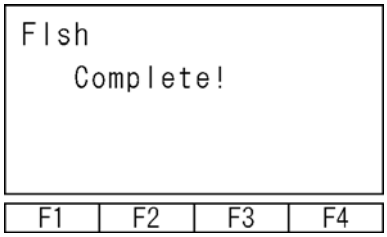


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



The message “Please wait…” flashes during flash ROM writing.

* Never turn off the power to the Controller at this time.



Return to the Edit screen with the ESC key.

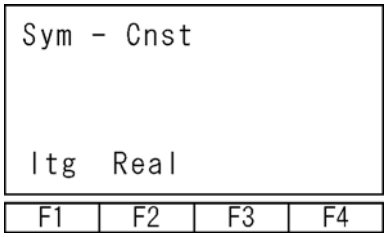
14-3. Symbol edit screen for each item

(1) Constant

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

Mode flow: Edit–Sym–Cnst

Selection between integer constant and real constant



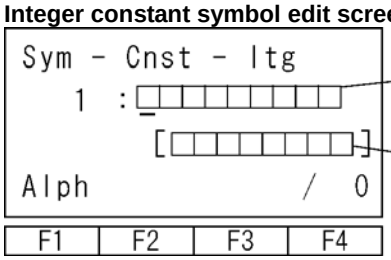
Select the integer or real number.

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

① Integer constant

Mode flow: Edit–Sym–Cnst–Itg

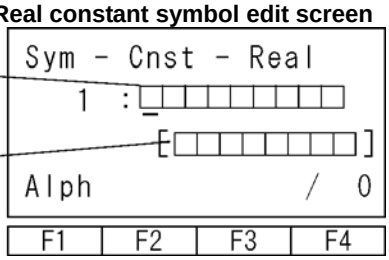
Integer constant symbol edit screen



② Real constant

Mode flow: Edit–Sym–Cnst–Real

Real constant symbol edit screen



Enter a symbol with alphabetic/numeric values.

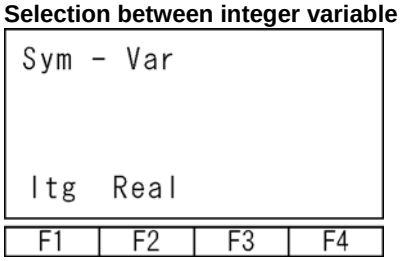
Enter a constant.

(2) Variable

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

Mode flow: Edit–Sym–Var

Selection between integer variable and real variable



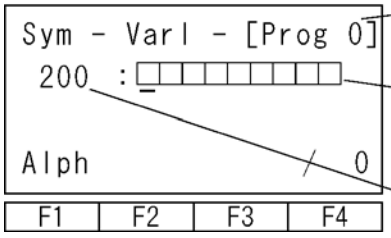
Select the integer or real number.

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

① Integer variable No.

Mode flow: Edit–Sym–Var–Itg

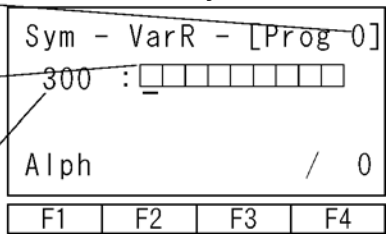
Integer variable No. symbol edit screen



② Real variable No.

Mode flow: Edit–Sym–Var–Real

Real variable No. symbol edit screen



Enter the program No. for the local area and 0 for the global area.

Enter a symbol with alphabetic/numeric values.

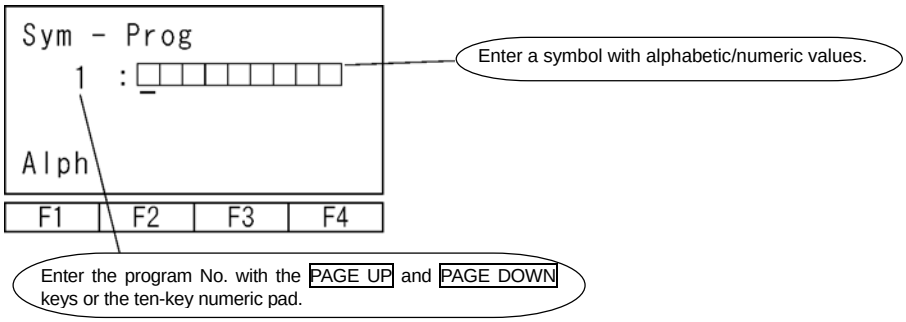
Enter the variable No. with the PAGE UP and PAGE DOWN keys or the ten-key numeric pad.

(3) Program

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

Mode flow: Edit—Sym—Prog

Program No. symbol edit screen

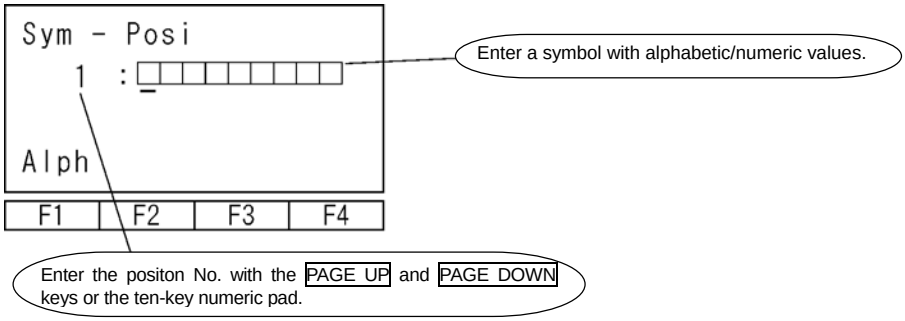


(4) Position

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

Mode flow: Edit—Sym—Posi

Position No. symbol edit screen

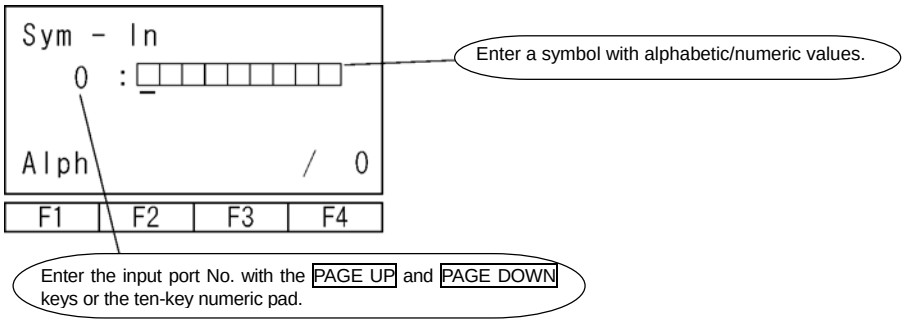


(5) Input port

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

Mode flow: Edit—Sym—In

Input port No. symbol edit screen

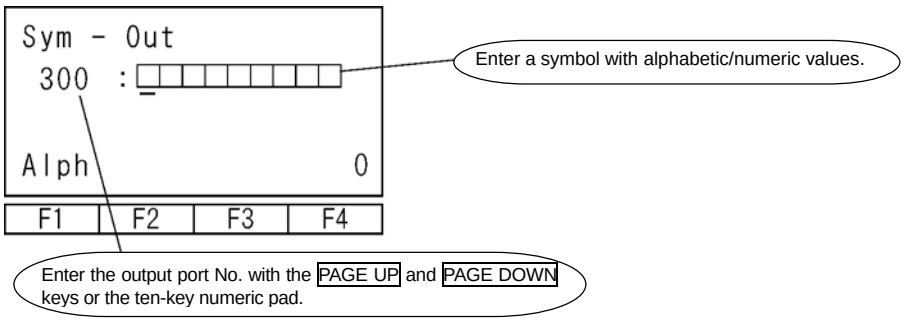


(6) Output port

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

Mode flow: Edit—Sym—Out

Output port No. symbol edit screen

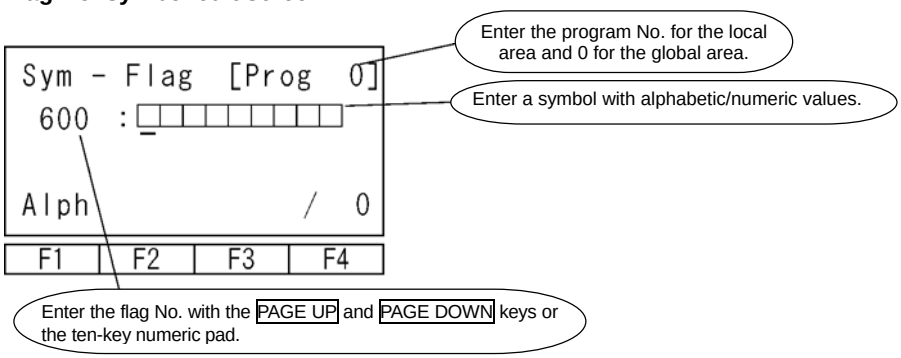


(7) Flag

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

Mode flow: Edit—Sym—Flag

Flag No. symbol edit screen

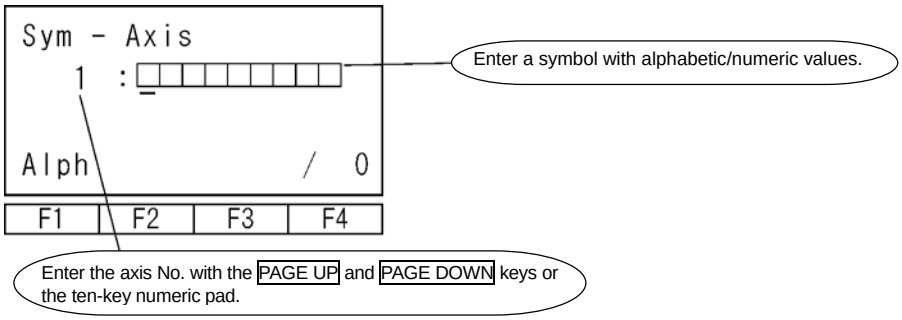


(8) Axis

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

Mode flow: Edit—Sym—Axis

Axis No. symbol edit screen

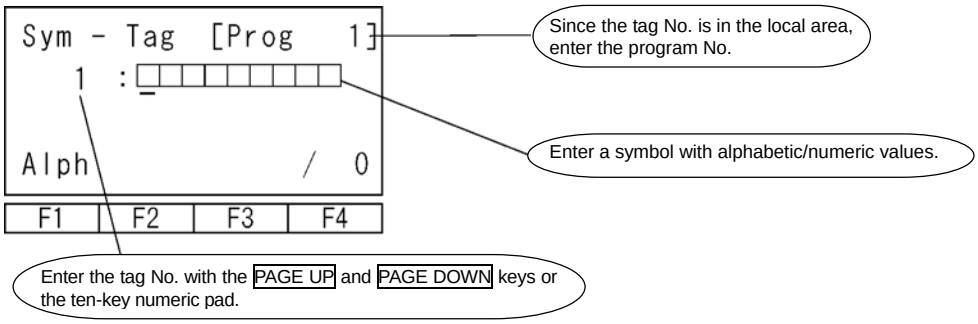


(9) Tag

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

Mode flow: Edit—Sym—Tag

Tag No. symbol edit screen

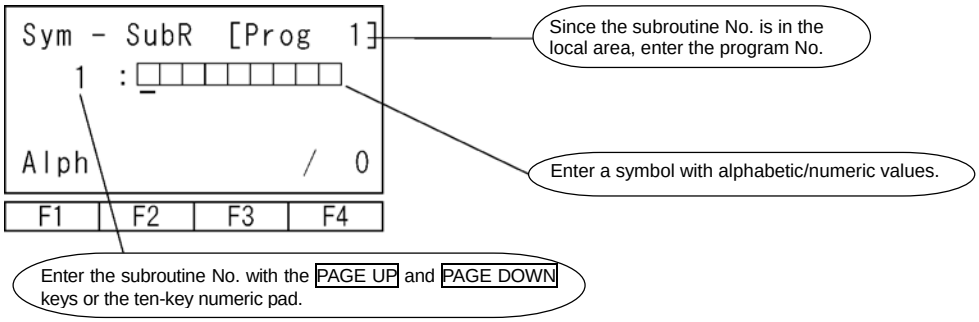


(10) Subroutine

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

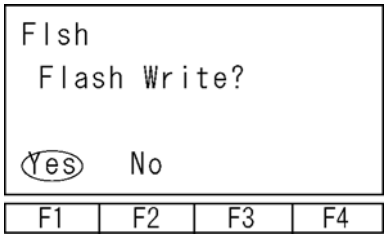
Mode flow: Edit—Sym—SubR

Subroutine No. symbol edit screen

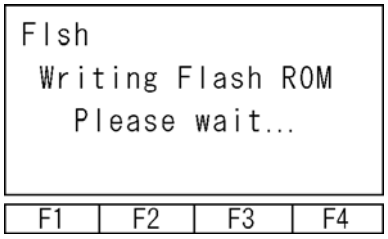


14-4. Flash ROM writing

If data is only transferred to the controller after symbol editing, the edited program is erased when the power is turned on again or software is reset.
To maintain the edited data even if the power is turned on again or software is reset, the data is written in flash ROM.
Return to the Flsh screen with the ESC key from the edit completion screen.

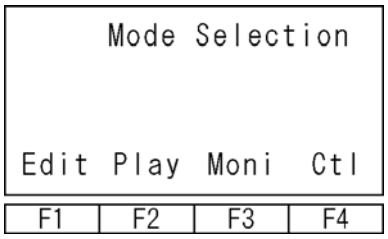


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.



The message “Please wait…” flashes during flash ROM writing.

* Never turn off the power to the Controller at this time.

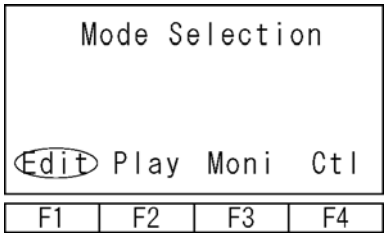


When flash ROM writing is completed, the screen returns to the Mode Selection screen.

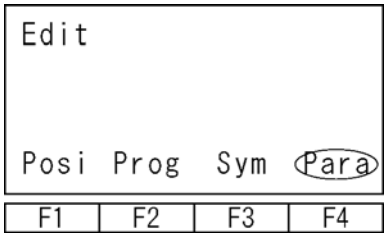
15. Parameter Editing

Parameters can be changed according to the customer's system.
When you change parameters, record the parameter descriptions.

Parameters after being written in flash ROM become valid when software is reset or the power is turned on again.



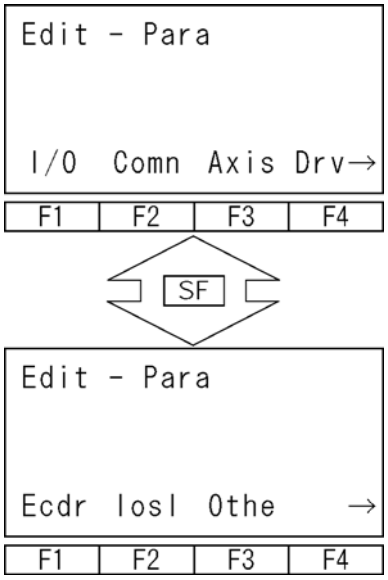
Select the F1 (Edit) key on the Mode Selection screen.



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

15-1. Parameter editing items

The parameter items are displayed in the function key section.
Every time the SF key is pressed, the items are shifted and displayed.



Parameter editing items

I/O:	I/O parameters
Comn:	All-axis common parameters
Axis:	Axis-specific parameters
Drv:	Driver card parameters

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

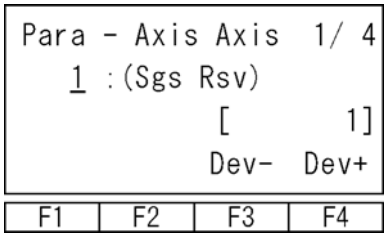
Select the parameter item for editing with the function key.

15-2. Input example: Editing of axis-specific parameters

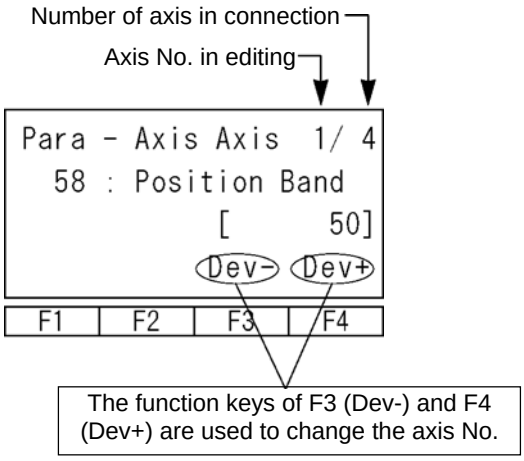
The axis-specific parameter No.58 positioning width is set as axis No. 1 = 0.1 mm and axis No. 2 = 0.1 mm.

Select the F3 (Axis) key on Edit-Para screen.

Mode flow: Edit → Para → Axis



The cursor is located at the parameter No.
Enter 58 with the ten-key numeric pad and press the return key.

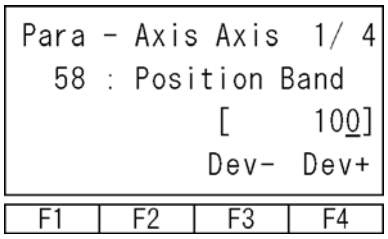


The screen for editing the axis-specific parameter No. 7 soft limit + is displayed. The cursor is located at the parameter data.

Data input for axis No. 1

Set the parameter by axis or I/O board depending on the parameter item.
(Axis-specific parameters, driver card parameters, encoder parameters, I/O slot card parameters)
Check that the screen for editing the axis No. 1 is displayed.

Enter 100 and press the return key.
(Unit: 0.001 mm)

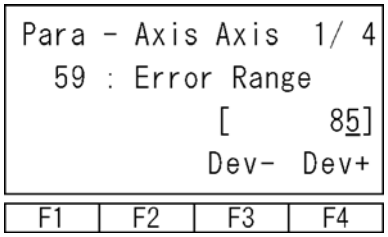


Press the WRT key to transfer the parameter data to the controller.

Note:

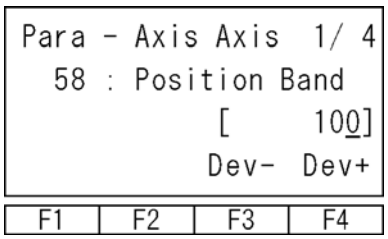
One transfer (WRT key) with the Teaching Pendant stores the data only on the current display screen in memory. Therefore, it is required to input the parameter data and transfer it by axis (device).

The untransferred data becomes invalid when the screen is changed.

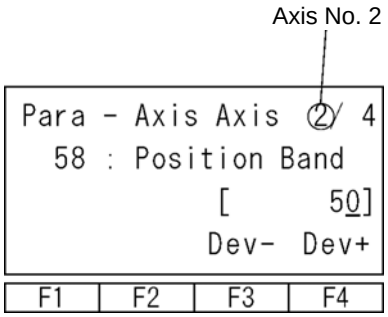


Data input for axis No. 2

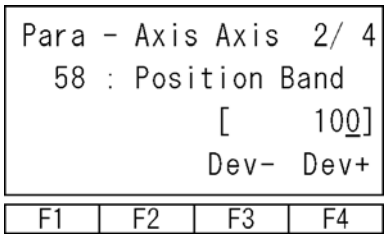
The display screen advances to the screen for parameter No. 59. Since the axis No. 2 for the parameter No. 58 is unedited, return to the edit screen for the parameter No. 58 with the PAGE DOWN key



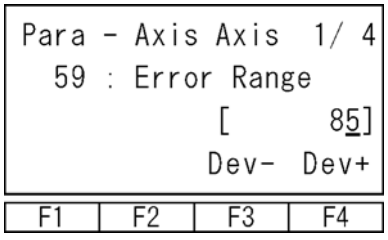
Change the axis No. to 2 with the F4 (Dev+) key.



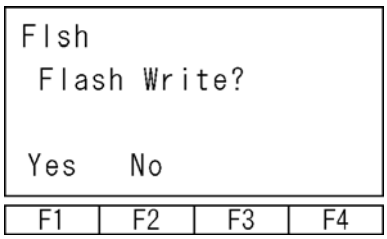
Enter 100 with the ten-key numeric pad and press the return key.



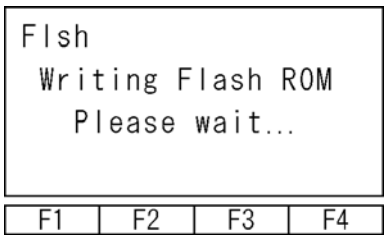
Press the WRT key to transfer the parameter data to the controller.



When continuing to edit the axis-specific parameters, move the cursor to the parameter No. and enter the parameter No. for editing.
When completing the axis-specific parameter editing, press the ESC key to return to the Flsh screen.

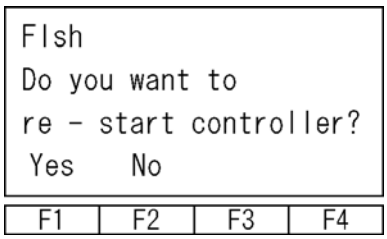


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key.

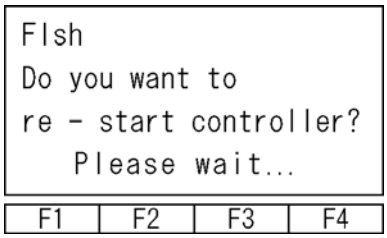


The message “Please wait…” flashes during flash ROM writing.

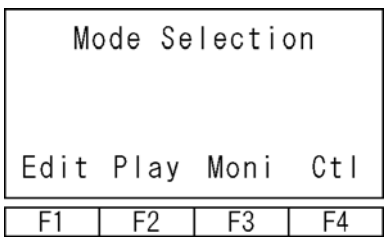
* Never turn off the power to the Controller at this time.



After flash ROM writing, the screen changes to the one for software reset.
To make the changed parameter valid, reset software. Press the F1 (Yes) key.



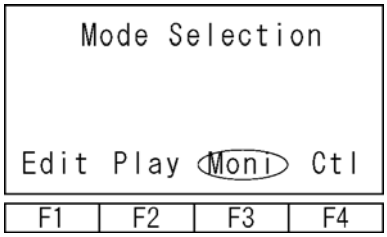
The message “Please wait…” flashes during software reset.



When software reset is completed, the screen returns to the Mode Selection screen.

16. Monitoring

Various statuses, global variables, port conditions, etc., are monitored.

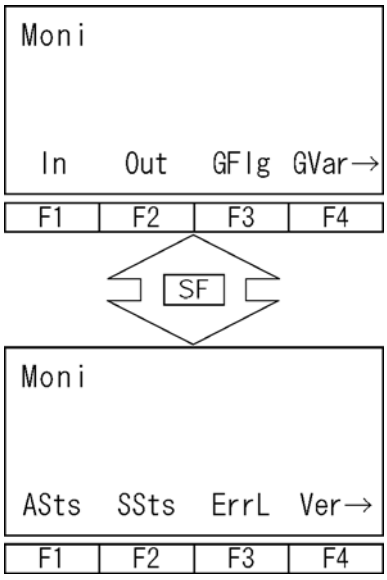


Select the F3 (Moni) key on the Mode Selection screen.

16-1. Monitor items

Monitor items are displayed in the function key section.
Every time the SF key is pressed, the items are shifted and displayed.

Moni (Monitor item) screen



In:	Input ports
Out:	Output ports
GFlg:	Global flags
GVar:	Global variables

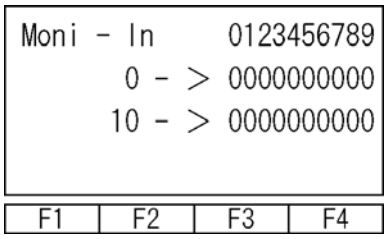
Asts:	Axis status
SSts:	System status
ErrL:	Error detail information
Ver:	Version information

Select the item to monitor with the function key.

16-2. Input ports

The ON/OFF conditions of input ports are displayed.
Select the F1 (In) key on the Moni screen.

Mode flow: Moni → In

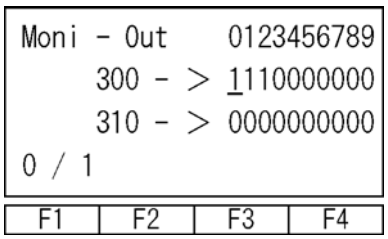


1: ON, 0: OFF
Every time the PAGE UP or PAGE DOWN key is pressed, the port Nos. are shifted by 20 and displayed.

16-3. Output ports

The ON/OFF conditions of output ports are displayed. In addition, the ON/OFF conditions of output ports can be changed.
Select the F2 (Out) key on the Moni screen.

Mode flow: Moni → Out



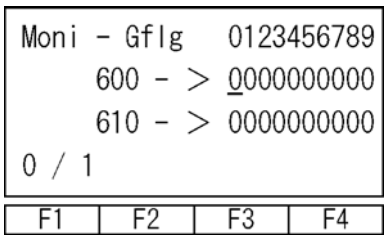
(The figure above is the screen on which the output ports No. 300 to No. 302 are ON.)

The condition of the output port at which the cursor is located can be changed between ON and OFF every time the F1 (0/1) key is pressed.
1: ON, 0: OFF
Move the cursor with the return key or ← key.
Every time the PAGE UP or PAGE DOWN key is pressed, the port Nos. are shifted by 20 and displayed.

16-4. Global flags

The ON/OFF conditions of global flags are displayed. In addition, the ON/OFF conditions of global flags can be changed.
Select the F3 (GFlg) key on the Moni screen.

Mode flow: Moni → GFlg

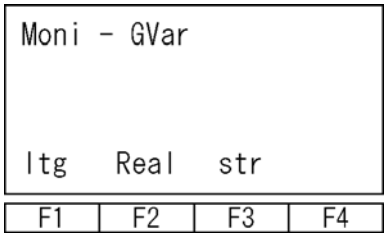


The condition of the global flag at which the cursor is located can be changed between ON and OFF every time the F1 (0/1) key is pressed.
1: ON, 0: OFF
Move the cursor with the return key or ← key.
Every time the PAGE UP or PAGE DOWN key is pressed, the flag Nos. are shifted by 20 and displayed.

16-5. Global variables

The descriptions of global variables and global strings are displayed. In addition, numeric values can be assigned to global variables while character strings can be assigned to global strings.
Select the F4 (GVar) key on the Moni screen.

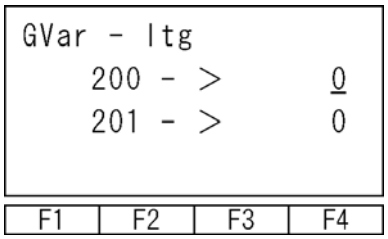
Mode flow: Moni → GVar



Global variables are displayed with the following 3 types:
Itg: Integer (No. 200 - 299, No. 1200 - 1299)
Real: Real number (No. 300 - 399, No. 1300 - 1399)
Str: String (No. 300 - 999)

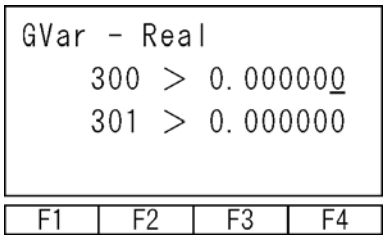
(1) Global integer variables

Mode flow: Moni → GVar → Itg



(2) Global real variables

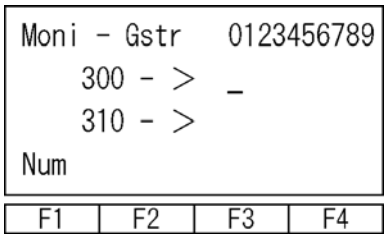
Mode flow: Moni → GVar → Real



The cursor is located at the data (variable description). Entering a numeric value with the ten-key numeric pad and pressing the return key can assign the numeric value to the variable. Move the cursor with the return key or the ← key.
The variable Nos. can be changed with the PAGE UP and PAGE DOWN keys.

(3) Global strings

Mode flow: Moni → GVar → Str

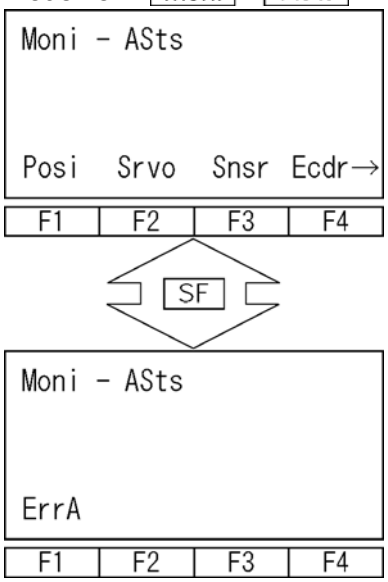


The cursor is located at the data (column).
Entering an ASCII code with the ten-key numeric pad and pressing the return key can assign the characters.
(A to F of hexadecimal notation can be input by changing Num to Alph with the F1 (Alph/Num) key.
Move the cursor with the return key or ← key.
The PAGE UP and PAGE DOWN keys display the column Nos. by shifting the numbers by 20.

16-6. Axis status

The current position, servo status, sensor status, etc., are displayed.
Select the F1 (ASts) key on the Moni screen.

Mode flow: Moni — ASts

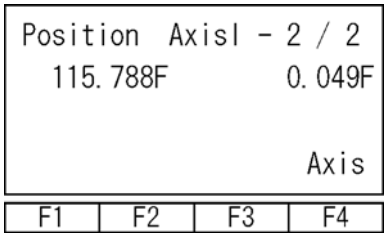


Posi:	Current position
Srvo:	Servo status
Snsr:	Sensor input status
Ecdr:	Encoder status

ErrA:	Axis-related error

(1) Current position

Mode flow: Moni — ASts — Posi

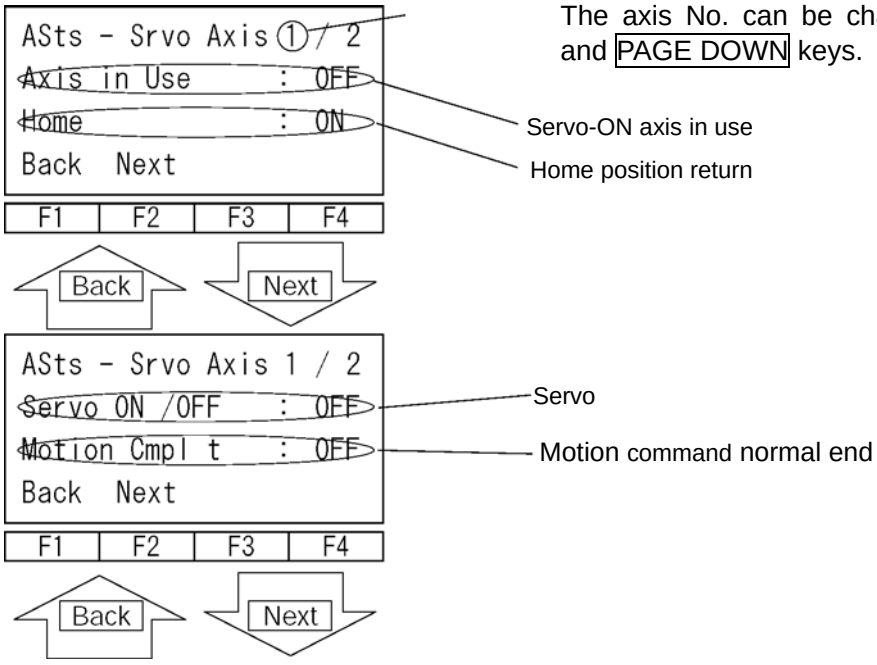


N: Servo ON condition

F: Servo OFF condition

(2) Servo status

Mode flow: Moni — ASts — Srvo



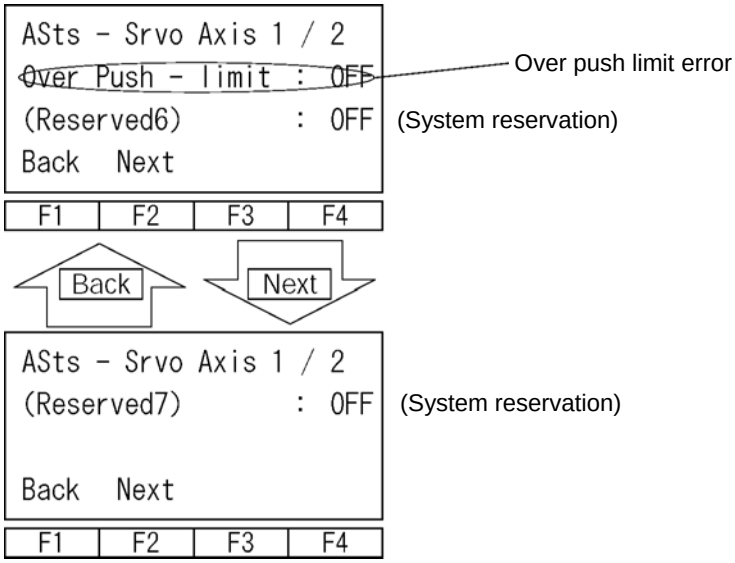
The axis No. can be changed with the PAGE UP and PAGE DOWN keys.

Servo-ON axis in use

Home position return

Servo

Motion command normal end



Over push limit error

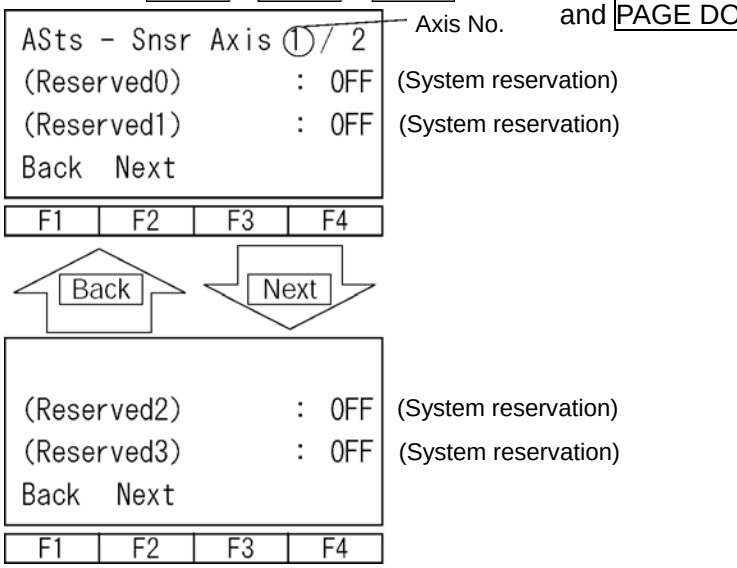
(System reservation)

(System reservation)

(3) Sensor input status

Mode flow: Moni → ASts → Snsr

The axis No. can be changed with the PAGE UP and PAGE DOWN keys.



Axis No.

(System reservation)

(System reservation)

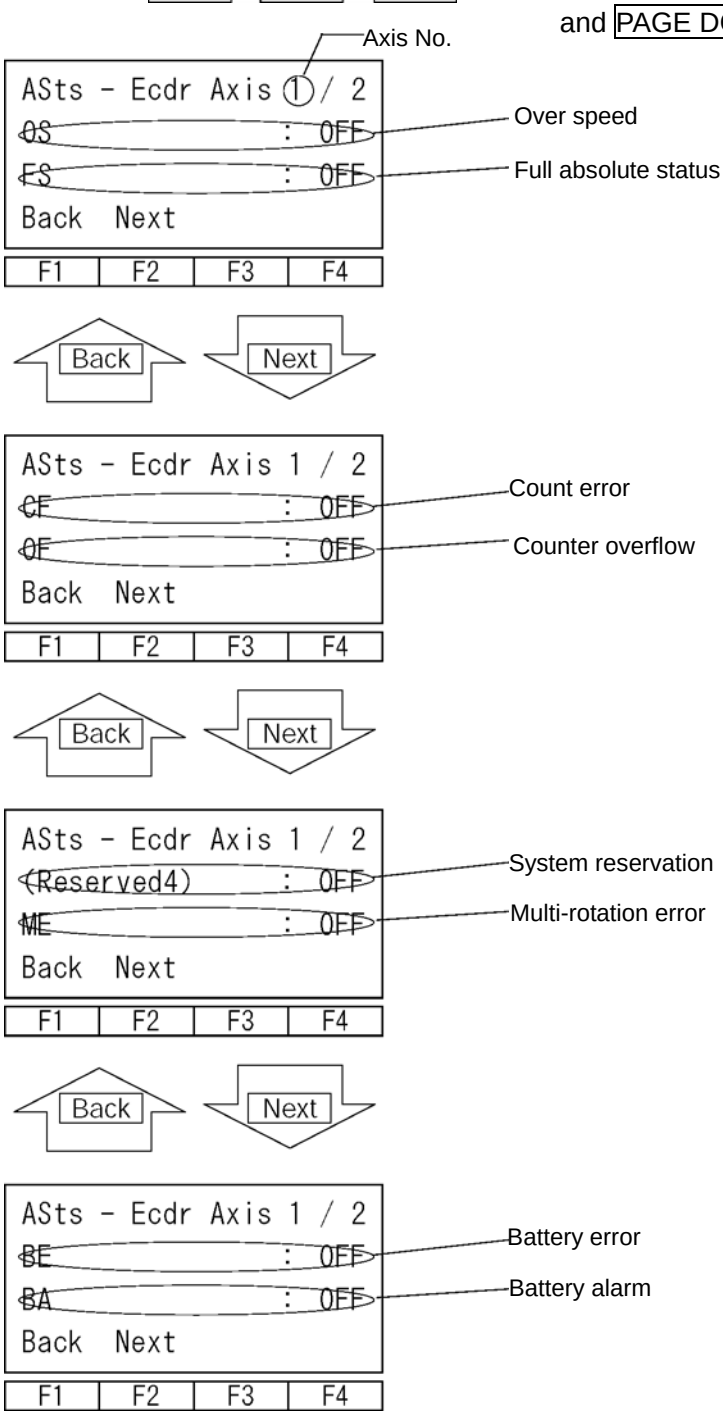
(System reservation)

(System reservation)

(4) Encoder status

Mode flow: Moni — ASts — Ecdr

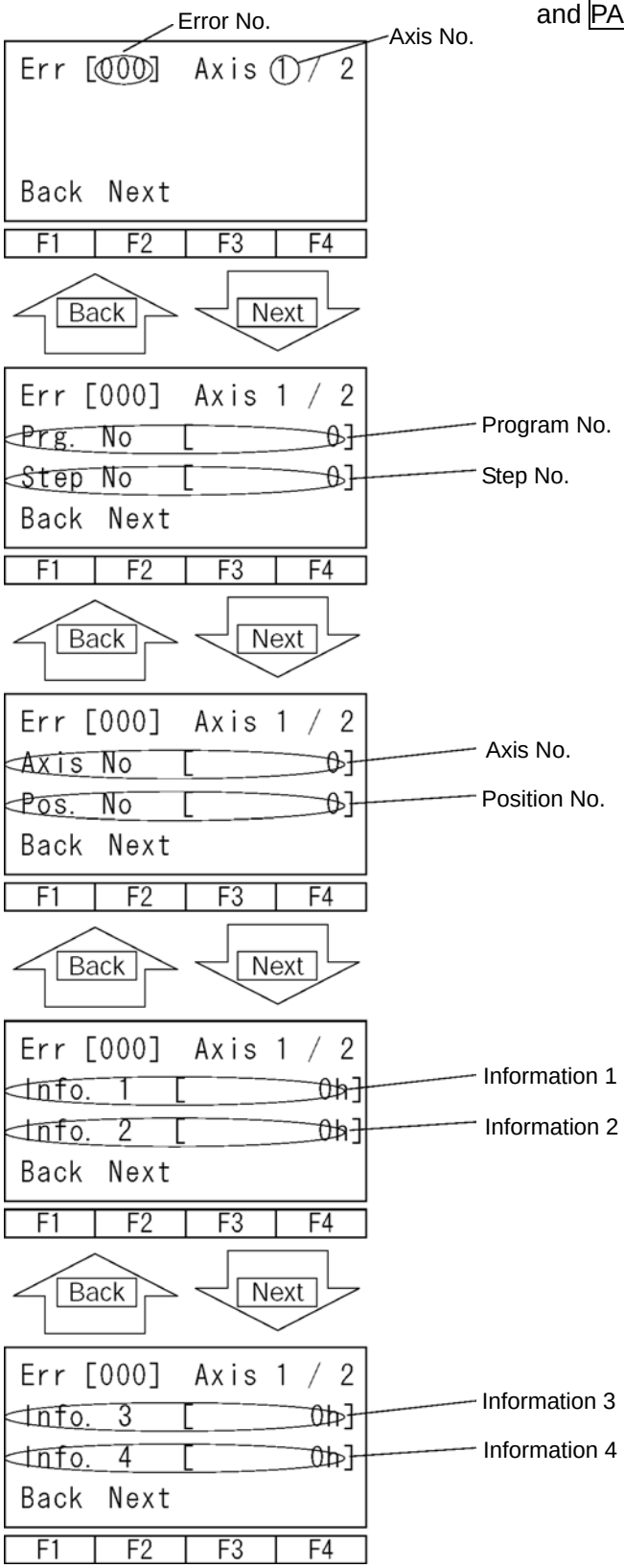
The axis No. can be changed with the PAGE UP and PAGE DOWN keys.



(5) Axis-related errors

Mode flow: Moni → ASts → ErrA

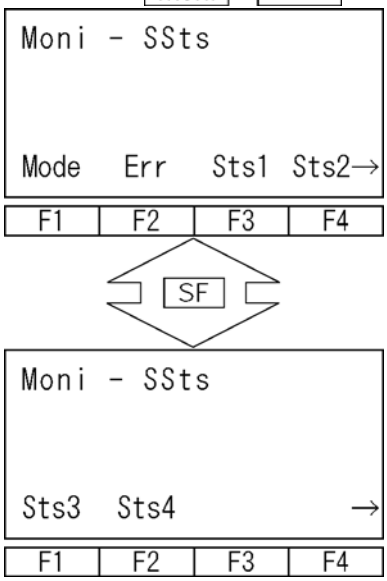
The axis No. can be changed with the PAGE UP and PAGE DOWN keys.



16-7. System status

The system status is displayed.
Select the F2 (SSts) key on the Moni screen.

Mode flow: Moni — SSts

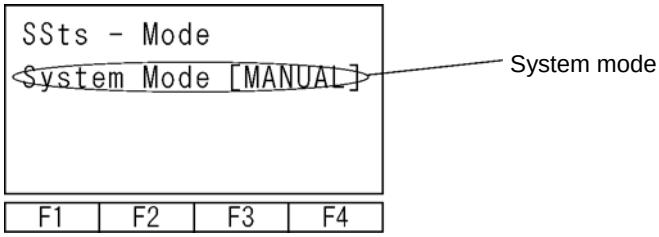


Mode:	System mode
Err:	System error
Sts1:	System status 1
Sts2:	System status 2

Sts3:	System status 3
Sts4:	System status 4

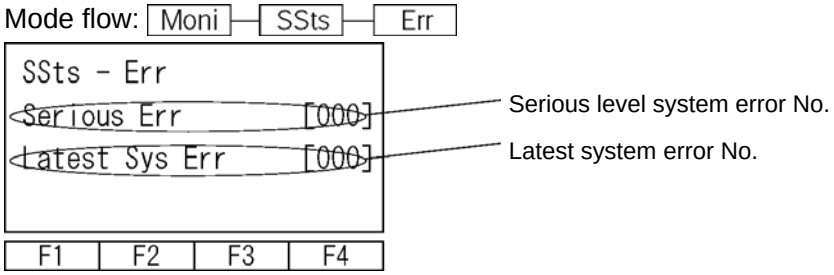
(1) System mode

Mode flow: Moni — SSts — Mode



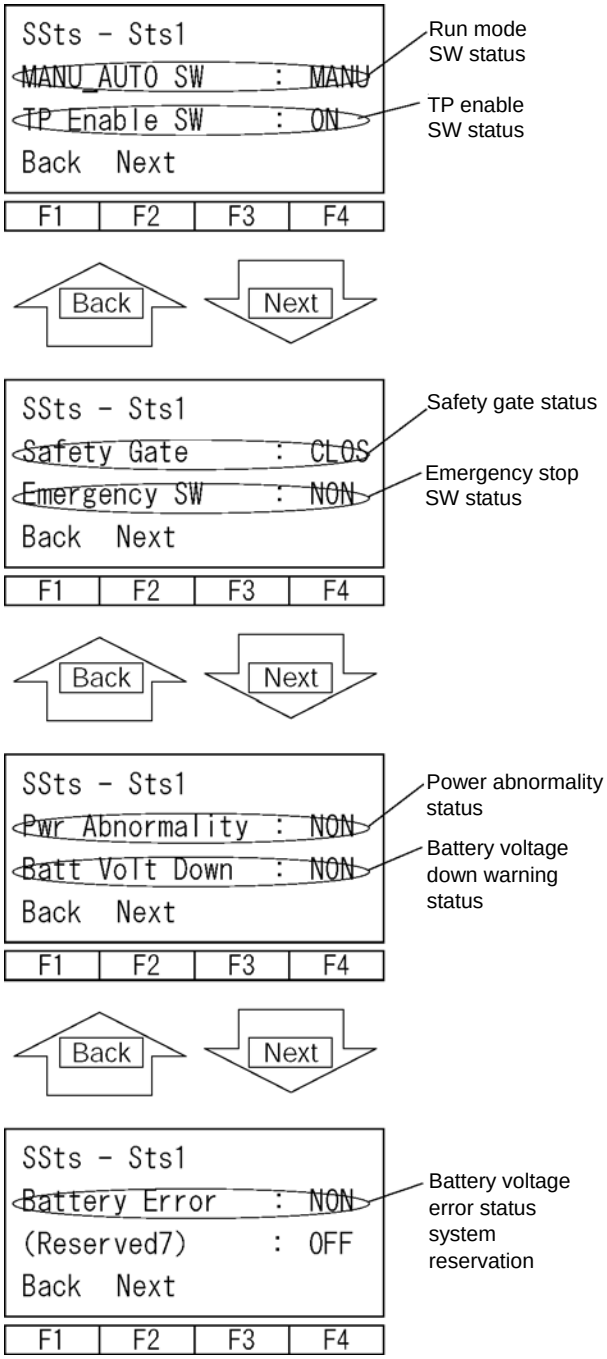
(2) System error

Mode flow: Moni — SSts — Err



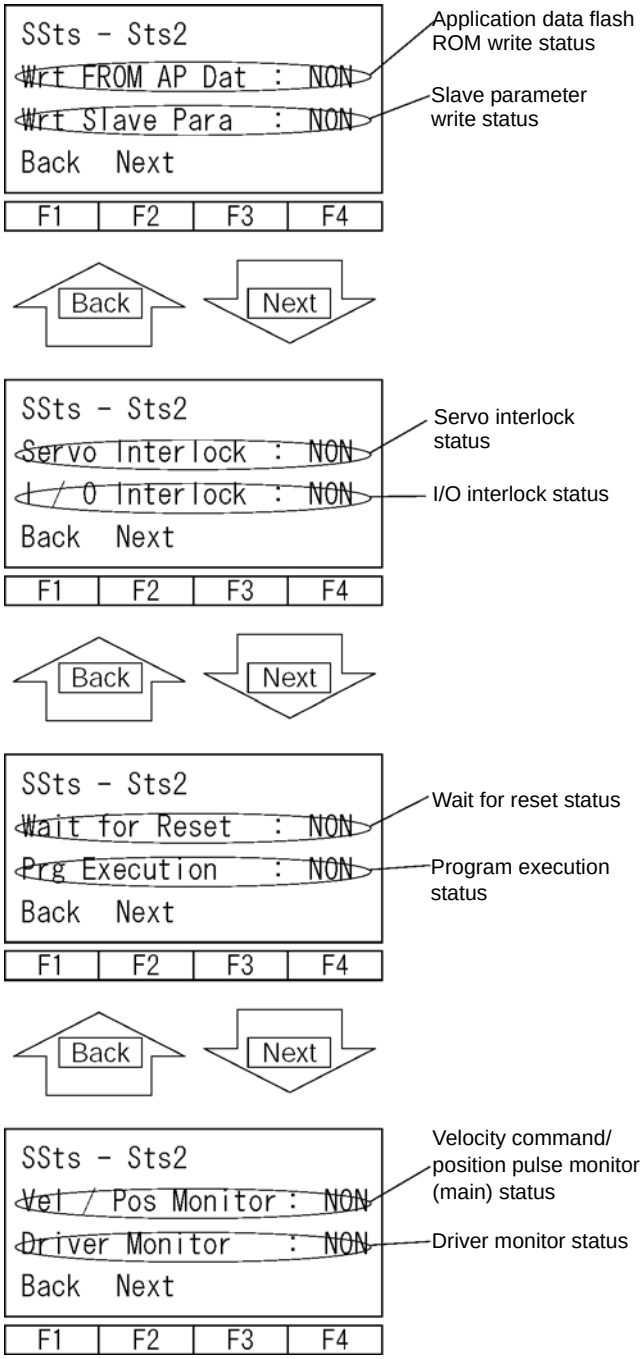
(3) System status 1

Mode flow: Moni → SSts → Sts1



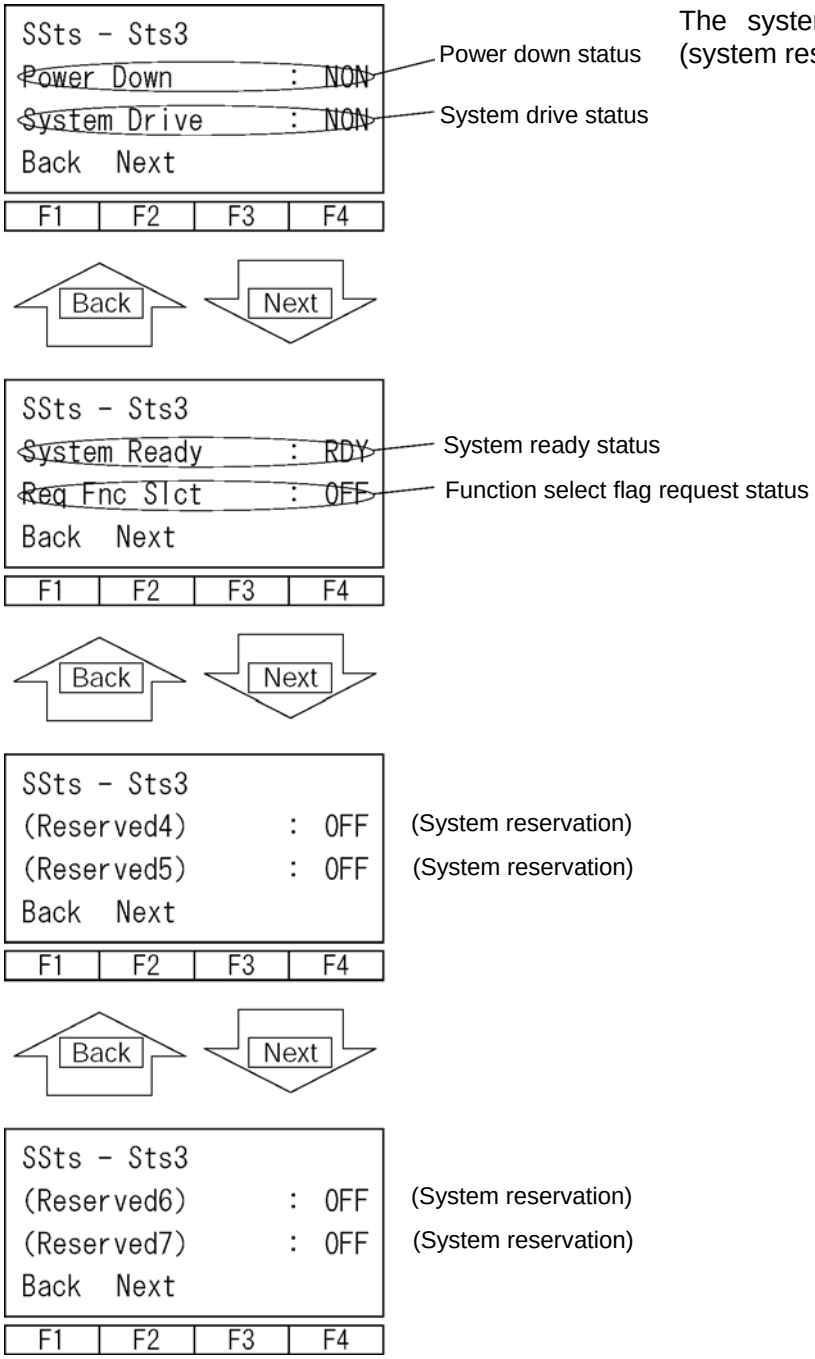
(4) System status 2

Mode flow: Moni → SSts → Sts2



(5) System status 3

Mode flow: Moni — SSts — Sts3



(6) System status 4

Mode flow: Moni — SSts — Sts4

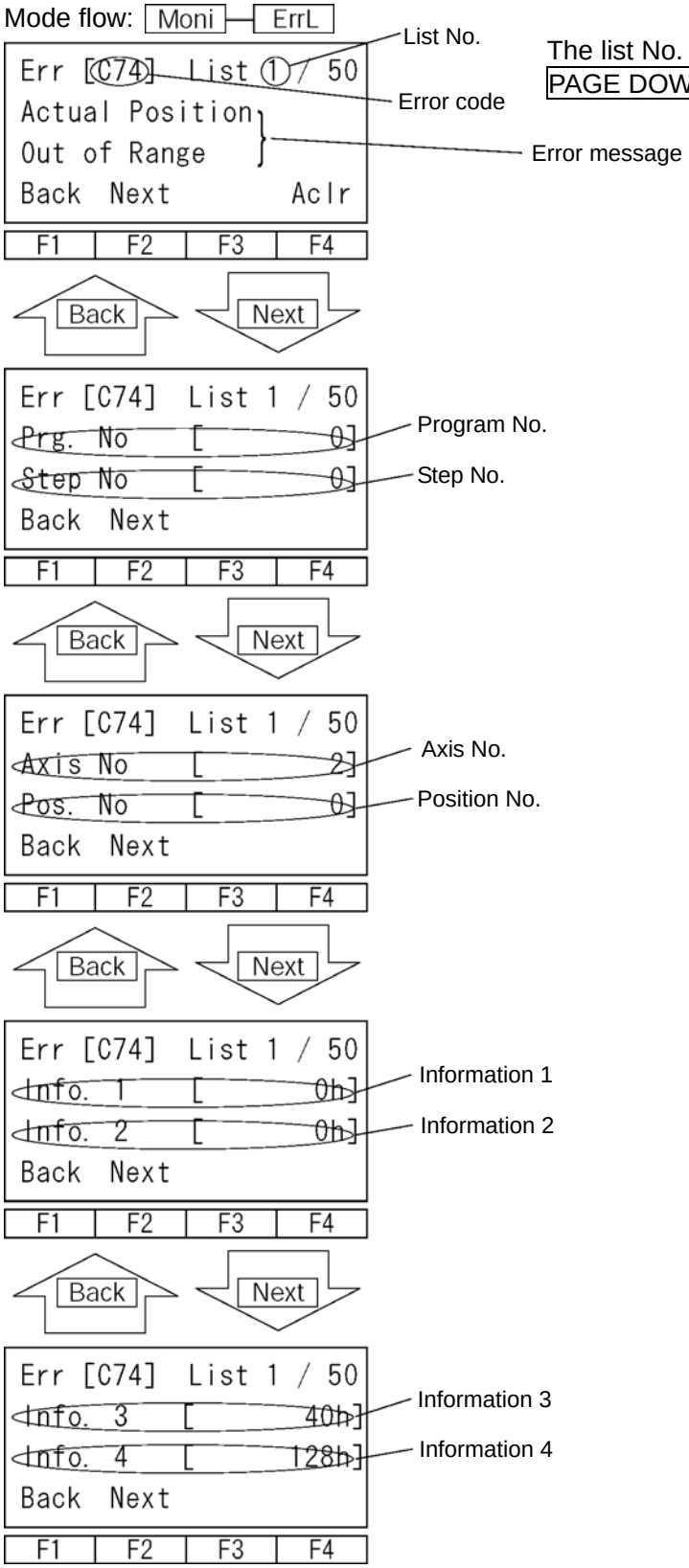
The system status 4 is all “Reserved” (system reservation).

16-8. Error detail information

Error detail information is displayed.

Select the F3 (ErrL) key on the Moni screen.

Mode flow: Moni — ErrL

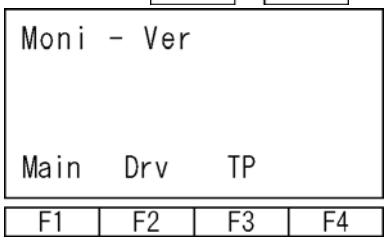


The list No. can be changed with the PAGE UP and PAGE DOWN keys.

16-9. Version information

A variety of version information is displayed.
Select the F4 (Ver) key on the Moni screen.

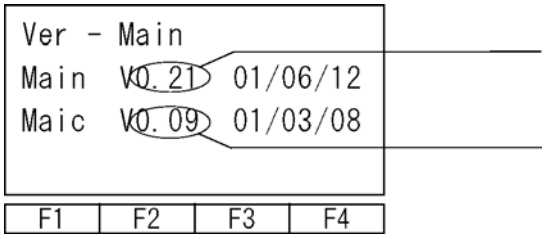
Mode flow: Moni → Ver



Main: Main
Drv: Driver
TP: Teaching Pendant

(1) Main

Mode flow: Moni → Ver → Main

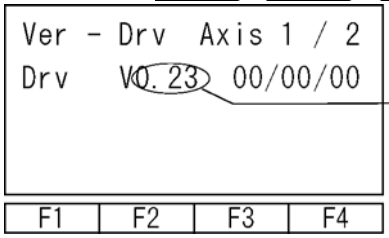


Version of controller main application part

Version of controller main core part

(2) Driver

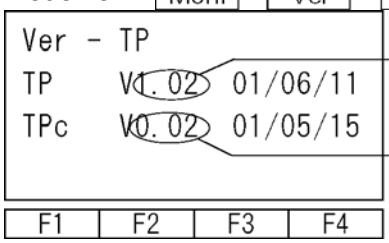
Mode flow: Moni → Ver → Drv



Driver CPU version

(3) Teaching Pendant

Mode flow: Moni → Ver → TP

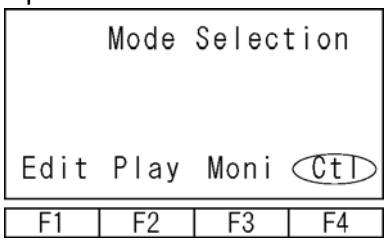


Version of Teaching Pendant application part

Version of Teaching Pendant core part

17. Controller

Operations such as software reset and error reset are performed for the controller.

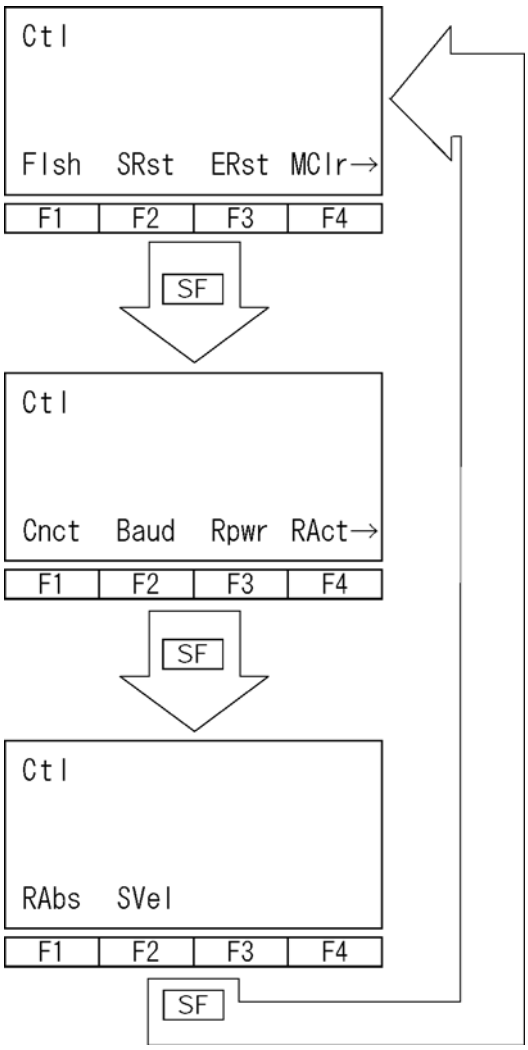


Select the F4 (Ctl) key on the Mode Selection screen.

The controller's operation items are displayed in the function key section.

17-1. Controller items

Every time the SF key is pressed, operation items are shifted and displayed.



Flsh: Flash ROM writing
SRst: Software reset
ERst: Error reset
MClr: Memory clear

Cnct: Reconnection
Baud: Baud rate change
RPwr: Driving power recovery request
RAct: Action restart request

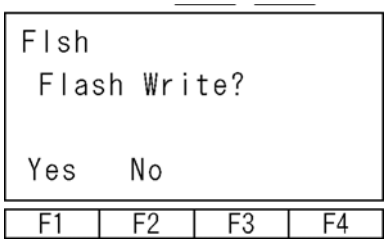
RAbs: Absolute encoder reset
SVel: Safety velocity

Select an operation item with the function key.

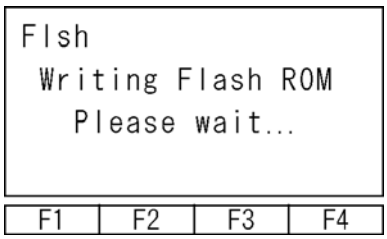
17-2. Flash ROM writing

After the data in flash ROM has been erased, the data stored in the controller's memory is written in flash ROM.
Select the F1 (Flsh) key on the Ctl (controller item) screen.

Mode flow: Ctl → Flsh

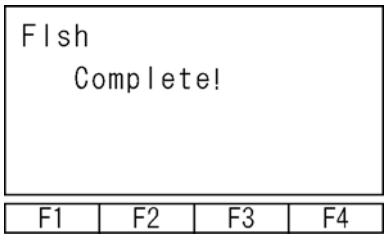


To write the data in flash ROM, press the F1 (Yes) key.
If not, press the F2 (No) key. The screen returns to the Ctl screen.



The message "Please wait…" flashes during flash ROM writing.

* Never turn off the power to the Controller at this time.

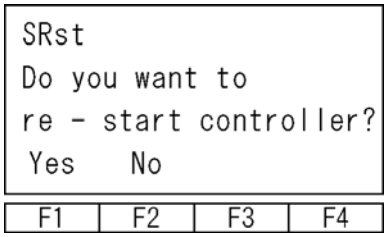


Return to the Clt screen with the ESC key.

17-3. Software reset

The controller's software is reset. The data in memory that has not been written in flash ROM is abandoned.
Select the F2 (SRst) key on the Ctl screen.

Mode flow: Ctl ⊣ SRst

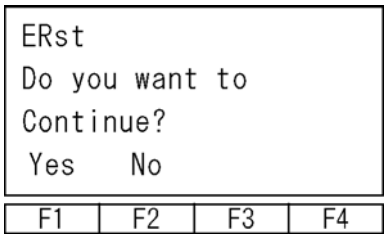


When resetting the software, press the F1 (Yes) key. When not resetting the software, press the F2 (No) key. The screen returns to the Mode Selection screen.

17-4. Error reset

The controller's errors are reset. The message-level and action-reset-level errors are reset. Unless the cause for the error is removed, the error occurs again.
Select the F3 (ERst) key on the Ctl screen.

Mode flow: Ctl ⊣ ERst

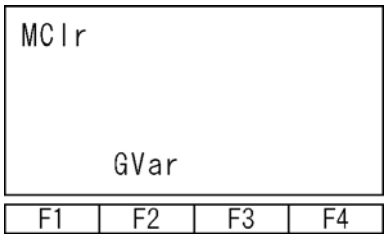


When resetting the error, press the F1 (Yes) key. When not resetting the error, press the F2 (No) key. The display returns to the Ctl screen.

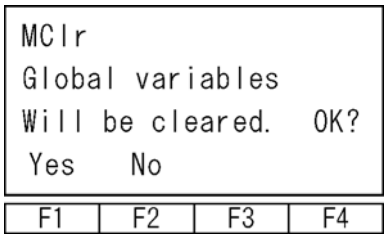
17-5. Memory clear

Global variables are cleared to zero.
Select the F4 (MClr) key on the Ctl screen.

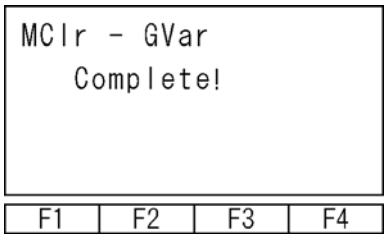
Mode flow: Ctl ─ MClr



Press the F2 (Gvar) key.



When clearing memory, press the F1 (Yes) key.
When not clearing memory, press the F2 (No) key.
The display returns to the previous screen.

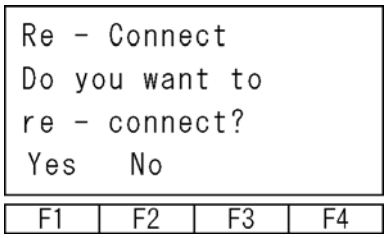


Return to the previous screen with the ESC key.

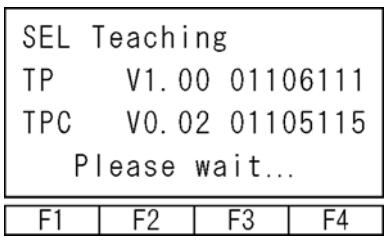
17-6. Reconnection

The Teaching Pendant is reconnected 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 Ctl screen.

Mode flow: Ctl ─ Cnct



When reconnecting, press the F1 (Yes) key.
When not reconnecting, press the F2 (No) key.
The display returns to the previous screen.



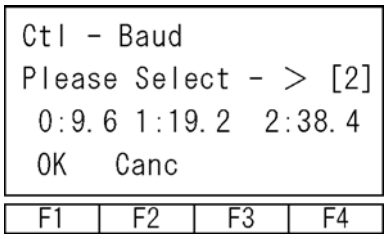
The message “Please wait…” flashes during reconnection.

After completion of reconnection, the display returns to the Mode Selection screen.

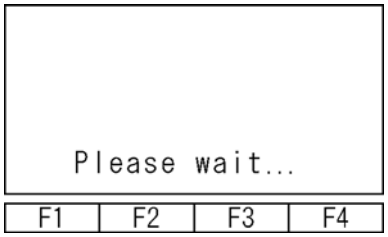
17-7. Baud rate change

The communication baud rate between the controller and the Teaching Pendant is changed.
Select the F2 (Baud) key on the Ctl screen.

Mode flow: Ctl → Baud



Enter the numeric value corresponding to the baud rate with the ten-key numeric pad and press the return key.
0: 9.6, 1: 19.2, 2: 38.4 (kbps)
When changing the baud rate, press the F1 (OK) key.
When canceling it, press the F2 (Canc) key. The display returns to the previous screen.



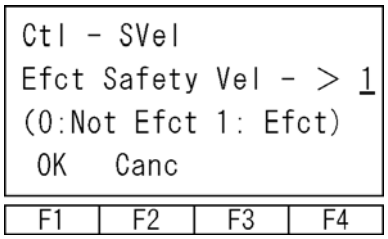
The message “Please wait…” flashes during a baud rate change.

The display returns to the screen for changing the baud rate.

17-8. Safety velocity

The safety velocity limit in the MANU mode is changed between “Effect” and “No Effect.”
Select the F2 (SVel) key on the Ctl screen.

Mode flow: Ctl → SVel



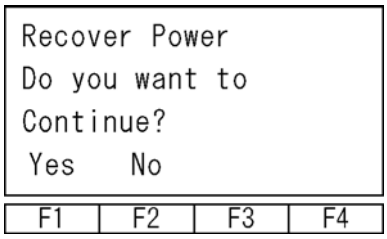
Enter 1 or 0 with the ten-key numeric pad and press the return key.
1: Safety velocity limit: Effect
The maximum velocity is 250 mm/sec or less regardless of the setting of the program and parameters.
0: Safety velocity limit: No Effect

When changing the safety velocity limit between “Effect” and “No Effect,” press the F1 (OK) key.
When canceling it, press the F2 (Canc) key.

17-9. Driving power recovery request

The driving power recovery request is given to the controller.
Select the F3 (RPwr) key on the Ctl screen.

Mode flow: Ctl → RPwr

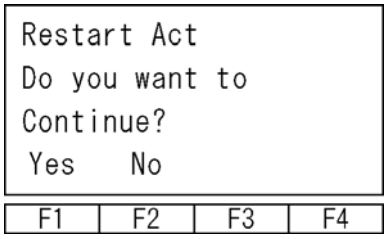


When requesting the driving power recovery, press the F1 (Yes) key. The display returns to the previous screen.
When not requesting the driving power recovery, press the F2 (No) key. The display returns to the previous screen.

17-10. Action restart request

The action restart request is given to the controller.
Select the F4 (RAct) key on the Ctl screen.

Mode flow: Ctl → RAct



When requesting the action restart, press the F1 (Yes) key. The display returns to the previous screen.
When not requesting the action restart, press the F2 (No) key. The display returns to the previous screen.

17-11. Driving power recovery request (RPwr) and action restart request (RAct)

(1) Driving power recovery request

① How to request driving power recovery

The driving power recovery can be requested with any of the following methods:

- Set the I/O parameter No. 44 (input selection function 014 = driving power restart input) to 1, and input ON edge for the input port No. 14.
- Select Controller (C) from the PC software menu and execute Driving Power Recovery Request (P).
- Select Ctl (controller operation) on the Mode Selection screen of the Teaching Pedant and execute RPwr (driving power recovery request).

② Case where driving power recovery request is required

The driving power recovery request is required only in the following case:

- Where the factor behind the driving power down occurs when the I/O parameter No. 44 is set to 1 and the driving power recovery is attempted after the factor removal.

(2) Action restart request

① How to request action restart

The action restart can be requested with any of the following methods:

- Set the I/O parameter No. 35 to 1 (input selection function 005 = action restart signal), and input ON edge for the input port No. 5.
- Select Controller (C) from the PC software menu and execute action restart request (L).
- Select Ctl (controller operation) on the Mode Selection screen of the Teaching Pendant and execute RAct (action restart request).

② Case where action restart request is required

The action restart request is required in any of the following cases:

- Where the controller in auto run stops with the Deadman switch when the other parameter No. 9 is set to 2 (Deadman SW recovery type = action continuation recovery [only in auto run]) and recovery is attempted after the stop reset (action restart).
- Where the controller in auto run makes an emergency stop when the other parameter No. 10 is set to 2 (emergency stop recovery type = action continuation recovery [only in auto run]) and recovery is attempted after the emergency stop reset (action restart).
- Where the safety gate is OPEN in auto run when the other parameter No. 11 is set to 2 (safety gate OPEN time recovery type = action continuation recovery [only in auto run]) and recovery is attempted after safety gate CLOSE (action restart).
- Where the input port No. 6 OFF level is input (action temporary stop) in auto run when the I/O parameter No. 36 is set to 1 (input selection function 006 = action temporary stop signal) and recovery is attempted after the input port No. 6 ON level input (action restart).

* Where (1) ② overlaps (2) ②, it is required to execute the driving power recovery request first and then the action restart request.

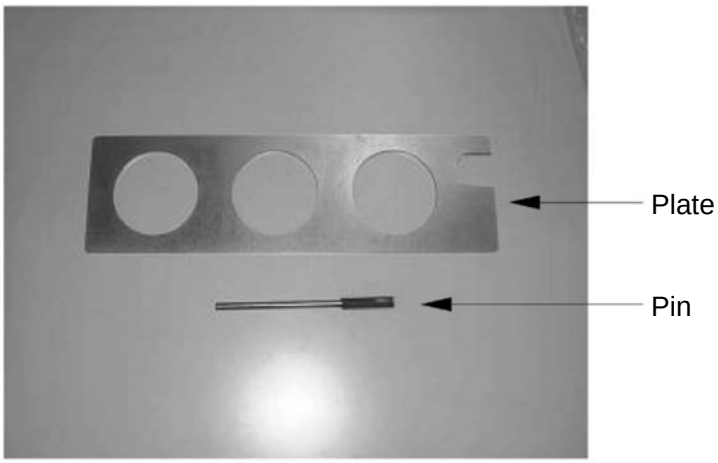
17-12. Absolute encoder reset

Preparation for absolute reset
The following jigs are required for an absolute reset:

▪ Absolute reset adjusting jigs

Type	Remarks
JG-1	Arm length 500/600
JG-2	Arm length 250/300/350
JG-3	Arm length 700/800

Connect the robot, controller and Teaching Pendant to make an operable state from the Teaching Pendant.
Be sure to check the functioning of the EMERGENCY STOP button before starting operation.
Performing an absolute reset on the rotation axis and vertical axis always requires an absolute reset adjusting jig. However, performing an absolute reset on the arm 1 and arm 2 does not always require it.
(Multi-rotation reset possible if the arm position is within the range of the positioning mark seal ± 1 scale)



Absolute reset adjusting jig (Type JG-1)

⚠ WARNING

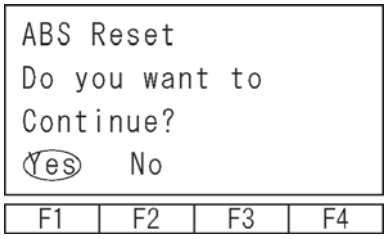
- Performing operation without understanding inspection and maintenance work fully may lead to a serious accident resulting in injury or death.
- Post a “MEN WORKING” sign to prevent other operators from operating the controller, operation panel, etc.

An absolute reset is performed on the following 3 types: arm 1, arm 2 and Z-axis + R-axis.

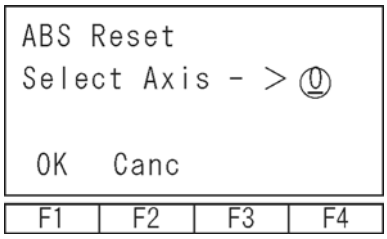
(1) Absolute reset on arm 1 and arm 2

Select the F1 (RAbs) key on the Ctl screen.

Mode flow: Ctl – RAbs

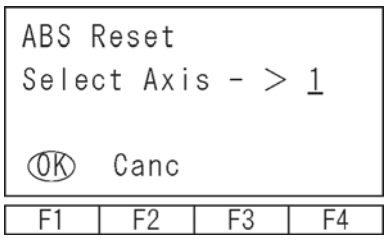


When performing an absolute reset, press the F1 (Yes) key.
When not performing an absolute reset, press the F2 (No) key. The display returns to the previous screen.

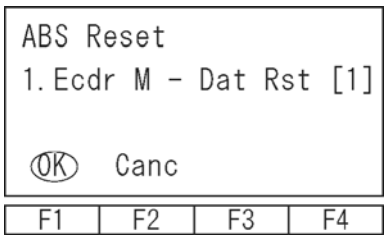


Axis No. input

Enter the axis No. for an absolute reset with the ten-key numeric pad and press the return key.
Enter 1 to perform an absolute reset on the arm 1 or enter 2 on the arm 2.

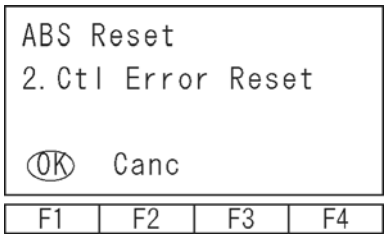


When continuing an absolute reset, press the F1 (OK) key.
When canceling an absolute reset, press the F2 (Canc) key.
When canceling an absolute reset on any screen of the following ① through ⑥, press the F2 (Canc) key.



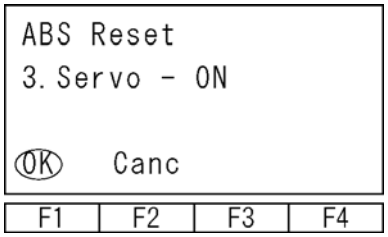
① Encoder multi-rotation data reset (1)

Press the F1 (OK) key.



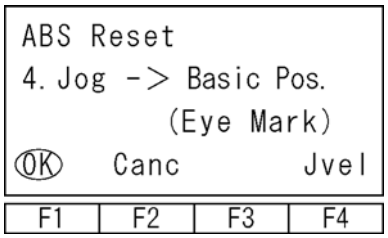
② Controller error reset

Press the F1 (OK) key.



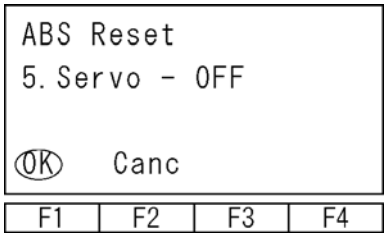
③ Servo ON

Press the F1 (OK) key.



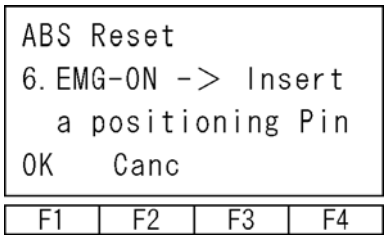
④ Jog movement

Jog the arm to the vicinity of the basic position (see the “Standard Posture Drawing” on the next page) and press the F1 (OK) key.



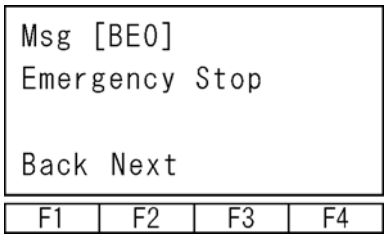
⑤ Servo OFF

Press the F1 (OK) key.



⑥ Emergency stop input and adjusting jig set

Press the EMERGENCY STOP button and set an adjusting jig.
After fixing the standard posture as shown on the next page, press the F1 (OK) key.

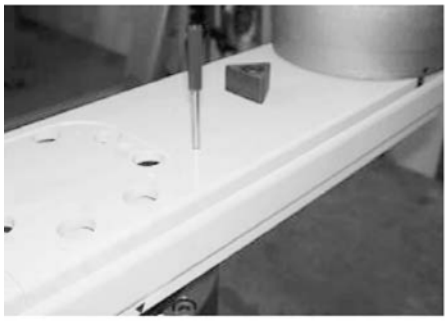


Inputting emergency stop displays the screen at the left.
Pressing the ESC key returns the display to the previous screen.

Check that the EMERGENCY STOP button has been pressed.

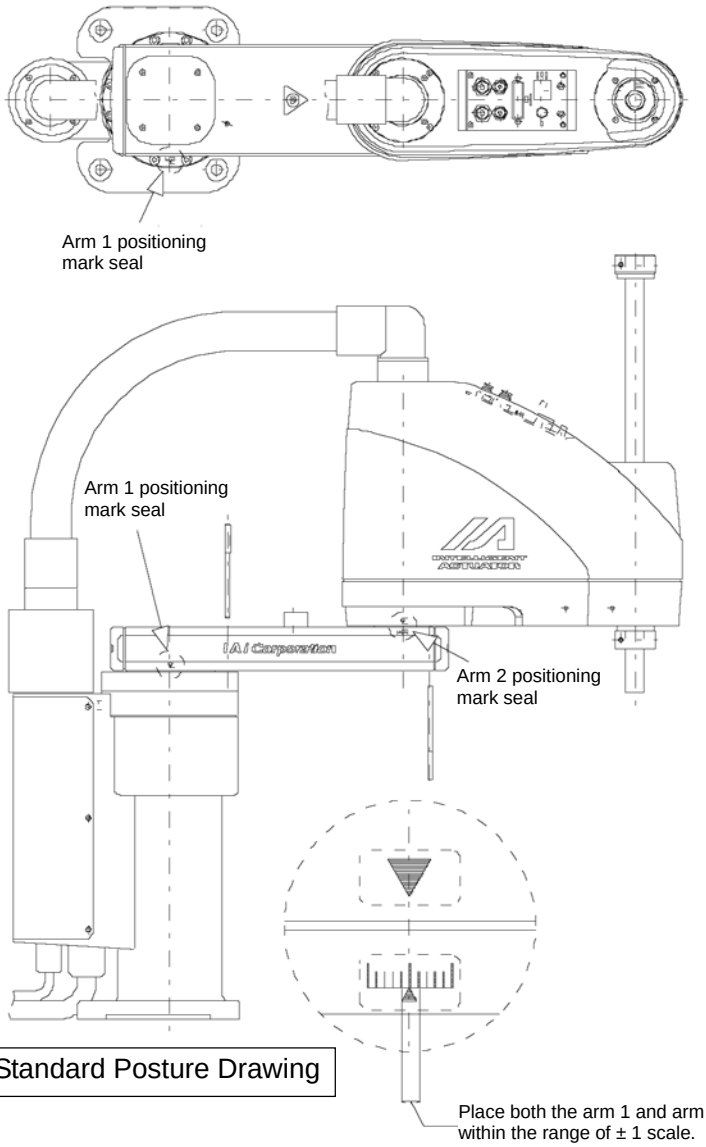
Set an adjusting jig (pin) to the arm 1 or arm 2 and fix the standard posture.

- After checking that the EMERGENCY STOP button has been pressed, set the jig.
- Decide the basic position referring to the positioning mark seal and set the jig.
- Only the arm 1 is covered with a lid with setscrews. Remove them and set the jig.
- An absolute reset on the arm with the adjusting jig is recommended. However, a multi-rotation reset is possible if the arm position is within the range of the mark seal ± 1 scale.



Arm 1

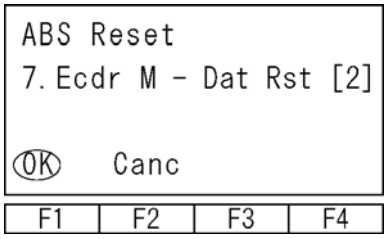
Arm 2



Standard Posture Drawing

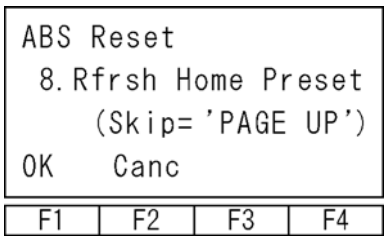
⚠WARNING

- Be sure to press the EMERGENCY STOP switch before setting an adjusting jig. Failure to do so may cause a robot malfunction, which may lead to a serious accident resulting in injury or death.



⑦ Encoder multi-rotation data reset (2)

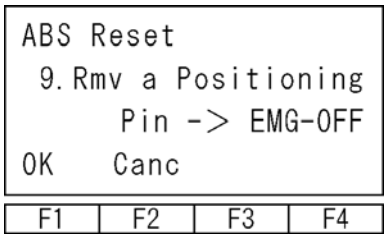
Press the F1 (OK) key.



⑧ Home preset value auto refresh

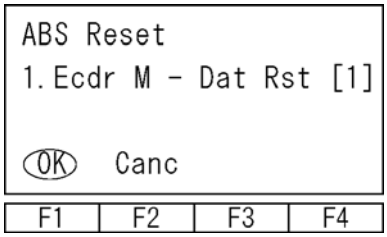
Press the PAGE UP key and do not press the F1 (OK) key.

- Do not execute the item of “home preset value auto refresh.” (Be careful especially when performing an absolute reset without a jig.)
- If “home preset value auto refresh” is executed without using an adjusting jig, the home position becomes misaligned.
- If “home preset value auto refresh” is executed by mistake, perform an absolute reset work again using an adjusting jig. (Up to the work steps of ⑧ above)

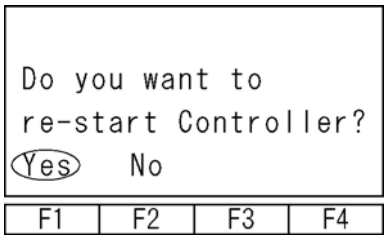


⑨ Remove the adjusting jig. Remove an emergency stop reset adjusting jig if it is set.

After resetting the EMERGENCY STOP button, press the F1 (OK) key.



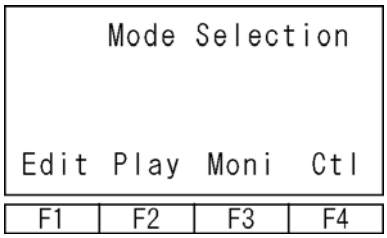
Press the ESC key.



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

NOTE:

When executing “home preset value auto refresh” using an adjusting jig, be sure to perform flash ROM writing before restarting the controller.

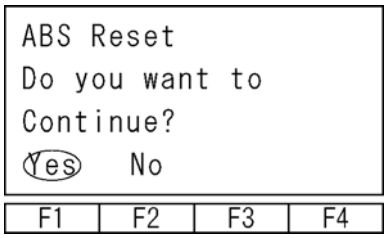


The screen returns to the Mode Selection screen.

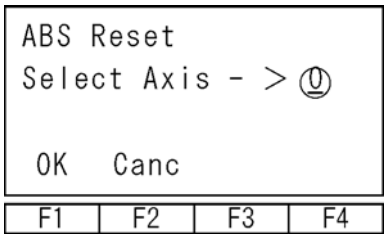
(2) Absolute reset on Z-axis + R-axis

Select the F1 (RAbs) key on the Ctl screen.

Mode flow: Ctl – RAbs

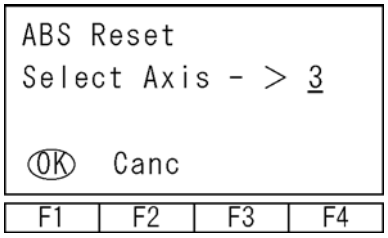


When performing an absolute reset, press the F1 (Yes) key.
When not performing an absolute reset, press the F2 (No) key. The display returns to the previous screen.

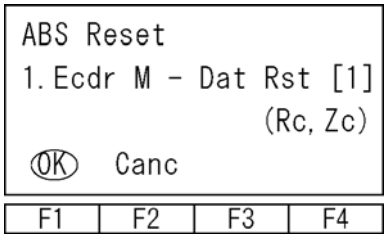


Axis No. input

Enter the axis No. for an absolute reset with the ten-key numeric pad and press the return key.
Enter 3.

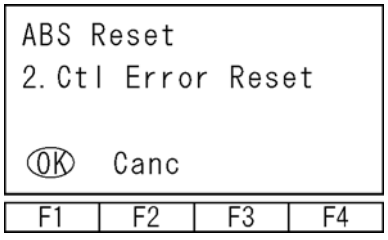


When continuing an absolute reset, press the F1 (OK) key.
When canceling an absolute reset, press the F2 (Canc) key.
When canceling an absolute reset on any screen of the following ① through ⑥, press the F2 (Canc) key.



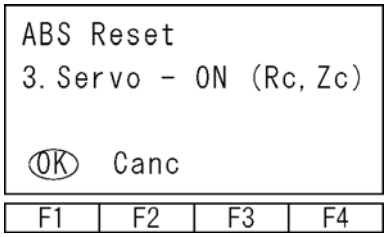
① Encoder multi-rotation data reset (1)

Press the F1 (OK) key.



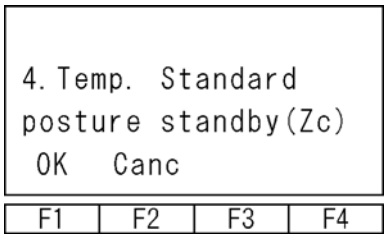
② Controller error reset

Press the F1 (OK) key.



③ Servo ON

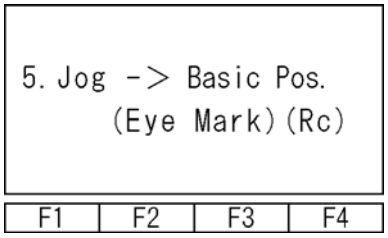
Press the F1 (OK) key.



④ Temporary standard posture standby

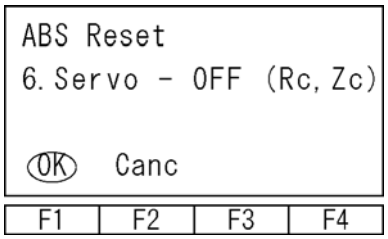
Press the F1 (OK) key.

Note: The Z-axis returns to the home position.



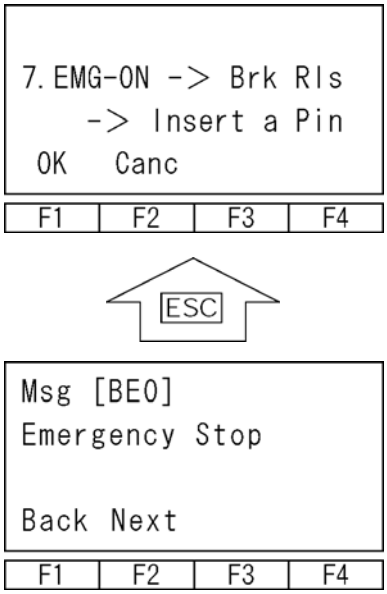
⑤ Jog movement

Jog the R-axis to the vicinity of the basic position with jog keys (see the “Standard Posture Drawing” on the next page).
Press the F1 (OK) key.



⑥ Servo OFF

Press the F1 (OK) key.



⑦ Emergency stop input and adjusting jig set

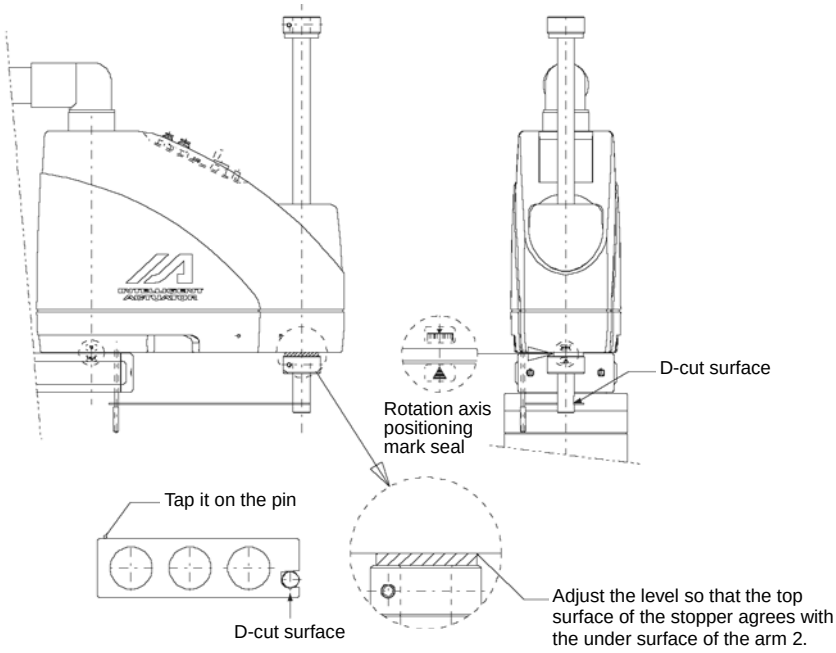
Press the EMERGENCY STOP button.
Press the brake release switch to release the brake.
After fixing the standard posture as shown below, press the F1 (OK) key.

Inputting emergency stop displays the screen at the left.
Pressing the ESC key returns the display to the previous screen.

Place the adjusting jig plate and pin as shown below and fix the standard posture.

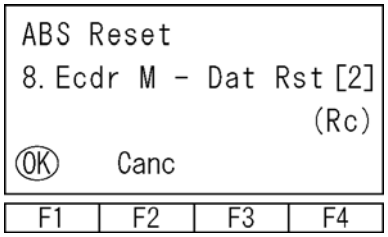
- After checking that the EMERGENCY STOP switch has been pressed, set the jig.
- Set the jig by referring to the positioning mark.
- Adjust the level so that the top surface of the stopper approximately agrees with the under surface of the arm 2.

Standard Posture Drawing



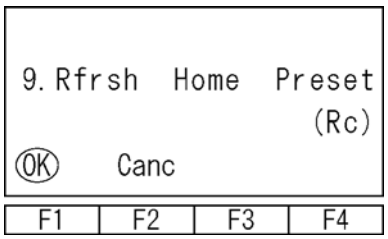
⚠ WARNING

- Be sure to press the EMERGENCY STOP switch before setting an adjusting jig. Failure to do so may cause a robot malfunction, which may lead to a serious accident resulting in injury or death.



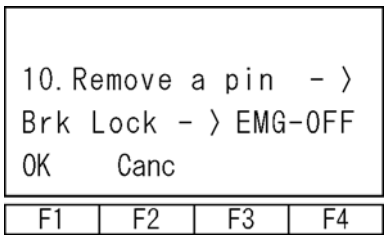
⑧ Encoder multi-rotation data reset (2)

Press the F1 (OK) key.



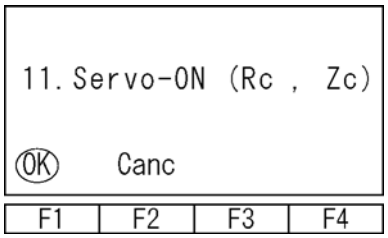
⑨ Home preset value auto refresh

Press the F1 (OK) key.



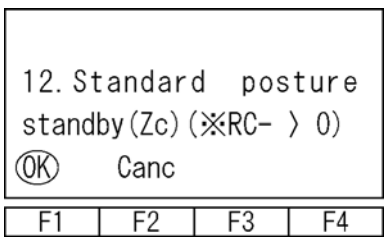
⑩ Adjusting jig removal and emergency off

Remove the adjusting jig.
Turn off the brake release switch to enable the brake.
Turn off the EMERGENCY STOP button.
Press the F1 (OK) key.



⑪ Servo ON

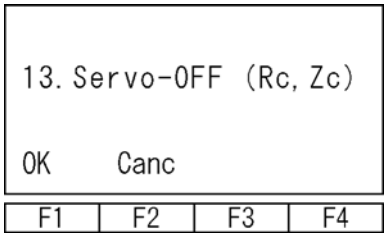
Press the F1 (OK) key.



⑫ Standard posture standby

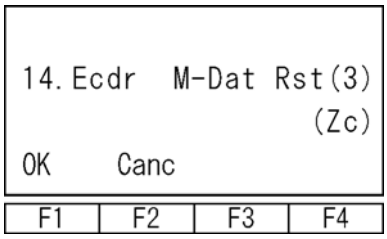
Press the F1 (OK) key.

Note: The Z-axis returns to the home position.



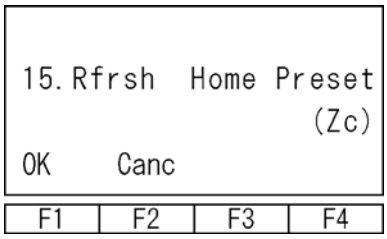
⑬ Servo OFF

Press the F1 (OK) key.



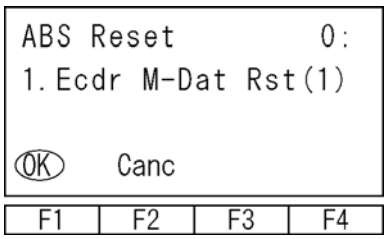
⑭ Encoder multi-rotation data reset (3)

Press the F1 (OK) key.

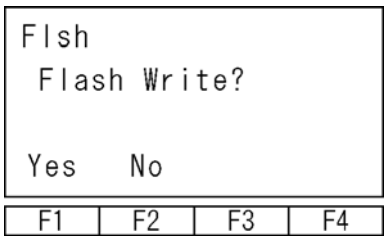


⑮ Home preset value auto refresh

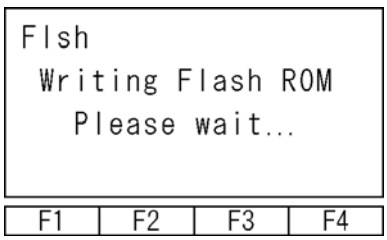
Press the F1 (OK) key.



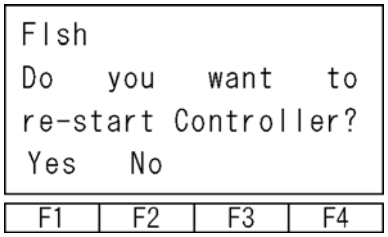
Return to the previous screen with the ESC key.



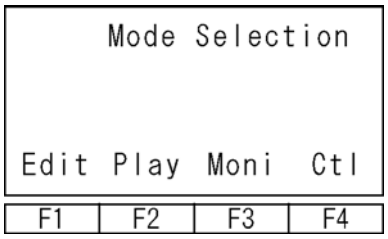
Write in flash ROM
Press the F1 (Yes) key.



Writing flash ROM



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



The screen returns to the Mode Selection screen.

◎ Error Level Control

Error level	System error origin	Error No. (HEX)	Display (7SEG, DISPLAY, etc.)	Error list	Error LED output	Program run		Error reset	Remarks
						When other parameter No. 4 is 0	When other parameter No. 4 is 1		
Secret level	Main application part	800 - 88F		○					Special error level for maintenance
	Main core part	890 - 8AF							
	PC	8B0 - 8DF							
	TP	8E0 - 8FF							
Message level	Main application part	900 - 93F	○	△ (Battery-related and field-bus-related errors are registered in the error list.)				Yes	Status display, input errors, etc.
	Main core part	940 - 97F							
	PC	980 - 9AF							
	PC (Update tool)	9B0 - 9BF							
	TP	9C0 - 9FF							
	Flash ACK time-out	A00 - A6F							
	Main core part	A70 - A9F							
	PC	AA0 - ACF							
	TP	AD0 - AFF							
Action reset level	Main application part	B00 - B9F	○	○		Reset the program at the source. (Errors other than axis-related errors become reset factors only in an error-occurring moment.)	Reset all the programs except for the “I/O processing program at action-abort time.” (Errors other than axis-related errors become reset factors only in an error-occurring moment.)	Yes	Errors interfering with action. For any minor errors with a level lower than this, error reset is attempted with the auto-reset function at the external active command (SIO/PIO) receipt.
	Main core part	BA0 - BBF							
	PC	BC0 - BDF							
	TP	BE0 - BFF							
	Main application part	C00 - CCF							
	Main core part	CD0 - CDF							
	PC	CE0 - CEF							
	TP	CF0 - CFF							
Cold start level	Main application part	D00 - D8F	○	○		Reset the program at the source. * However, reset 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.	Reset all the programs except for the “I/O processing program at action-abort time.”	No	It is required to turn on the power again. (Normal execution for CPU and OS)
	Main core part	D90 - DAF							
	PC	DB0 - DCF							
	PC (Update tool)	DD0 - DDF							
	TP	DE0 - DFF							
	Main application part	E00 - E8F							
	Main core part	E90 - EBF							
	PC	EC0 - EDF							
	TP	EE0 - EFF							
System down level	Main application part	FF0 - FBF	○	○	○	Reset all		No	It is required to turn on the power again. (Execution is impossible for CPU and OS)
	Main core part	FC0 - FCF							
	PC	FD0 - FDF							
	TP	FE0 - FEF							

TP: Teaching Pendant, PC: PC-compatible software

X-SEL Teaching Box Error List (Application Part)

The following errors are specific to the Teaching Box. For controller errors, refer to the X-SEL Controller Instruction Manual.)

Error No.	Error message	Special remarks
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 home position return first.
9E2	Not yet Homed TEACH	Teaching prohibition error at not-yet-homed time. Complete home position return 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 (axis-specific 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.
9F0	Crd[1] and Crd[2] do not have consistency	The coordinate [1] and coordinate [2] in the simple interference check zone definition data do not have consistency in the specified axis pattern.
9F1	No effective data in Crd[1] and Crd[2]	No coordinate values are input in the simple interference check zone definition data.
9F2	'Scan' prohibition at each axis system	"Scan" (current position import) operation cannot be performed at each axis coordinate system.
9F3	Can't read the protected data	Read, copy or movement operation cannot be performed for the read protection data.
9F5	Can't write to the protection area	Writing, copy. movement or clear operation cannot be performed for the write protection data.
9F6	Protection setteing prmtr is abnormal	Invalid values are set for protection setting parameters (other parameters No. 36 - No. 39).
DE0	Receive Data Invalid	Received data string error (TP). The received data has an error. When it is not eliminated even through reconnection, 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.
DF0	Unsupported CTL is connected	An unsupported controller is connected.

X-SEL Teaching Pendant Error List (Core Part)

(The following errors are specific to the Teaching Pendant. For the controller's errors, refer to the X-SEL Controller Instruction Manual.)

Error No.	Error message	Special remarks
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.

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