



Robostar Robot Controller N2 Series Operating Manual

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Robostar

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Chapter 1 System Configuration

1. Configuration of whole system

As shown below, the basic configuration of the system that uses N2S Series consists of the Manipulator, Controller, T/P (Teach Pendant).

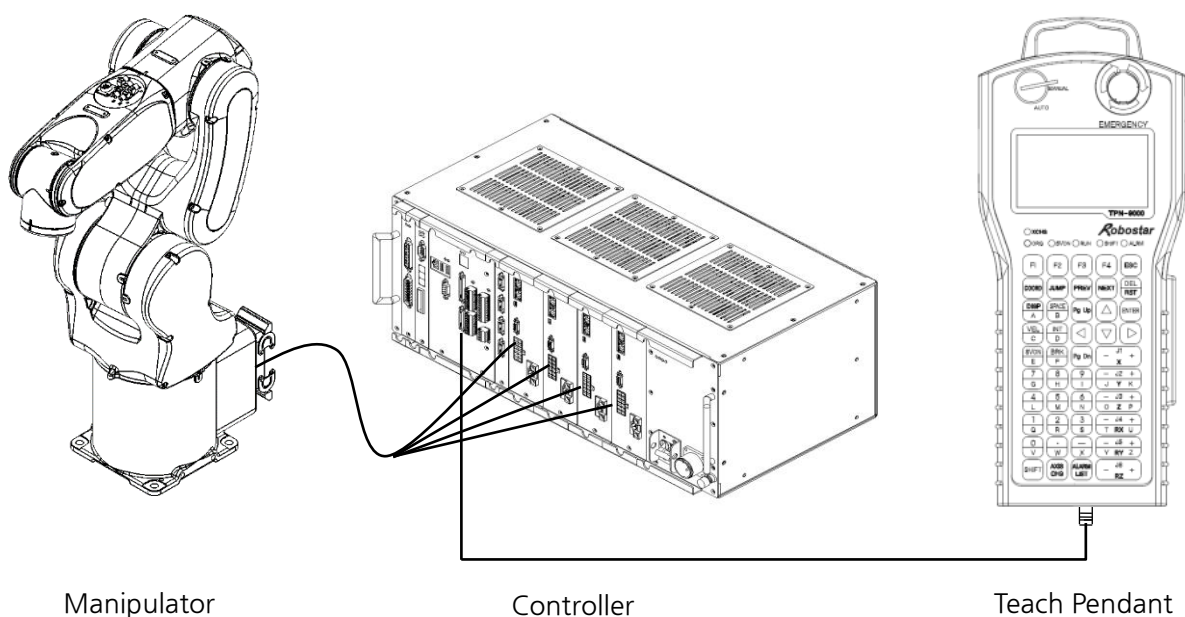


Figure 1-1 Configuration of N2 Series system

2. Configuration of N2S Controller

The Controller of N2S Series provides all parts besides the Option Panels below as default components. Additionally, 3 optional boards can be installed.

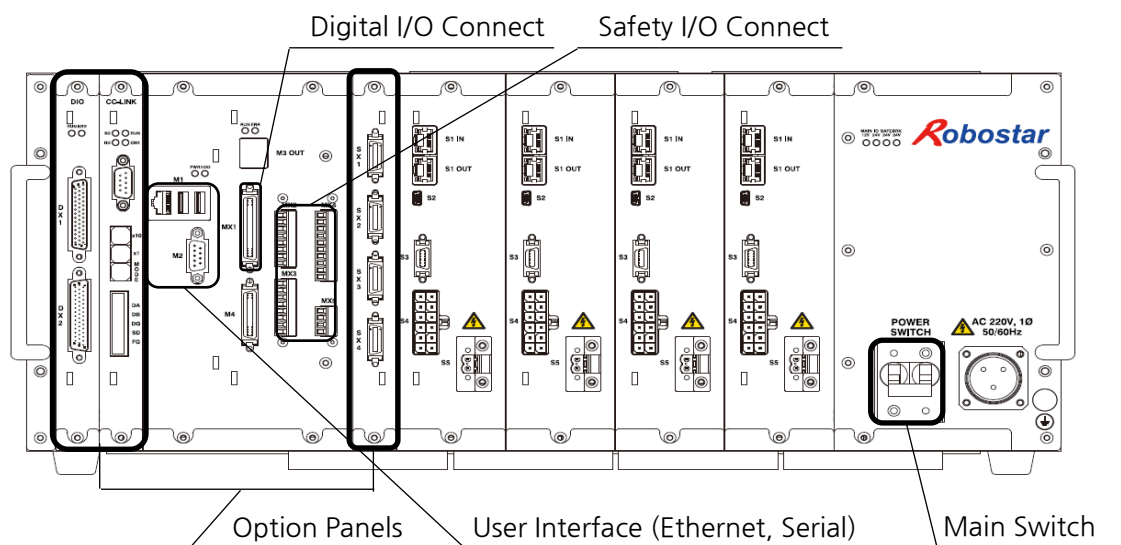


Figure 1-2 Configuration of N2 Series Controller

3. Robot configuration

The Manipulator supported by N2S Series is RA Series.

RA Series is a single model with 6 axes. Air Out port to use pneumatic on the top of 4-axis frame and User I/O that is input/output interface with the Controller are provided. A Connector that is connected with the Air In port and the Controller is provided on the Base Frame.

※ For Air, User I/O Connector Pin-map and specification, refer to RA Series robot manual(N2-IM-□□□).

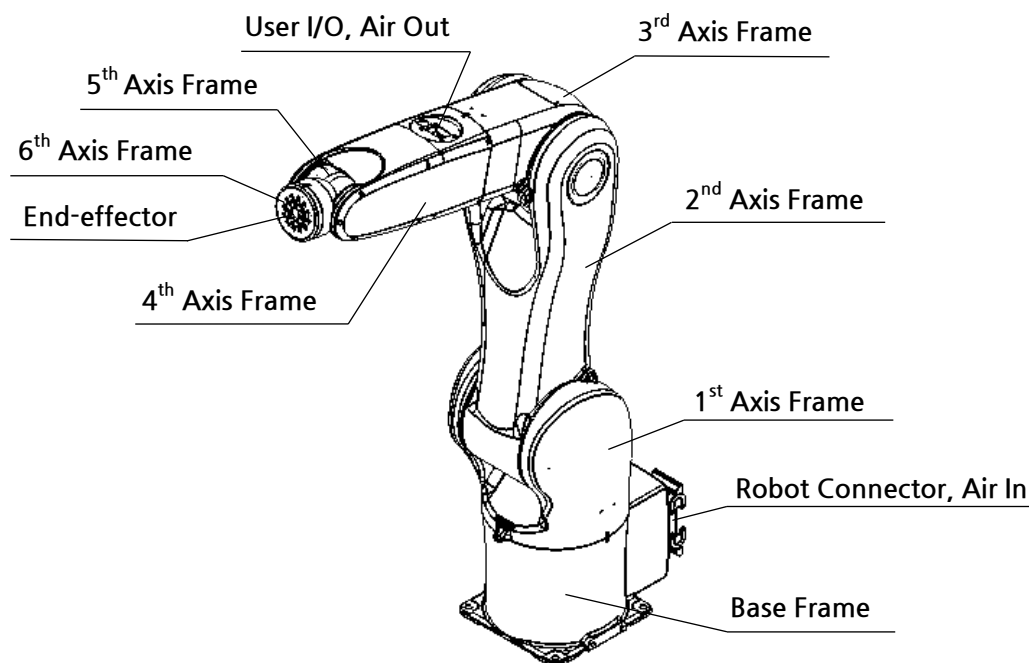


Figure 1-3 RA Series configuration

4. Option configuration

N2S Series supports 2 types of optional cards.

- 1) CC-Link Board
- 2) Extern Digital I/O Board

Optional cards are additional purchase items.

5. Configuration of compact Teach Pendant (T/P)

5.1 Compact T/P configuration and description

T/P is a user interface device exclusive for Controller. It provides variable functions with which to start, stop and teach the movement of the robot, create and edit the user program.

In this chapter, we describe the configuration and how to use.

The figure below shows basic configuration of compact T/P.

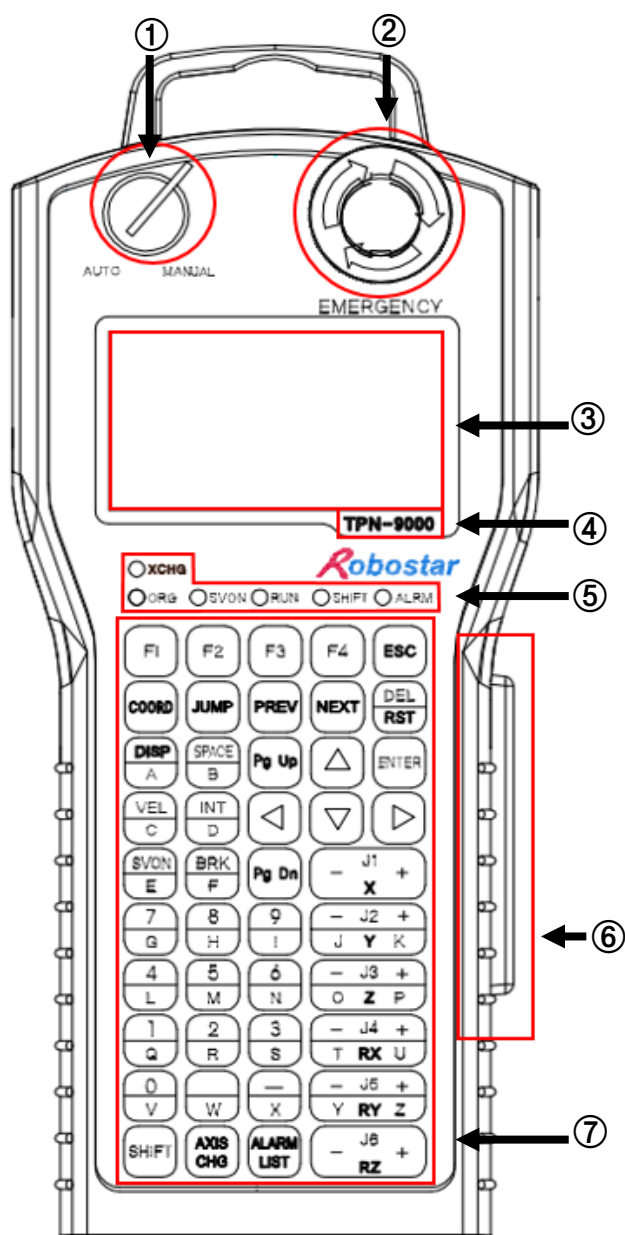


Figure 1-4 T/P configuration

① Mode switch

Mode of the Teach Pendant is divided into Auto mode and Manual mode. Use Mode switch to convert modes.

- Manual mode: robot control mode with T/P
- Auto mode: robot control mode with external control signal from I/O or communication devices

② Emergency switch

Emergency Switch is the red switch on top right of the T/P. This is to immediately stop the robot when abnormal operation or system error occurs during the operation. Pressing the switch stops the robot immediately and the switch will remain pressed.

③ LCD

LCD displays current status and related information.

④ Teach pendant model

T/P model name.

⑤ Status LED

Status LED indicates robot control status. The table below shows meaning of each LED.

LED	Description
XCHG	ON when AXIS CHG key is used
ORG	ON when setting for origin of robot is completed.
SVON	ON when servo power is on
RUN	ON when JOB program runs
SHIFT	ON when SHIFT key is used
ALARM	ON when an alarm currently occurs

⑥ Deadman switch

The Deadman switch can be used when it's not controlled in proper way due to unforeseen circumstances, such as power failure, discharge, or emergency situations during the operation in manual mode (direct teaching, JOG Mode) with T/P.

If any of these situations occur, an operator can stop the robot by adjusting the force of pressing the Deadman switch.

The table below shows how to use the Deadman switch.

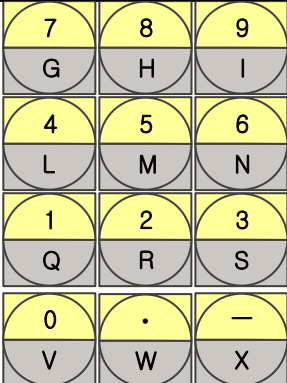
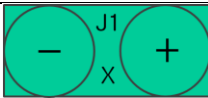
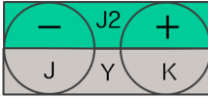
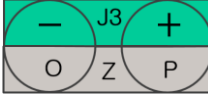
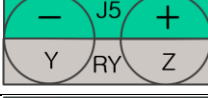
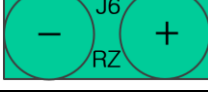
Operational step	Switch pressing force	Switch status	Robot operation
Step 1	Not pressed or pressed lightly	OFF	X
Step 2	Slightly pressed to make a "click" sound and held pressed	ON	O
Step 3	More pressed than Step 2 and held pressed down	OFF	X

⑦ Keypad

Keys are provided for Controller operations such as menu selection, data input, and robot operation.

5.2 Compact T/P Keypad

Key	Description	
 ~ 	[Function key] The menu function represented in the 8 th line is supported by the F1 ~ F4 keys. <ROBOT:INS> F:MOVE2 S:3 S R:RA007 T:0 V: 50 SVON JMOV GP0 WHILE 1 <u>EXIT</u> <u>START</u> <u>RE-ST</u> <u>WAY</u> <RA007:M-TURN> MULTI TURN CLEAR 1/2 <u>J1</u> <u>J2</u> <u>J3</u> <u>J4</u>	
	[Coordinate key] Converts coordinate system.	
	[JUMP key] Performs JUMP function during JOB STEP and number move.	
	[ESC key] Performs function of cancel, return to the previous screen.	
	[SHIFT key] Converts value of the key that has plural input value.	
 	[DELETE key]	Deletes entered data value.
	[RESET key]	Resets entered data value.
 	[PgUp key] & [PgDn key] Turns screen page.	
	[ENTER key] Completes or selects input.	
   	[Arrow key] Moves cursor or current position.	
 	[DISP key]	Performs monitoring function.
	[Alphabet A key]	Inputs alphabet A.
 	[SPACE key]	Moves cursor one space to the right.
	[Alphabet B key]	Inputs alphabet B.
 	[VEL key]	Performs velocity change.
	[Alphabet C key]	Inputs alphabet C.

key	Description	
	[INT key]	Converts INTEGER and FLOAT variable in RUN Monitoring. Changes the index of BASE, TOOL, USER coordinate system in MDI edit screen
	[Alphabet D key]	Inputs alphabet D.
	[SVON key]	Turns on/off servo power.
	[Alphabet E key]	Inputs alphabet E.
	[BRK key]	Releases motor brake.
	[Alphabet F key]	Inputs alphabet F.
 	[PREV key] & [NEXT key] Used to move to page.	
	[AXIS CHG key] In case of using additional axis using EXT_AX in chapter 6, section 5.1.8, converts T/P screen into additional axis operation screen.	
	[ALARM LIST key] Checks list of currently occurred alarm.	
	[Number key] & [Alphabet G ~ X key] Inputs alphabet, number. Input of decimal point and negative number is supported.	
		[Period key] Converts edit modes in JOB edit screen.
		[Minus key] Inputs special symbol in JOB edit screen.
	[1-axis JOG key] Operates the 1 st joint.	
	[2-axis JOG key]	Operates the 2 nd joint.
	[Alphabet J, K key]	Inputs alphabet J, K.
	[3-axis JOG key]	Operates the 3 rd joint.
	[Alphabet O, P key]	Inputs alphabet O, P.
	[4-axis JOG key]	Operates the 4 th joint.
	[Alphabet T, U key]	Inputs alphabet T, U.
	[5-axis JOG key]	Operates the 5 th joint.
	[Alphabet Y, Z key]	Inputs alphabet Y, Z.
	[6-axis JOG key] Operates the 6 th joint.	

5.3 Alarm screen and release method

We simply describe method to release occurred alarm and method to solve alarm cause using systematic access method.

For more detail of the alarm list and the related measures, refer to N2 alarm manual (N2-AM-□□□).

1) How to release the alarm and the warning

There are some cases that the alarms can be released with simple actions without turning the Controller off. Released the alarms through the following order

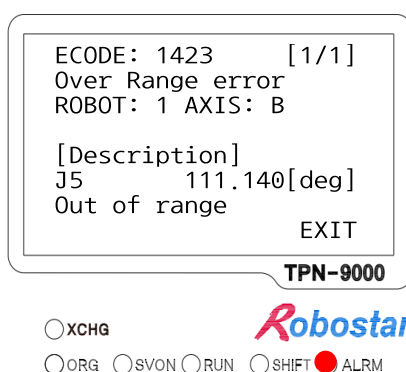


Figure 1-5 Over Range alarm example

- ① If alarm LED turns on or blinks, press PgUp, PgDn keys to check all messages of alarm or warning.



- ② Find cause of alarm occurrence and take proper measures by referring to N2 alarm manual (N2-AM-□□□).
- ③ Press alarm list key to display alarm message window.
(Alarm list keys preferentially operate in the most of screens.)



- ④ Recheck alarm and warning detail and press reset key to release the alarm or warning.



- ⑤ If any alarm is not released, alarm message will be displayed again.
- ⑥ When the release is complete, the alarm message window disappears and the alarm LED is turned off at the same time. After that the robot can be operated normally.

Chapter 2 Basic Specification of Vertical Articulated Robot

1. Coordinate system

Coordinate system represents the position and the orientation of the robot in arbitrary space. N2 Series provides JOINT coordinate system, BASE coordinate system, TOOL coordinate system, USER coordinate system.

<JOINT coordinate system>

Indicates each rotation amount (degree) of the motor shafts from mechanical origin of the each motors.

The motor can be individually rotated by the JOG key.

<BASE coordinate system>

Indicates position (mm) and rotation (degree) of the end-effector with respect to the origin located at the base of the robot.

The manipulation of the end-effector can be operated by JOG key. At this time, some or all joint axes can move

<TOOL coordinate system>

It is fixed in the end of the tool and coincident with the control point. and it is represented in the same with the BASE coordinate.

At this time, some or all joint axes can move

<USER coordinate system>

Users can set arbitrary coordinates in space through the input parameter.

ORG Teaching position is set as origin represented in the same with the BASE coordinate.

1.1 Axis name of each coordinate system

The table below shows name of each axis displayed on the T/P according to setting coordinate system.

Coordinate system	JOINT	BASE	TOOL	USER
Axis 1	J1	X	Xt	Xu
Axis 2	J2	Y	Yt	Yu
Axis 3	J3	Z	Zt	Zu
Axis 4	J4	RX	RX	RX
Axis 5	J5	RY	RY	RY
Axis 6	J6	RZ	RZ	RZ

1.2 JOINT coordinates definition

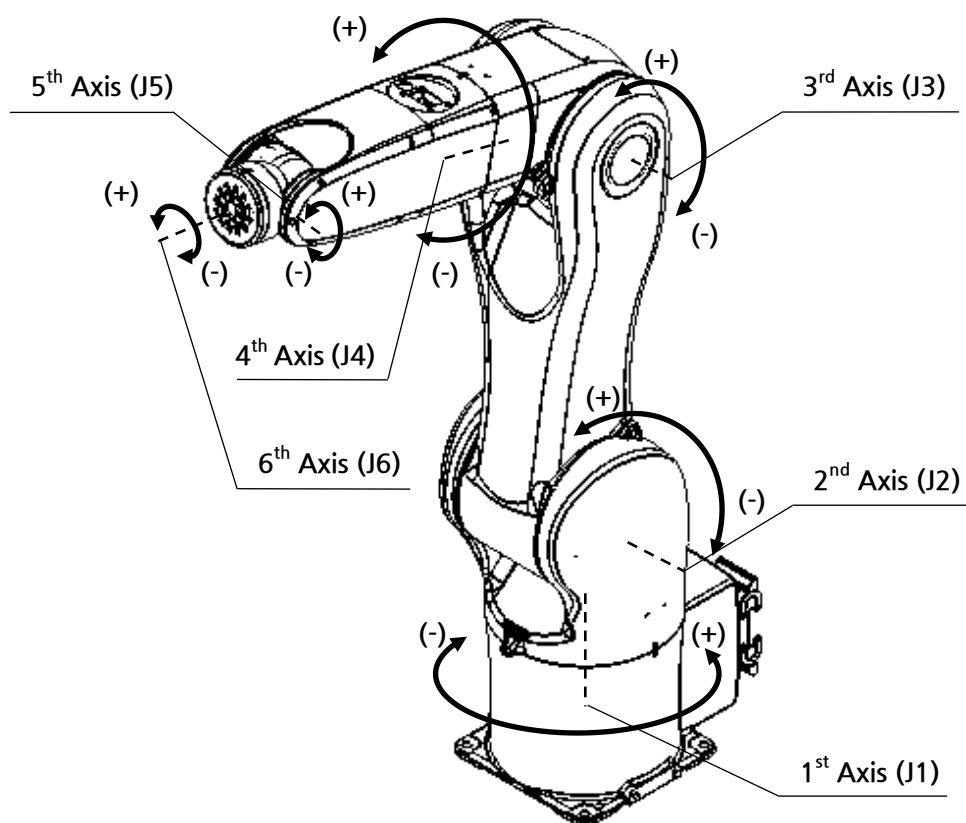


Figure 2-1 Robot axis name and direction of rotation

1.3 BASE coordinates definition

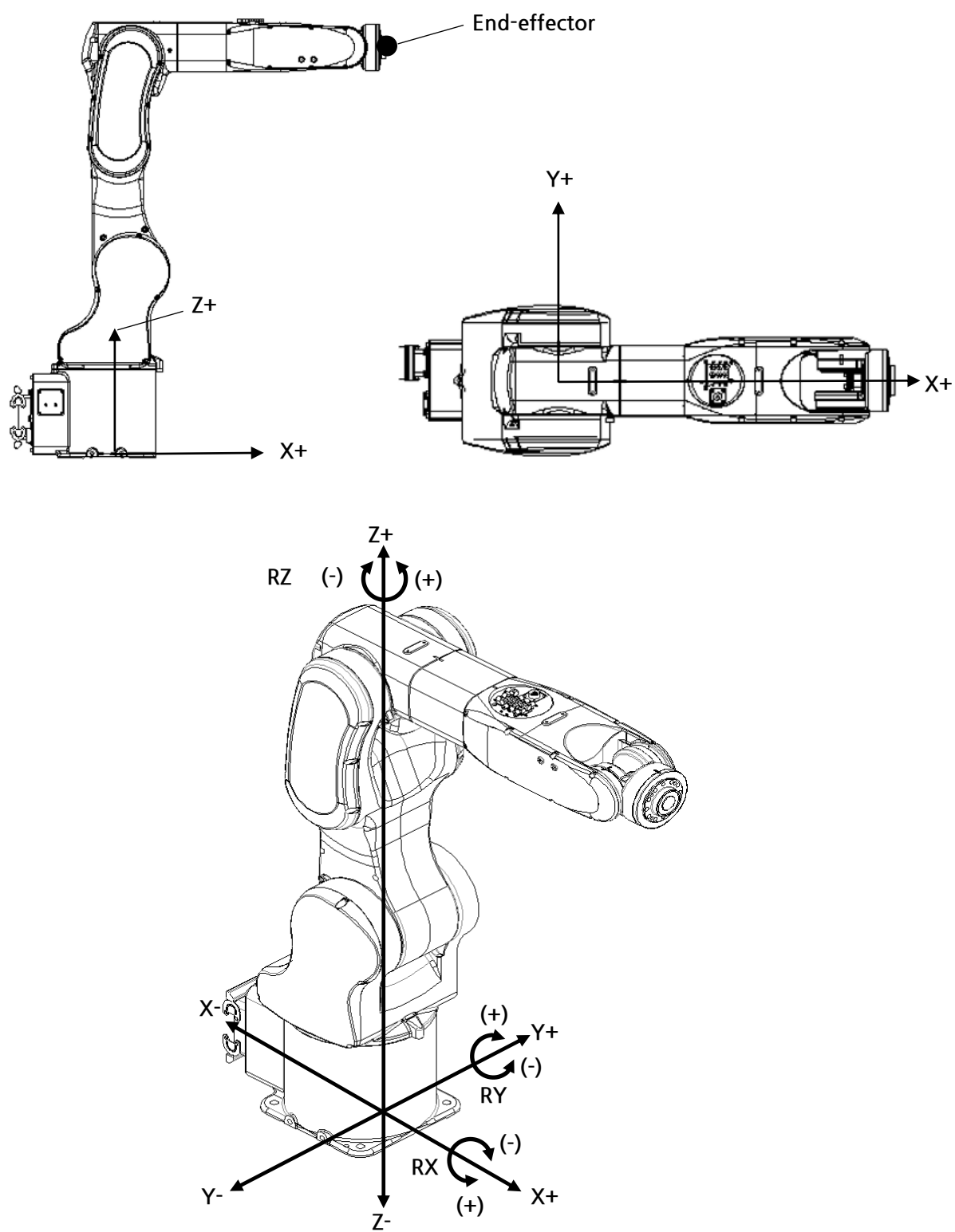


Figure 2-2 Base coordinate system

1.4 TOOL coordinates definition

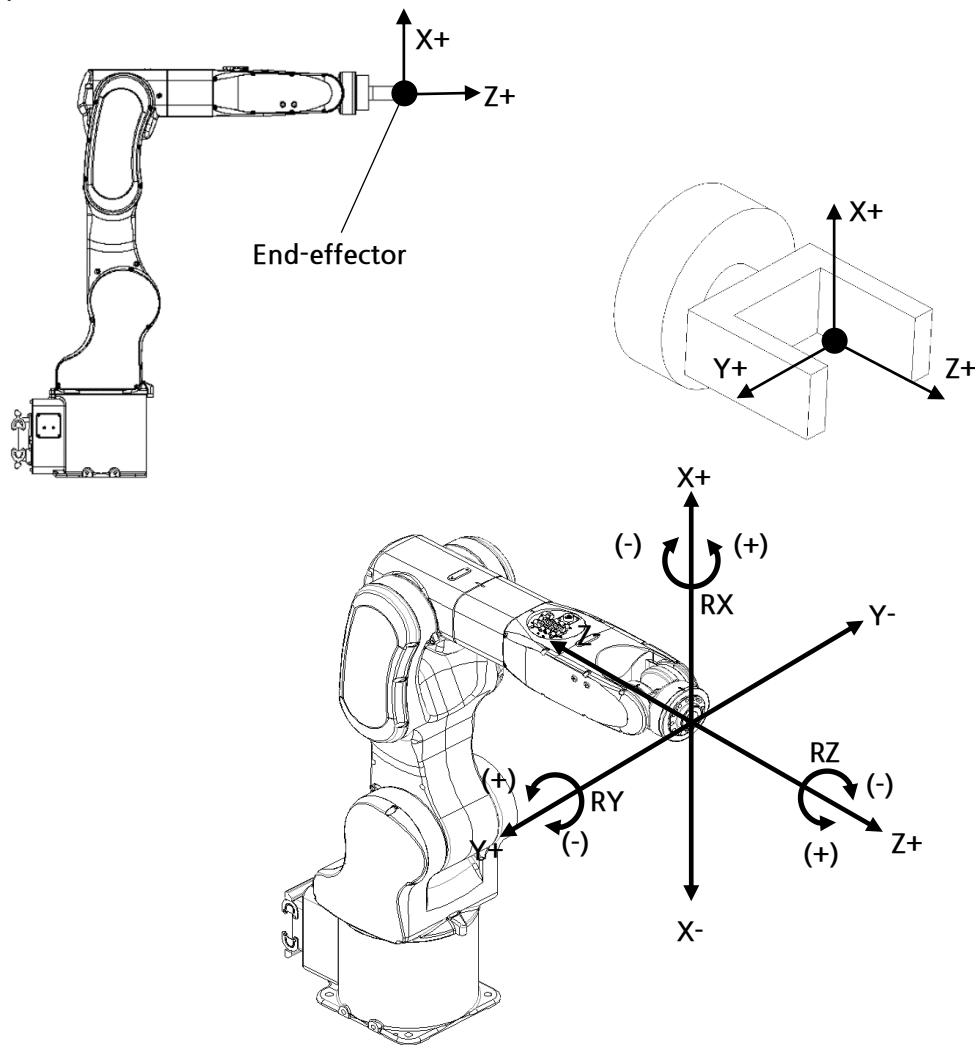


Figure 2-3 Tool coordinate system

1.5 USER coordinates definition

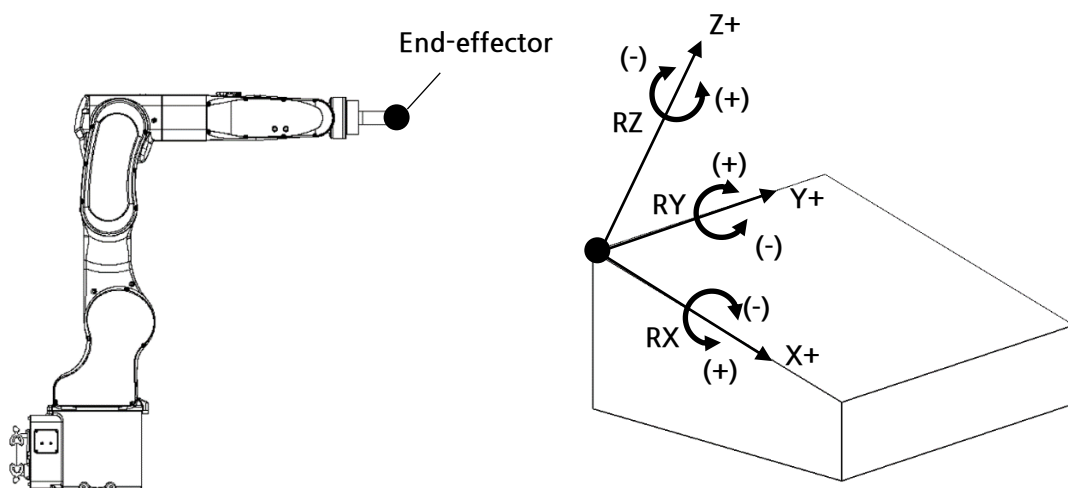


Figure 2-4 User coordinate system

2. Posture of Vertical Articulated robot

Shape of 6-axis Vertical Articulated robot differs depending on posture of shoulder, elbow, and wrist on one end-effector position.

2.1 Shoulder posture

If wrist center (WC) position viewed from right vertical direction from the front of the robot is located in front of 1 rotating axis, it is expressed as FRONT shaped posture. If wrist center (WC) position is on the rear, it is expressed as REAR shaped posture.

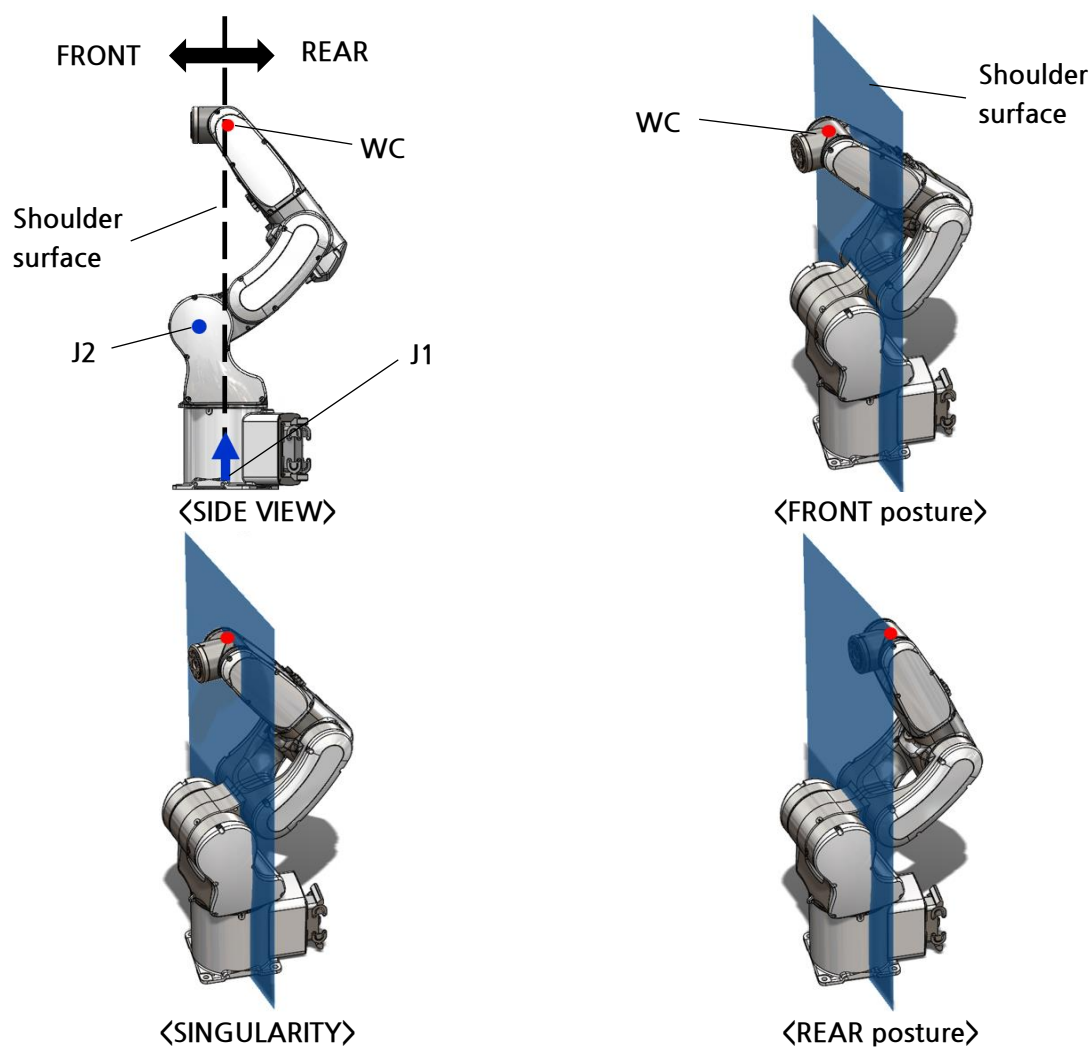


Figure 2-5 Robot shoulder posture

2.2 Elbow posture

If robot wrist center (WC) position is located toward (+) direction from center line that links 2 axis and 3 axis, it is expressed as UP shaped posture. If toward (-) direction, expressed as DOWN shaped posture.

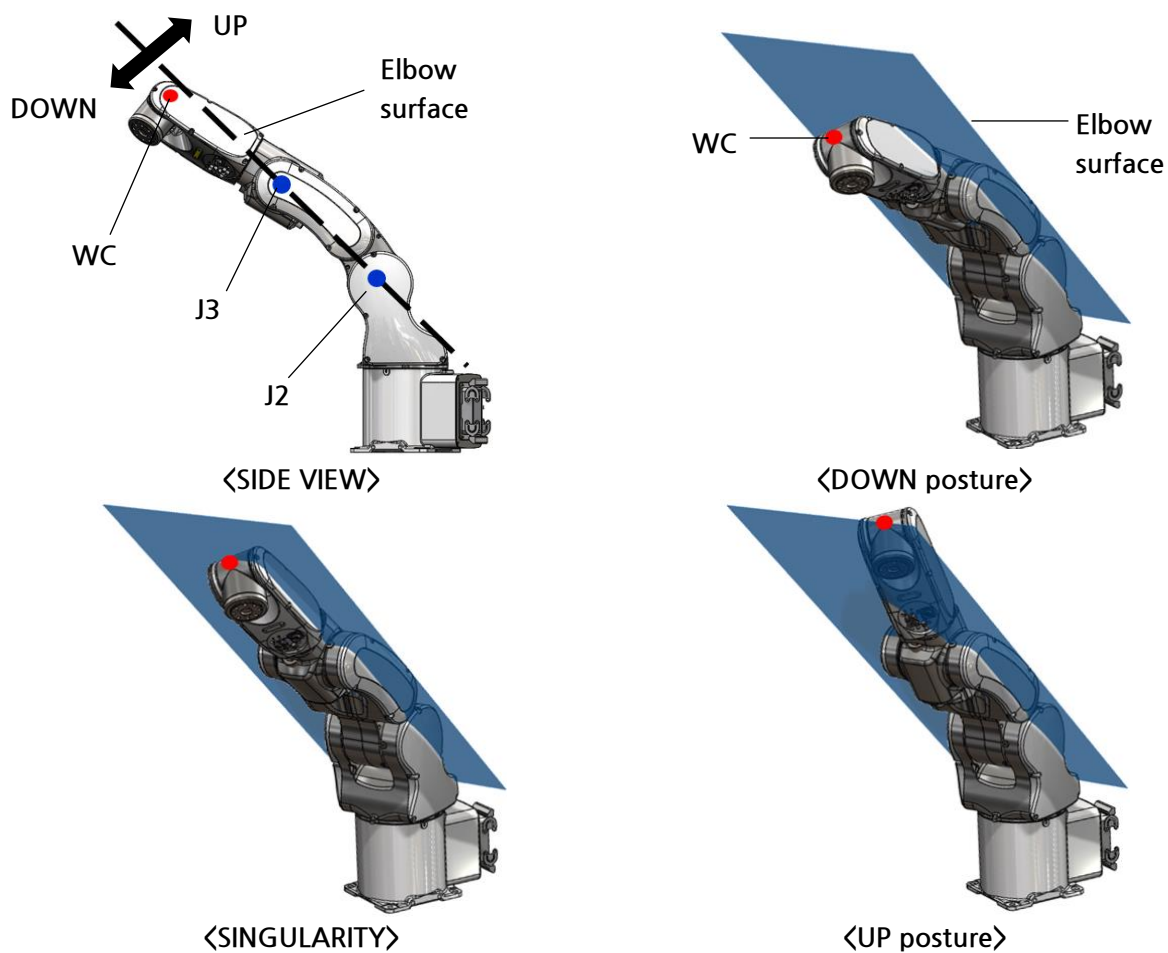


Figure 2-6 Robot elbow posture

2.3 Wrist posture

If end-effector is located toward (+) direction based on 4-axis rotation axis, it is expressed as FLIP shaped posture. If (-) direction, expressed as NONFLIP shaped posture.

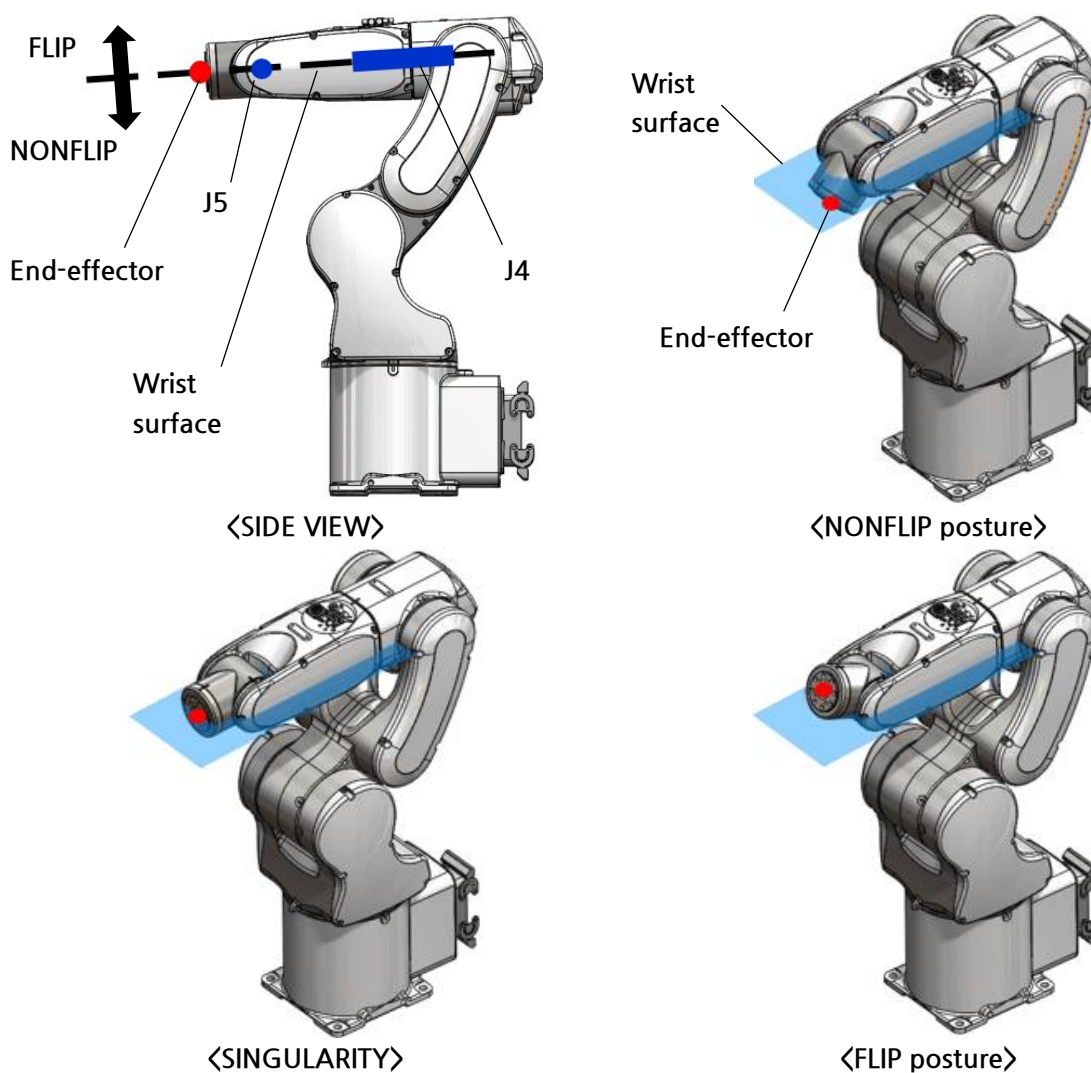


Figure 2-7 Robot wrist posture



- 1) Increase of acceleration of specific axis at point where robot posture changes during straight or circular interpolation move can occur.

2.4 Robot posture number

Robot posture data for each point is defined as shown in the table below.

Value	Shoulder	Elbow	Wrist
000	NOT DEFINED	NOT DEFINED	NOT DEFINED
001	NOT DEFINED	NOT DEFINED	FLIP
002	NOT DEFINED	NOT DEFINED	NON FLIP
010	NOT DEFINED	DOWN	NOT DEFINED
011	NOT DEFINED	DOWN	FLIP
012	NOT DEFINED	DOWN	NON FLIP
020	NOT DEFINED	UP	NOT DEFINED
021	NOT DEFINED	UP	FLIP
022	NOT DEFINED	UP	NON FLIP
100	REAR	NOT DEFINED	NOT DEFINED
101	REAR	NOT DEFINED	FLIP
102	REAR	NOT DEFINED	NON FLIP
110	REAR	DOWN	NOT DEFINED
111	REAR	DOWN	FLIP
112	REAR	DOWN	NON FLIP
120	REAR	UP	NOT DEFINED
121	REAR	UP	FLIP
122	REAR	UP	NON FLIP
200	FRONT	NOT DEFINED	NOT DEFINED
201	FRONT	NOT DEFINED	FLIP
202	FRONT	NOT DEFINED	NON FLIP
210	FRONT	DOWN	NOT DEFINED
211	FRONT	DOWN	FLIP
212	FRONT	DOWN	NON FLIP
220	FRONT	UP	NOT DEFINED
221	FRONT	UP	FLIP
222	FRONT	UP	NON FLIP

Chapter 3 Robot Manual Operation (Teaching) Method

1. Overview of Robot Manual Operation (Teaching)

The function is to save coordinates value through direct teaching (CURR mode, JOG) or manual input (MDI mode)

Global Point	It's the coordinate value that can be accessed from all channels, all JOB files in the Controller as Global Variable. Teaching points can be saved up to 2,000 points. edit functions such as copy, move, delete are provided in teaching mode
JOB Point	It's the coordinate value that can be accessed from individual JOB file as a program variable. It can be used as a Global Variable in that file, but other files cannot refer to this. Teaching points can be saved up to 1,000 points. edit functions such as Copy, Move, Delete are provided in JOB point edit screen. The points in each JOB file are independent, it doesn't matter if it's duplicated.
Parameter Point	If robot coordinate value is needed in parameter edit windows such as Tool Calibration, USER parameter, save data through teaching.

2. Flowchart of Robot Manual Operation (Teaching)

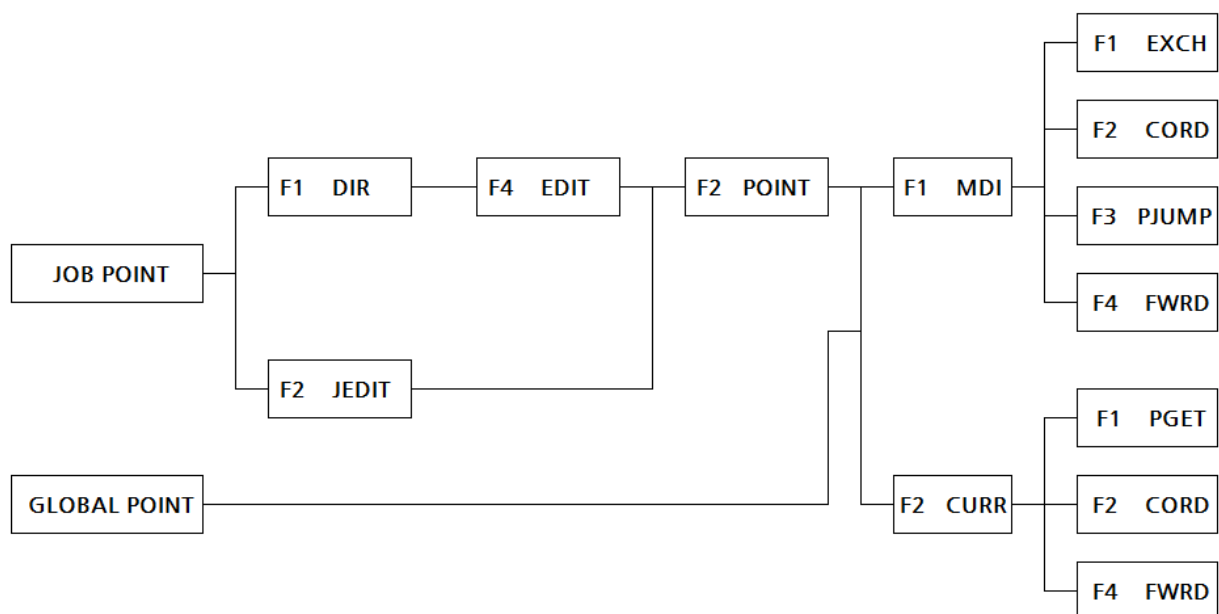
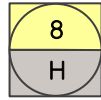
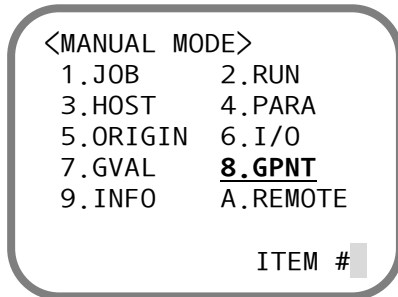


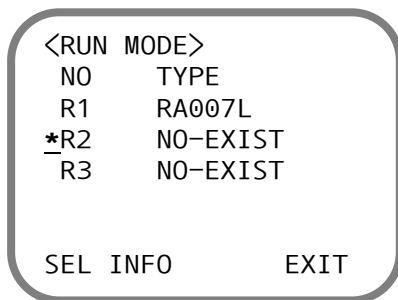
Figure 3-1 Robot teaching flowchart

3. Access to Robot Manual Operation (Teaching) screen

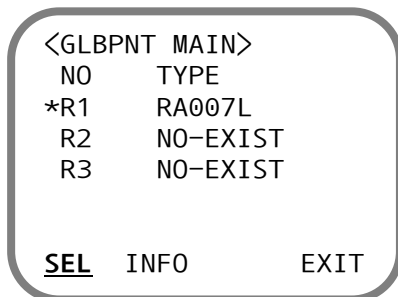
3.1 Access to Global Point Teaching screen



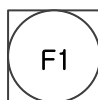
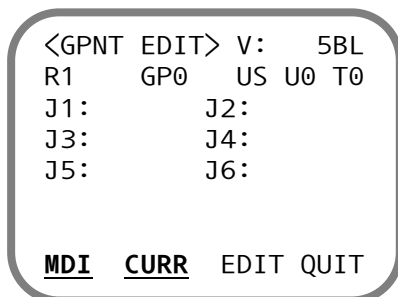
Input number key in the main menu screen to select "8.GPNT".



Use arrow keys to select robot channel.
 Check current position with "*".



Use F1 (SEL) Function key to select robot channel.



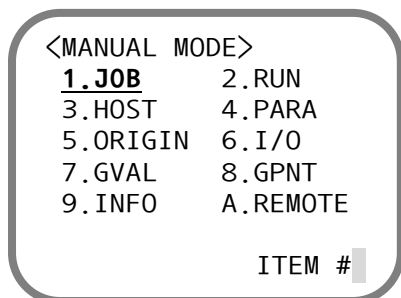
Run in MDI mode.

OR

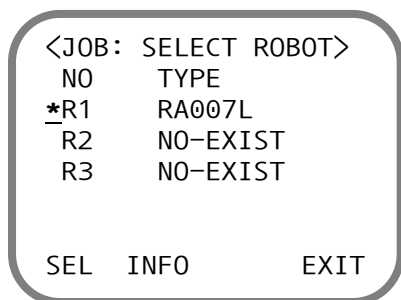


Run in CURR mode.

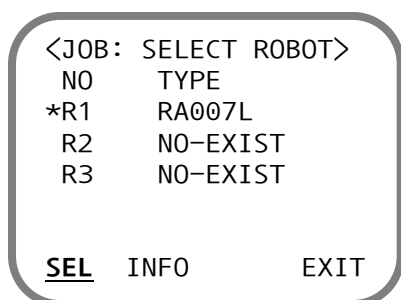
3.2 JOB Point Teaching screen access



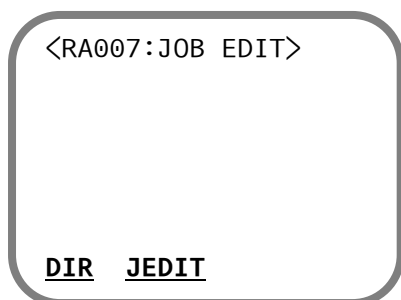
Input number key in the main menu screen to select "1.JOB".



Use arrow keys to select robot channel.
Check current position with “*”.



Use F1 (SEL) Function key to select robot channel.



Move to JOB select screen.

OR



Move to JOB create screen.

```
<RA007:DIR>
NO  NAME  PNT STEPS
*000.TEST  0   52

COPY  REN  DEL  EDIT
```



Use arrow keys to select a JOB file when DIR is selected.

```
<RA007:DIR>
NO  NAME  PNT STEPS
*000.TEST  0   52

COPY  REN  DEL  EDIT
```



Use F4 (EDIT) Function key to move to JOB Point edit screen.

```
<RA007:EDIT>
JOB NAME = TEST

PROG POINT
```



Move to JOB POINT edit screen.

```
<PNT JOINT> V:   5BL
TEST P0      US U0 T0
J1:-         J2:-
J3:-         J4:-
J5:-         J6:-

MDI CURR  EDIT  QUIT
```



Run in MDI mode.

OR



Run in CURR mode.

4. SVON (Servo ON) method

※ SVON LED on the T/P turns on when the motor power is normally applied

●ORG ●SVON ○RUN ○SHIFT ○ALRM

※ In case that ENB parameter (described in chapter 6, section 7.1.3.1) is ENB, you should enter the SVON key while holding pressing the Deadman switch to turn Servo on

※ If Deadman Mute contact in the front of the Controller is open, operate the Deadman switch even when ENB parameter (described in chapter 6, section 7.1.3.1) is DIS.

※ Refer to the following description to operate Deadman switch.

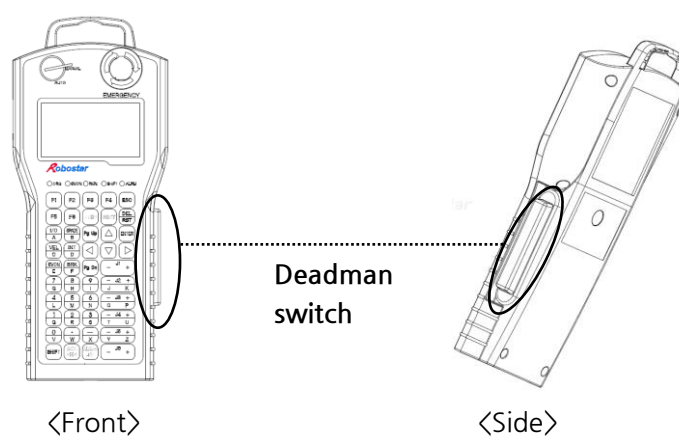


Figure 3-2 Deadman Switch

※ The Deadman switch has the following 3 operational steps.

Operational step	Switch pressing force	Switch status	SVON
Step 1	Not pressed or pressed lightly	OFF	X
Step 2	Slightly pressed to make a “click” sound and held pressed	ON	O
Step 3	More pressed than Step 2 and held pressed down	OFF	X

5. MDI (Manual Direct Input) mode

5.1 MDI screen

<MDI JOINT> V: 5BL
R1 GP0 US U0 T0
J1: J2:
J3: J4:
J5: J6:

EXCH CORD PJUMP FWRD

Line	Item	Description		
1	JOINT	Current teaching coordinate system. (JOINT, BASE, TOOL, USER)		
	V : 5	Displays operating velocity by percentage of Jv value of JOINT parameter.		
	B	Brake status. (B : Brake on, blank : Brake off)		
	L	JOG mode and velocity level.	Continuous mode	L : low, M : medium, H : high speed
			Inching mode	l : low, m : medium, h : high speed
2	R1	Selected channel. (R1 : CH1, R2 : CH2, R3 : CH3)		
	GP0	Displays Point Index number that is being edited. (GP : Global Point, P : JOB Point)		
	US	Point saving status. (NW : Before saving, US : After saving)		
	U0	Current USER coordinate system number. (U0 ~ U15)		
	T0	Current TOOL coordinate system number. (T0 ~ T15)		
3 ~ 5	J1 ~ J6	Coordinate value of each axis. Axis name is differently displayed depending on coordinate system.		
		JOINT coordinate system		J1, J2, J3, J4, J5, J6
		BASE coordinate system		X, Y, Z, RX, RY, RZ
		TOOL coordinate system		Xt, Yt, Zt, RX, RY, RZ
		USER coordinate system		Xu, Yu, Zu, RX, RY, RZ
		※ In case of axis of which XENB parameter is DIS, axis name and information are not displayed in the screen.		
8	EXCH	Saves Point data displayed in the current screen at current Point Index.		
	CORD	Converts current coordinate system.		
	PJUMP	Moves to Point of entered Index number.		
	FWRD	Performs JMOV or LMOV operation with currently entered Point.		

5.2 How to manually input robot coordinate

※ Check if ORG LED on the T/P is on before inputting Point data. For description of each LED, refer to ⑤Status LED description in chapter 1, section 5.1.

●ORG ○SVON ○RUN ○SHIFT ○ALRM

```
<MDI JOINT> V: 5BL
R1   GP0   NW U0 T0
J1:- J2:-
J3:- J4:-
J5:- J6:-
```

EXCH CORD PJUMP FWRD

Move to MDI Teaching screen in Global or JOB Point edit screen.

```
<MDI JOINT> V: 5BL
R1   GP0   NW U0 T0
J1:- J2:-
J3:- J4:-
J5:- J6:-
```

EXCH CORD PJUMP FWRD

Pg Up

Use PgUp, PgDn keys to change Point Index.
Use GP0 or P0 of the 2nd line on the T/P to check Point Index.

Pg Dn

※ If PgUp, PgDn key is pressed at the 1st or last Point Index, Point Index won't be changed.

```
<MDI JOINT> V: 5BL
R1   GP0   NW U0 T0
J1:- J2:-
J3:- J4:-
J5:- J6:-
```

PNT NUM =

F3

Press F3 (JUMP) Function key to input Point Index number to be moved.

※ If range is exceeded, "OUT OF BOUND" message is displayed and fail to move.

```
<MDI JOINT> V: 5BL
R1   GP0   NW U0 T0
J1:- J2:-
J3:- J4:-
J5:- J6:-
```

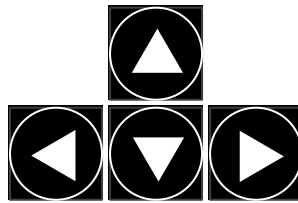
EXCH CORD PJUMP FWRD

If moved Point Index is already saved, "US" is displayed in 2nd line on the T/P and coordinate value is displayed.

If moved Point Index is not already saved, "NW" is displayed in 2nd line on the T/P and blank is displayed for coordinate value.

```
<MDI JOINT> V: 5BL
R1 GP0 NW U0 T0
J1:- J2:-
J3:- J4:-
J5:- J6:-

EXCH CORD PJUMP FWRD
```



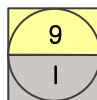
Use arrow keys to move cursor to the item to be edited.
Check current position with the cursor.

```
<MDI JOINT> V: 5BL
R1 GP0 NW U0 T0
J1:- J2:17.3
J3:- J4:-
J5:- J6:-

EXCH CORD PJUMP FWRD
```



~



Use number keys to enter coordinate value at cursor position.

```
<MDI JOINT> V: 5BL
R1 GP0 NW U0 T0
J1:- J2:17.3
J3: J4:-
J5:- J6:-

EXCH CORD PJUMP FWRD
```



Press ENTER key to set coordinate value and to move to the next axis.

5.3 Changing Coordinate system

※ For changing coordinates and teaching, you are required to understand about the vertical articulated robot.

Therefore, be well aware of description of coordinate system in chapter 2, section 1 Coordinate system before operation.

```
<MDI JOINT> V: 5BL
R1 GP0 US U0 T0
J1:0 J2:0
J3:0 J4:0
J5:0 J6:0
```

EXCH CORD PJUMP FWRD

Move to MDI Teaching screen in Global or JOB Point edit screen.

```
<MDI BASE > V: 5BL
R1 GP0 US U0 T0
X :573 Y :0
Z :843 RX:-135
RY:90 RZ:-45
```

EXCH CORD PJUMP FWRD



Press F2 (CORD) Function key to convert from current coordinate system into another coordinate system.

Conversion order is JOINT → BASE → USER → TOOL.

```
<MDI TOOL > V: 5BL
R1 GP0 US U0 T0
Xt:573 Yt:0
Zt:843 RX:-135
RY:90 RZ:-45
```

EXCH CORD PJUMP FWRD

The coordinate value in the TOOL, USER coordinate system may differ depending on Currently selected USER, TOOL Index.

5.4 TOOL number change

```

<MDI BASE > V: 5BL
R1 GP0 US U0 T0
Xt:573 Yt:0
Zt:843 RX:-135
RY:90 RZ:-45

TOOL NO(0-15) = 0

```



Press INT key when current coordinate system is BASE or TOOL coordinate system. Screen to enter TOOL number is displayed on the bottom of the T/P.

```

<MDI BASE > V: 5BL
R1 GP0 US U0 T0
Xt:573 Yt:0
Zt:843 RX:-135
RY:90 RZ:-45

TOOL NO(0-15) = 11

```



~



Use number keys to enter coordinate value at cursor position.

```

<MDI BASE > V: 5BL
R1 GP0 US U0 T0
Xt:573 Yt:0
Zt:843 RX:-135
RY:90 RZ:-45

CHANGE TOOL NUMBER!!

```



Input ENTER key to display success message on bottom of the T/P. TOOL number is changed or display failure message and maintain current TOOL number.

Successful conversion	CHANGE TOOL NUMBER
Failed conversion	FAIL LOAD COORDINATE

```

<MDI JOINT> V: 5BL
R1 GP0 US U0 TB
Xt:573 Yt:0
Zt:843 RX:-135
RY:90 RZ:-45

EXCH CORD PJUMP FWRD

```



Press ENTER key to display changed TOOL number in one hexadecimal digit in the 2nd screen of the T/P.
Ex) decimal (0 ~ 15) → hexadecimal (0 ~ F)

5.5 USER number change

<MDI USER > V: 5BL
R1 GP0 US U0 T0
Xu:0 Yu:0
Zu:0 RX:-135
RY:90 RZ:-45

USER NO(0-15) = 0



Press INT key when current coordinate system is USER coordinate system. Screen to enter USER number is displayed on the bottom of the T/P.

<MDI USER > V: 5BL
R1 GP0 US U0 T0
Xu:0 Yu:0
Zu:0 RX:-135
RY:90 RZ:-45

USER NO(0-15) = 11



~



Use number keys to enter coordinate value at cursor position.

<MDI USER > V: 5BL
R1 GP0 US U0 T0
Xu:0 Yu:0
Zu:0 RX:-135
RY:90 RZ:-45

CHANGE USER NUMBER!!



Input ENTER key to display success message on bottom of the T/P. USER number is changed or display failure message and maintain current USER number.

Conversion successful	CHANGE USER NUMBER
Conversion failed	FAIL LOAD COORDINATE

<MDI JOINT> V: 5BL
R1 GP0 US UB T0
Xu:0 Yu:0
Zu:0 RX:-135
RY:90 RZ:-45

EXCH CORD PJUMP FWRD



Press ENTER key to display changed USER number in one hexadecimal digit in the 2nd screen of the T/P.
Ex) decimal (0 ~ 15) → hexadecimal (0 ~ F)

5.6 EXCH (Exchange) method

5.6.1 How to exchange points in the Joint Coordinate system

```
<MDI JOINT> V: 5BL
R1 GP0 NW U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0
```

UPDATE? (ENT/ESC)



F1 (EXCH) Function key is to ask whether to save coordinate value input in the current screen at current Point Index.

```
<MDI JOINT> V: 5BL
R1 GP0 US U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0
```

EXCH CORD PJUMP FWRD



Press ENTER key to change “NW” (NEW) to “US” (USED) in 2nd line on the T/P and temporarily save it.

```
<MDI JOINT> V: 5BL
R1 GP0 NW U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0
```

PLEASE ORIGIN SEARCH

※ If ORG LED on the T/P is off,

☒ORG ☐SVON ☐RUN ☐SHIFT ☐ALRM

“PLEASE ORIGIN SEARCH” message is displayed and Point can’t be saved.

Refer to chapter 6, section 5.1.4.3 to perform ORGIN.

5.6.2 How to exchange Points in the BASE, USER, TOOL coordinate systems

```

<MDI BASE > V: 5BL
R1 GP0 US U0 T0
X :573 Y :0
Z :843 RX:-135
RY:90 RZ:-45

```

CURR FORM? (ENT/ESC)



F1 (EXCH) Function key is to display a message to ask posture to save coordinate value input in the current screen.

※ In case of N2 Series, Point value is saved based on JOINT. Point value may differ depending on robot posture when BASE, USER, TOOL coordinate data are converted into JOINT coordinate. Convert it into current posture or specific posture to save Point value

※ For description of robot posture, refer to chapter 2, section 2.

```

<MDI BASE > V: 5BL
R1 GP0 US U0 T0
X :573 Y :0
Z :843 RX:-135
RY:90 RZ:-45

```

CURR FORM? (ENT/ESC)



Save coordinate at current robot posture.

OR



Input robot posture.

1) When ESC is pressed

```

<MDI BASE > V: 5BL
R1 GP0 US U0 T0
X :573 Y :0
Z :843 RX:-135
RY:90 RZ:-45

```

CURR SHOULDER: FRONT
FRON REAR CURR



Set robot shoulder posture to FRONT.



Set robot shoulder posture to REAR.



Set robot shoulder posture to current posture.

```

<MDI BASE > V: 5BL
R1 GP0 US U0 T0
X :573 Y :0
Z :843 RX:-135
RY:90 RZ:-45

```

CURR ELBOW: DOWN
UP DOWN CURR



Set robot elbow posture to UP.



Set robot elbow posture to DOWN.



Set robot elbow posture to current posture.

```

<MDI BASE > V: 5BL
R1 GP0 US U0 T0
X :573 Y :0
Z :843 RX:-135
RY:90 RZ:-45

```

```

CURR WRIST: NONFL
FLIP NONFL CURR

```

F1

Set robot wrist posture to FLIP.

F2

Set robot wrist posture to NONFLIP.

ESC

Set robot wrist posture to current posture.

2) When ENTER is pressed

```

<MDI JOINT> V: 5BL
R1 GP0 NW U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0

```

UPDATE? (ENT/ESC)

F1

F1 (EXCH) Function key is to ask whether to save coordinate value input in the current screen at current Point Index.

```

<MDI JOINT> V: 5BL
R1 GP0 US U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0

```

EXCH CORD PJUMP FWRD

ENTER

Press ENTER key to change “NW” (NEW) to “US” (USED) in 2nd line on the T/P and temporarily save it.

```

<MDI JOINT> V: 5BL
R1 GP0 NW U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0

```

PLEASE ORIGIN SEARCH

※ If ORG LED on the T/P is off,

ORG OSVON ORUN OSHIFT OALRM

“PLEASE ORIGIN SEARCH” message is displayed and Point can’t be saved.

Refer to chapter 6, section 5.1.4.3 to perform ORIGIN.

5.7 Forward method

※ Check for any person in robot operating range before operating the Controller.

<MDI JOINT> V: 5BL
R1 GP0 US U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0

EXCH CORD PJUMP FWRD



Press SVON key to supply motor power.

<MDI JOINT> V: 5 L
R1 GP0 US U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0

EXCH CORD PJUMP FWRD



Press VEL key to change velocity level.

Velocity level	T/P screen
Low Speed (5)	“L” or “l”
Middle Speed (50)	“M” or “m”
High Speed (100)	“H” or “h”

<MDI JOINT> V: 5 L
R1 GP0 US U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0

JMOV LMOV



F4 (FWRD) Function key is to perform Forward function.

- ※ If Origin setup is not set, “PLEASE ORIGIN SEARCH” message is displayed on the T/P.
- ※ If SVON is not set, “PLEASE SERVO ON!” message is displayed on the T/P.

<MDI JOINT> V: 5BL
R1 GP0 US U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0

JMOV LMOV



JMOV Forward

OR



LMOV Forward

```
<MDI JOINT> V: 5 L
R1 GP1 US U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0
```

NOT TEACHING POINT!

If Point displayed currently is not saved,
“NOT TEACHING POINT!” message is
displayed on the T/P.

```
<MDI JOINT> V: 5 L
R1 GP0 US U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0
```

READY? (ENT/ESC)



Perform Forward.

OR



Not perform Forward.

```
<MDI JOINT> V: 5 L
R1 GP0 US U0 T0
J1:0 J2:17.3
J3:0 J4:0
J5:0 J6:0
```

F4:STOP



“F4 : STOP” message is displayed during
Forward operation and press F4 (STOP)
Function key to stop Forward.

※ If an alarm occurs or stops during Forward
operation, “FORWARD FAIL” message is
displayed on the T/P.

5.8 How to save Points

```

<MDI JOINT> V: 5BL
R1   GP0   US U0 T0
J1:0   J2:17.3
J3:0   J4:0
J5:0   J6:0

```

UPDATE OK?(ENT/ESC)



OR



If Point is temporarily saved by EXCH function, a message is displayed to ask whether to save it finally when teaching screen ends.

```

<MDI JOINT> V: 5BL
R1   GP0   US U0 T0
J1:0   J2:17.3
J3:0   J4:0
J5:0   J6:0

```

UPDATE COMPLETE!



Press ENTER key to save Point.

```

<MDI JOINT> V: 5BL
R1   GP0   US U0 T0
J1:0   J2:17.3
J3:0   J4:0
J5:0   J6:0

```

LOST OK?(ENT/ESC)



Press ESC key to display a message to ask whether to cancel file saving.

```

<MDI JOINT> V: 5BL
R1   GP0   US U0 T0
J1:0   J2:17.3
J3:0   J4:0
J5:0   J6:0

```

R U SURE?(ENT/ESC)



Press ENTER key to display a message to ask whether to cancel file saving again.

6. CURR (Current Teaching) mode

6.1 CURR screen

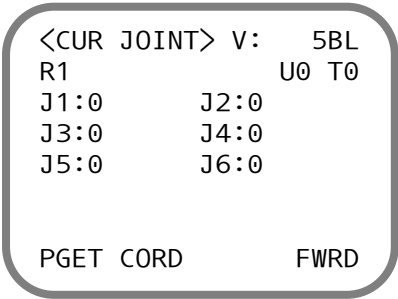
<CUR JOINT> V: 5BL
R1 U0 T0
J1:0 J2:0
J3:0 J4:0
J5:0 J6:0

PGET CORD FWRD

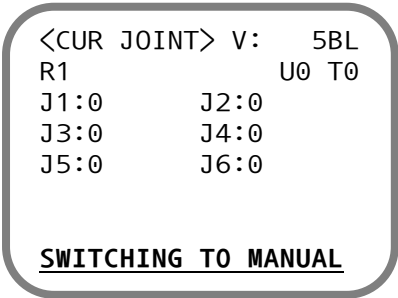
Line	item	Description		
1	JOINT	Displays current teaching coordinate system. (JOINT, BASE, TOOL, USER)		
	V : 5	Displays operating velocity by permillage of Jv value of JOINT parameter.		
	B	Brake status. (B : Brake on, blank : Brake off)		
	L	JOG mode and velocity level.	Continuous mode	L : low speed, M : medium speed, H : high speed
			Inch mode	l : low speed, m : medium speed, h : high speed
2	R1	Selected channel. (R1 : CH1, R2 : CH2, R3 : CH3)		
	U0	Current USER coordinate system number. (U0 ~ U15)		
	T0	Current TOOL coordinate system number. (T0 ~ T15)		
3 ~ 5	J1 ~ J6	Current coordinate value of each axis. Axis names are displayed differently depending on coordinate system..		
		JOINT coordinate system	J1, J2, J3, J4, J5, J6	
		BASE coordinate system	X, Y, Z, Rx, Ry, Rz	
		TOOL coordinate system	Xt, Yt, Zt, Rx, Ry, Rz	
		USER coordinate system	Xu, Yu, Zu, Rx, Ry, Rz	
		※ If XENB parameter of each axis is DIS, axis name and information is not displayed in the screen.		
8	PGET	Saves current position at Index Point.		
	CORD	Converts current coordinate system.		
	FWRD	Performs JMOV or LMOV operation toward Point designated at current position.		

6.2 Robot Manual Operation method (JOG)

※ Check for any person in robot operating range before operating the Controller.

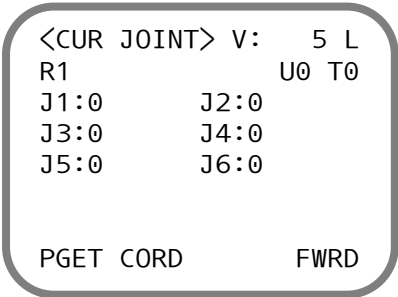


Move to CURR Teaching in Global or JOB Point edit screen.



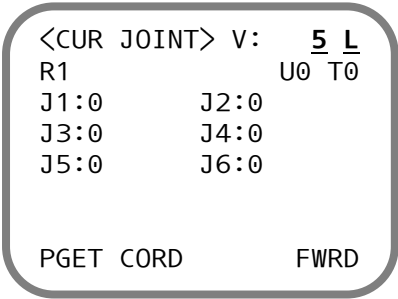
Mode Switch must be in Manual mode all the time during JOG operation. If switch is converted into Auto, “SWITCHING TO MANUAL” message is displayed on the bottom of the screen.

3) SVON method



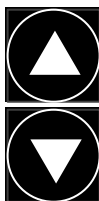
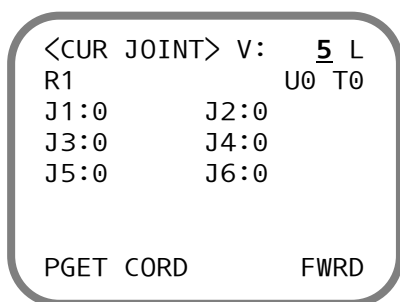
Press SVON key to supply motor power.

2) Velocity change



Press VEL key to change velocity level.

Velocity level	T/P screen
Low Speed (5)	“L” or “l”
Middle Speed (50)	“M” or “m”
High Speed (100)	“H” or “h”

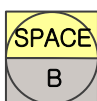
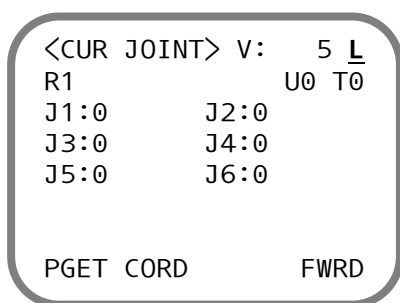


Use Up/down arrow key to change JOG velocity.

Width differs from velocity level.

Velocity level	Velocity width
Low Speed	1
Middle Speed	5
High Speed	10

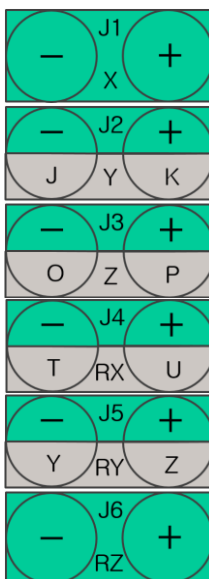
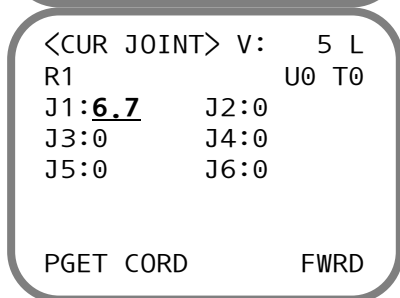
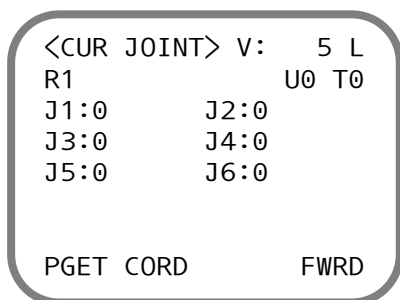
3) JOG mode change



Press SPACE key to convert JOG mode.

JOG mode	T/P screen
Continuous mode	"L", "M", "H"
Inching mode	"I", "m", "h"

4) Continuous JOG mode



Robot operates toward direction of the relevant key while JOG key is pressed.

Refer to chapter 2, section 1.2 to check if JOG key matches with actual moving direction.

※ If an additional axis is used, press AXIS CHG key to convert screen.

Use J1 key to operate additional axis number 1, and use J2 key to operate additional axis number 2.

※ Input SPACE key to convert JOG mode. (If JOG mode is Continuous mode, the alphabet “L” is displayed next to velocity on T/P screen. If it is Inching mode, the alphabet “I” is displayed..)

※ Continuous mode operates the robot only while holding the JOG key pressed. Inching mode is to move as much as the distance set at parameter.

5) Inching JOG mode

<CUR JOINT> V: 5 1

R1 U0 T0

J1:0 J2:0

J3:0 J4:0

J5:0 J6:0

PGET CORD IDIST FWRD

<CUR JOINT> V: 5 1

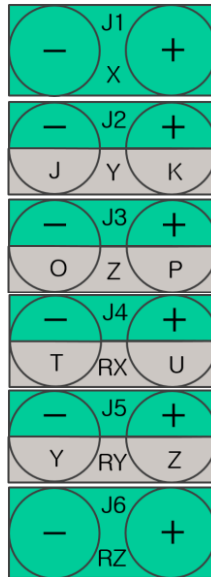
R1 U0 T0

J1:1 J2:0

J3:0 J4:0

J5:0 J6:0

PGET CORD IDIST FWRD



Input JOG key to move as much as la value of JOINT parameter.

Ex) If la value is 1 (Default), move as much as 1mm.

※ If an additional axis is used, press AXIS CHG key to convert screen.
Use J1 key to operate additional axis number 1, and use J2 key to operate additional axis number 2.

※ If JOG moves in the opposite direction, change DISP parameter in chapter 6, section 5.2.4.

※ An example of JOG in JOINT coordinate system : 3-axis +30.000 JOG

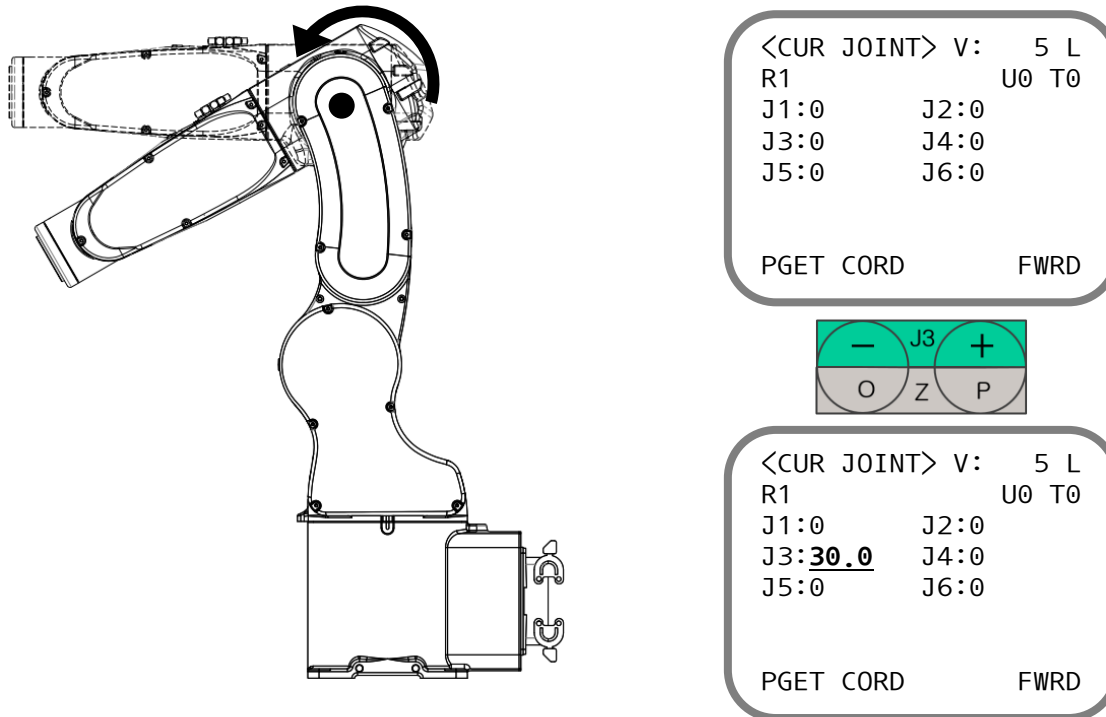
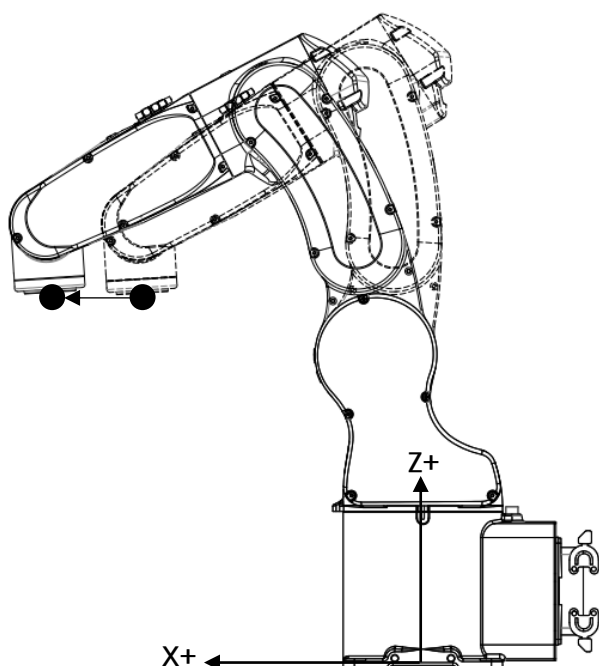


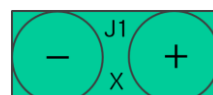
Figure 3-3 A JOG example in JOINT coordinate system

※ An example of JOG in Base coordinate system : X-AXIS +100.000 JOG MOVE



```
<CUR BASE> V: 5 L
R1          U0 T0
X :300      Y :0
Z :400      RX:-180
RY:-3.621  RZ:0
```

PGET CORD FWRD

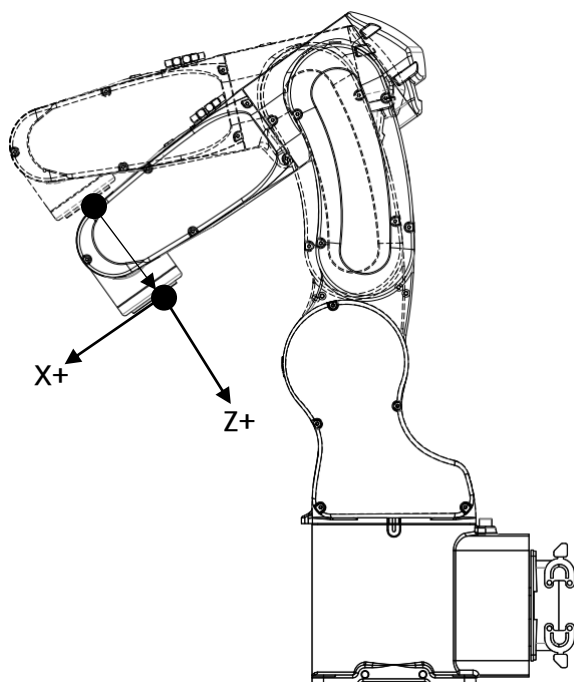


```
<CUR JOINT> V: 5 L
R1          U0 T0
X :400      Y :0
Z :400      RX:-180
RY:-3.621  RZ:0
```

PGET CORD FWRD

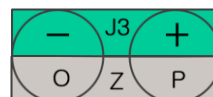
Figure 3-4 A JOG example in Base coordinate system

※ An example of JOG in TOOL coordinate system : Z-AXIS +100.000 JOG MOVE



```
<CUR TOOL> V: 5 L
R1          U0 T0
Xt:250      Yt:0
Zt:400      RX:-180
RY:-35.439 RZ:0
```

PGET CORD FWRD



```
<CUR TOOL> V: 5 L
R1          U0 T0
Xt:320      Yt:0
Zt:500      RX:-180
RY:-35.437 RZ:0
```

PGET CORD FWRD

Figure 3-5 A JOG example in TOOL coordinate system

6.3 Changing coordinate systems

Description related in changing coordinate systems is same with that of MDI mode. Hence, refer to chapter 3, section 5.3.

6.4 PGET (Point Get) method

```

<PGET>
SELECT POINT NUMBER
RANGE : 0 - 1999

POINT NUM: █
  
```



F1 (PGET) Function key in CURR screen is to display screen to enter Point Index to be saved.

```

<PGET>
SELECT POINT NUMBER
RANGE : 0 - 1999

POINT NUM: 10

UPDATE? (ENT/ESC)
  
```



~



Use number keys to enter Point Index number.

Press ENTER key to temporarily save Point.

Message to check update is displayed.

```

<PGET>
SELECT POINT NUMBER
RANGE : 0 - 1999

POINT NUM: 10

UPDATE COMPLETE
  
```

If “UPDATE COMPLETE” message is displayed on the T/P screen, Point is successfully temporary saved.

※ If another screen is displayed, refer to the screen below.

```

<PGET>
SELECT POINT NUMBER
RANGE : 0 - 1999

POINT NUM: 2000

INVALID NUMBER
  
```



~



If Point Index number that exceeds the range, “INVALID NUMBER” message is displayed on the T/P.

※ You can input 0 ~ 1,999 in case of Global Point, 0 ~ 999 in case of JOB point.

```

<CUR JOINT> V:  5 L
R1           US U0 T0
J1:0        J2:0
J3:0        J4:0
J5:0        J6:0

PLEASE ORIGIN SEARCH

```



※ If ORG LED on the T/P is off,



“PLEASE ORIGIN SEARCH” message is displayed and Point can’t be saved.
Refer to chapter 6, section 5.1.4.3 to perform ORGIN.

6.5 Forward method

```

<CUR JOINT> V:  5 L
R1           U0 T0
J1:0        J2:0
J3:0        J4:0
J5:0        J6:0

PGET CORD      FWRD

```



F4 (FWRD) Function key is to perform Forward function.

※ At this point, if Origin Return is not performed, “PLEASE ORIGIN SEARCH” message is displayed on the T/P.

※ At this point, if SVON is not performed, “PLEASE SERVO ON!” message is displayed on the T/P.

```

<CUR JOINT> V:  5 L
R1           U0 T0
J1:0        J2:0
J3:0        J4:0
J5:0        J6:0

JMOV LMOV

```



JMOV Forward

OR



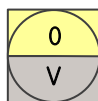
LMOV Forward

```

<CUR JOINT> V:  5 L
R1           U0 T0
J1:0        J2:0
J3:0        J4:0
J5:0        J6:0

PNT NUM = █

```



Use number keys to enter Point Index number to move to.

~



※ If SVON is not performed, “PLEASE SERVO ON!” message is displayed.

※ If value that exceeds the range is entered, “FAILED PNT NUM!” message is displayed.

※ If you enter a not-taught value, “NOT TEACHING POINT!” message is displayed.

```
<CUR JOINT> V:    5 L
R1    GP0      U0 T0
J1:0      J2:0
J3:0      J4:0
J5:0      J6:0

READY? (ENT/ESC)
```



Perform Forward. Point number is displayed in 2nd line on the T/P.

OR



Not perform Forward.

```
<CUR JOINT> V:    5 L
R1    GP0      U0 T0
J1:0      J2:0
J3:0      J4:0
J5:0      J6:0

F4:STOP
```



"F4 : STOP" message is displayed during Forward operation and press F4 (STOP) Function key to stop Forward.

※ If an alarm occurs or stops during Forward operation, "FORWARD FAIL" message is displayed on the T/P.

6.6 How to save Points

```
<CUR JOINT> V: 5 L
R1          U0 T0
J1:0        J2:0
J3:0        J4:0
J5:0        J6:0

UPDATE OK?(ENT/ESC)
```

If Point is temporarily saved by PGET function, a message is displayed to ask whether to save it finally when teaching screen ends.

```
<CUR JOINT> V: 5 L
R1          U0 T0
J1:0        J2:0
J3:0        J4:0
J5:0        J6:0

UPDATE COMPLETE!
```



Press ENTER key to save Point.

```
<CUR JOINT> V: 5 L
R1          U0 T0
J1:0        J2:0
J3:0        J4:0
J5:0        J6:0

LOST OK?(ENT/ESC)
```



Press ESC key to display a message to ask whether to cancel file saving.

```
<CUR JOINT> V: 5 L
R1          U0 T0
J1:0        J2:0
J3:0        J4:0
J5:0        J6:0

R U SURE?(ENT/ESC)
```



Press ESC key to display a message to ask whether to cancel file saving.

6.7 Special function (I/O)

```

<CUR JOINT> V:   5BL
R1              U0 T0
J1:0           J2:0
J3:0           J4:0
J5:0           J6:0
OUT 0123456789ABCDEF
00 0000000000000000
PGET CORD      FWRD

```



Press DISP key in CURR Teaching screen to display screen with which to edit Digital I/O monitoring in the 6 ~ 7th line.

```

<CUR JOINT> V:   5BL
R1              U0 T0
J1:0           J2:0
J3:0           J4:0
J5:0           J6:0
IN 0123456789ABCDEF
00 0000000000000000
PGET CORD      FWRD

```



~



Bit number “0 ~ 9” are output using number keys. “A” (HEX expression of 10) bit ~ “F” (16) bit are output using “A ~ F” alphabets. Signals are displayed as “0” (LOW) or “1” (HIGH).

```

<CUR JOINT> V:   5BL
R1              U0 T0
J1:0           J2:0
J3:0           J4:0
J5:0           J6:0
IN 0123456789ABCDEF
00 0000000000000000
PGET CORD      FWRD

```



Arrow keys are to convert Input mode and Output mode. In case of the Input mode, only Contact Status can be monitored.

```

<CUR JOINT> V:   5BL
R1              U0 T0
J1:0           J2:0
J3:0           J4:0
J5:0           J6:0
IN 0123456789ABCDEF
16 0000000000000000
PGET CORD      FWRD

```



Use PgUp, PgDn keys to turn screen page contact port. Max page is differently applied according to Digital I/O parameter.

```

<CUR JOINT> V:   5BL
R1              U0 T0
J1:0           J2:0
J3:0           J4:0
J5:0           J6:0

PGET CORD      FWRD

```



Enter ESC key is to close I/O screen.

※ Output status is maintained even when the screen is disappears.

7. EDIT (Point edit) mode

7.1 EDIT screen

<EDIT GLOBAL POINT>

R:RA007

GP0	--	GP1	US
GP2	US	GP3	US
GP4	--	GP5	--
GP6	--	GP7	--
GP8	--	GP9	--

COPY MOVE DEL PJUMP

<EDIT POINT>

JOB:AA

P0	--	P1	US
P2	US	P3	US
P4	--	P5	--
P6	--	P7	--
P8	--	P9	--

COPY MOVE DEL PJUMP

Line	Item	Description
1	GLOBAL	Represents POINT item that is currently being edited (GLOBAL : Global Point, blank : JOB Point)
2	RA007	In case of Global Point, a robot model name of the selected channel is displayed. In case of JOB Point, A JOB file name is displayed.
3 ~ 7	J1 ~ J6	Displays whether to save each Point Index. (GP0 : Global Point, P0 : JOB Point) US : USED, -- : NON USED
8	COPY	Copies the selected Point as another Point Index.
	MOVE	Moves the selected Point to another Point Index.
	DEL	Deletes the selected Point.
	PJUMP	Moves screen to enter Point Index.

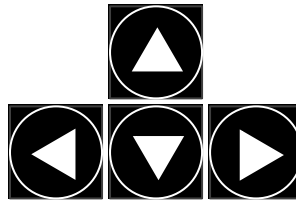
7.2 How to select Point Index

※ To use COPY, MOVE, DEL function, Point Index must be the selected first.

```
<EDIT GLOBAL POINT>
R:RA007
GP0  -- GP1  US
GP2  US GP3  US
GP4  -- GP5  --
GP6  -- GP7  --
GP8  -- GP9  --
COPY MOVE DEL PJUMP
```

Move to edit screen in Global or JOB Point edit screen.

```
<EDIT GLOBAL POINT>
R:RA007
GP0  -- GP1  US
GP2  US GP3  US
GP4  -- GP5  --
GP6  -- GP7  --
GP8  -- GP9  --
COPY MOVE DEL PJUMP
```



Use arrow keys to change Point Index.
Check current position with the cursor.

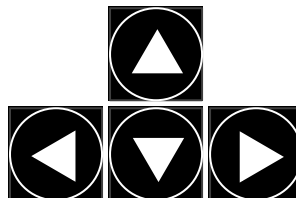
```
<EDIT GLOBAL POINT>
R:RA007
GP0  --*GP1  US
GP2  US GP3  US
GP4  -- GP5  --
GP6  -- GP7  --
GP8  -- GP9  --
COPY MOVE DEL PJUMP
```



Press ENTER key to select the Point Index where the cursor blinks. And “*” key will be displayed at the Point Index.

1) In case of selecting many Point Indexes

```
<EDIT GLOBAL POINT>
R:RA007
GP0  --*GP1  US
GP2  US GP3  US
GP4  -- GP5  --
GP6  -- GP7  --
GP8  -- GP9  --
COPY MOVE DEL PJUMP
```



Use arrow keys to change Point Index.
Check current position with the cursor.

<EDIT GLOBAL POINT>

R:RA007

GP0	--*GP1	US
*GP2	US GP3	US
GP4	-- GP5	--
GP6	-- GP7	--
GP8	-- GP9	--
COPY MOVE DEL PJUMP		



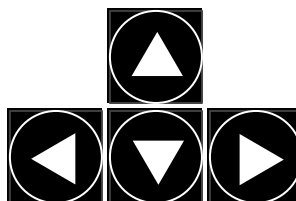
Press ENTER key to select the Point Index where the cursor blinks. And “*” key will be displayed.

2) In case of selecting Point Index that is not USED

<EDIT GLOBAL POINT>

R:RA007

GP0	--*GP1	US
GP2	US GP3	US
GP4	-- GP5	--
GP6	-- GP7	--
GP8	-- GP9	--
COPY MOVE DEL PJUMP		



Use arrow keys to change Point Index.

Check current position with the cursor.

<EDIT GLOBAL POINT>

R:RA007

GP0	--*GP1	US
GP2	US GP3	US
GP4	-- GP5	--
GP6	-- GP7	--
GP8	-- GP9	--

NOT SELECT POINT



If you press ENTER key at a not-taught Point “NOT SELECT POINT” message is displayed on the bottom of the T/P and it is not selected.

7.3 How to copy Point

```

<EDIT GLOBAL POINT>
R:RA007
GP0    --*GP1    US
*GP2    US GP3    US
GP4    -- GP5    --
GP6    -- GP7    --
GP8    -- GP9    --
PNT NUM =

```



F1 (COPY) Function key is to display screen to enter Point Index.

```

<EDIT GLOBAL POINT>
R:RA007
GP0    --*GP1    US
*GP2    US GP3    US
GP4    -- GP5    --
GP6    -- GP7    --
GP8    -- GP9    --
PNT NUM = 4

```



~



Use number keys to enter Point Index value at cursor position.

```

<EDIT GLOBAL POINT>
R:RA007
GP0    --*GP1    US
*GP2    US GP3    US
GP4    -- GP5    --
GP6    -- GP7    --
GP8    -- GP9    --
COPY COMPLETE

```



If you press ENTER key and “COPY COMPLETE” message is displayed on the bottom of the T/P, Point is successfully copied.

```

<EDIT GLOBAL POINT>
R:RA007
GP0    -- GP1    US
GP2    US GP3    US
GP4    US GP5    US
GP6    -- GP7    --
GP8    -- GP9    --
COPY MOVE DEL PJUMP

```



Press ENTER key to check that Point is copied in the order from entered Point Index.

7.4 How to move Point

```

<EDIT GLOBAL POINT>
R:RA007
GP0    -- GP1    US
GP2    US*GP3    US
GP4    US*GP5    US
GP6    -- GP7    --
GP8    -- GP9    --
COPY MOVE DEL PJUMP

```



Select Point Index to be moved and press F2 (MOVE) Function key to display Screen to enter Point Index.

```

<EDIT GLOBAL POINT>
R:RA007
GP0    -- GP1    US
GP2    US*GP3    US
GP4    US*GP5    US
GP6    -- GP7    --
GP8    -- GP9    --
PNT NUM = 

```



Press ENTER key to select the Point Index where the cursor blinks. And “*” key will be displayed at the Point Index.

```

<EDIT GLOBAL POINT>
R:RA007
GP0    -- GP1    US
GP2    US*GP3    US
GP4    US*GP5    US
GP6    -- GP7    --
GP8    -- GP9    --
PNT NUM = 6

```



~



Use number keys to enter Point Index value at cursor position.

```

<EDIT GLOBAL POINT>
R:RA007
GP0    -- GP1    US
GP2    US GP3    US
GP4    US GP5    US
GP6    -- GP7    --
GP8    -- GP9    --
MOVE COMPLETE

```



If you press ENTER key and “MOVE COMPLETE” message is displayed on the bottom of the T/P, Point is successfully moved.

```

<EDIT GLOBAL POINT>
R:RA007
GP0    -- GP1    US
GP2    US GP3    --
GP4    US GP5    --
GP6    US GP7    US
GP8    -- GP9    --
COPY MOVE DEL PJUMP

```



Press ENTER key to check that Point moved in the order from entered Point Index.

7.5 How to delete Point

```

<EDIT GLOABAL POINT>
R:RA007
GP0    -- GP1    US
GP2    US GP3    --
GP4    US GP5    --
*GP6   US*GP7   US
GP8    -- GP9    --
DELETE? (ENT/ESC)

```



Select Point Index to be deleted and press F3 (DEL) Function key to display a message to ask whether to delete it.

```

<EDIT GLOABAL POINT>
R:RA007
GP0    -- GP1    US
GP2    US GP3    --
GP4    US GP5    --
*GP6   US*GP7   US
GP8    -- GP9    --
DELETE? (ENT/ESC)

```



Perform Point delete.

OR



Cancel Point delete.

```

<EDIT GLOABAL POINT>
R:RA007
GP0    -- GP1    US
GP2    US GP3    --
GP4    US GP5    --
*GP6   US*GP7   US
GP8    -- GP9    --
DELETE COMPLETE

```



Press ENTER key to display "DELETE COMPLETE" message on the bottom of the T/P.

```

<EDIT GLOABAL POINT>
R:RA007
GP0    -- GP1    US
GP2    US GP3    --
GP4    US GP5    --
GP6    -- GP7    --
GP8    -- GP9    --
COPY MOVE DEL PJUMP

```



Press ENTER key to check Point delete result.

Chapter 4 JOB Operation Mode

1. JOB mode overview

- 1) You can display, edit and save files written in robot language (RRL).
- 2) It's possible to edit the file on the T/P when writing a file.
- 3) Up to 10,000 lines can be written in each file.
- 4) Up to 1,000 JOB files can be created.
- 5) The file list is alphabetically listed. [JOB EDIT] is to create, copy, edit, view contents these files.

2. Flowchart of JOB mode

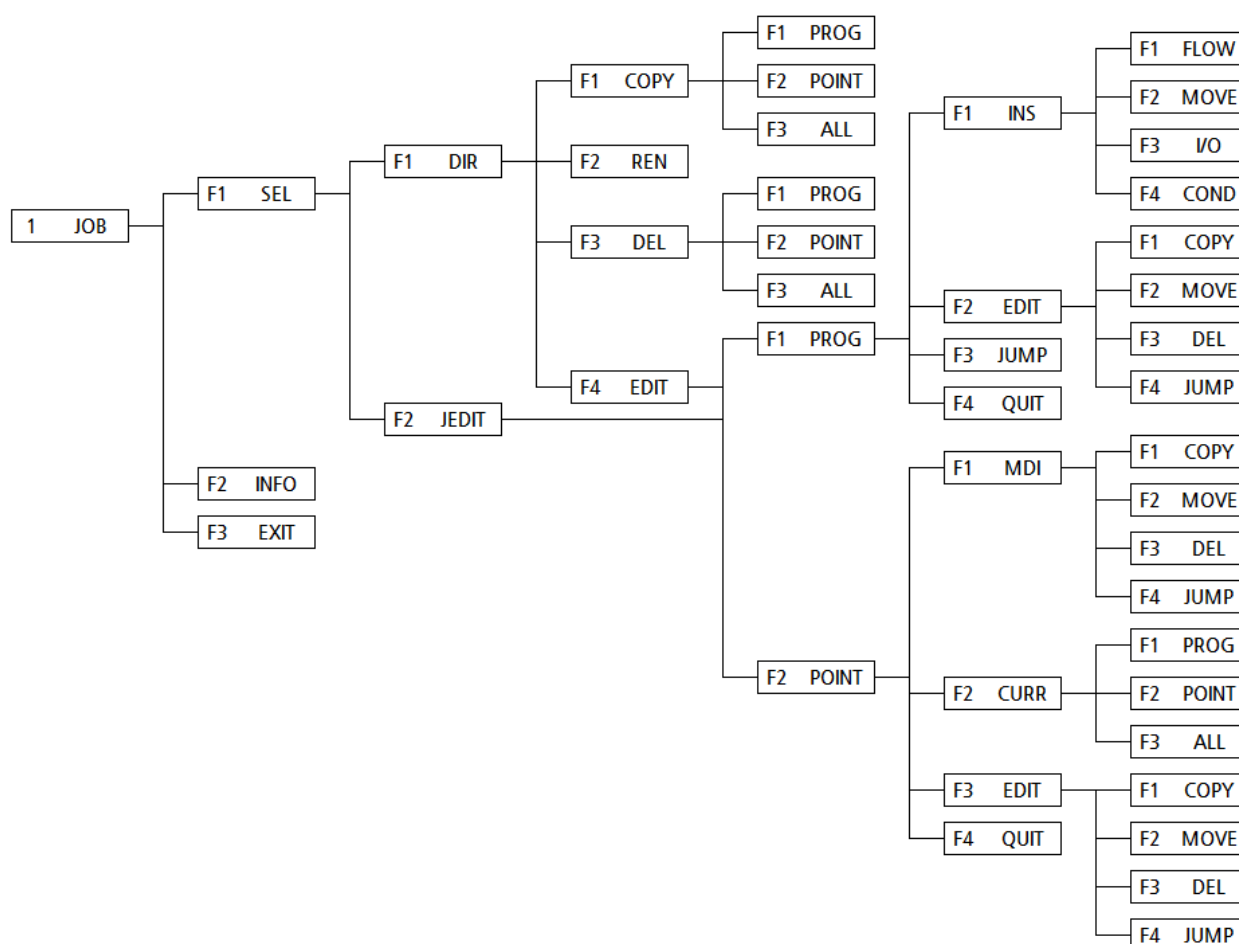
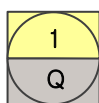
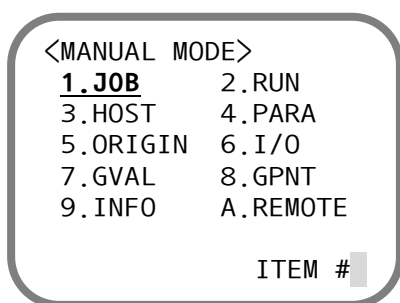


Figure 4-1 Flowchart of JOB mode

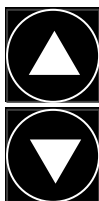
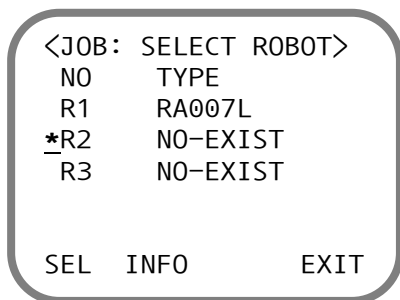
3. Rules to create a JOB file name

- 1) Name of JOB file can't be created in duplicate. (JOB file with same name can't be created even in different channel)
- 2) Max 5 characters with combination of alphabetical character and number can be entered to create name of JOB file.
- 3) Number can't be entered at the 1st digit of name of JOB file.

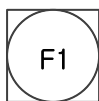
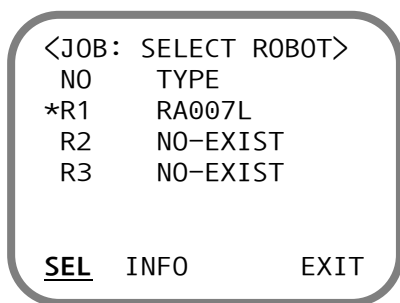
4. Access to JOB screen



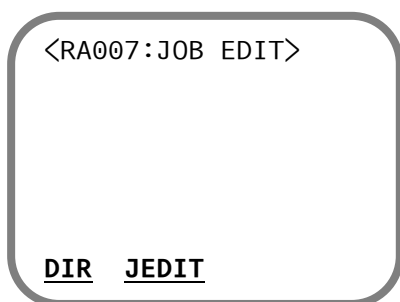
Input number key in the main menu screen to select "1.JOB".



Use arrow keys to select robot channel.
Check current position with "*".

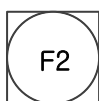


Use F1 (SEL) Function key to select robot channel.



Run in DIR mode.

OR



Run in JEDIT mode.

5. DIR (Directory) mode

5.1 Overview

- 1) You can edit, copy, delete the JOB files which is already registered.
- 2) You can edit the selected Teaching Point of JOB file and Program command.

5.2 DIR mode screen

<RA007:DIR>			
NO	NAME	PNT	STEPS
*000	.BGTD	2	187
001	.BGTF	0	189
002	MAST	2	10
COPY REN DEL EDIT			

Line	Item	Description
1	RA007	A robot model name of the selected channel.
	DIR	JOB DIR mode.
2	NO	Index number of JOB file. ※ Set number not in creation order but in alphabet order.
	NAME	Name of JOB file.
	PNT	Teaching number of Point of JOB file
	STEPS	Number of line of JOB file
3 ~ 7	*	Currently selected JOB file
	text	List and file information of JOB file
8	COPY	Creates a new JOB file by copying the selected JOB file program detail or teaching Point or All JOB files
	REN	Changes name of the selected JOB file.
	DEL	Deletes the selected JOB file program detail or teaching Point or All JOB files.
	EDIT	Edits the selected JOB file program and teaching Point.

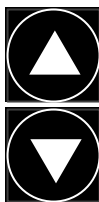
5.3 JOB file copy

```

<RA007:DIR>
NO  NAME  PNT STEPS
*000.BGTD 2   187
001.BGTF  0   189
002.MAST  2    10

COPY  REN  DEL  EDIT

```



Use arrow keys to select a JOB file.
Check current position with “*”.

```

<RA007:COPY>
JOB NAME =  BGTD

PROG POINT ALL

```



Press F1 (COPY) Function key to perform the functions below.

PROG	Copies only JOB file program.
POINT	Copies only Teaching Point of JOB file.
ALL	Copies All JOB files.

1) When PROG COPY is performed

```

<RA007:COPY>
JOB NAME =  BGTD

PROG POINT ALL

```



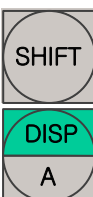
Input SELECT JOB AND F1 (PROG) Function key.

```

<RA007:COPY>
JOB NAME =  BGTD

NEW JOB NAME = A

```



Copy and Enter a JOB file name to be newly created. Press SHIFT key to enter the following alphabet on the keypad.

※ When pressing SHIFT key, SHIFT LED on the T/P status turns on.

○ORG ○SVON ○RUN ●SHIFT ○ALRM

※ Refer to Rule to create a JOB file name in chapter 4, section 3.

<RA007: COPY>
JOB NAME = BGTD



Input JOB file and press ENTER key to display "COPY COMPLETE" message on the T/P and copying is completed.

COPY COMPLETE

<RA007: DIR>
NO NAME PNT STEPS
*000 .A 0 187
001 .BGTD 2 187
002 .BGTF 0 189
003 MAST 2 10

COPY REN DEL EDIT



Check that A.JOB file is created and value of STEPS is created to be same with that of original file (BGTD).
0 is created for PNT in case of PROG copy.

2) IF POINT COPY is performed

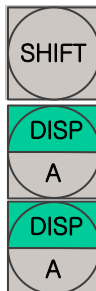
<RA007: COPY>
JOB NAME = BGTD



Select the JOB and enter the F2 (POINT) Function key.

PROG POINT ALL

<RA007: COPY>
JOB NAME = BGTD



Copy and Enter a name of the JOB file to be newly created. You can enter the alphabet represented on the keypad by pressing SHIFT key.

NEW JOB NAME = AA

※ When pressing SHIFT key, SHIFT LED on the T/P status turns on.

○ORG ○SVON ○RUN ●SHIFT ○ALRM

※ Refer to Rule to create a JOB file name in chapter 4, section 3.

<RA007: COPY>
JOB NAME = BGTD

COPY COMPLETE



Input JOB file and press ENTER key to display "COPY COMPLETE" message on the T/P and copying is completed.

<RA007: DIR>

NO	NAME	PNT	STEPS
*000	.A	0	187
001	.AA	<u>2</u>	<u>0</u>
002	.BGTD	2	187
003	.BGTF	0	189
004	MAST	2	10
COPY	REN	DEL	EDIT



Check that AA.JOB file is created and PNT is created to be same with that of original file (BGTD).
0 is created for STEPS in case of POINT COPY.

3) When ALL COPY is performed

<RA007: COPY>
JOB NAME = BGTD

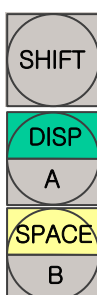
PRG POINT ALL



Select a JOB file and input F3 (ALL) Function key.

<RA007: COPY>
JOB NAME = BGTD

NEW JOB NAME = AB



Enter a name of the JOB file to be newly created. You can enter the alphabet represented on the keypad by pressing SHIFT key.

※ When pressing SHIFT key, SHIFT LED on the T/P status turns on.

○ORG ○SVON ○RUN ●SHIFT ○ALRM

※ Refer to Rule to create a JOB file name in chapter 4, section 3.

```
<RA007: COPY>
JOB NAME = BGTD
```

COPY COMPLETE



Enter a name of the JOB file and press ENTER key, "COPY COMPLETE" message is displayed on the T/P and copying is completed.

```
<RA007: DIR>
NO  NAME  PNT  STEPS
*000.A    0   187
001.AA    2    0
002.AB    2   187
003.BGTD  2   187
004.BGTF  0   189
COPY  REN  DEL  EDIT
```



You can see the AB.JOB file is created and PNT is created to be same with that of original file.
The STEPS is created as 0 in case of POINT copy.

5.4 Changing a JOB file name

```
<RA007: DIR>
NO  NAME  PNT  STEPS
*000.A    0   187
001.AA    2    0
002.AB    2   187
003.BGTD  2   187
004.BGTF  0   189
COPY  REN  DEL  EDIT
```



Use arrow keys to select a JOB file.
Check current position with "*".

```
<RA007: DIR>
NO  NAME  PNT  STEPS
*000.A    0   187
001.AA    2    0
002.AB    2   187
003.BGTD  2   187
004.BGTF  0   189
COPY  REN  DEL  EDIT
```



Press F2 (REN) Function key to move to the next screen.

```
<RA007: REN>
JOB NAME = A
```



NEW JOB NAME = B

Enter a JOB file name to be changed.
Press SHIFT key to enter the following alphabet on the keypad.

※ When pressing SHIFT key, SHIFT LED on the T/P status turns on.

○ORG ○SVON ○RUN ●SHIFT ○ALRM

※ Refer to Rule to create a JOB file name in chapter 4, section 3.

<RA007:REN>
JOB NAME = A



Enter a name of the JOB file and press ENTER key. "RENAME COMPLETE" message is displayed on the T/P and copying is completed.

RENAME COMPLETE

<RA007:DIR>
NO NAME PNT STEPS
*000.AA 2 0
001.AB 2 187
002.B 0 187
003.BGTD 2 187
004.BGTF 0 189
COPY REN DEL EDIT



Check that name of A.JOB file is changed to B.JOB.

5.5 How to delete JOB file

<RA007:DIR>
NO NAME PNT STEPS
000.AA 2 0
*001.AB 2 187
002.B 0 187
003.BGTD 2 187
004.BGTF 0 189
COPY REN DEL EDIT



Use arrow keys to select a JOB file.
Check current position with "*".

<RA007:DEL>
JOB NAME = AB



Press F3 (DEL) Function key to perform the functions below.

PROG POINT ALL

PROG	Deletes only JOB file program.
POINT	Deletes only Teaching Point of JOB file.
ALL	Deletes all JOB files.

1) When PROG DEL is performed

<RA007:DEL>
JOB NAME = AB

DELETE OK? (ENT/ESC)



Delete.

OR



Not delete.

<RA007:DEL>
JOB NAME = AB

DELETE COMPLETE



Press ENTER key. “DELETE COMPLETE” message is displayed on the T/P.

<RA007:DIR>
NO NAME PNT STEPS
000.AA 2 0
*001.AB 2 0
002.B 0 187
003.BGTD 2 187
004.BGTF 0 189
COPY REN DEL EDIT



Press ENTER key to move to JOB DIR screen and check that the STEPS of the selected AB.JOB file is displayed as 0.

2) When POINT DEL is performed

<RA007:DEL>
JOB NAME = AB

DELETE OK? (ENT/ESC)



Delete.

OR



Not delete.

<RA007:DEL>
JOB NAME = AB

DELETE COMPLETE



Press ENTER key to display
“DELETE COMPLETE” message on the T/P.

<RA007:DIR>

NO	NAME	PNT	STEPS
000	.AA	2	0
*001	.AB	<u>0</u>	187
002	.B	0	187
003	.BGTD	2	187
004	.BGTF	0	189
COPY	REN	DEL	EDIT



Press ENTER key to move to JOB DIR screen
and check that 0 is displayed as PNT value of
the selected AB.JOB file.

3) When ALL DEL is performed

<RA007:DEL>
JOB NAME = AB

DELETE OK? (ENT/ESC)



Delete.

OR



Not delete.

<RA007:DEL>
JOB NAME = AB



Press ENTER key to display
"DELETE COMPLETE" message on the T/P.

DELETE COMPLETE

<RA007:DIR>
NO NAME PNT STEPS
*000.AA 2 0
001.B 0 187
002.BGTD 2 187
003.BGTF 0 189
004.MAST 2 10
COPY REN DEL EDIT



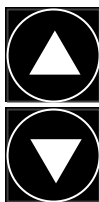
Press ENTER key to move to JOB DIR screen
and check that the selected AB.JOB file is
deleted.

5.6 How to edit JOB program

```

<RA007:DIR>
NO  NAME  PNT STEPS
*000.AA   2   0
001.B     0  187
002.BGTD  2  187
003.BGTF  0  189
004.MAST  2  10
COPY  REN  DEL  EDIT

```



Use arrow keys to select a JOB file.
Check current position with “*”.

```

<RA007:DIR>
NO  NAME  PNT STEPS
*000.AA   2   0
001.B     0  187
002.BGTD  2  187
003.BGTF  0  189
004.MAST  2  10
COPY  REN  DEL  EDIT

```



Press F4 (EDIT) Function key to perform the edit functions below.

```

<RA007:EDIT>
JOB NAME =  AA

```



Select a JOB file and input F1 (PROG) Function key.

PROG POINT

PROG	Edits JOB file program.
POINT	Edits Teaching Point of JOB file.

5.6.1 How to insert JOB program

```

<RA007:EDIT> AA
STEP INS
*0000 -
0001 -
0002 -
0003 -
0004 -
INS  EDIT JUMP QUIT

```



Input F1 (INS) Function key in program edit screen to move to the next screen.

```

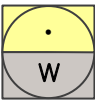
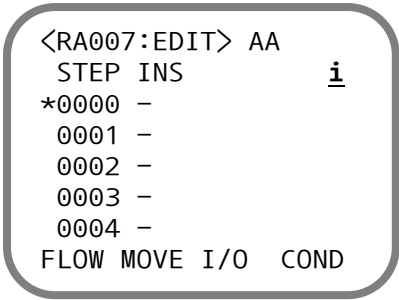
<RA007:EDIT> AA
STEP INS          i
*0000 -
0001 -
0002 -
0003 -
0004 -
FLOW MOVE I/O  COND

```



Use arrow keys to change STEP.
Check current position with “*”.

※ Can't move to the next STEP from the last STEP.



Input period key to convert insertion mode.
Insertion mode is displayed in the 2nd line on
the T/P.

i (Insert)	Inserts command at the selected STEP.
e (Edit)	Adds command at cursor position of the selected STEP.

※ If SHIFT LED on the T/P is on, insertion mode won't be converted.

○ORG ○SVON ○RUN ●SHIFT ○ALRM

※ Command group table

Command group table listed below shows list of frequently used commands to directly input those using Function keys.

GROUP	FLOW	MOVE	I/O	COND	special symbol
PAGE1	MAIN	JMOV	OUT	VEL	+
	FOR	LMOV	POUT	FOS	-
	IF	CMOV	IN	DLAY	*
	WHILE	AMOV	PIN	INT	/
PAGE2	EOP	IMOV	CIN	ACC	%
	NEXT	PMOV	CWIN	PFOS	=
	ELSE	HMOV	COUT	PLUP	<
	ENDWL		CWOUT	REAL	>
PAGE3	FUNC	SVON	SYS	FORM	→
	RET	SVOF		TOOL	!
	CALL	WITH		PCLR	&
	ENDIF	ENDWT		POS	
PAGE4	LABL	MVR		LIMIT	^
	GOTO	HERE		OFFS	(
	STOP	PASS		CNT	)
	EXIT	PCNT		INPOS	,
PAGE5				TMR	.
				NO	‘
				LEFT	“
				RIGHT	—
PAGE6				FIX	[
				TRQ	]
				TQL	\$
				XCHG	
PAGE7				DEC	

1) How to insert command using Function key

```

<RA007:EDIT> AA
STEP INS          i
*0000 █
0001 -
0002 -
0003 -
0004 -
MAIN  FOR  IF  WHILE

```



Press F1 (FLOW) Function key to make cursor blinks at the 1st space of the selected STEP. Command can be inserted in the 8th line of the T/P is displayed.

```

<RA007:EDIT> AA
STEP INS          i
*0000 █
0001 -
0002 -
0003 -
0004 -
EOP  NEXT ELSE ENDWL

```



Use arrow keys to change command page. Refer to command group table.

```

<RA007:EDIT> AA
STEP INS          i
*0000 MAIN █
0001 -
0002 -
0003 -
0004 -
MAIN  FOR  IF  WHILE

```



F1 (MAIN) Function key is to insert MAIN command at STEP number 0.

```

<RA007:EDIT> AA
STEP INS          i
*0000 █
0001 -
0002 -
0003 -
0004 -
MAIN FOR  IF    WHILE

```



ESC key is to cancel entered command and return to initial status.

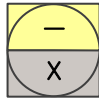
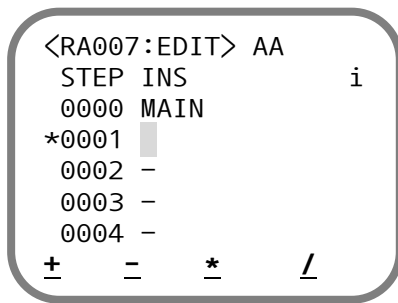
```

<RA007:EDIT> AA
STEP INS          i
0000 MAIN
*0001 █
0002 -
0003 -
0004 -
MAIN FOR  IF    WHILE

```

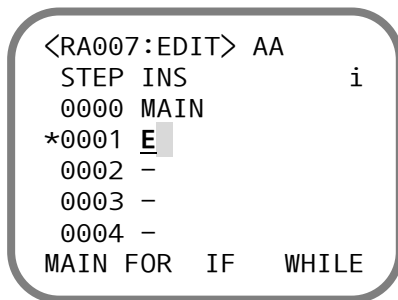


Press ENTER key to temporarily save command of STEP number 0 and cursor moves to the next STEP.



If minus key is pressed in insertion mode, function page is changed to special character page.

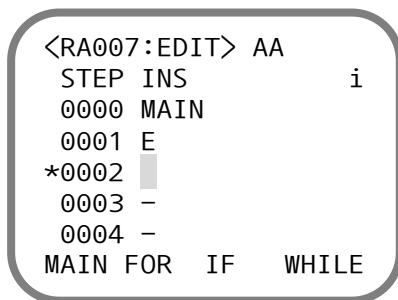
2) How to Directly enter command



Directly enter command on the keypad when cursor blinks.



You can enter the alphabet represented on the keypad by pressing SHIFT key.



Press ENTER key to temporarily save command of STEP number 1 and cursor moves to the next STEP.

5.6.2 How to edit JOB program

```

<RA007:EDIT> AA
STEP INS
*0000 MAIN
0001 E
0002 -
0003 -
0004 -
INS EDIT JUMP QUIT

```



Press F1 (INS) Function key in program edit screen to move to the next screen.

```

<RA007:EDIT> AA
STEP INS
0000 MAIN
*0001 E
0002 -
0003 -
0004 -
FLOW MOVE I/O COND

```



Use arrow keys to change STEP.
Check current position with “*”.

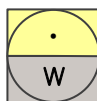


※ Move to the next STEP from the last STEP is not possible.

```

<RA007:EDIT> AA
STEP INS e
0000 MAIN
*0001 E
0002 -
0003 -
0004 -
FLOW MOVE I/O COND

```



Input period key to convert insertion mode.
Insertion mode is displayed in the 2nd line on the T/P.

i (Insert)	Inserts command at the selected STEP.
e (Edit)	Adds command at cursor position of the selected STEP.

※ If SHIFT LED on the T/P is on, insertion mode won't be converted.

○ORG ○SVON ○RUN ●SHIFT ○ALRM

1) How to edit command in insertion mode i (insert)

```

<RA007:EDIT> AA
STEP INS i
0000 MAIN
*0001 █
0002 E
0003 -
0004 -
FLOW MOVE I/O COND

```



Press ENTER key to newly create STEP at “*” and the existing STEP moves back by 1 STEP.
At this point, cursor blinks at the 1st digit of current STEP.

2) How to edit command in insertion mode e (edit)

```

<RA007:EDIT> AA
STEP INS          e
0000 MAIN
*0001 E
0002 -
0003 -
0004 -
FLOW MOVE I/O  COND

```



Press ENTER key to makes cursor blink at the 1st digit of current STEP.

```

<RA007:EDIT> AA
STEP INS          e
0000 MAIN
*0001 E
0002 -
0003 -
0004 -
FLOW MOVE I/O  COND

```



Use arrow keys to change cursor position.

```

<RA007:EDIT> AA
STEP INS          e
0000 MAIN
*0001 EN
0002 -
0003 -
0004 -
MAIN FOR IF WHILE

```



Input value to enter key value at cursor blinking digit.

```

<RA007:EDIT> AA
STEP INS          e
0000 MAIN
*0001 E
0002 -
0003 -
0004 -
MAIN FOR IF WHILE

```



Press DEL key value to delete the value at cursor blinking digit.

5.6.3 How to save JOB program

```

<RA007:EDIT> AA
STEP INS      e
0000 MAIN
*0001 E
0002 -
0003 -
0004 -
FLOW MOVE I/O COND

```



ESC key is to make cursor disappear and return to INS main screen.

```

<RA007:EDIT> AA
STEP INS
0000 MAIN
*0001 E
0002 -
0003 -
0004 -
INS  EDIT JUMP QUIT

```



Press ESC key to return to JOB edit screen.

```

<RA007:EDIT> AA
STEP INS
0000 MAIN
*0001 E
0002 -
0003 -
0004 -
UPDATE ? (ENT/ESC)

```



Save JOB file.

OR



Not save JOB file.

```

<RA007:EDIT> AA
STEP INS
0000 MAIN
*0001 E
0002 -
0003 -
0004 -
SAVE COMPLETE

```



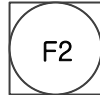
Press ENTER key to save JOB file.

5.6.4 How to use COPY function

```

<RA007:EDIT> AA
STEP INS
*0000 MAIN
0001 E
0002 -
0003 -
0004 -
INS EDIT JUMP QUIT

```



Press F2 (EDIT) Function key in program edit menu to move to the next screen.

```

<RA007:EDIT> AA
STEP INS
*0000 MAIN
0001 E
0002 -
0003 -
0004 -
COPY MOVE DEL JUMP

```

COPY	Copies the selected Block.
MOVE	Moves the selected Block.
DEL	Deletes the selected STEP or Block.
JUMP	Moves STEP.

※ COPY & MOVE functions are functions of Block unit. Hence, perform Block setup first.

1) How to set block

```

<RA007:EDIT> AA
STEP INS
*0000<MAIN
0001 E
0002 -
0003 -
0004 -
COPY MOVE DEL JUMP

```



Press SPACE key to add "<" symbol next to STEP when SHIFT LED on the T/P is on at the STEP to be copied.

```

<RA007:EDIT> AA
STEP INS
0000<MAIN
*0001<E
0002 -
0003 -
0004 -
COPY MOVE DEL JUMP

```



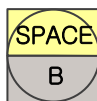
Use arrow keys to move STEP to add Block.
Use "<" symbol to check Block setup.

※ Move to the next STEP from the last STEP is not possible.

```

<RA007:EDIT> AA
STEP INS      b
0000<MAIN
*0001<E
0002 -
0003 -
0004 -
COPY MOVE DEL JUMP

```



Press SPACE key again to finish Block setup.
Check that "b" symbol is displayed in the 2nd line on the T/P screen

2) How to copy

```

<RA007:EDIT> AA
STEP INS      b
0000<MAIN
0001<E
*0002
0003 -
0004 -
COPY MOVE DEL JUMP

```

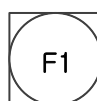


Use arrow keys to move STEP to the STEP to be copied.
Check position to be copied with "*".

```

<RA007:EDIT> AA
STEP INS      b
0000<MAIN
0001<E
*0002 -
0003 -
0004 -
COPY COMPLETE

```



Press F1 (COPY) Function key to copy detail of the selected Block at "*".

```

<RA007:EDIT> AA
STEP INS      -
0000 MAIN
0001 E
*0002 MAIN
0003 E
0004 -
COPY MOVE DEL JUMP

```



Press ENTER key to check copy result.

5.6.5 How to use MOVE function

```

<RA007:EDIT> AA
STEP INS
*0000 MAIN
0001 E
0002 MAIN
0003 E
0004 -
INS EDIT JUMP QUIT

```



Press F2 (EDIT) Function key in program edit menu to move to the next screen.

```

<RA007:EDIT> AA
STEP INS
*0000 MAIN
0001 E
0002 MAIN
0003 E
0004 -
COPY MOVE DEL JUMP

```

COPY	Copies the selected Block.
MOVE	Moves the selected Block.
DEL	Deletes the selected STEP or Block.
JUMP	Moves STEP.

※ COPY and MOVE are functions of Block unit. Hence, perform Block setup first.

1) How to set block

```

<RA007:EDIT> AA
STEP INS
0000 MAIN
*0001<E
0002 MAIN
0003 E
0004 -
COPY MOVE DEL JUMP

```

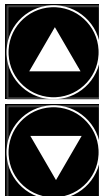


When SHIFT LED on the T/P is on at STEP to be moved, press SPACE key to add "<" symbol next to STEP.

```

<RA007:EDIT> AA
STEP INS
0000 MAIN
0001<E
*0002<MAIN
0003 E
0004 -
COPY MOVE DEL JUMP

```



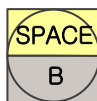
Use arrow keys to move STEP to add Block.
Use "<" symbol to check Block setup.

※ Move to the next STEP from the last STEP is not possible.

```

<RA007:EDIT> AA
STEP INS      b
0000 MAIN
0001<E
*0002<MAIN
0003 E
0004 -
COPY MOVE DEL JUMP

```



Press SPACE key again to finish Block setup.
Check that "b" symbol is displayed in the 2nd line on the T/P.

2) How to move

```

<RA007:EDIT> AA
STEP INS      b
0000 MAIN
0001<E
0002<MAIN
0003 E
*0004 -
COPY MOVE DEL JUMP

```

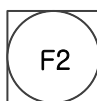


Use arrow keys to move STEP.
Check position to be moved with "*".

```

<RA007:EDIT> AA
STEP INS
0000 MAIN
0001 E
0002 E
0003 MAIN
*0004 -
COPY MOVE DEL JUMP

```



Input F2 (MOVE) Function key to move the content of the selected Block to "*".
At this point, the blocked STEP is deleted and the next STEP moves to the previous STEP.

5.6.6 How to use DEL function

```

<RA007:EDIT> AA
STEP INS
*0000 MAIN
0001 E
0002 E
0003 MAIN
0004 -
INS EDIT JUMP QUIT

```



Press F2 (EDIT) Function key in program edit menu to move to the next screen.

```

<RA007:EDIT> AA
STEP INS
*0000 MAIN
0001 E
0002 E
0003 MAIN
0004 -
COPY MOVE DEL JUMP

```

COPY	Copies the selected Block.
MOVE	Moves the selected Block.
DEL	Deletes the selected STEP or Block.
JUMP	Moves STEP.

※ Deleting the blocks or the each STEP can be done after setting blocks in DEL function.

1) How to delete after setting block

```

<RA007:EDIT> AA
STEP INS
*0000<MAIN
0001 E
0002 E
0003 MAIN
0004 -
COPY MOVE DEL JUMP

```



When SHIFT LED on the T/P is on at STEP to be deleted, press SPACE key to add "<" symbol next to STEP.

```

<RA007:EDIT> AA
STEP INS
0000<MAIN
*0001<E
0002 E
0003 MAIN
0004 -
COPY MOVE DEL JUMP

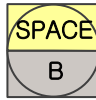
```



Use arrow keys to move STEP to add Block.
Use "<" symbol to check Block setup.

※ Can't move from the last STEP to the next STEP.

```
<RA007:EDIT> AA
STEP INS      b
0000<MAIN
*0001<E
0002 E
0003 MAIN
0004 -
COPY MOVE DEL JUMP
```



Press SPACE key again to finish Block setup.
Check that “b” symbol is displayed in the 2nd line on the T/P.

```
<RA007:EDIT> AA
STEP INS      b
0000<MAIN
*0001<E
0002 E
0003 MAIN
0004 -
COPY MOVE DEL JUMP
```



Press F3 (DEL) Function key to delete Blocked STEP.

```
<RA007:EDIT> AA
STEP INS      b
0000<MAIN
*0001<E
0002 E
0003 MAIN
0004 -
DELETE OK? (ENT/ESC)
```



Delete.

OR



Not delete.

```
<RA007:EDIT> AA
STEP INS
*0000 E
0001 MAIN
0002 -
0003 -
0004 -
COPY MOVE DEL JUMP
```



When Delete is successfully completed, the contents of the block is deleted and the next STEP moves to the previous STEP.

2) How to delete individual STEP

```
<RA007:EDIT> AA  
STEP INS  
*0000 E  
0001 MAIN  
0002 -  
0003 -  
0004 -  
COPY MOVE DEL JUMP
```



Press F3 (DEL) Function key to delete current STEP of “*”.

```
<RA007:EDIT> AA  
STEP INS  
*0000 E  
0001 MAIN  
0002 -  
0003 -  
0004 -  
DELETE OK? (ENT/ESC)
```



Delete.

OR



Not delete.

```
<RA007:EDIT> AA  
STEP INS  
*0000 MAIN  
0001 -  
0002 -  
0003 -  
0004 -  
COPY MOVE DEL JUMP
```



When delete is successfully completed, detail of the relevant line is deleted and the next STEP moves to the previous STEP.

5.6.7 How to use JUMP function

<RA007:EDIT> AA
STEP INS
*0000 MAIN
0001 EOP
0002 -
0003 -
0004 -
INS EDIT JUMP QUIT



Press F2 (EDIT) Function key in program edit menu to move to the next screen.

<RA007:EDIT> AA
STEP INS
*0000 MAIN
0001 EOP
0002 -
0003 -
0004 -
COPY MOVE DEL JUMP

COPY	Copies the selected Block.
MOVE	Moves the selected Block.
DEL	Deletes the selected STEP or Block.
JUMP	Moves STEP.

<RA007:EDIT> AA
STEP INS
*0000 MAIN
0001 EOP
0002 -
0003 -
0004 -
STEP # = █



F4 (JUMP) Function key is to input STEP number to be moved.

<RA007:EDIT> AA
STEP INS
*0000 MAIN
0001 EOP
0002 -
0003 -
0004 -
OUT OF BOUND



~



Use number keys to enter value.
At this point, if entered value is larger than number of written STEP, “OUT OF BOUND” message is displayed on the T/P.

※ If SHIFT LED on the T/P is on, number won't be entered.

○ORG ○SVON ○RUN ●SHIFT ○ALRM

5.7 How to edit JOB Point

```
<RA007:EDIT>  
JOB NAME =  AA  
  
PROG POINT
```



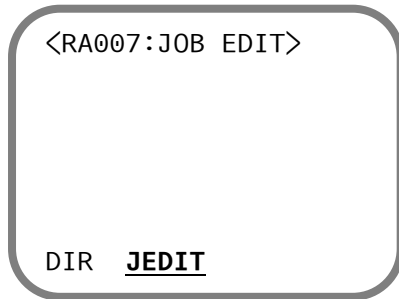
After selecting JOB, press F2 (POINT) Function key.

```
<PNT JOINT> V:   5BL  
AA   P0   NW U0 T0  
J1:   J2:  
J1:   J2:  
J1:   J2:  
  
MDI  CURR  EDIT  QUIT
```

For the method to edit Point, refer to MDI mode in chapter 3, section 5 and CURR mode in section 6.

5.8 How to create new JOB files

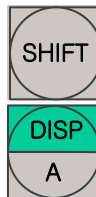
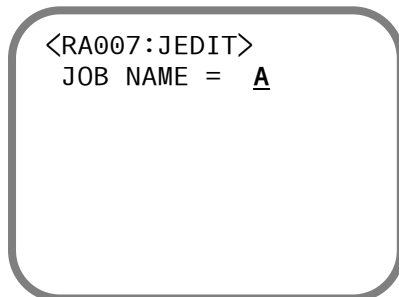
Creates and edits new JOB files.



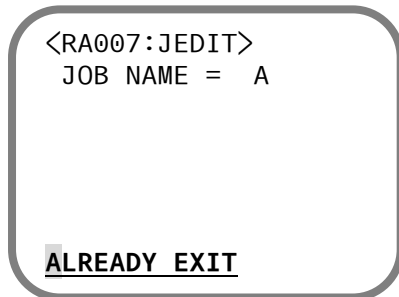
Refer to Access to JOB screen in chapter 4, section 4 to move to JOB edit screen.

F2 (JEDIT) Function key is to run in JEDIT mode.

※ If there are more than 1,000 created JOB files in the current Controller, in JEDIT mode, “EXCEED MAX JOB CNT!!” message is displayed on bottom of the T/P and JEDIT mode won’t run.

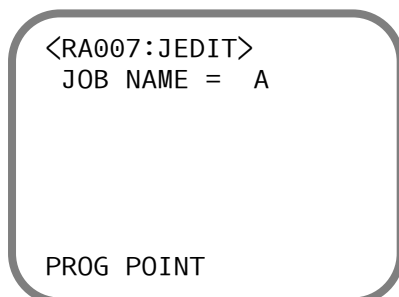


Enter JOB name to be newly created.
You can enter the alphabet represented on the keypad by pressing SHIFT key.



Enter a JOB file name and press ENTER key to create JOB file.

※ If JOB of entered name exists, “ALREADY EXIT” message is displayed on the bottom of the T/P.



After successfully creating JOB file, move to edit screen. Edit JOB file with chapter 4, section 5.6 and chapter 4, section 5.7 ,

Chapter 5 RUN Operation Mode

1. Overview

- 1) Executes JOB file written in JOB mode.
- 2) Be sure to complete ORIGIN return before executing JOB file.
 - A. If ORG LED on the T/P is "OFF", perform origin return.

※ For how to perform the origin, refer to Chapter 6, section 5.1.4.3 ZCAL CUR mode.

- 3) There are 3 types of RUN mode. In this chapter, we describe running and monitoring method of each mode in detail.

GROUP		Description		Remark
MANUAL RUN	AUTO/STEP mode	AUTO	Run the whole program.	-
		STEP	Run the program by 1 STEP (1 row) unit and wait.	
	BODY LOCK mode	Executes signal input/output and command without running the robot.		-
AUTO RUN		Run robot program such as sequence from external machine.		In general, Auto Run mode

2. Manual Run mode

2.1 Flowchart of Manual Run mode

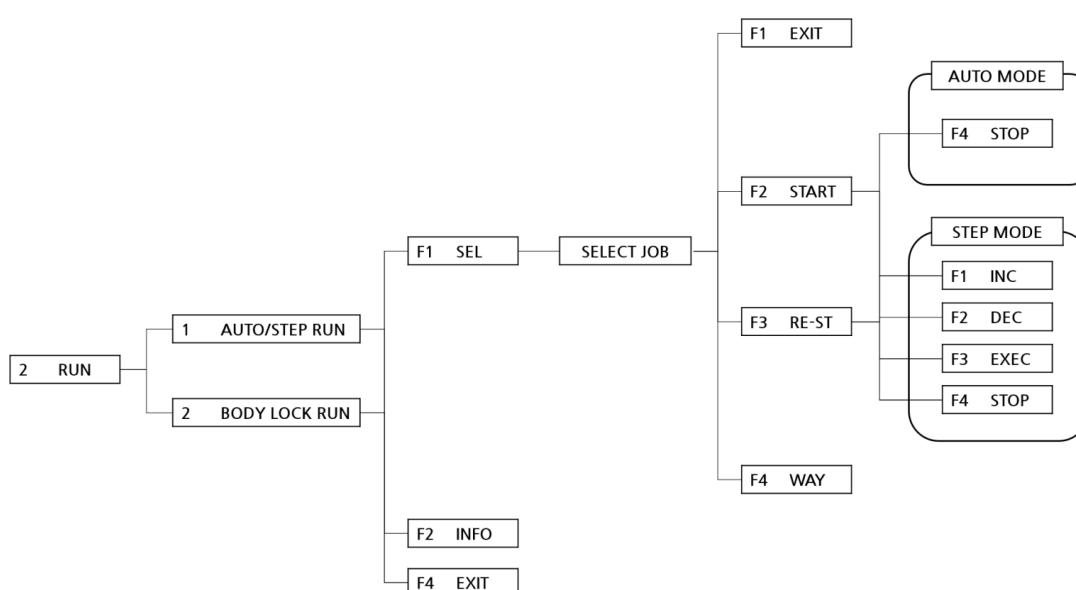
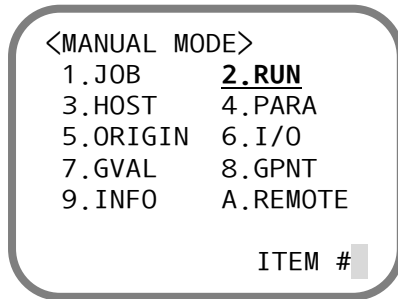


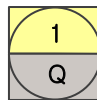
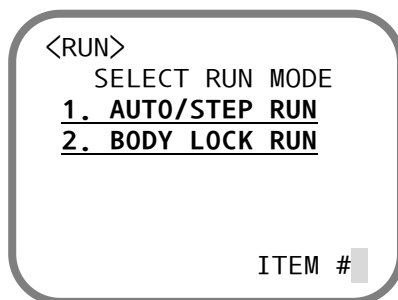
Figure 5-1 Flowchart of Manual run mode

2.2 How to operate Manual Run mode

2.2.1 Moving Manual Run screen



Input number key in the main menu screen to select "2.RUN".

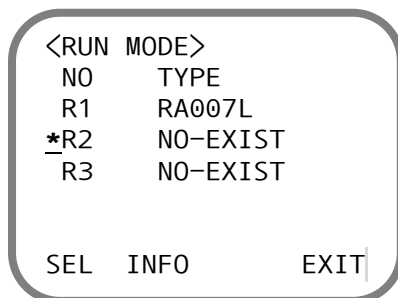


Operate in AUTO/STEP RUN mode.

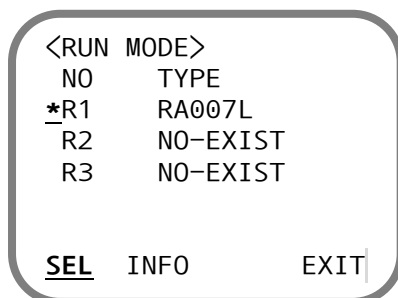
OR



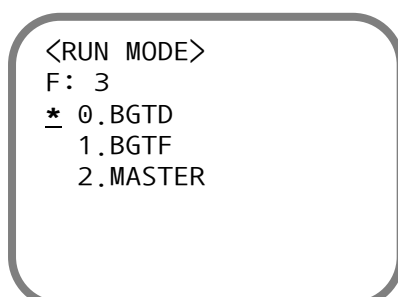
Operate in BODY LOCK RUN mode.



Use arrow keys to select robot channel.
 Check current position with "*".



Use F1 (SEL) Function key to select robot channel.



Use arrow keys to select a JOB file to be executed.
 Check current position with "*".

```

<ROBOT:INS>
F:MASTER  S:1      S
R:RA007   T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
EXIT START RE-ST WAY

```



Select JOB and press ENTER key to perform JOB file compile. If JOB file is called without error, Manual Run screen is displayed.

```

<RUN MODE>
F: 3
  0.BGTD
  1.BGTF
* 2.MASTER

```



If it is not normally called, "LOAD ERR" message is displayed.

MASTER.JOB LOAD ERR

```

ECODE: 1315 [1/1]
Compile error
J: MASTER   L:1

[Description]
[0:0] variable
Declaration is

```



At this point, if there's a grammatical errors, "[1315] Compile error" can occur.

```

ECODE: 1315 [1/1]
Compile error
[0:0] variable
Declaration is
needed: █
SV01N █

```

EXIT



If all alarm descriptions are not displayed in the screen, use arrow keys to move screen up or down to check it.

※ The example shows that an alarm occurs not by normal command (SVON) but by misprint (SVO1N).

2.2.2 Manual Run screen

```

<ROBOT:INS>
F:MASTER  S:1    S
R:RA007   T:0  V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
EXIT START RE-ST WAY

```

Line	Item	Description	
1	INS	Displays RUN Monitoring mode.	
2	F : MASTER	Displays a JOB file name in progress	
	S : 1	Displays STEP number to be executed	
	S	Displays Run mode. (S : STEP, A : AUTO)	
3	R : RA007	Displays model name of robot channel in operation	
	T : 0	Displays TOOL number that is currently being applied	
	V : 50	Displays operating velocity by permillage.	
4 ~ 7	Text	Displays JOB program in progress.	
8	EXIT	Returns to the previous screen in RUN mode. (channel select screen)	
	START	STEP	Go to the 1 st STEP of the JOB program
		AUTO	Executed from the 1 st STEP of the JOB program
	RE-ST	Executed from the stopped STEP	
	WAY	Changes Manual RUN mode. (S : STEP, A : AUTO)	

2.2.3 Executing Manual STEP Run

```

<ROBOT:INS>
F:MASTER  S:1      S
R:RA007   T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
EXIT START RE-ST WAY

```



Use F4 (WAY) Function key in Manual Run screen to convert run mode.

※ Default setup is STEP mode and “S”, “A” are marked on top right of the T/P.

```

<ROBOT:INS>
F:MASTER  S:1      S
R:RA007   T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
EXIT START RE-ST WAY

```



OR



Press F2 (START) or F3 (RE-ST) Function key to run operation.

```

<ROBOT:INS>
F:MASTER  S:1      S
R:RA007   T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
INC DEC EXEC STOP

```



Press F3 (EXEC) Function key to perform JOB command by 1 STEP.

※ Run 1 STEP to move to the next STEP and wait for next input of T/P key.

```

<ROBOT:INS>
F:MASTER  S:1      S
R:RA007   T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
INC DEC EXEC STOP

```



OR



Press F1 (INC) Function key to move to the next STEP. Press F2 (DEC) Function key to move to the previous STEP.

※ Not execute command of the relevant STEP.

```

<ROBOT:INS>
F:MASTER  S:3      S
R:RA007   T:0 V: 50
JMOV P0
DLAY 1000
JMOV P1
DLAY 1000
INC DEC EXEC STOP

```



Input F4 (STOP) Function key to stop JOB running.

```

<ROBOT:INS>
F:MASTER  S:3      S
R:RA007   T:0 V: 50
JMOV P0
DLAY 1000
JMOV P1
DLAY 1000
EXIT START RE-ST WAY

```

F3

After stopping, input F3 (RE-ST) Function key to restart at the stopped STEP.

```

<ROBOT:INS>
F:MASTER  S:1      S
R:RA007   T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
EXIT START RE-ST WAY

```

F2

After stopping, press F2 (START) Function key to start from the 1st STEP.

2.2.4 Executing Manual Auto Run

```

<ROBOT:INS>
F:MASTER  S:1      A
R:RA007   T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
EXIT START RE-ST WAY

```

F4

Use F4 (WAY) Function key in Manual Run screen to convert run mode.

※ Default setup is STEP mode and “S”, “A” are marked on top right of the T/P.

```

<ROBOT:INS>
F:MASTER  S:1      A
R:RA007   T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
EXIT START RE-ST WAY

```

F2

OR

F3

Press F2 (START) or F3 (RE-ST) Function key to start operation.

```

<ROBOT:INS>
F:MASTER  S:3      A
R:RA007   T:0 V: 50
JMOV P0
DLAY 1000
JMOV P1
DLAY 1000

```

F4

F4:STOP

Press F4 (STOP) Function key to stop JOB running.

```

<ROBOT:INS>
F:MASTER S:3 A
R:RA007 T:0 V: 50
JMOV P0
DLAY 1000
JMOV P1
DLAY 1000
EXIT START RE-ST WAY

```



Input F3 (RE-ST) Function key to restart from the stopped STEP.

```

<ROBOT:INS>
F:MASTER S:1 S
R:RA007 T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
EXIT START RE-ST WAY

```



After stopping, press F2 (START) Function key to start from the 1st STEP.

2.2.5 Working velocity change

```

<ROBOT:INS>
F:MASTER S:1 A
R:RA007 T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
EXIT START RE-ST WAY

```



Arrow keys are to control command executing velocity of execution file.

※ Max value of working velocity displayed in the screen can differ depending on JOB command VEL value. In addition, also velocity value can differ with keys entered.

3. Manual Body Lock mode

- 1) Running method is same with that of Manual Run mode.
- 2) In Body Lock mode, SVON command runs JOB program, assuming that servo on is done in the system even though the actual motor servo on is not done.
- 3) Robot motion execution command such as JMOV can be virtually executed. Use 3D_Simulator program to check robot trajectory, motion in advance.
- 4) Actually executes all commands including I/O OUTPUT command and checks sequence without robot operation.

4. Auto Run mode

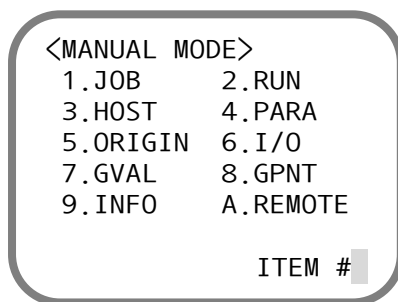
- 1) In general, Auto Run mode repeatedly runs setting robot program in Auto Run mode of the equipment(parent controller or terminal block).
- 2) The system provides System I/O MAP (minimum information and signal needed for robot operation) to control the Controller.
- 3) System I/O functions can be used through BGT (Background Task) JOB and Digital I/O or Fieldbus I/O.
- 4) Set parameter in advance to run BGT (Background Task) JOB file.

※ For parameter setup method, refer to chapter 6, section 7.1.1.1.

- 5) Select Switch on top of the T/P in AUTO mode and receive signal from the system to operate the robot.

4.1 How to operate Auto Run mode

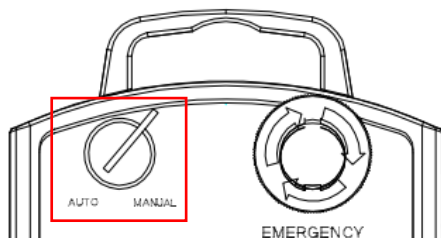
4.1.1 Moving to main menu screen



Move to main menu to convert from Manual Mode into Auto Mode.

4.1.2 Operating Mode Switch

※ Be fully aware of the parent controller (PLC or PC) and surroundings before converting the Mode.



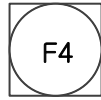
Convert T/P Mode switch from Manual Mode into Auto Mode.

```

<ROBOT:TH INFO>
THREAD    STATE
*TH1      IDLE
TH2       IDLE
TH3       IDLE
TH4       IDLE

SEL        SYS

```



In case of Auto Mode conversion, robot thread state is displayed on the T/P screen.
Input F4 (SYS) Function key to display System thread state.

```

<SYS :TH INFO>
THREAD    STATE
*TH1      IDLE
TH2       IDLE
TH3       IDLE
TH4       IDLE

SEL        ROBOT

```



Input F4 (ROBOT) Function key to display Robot thread state.

4.2 Auto Run mode screen

```

<ROBOT:TH INFO>
THREAD    STATE
*TH1      IDLE
TH2       IDLE
TH3       IDLE
TH4       IDLE

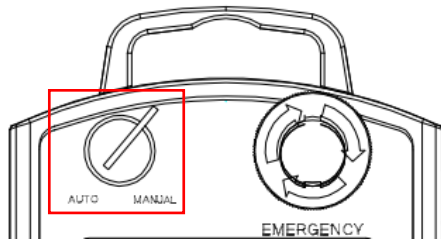
SEL        SYS

```

Line	Item	Description
1	ROBOT	Displays current thread item. (ROBOT : Robot Thread, SYS : System Thread) In case of N2 Series, it's divided into System Thread that runs BGT (Background Task) JOB and Robot Thread that runs written JOB. 4 Threads of each item can be performed at the same time.
2 ~ 6	THREAD	Displays individual thread item.
	STATE	Displays thread state.
		IDLE Thread (JOB) can be used.
		RUN Thread (JOB) is running.
		STOP Thread (JOB) paused.
	*	Displays currently selected thread.
8	SEL	Moves to the selected thread monitoring screen.
	SYS	Moves to system thread item.

4.3 Executing BGT

- 1) Refer to chapter 6, section 7.1.1 to set BGT parameter.
- 2) If BGT parameter is changed, reboot first for normal operation.
- 3) After booting, BGT JOB file set by HW_CONF (1)-BGT-NAME parameter is executed at System Thread.



Convert T/P Mode switch from Manual Mode into Auto Mode.

<ROBOT:TH INFO>	
THREAD	STATE
*TH1	IDLE
TH2	IDLE
TH3	IDLE
TH4	IDLE
SEL	<u>SYS</u>



In case of Auto Mode Conversion, robot thread state is displayed on the T/P screen. Input F4 (SYS) Function key to display System thread state.

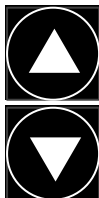
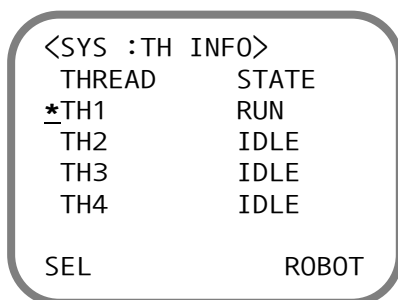
<SYS :TH INFO>	
THREAD	STATE
*TH1	<u>RUN</u>
TH2	IDLE
TH3	IDLE
TH4	IDLE
SEL	ROBOT

If at least one of TH1 ~ 4 is in RUN status, RUN LED on the T/P turns on.

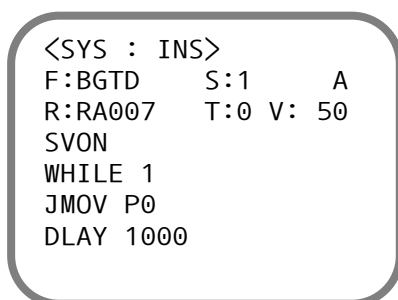
●ORG ○SVON ●RUN ○SHIFT ○ALARM

※ Robot Thread is run by the System I/O Map agreed by a user and a Controller.

4.4 Auto Run mode monitoring



Use arrow keys to select thread.
Check current position with “*”.



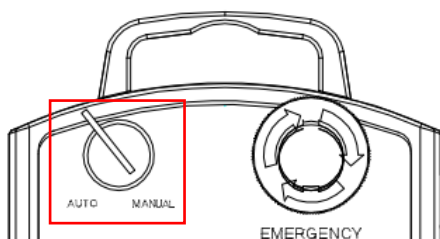
Use F1 (SEL) Function key to select robot channel.

Run screen is same with Manual Run screen and Run Monitoring function is also same. Refer to Manual Run screen in chapter 5, section 2.2.2.

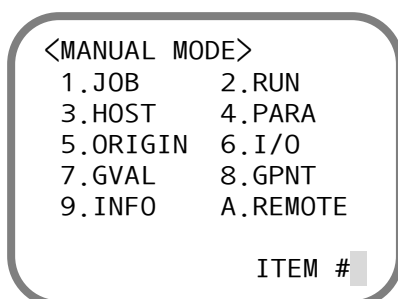
※ Stop or start function by inputting on T/P key is limited in Auto Run mode.

4.5 Converting Mode in Auto Run

4.5.1 Converting into Manual mode from Auto mode

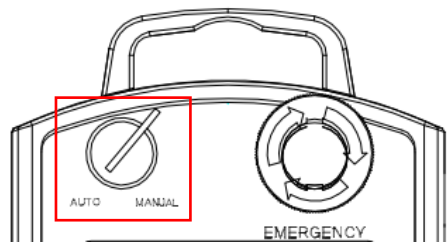


Convert T/P Mode switch from Auto Mode into Manual Mode.



In case of Manual Mode Conversion, T/P main menu screen is displayed. If robot is in operation, it stops.
(Servo maintains current status.)

4.5.2 Converting into Auto mode from Manual mode



Convert T/P Mode switch from Manual Mode into Auto Mode.

<ROBOT:TH INFO>

THREAD

STATE

*TH1

TH2

TH3

TH4

STOP

IDLE

IDLE

IDLE

RESTART?

(ENT/ESC)



OR



Maintain running thread.
(TH1 state maintains STOP.)

End running Thread.
(TH1 state is changed to IDLE.)

5. System I/O MAP

Check BGT Version before BGT operation. (Based on BGT version 1.0.1)

5.1 System I/O input signal and function (parent controller → N2 Controller)

Pin No	Name	Description	Operation point
IN0	Sys In Enable Ctr	Signal to control input signal needed for robot control. The signal must be in always "ON" status to operate input signal.	Rising level
IN1	JOB Start	Signal for robot JOB loading and operation. Initial operation after Controller power input or starts after JOB end and starts from the 1 st step of robot JOB.	Rising edge
IN2	JOB Exit	Signal to end currently running JOB.	Rising edge
IN3	JOB Pause	Signal to pause currently running JOB.	Rising edge
IN4	JOB Restart	Signal to restart paused JOB.	Rising edge
IN5	Alarm Reset	Signal for alarm release if an alarm occurs.	Rising edge
IN6	Servo On/Off	Signal to manually turn servo ON/OFF of robot motor. ON/OFF toggles according to servo state of the motor.	Rising edge

5.2 System I/O OUTPUT signal and function (N2 Controller → parent controller)

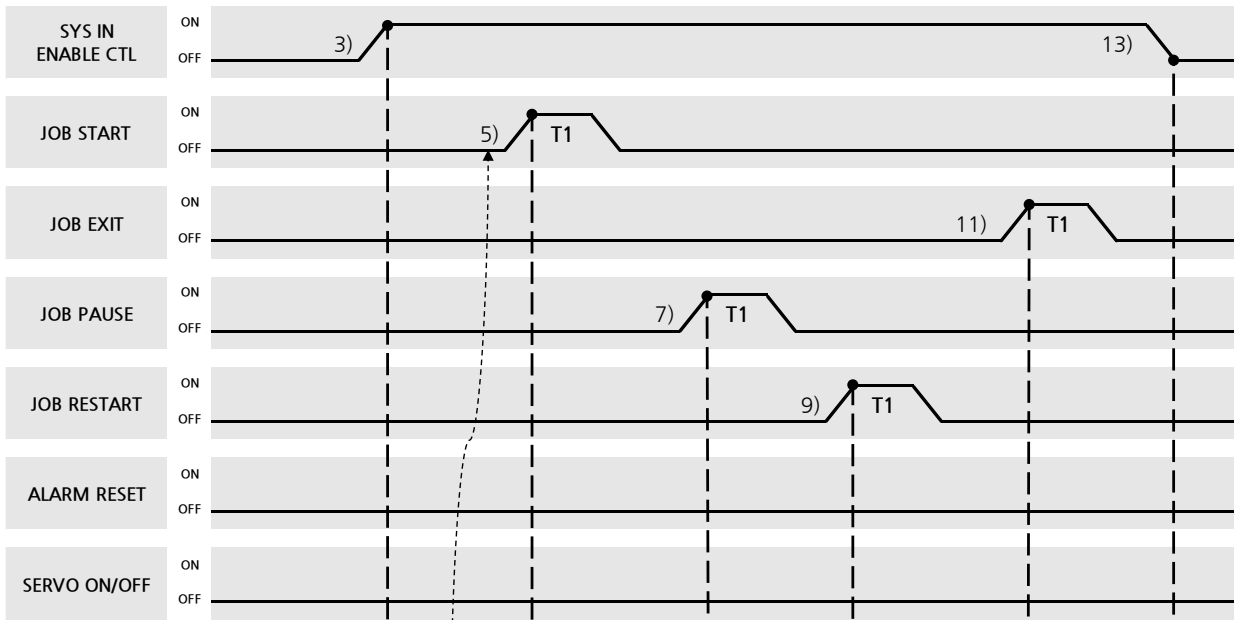
Pin No	Name	Description		Output
OUT0	Sys In Enable Status	ON	Sys In Enable Ctr signal is "ON"	level
		OFF	Sys In Enable Ctr signal is "OFF"	
OUT1	JOB Run	ON	JOB is currently operating	level
		OFF	JOB is ended	
OUT2	JOB Pause	ON	JOB is paused	level
		OFF	JOB is running or ended	
OUT3	Robot Ready	ON	Supply of main power (motor power) is normal.	level
		OFF	Supply of main power (motor power) is abnormal.	
OUT4	Robot Alarm	ON	When alarm inside the robot Controller occurred or when external alarm is input.	level
OUT5	Robot ORG	ON	Mechanical origin setup of robot is completed.	level
OUT6	Auto Mode	ON	T/P mode is in Auto Mode	level
OUT7	Robot Running	ON	Robot is currently moving.	level
		OFF	Robot is not currently moving.	
OUT8	Servo state	ON	Robot motor is in servo ON status.	level

5.3 System I/O timing chart

5.3.1 Timing chart of JOB start and stop

PLC(PC)

-> N2 Series



N2 Series
-> PLC(PC)

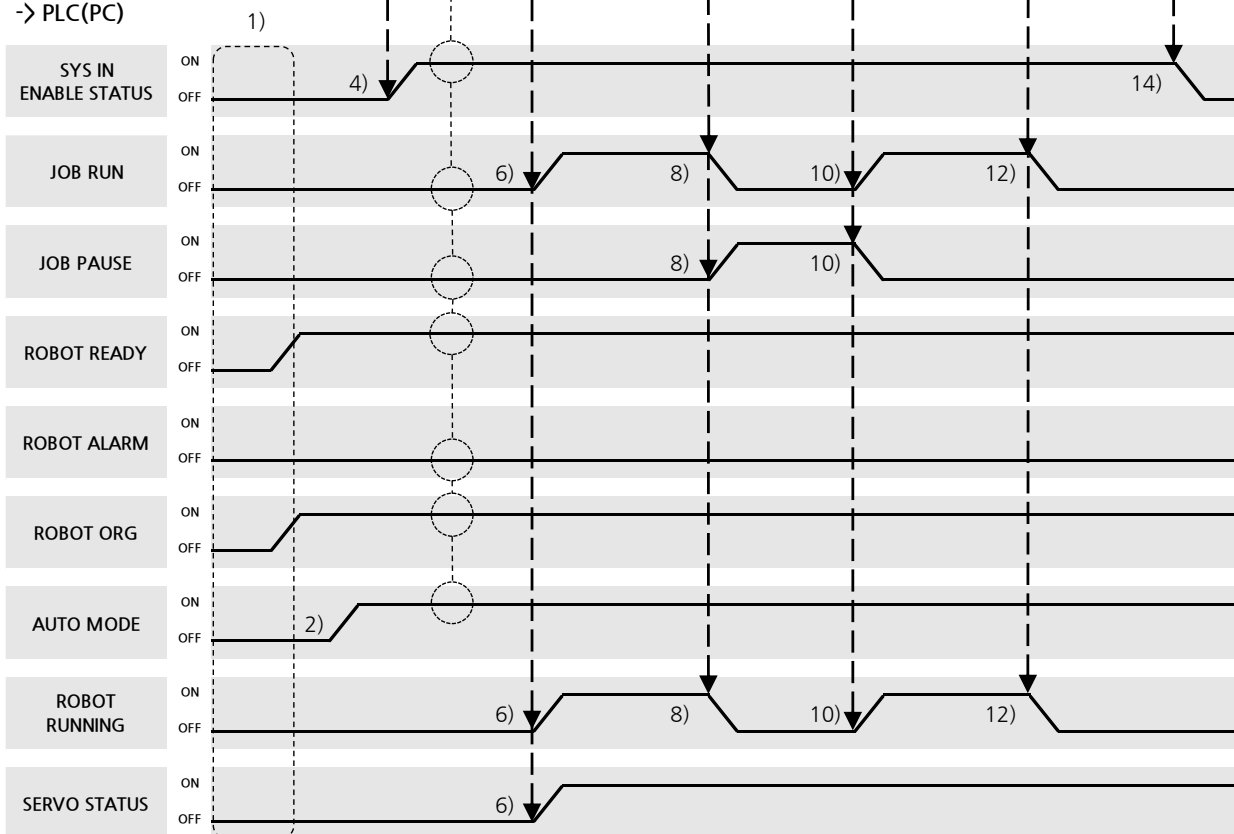


Figure 5-2 Timing chart 1

Turn on Power

- 1) All output ports are in “OFF” status right after power input. “Robot Ready, Robot Alarm or Robot ORG” signal operates according to Controller status. (System Output port is displayed regardless of Sys In Enable bit port status.)

Switching To AUTO Mode

- 2) Convert T/P Mode switch into Auto to use System I/O. (Manual : off, Auto : on)

System in Enable bit on

- 3) To use System Input port, maintain Sys In Enable Ctl port in “ON” status.
- 4) If Sys In Enable Ctl port turns “ON”, Sys In Enable Status port turns “ON”.

JOB Start

- 5) Parent controller (PLC or PC) checks the following port status before starting JOB programming.

Sys In Enable Status	JOB Run	JOB Pause	Robot Ready	Robot Alarm	Robot ORG	Auto Mode
ON	OFF	OFF	ON	OFF	ON	ON

- 6) JOB programming will be executed if the conditions above are satisfied and JOB Start port is turned “ON”. At this point, robot motor turns Servo on and Robot Run port turns “ON”. Robot running port turns “ON” during actual robot operation by executing motion command.

JOB Pause

- 7) JOB program will be paused when JOB Pause port turns “ON”.
- 8) When JOB program pauses, JOB Run port turns “OFF”, JOB Pause port turns “ON”, and Robot Running port turns “OFF”.

JOB Restart

- 9) Parent controller (PLC or PC) checks the following port status before starting JOB program.

Sys In Enable Status	JOB Run	JOB Pause	Robot Ready	Robot Alarm	Robot ORG	Auto Mode
ON	OFF	ON	ON	OFF	ON	ON

- 10) If JOB Restart port turns “ON” when JOB Pause port is in “ON”, and it is restarted at the STEP where JOB program is stopped. It is same with 6) procedure.

JOB Exit

11) When JOB Exit port turns “ON”, running JOB program ends. It runs regardless of JOB Run port and JOB Pause port status.

12) If JOB program ends, JOB Run port turns “OFF”, Robot Running port turns “OFF”.

System In Enable bit off

13) To end using System Input port, maintain Sys In Enable Ctl port in “OFF” status.

14) If Sys In Enable Ctl port turns “OFF”, Sys In Enable Status port turns “OFF”.

※ T1 : Operates once when the relevant port turns “ON” from “OFF” status and maintain it for enough time to process Background work inside the Controller for about 10ms.

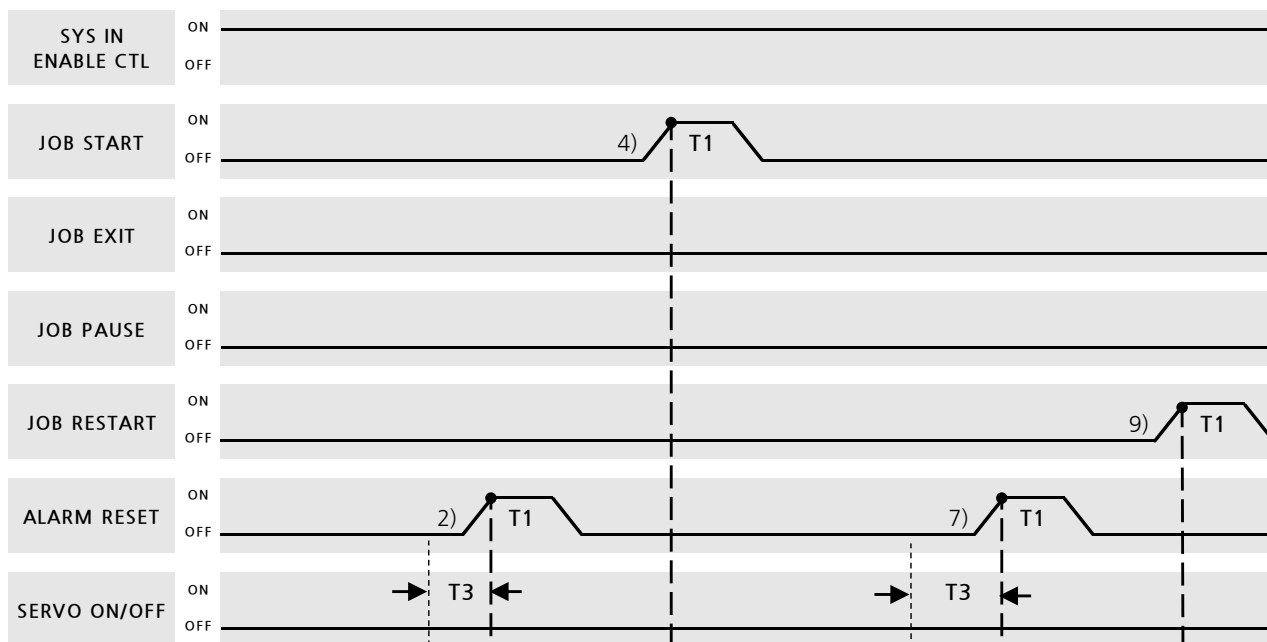


- 1) Check for any person in robot operating range before operating the Controller.
- 2) JOB Exit, JOB Pause port operate regardless of Sys In Enable Status and another output status.
- 3) If JOB ends, restarting at current STEP is impossible.
- 4) If JOB pauses, JOB Start is impossible and JOB Restart, JOB Exit port are possible.

5.3.2 Timing chart of Controller alarm and alarm release

PLC(PC)

-> N2 Series



N2 Series

-> PLC(PC)

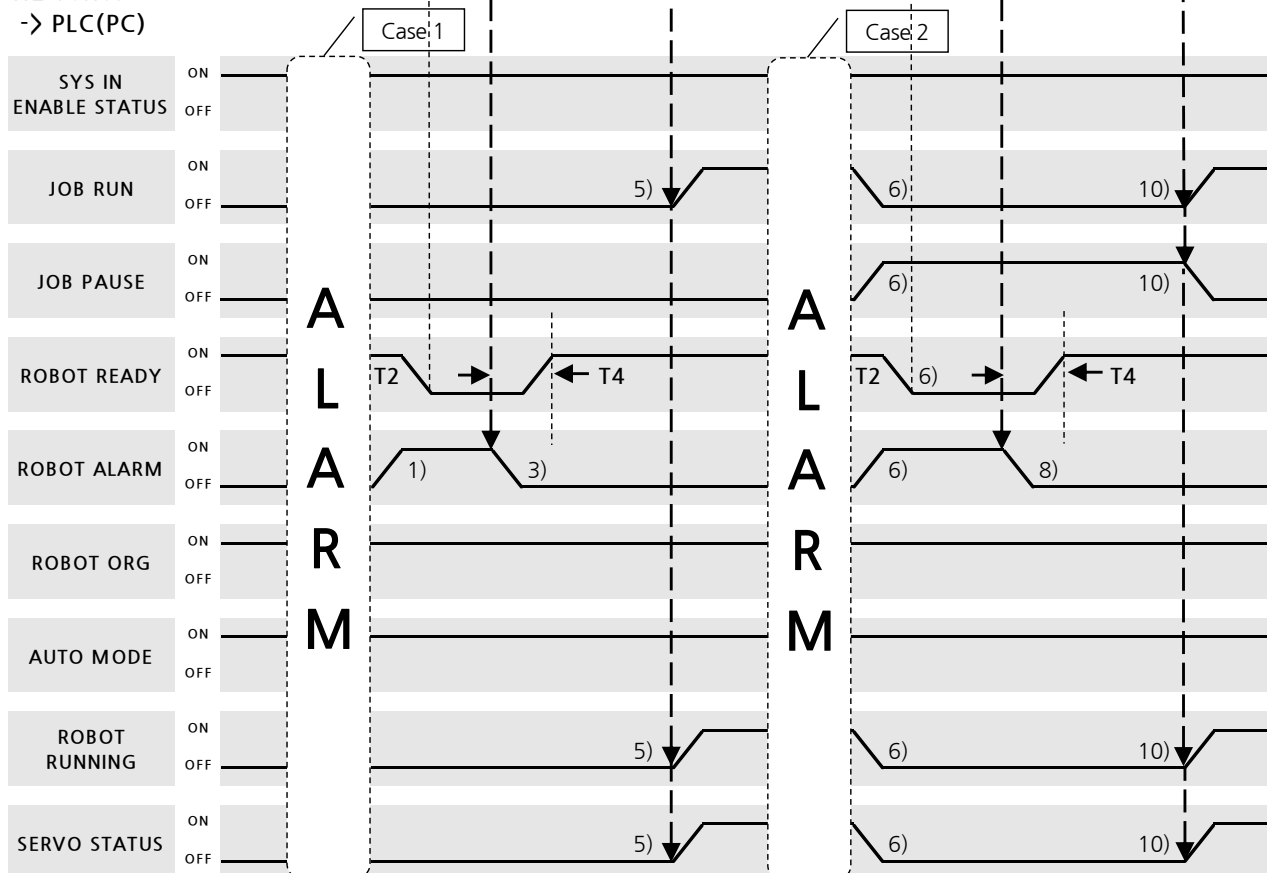


Figure 5-3 Timing chart 2

Case1. If an Alarm occurs in Normal status

- 1) Robot Alarm port turns "ON".

※ T2 : The main power supply relay (MC relay) of the motor turns "OFF" after about 780ms of alarm occurrence. At this point, Robot Ready port turns "OFF". If Robot Ready port does not turn "OFF" after up to 1,000ms, "[1178] MC OFF ERR" alarm will occur.

Alarm Reset

- 2) Turn "ON" Robot Reset port when Robot Alarm port is in "ON" status and after T3 time of turning "OFF" of Robot Ready port.

※ T3 : Alarm Reset port operates after 120ms of "OFF" point of Robot Ready port by occurrence of an alarm.

- 3) When Alarm Reset port turns "ON", Robot Alarm turns "OFF" if the condition to release Controller alarm is satisfied. In addition, motor main power supply relay turns "ON" and Robot Ready port turns "ON" after T4 time.

※ T4 : Main power supply relay (MC relay) of the motor turns "ON" after about 250ms of Alarm Reset. At this point, Robot Ready port turns "ON".

JOB Start

- 4) Parent controller (PLC or PC) checks the following port status before starting JOB program.

Sys In Enable Status	JOB Run	JOB Pause	Robot Ready	Robot Alarm	Robot ORG	Auto Mode
OFF	OFF	OFF	ON	OFF	ON	ON

- 5) Master JOB program runs when the conditions above are satisfied and JOB Start port turns "ON". At this point, robot motor turns Servo on and Robot Run port turns "ON". Robot Running port turns "ON" during actual robot operation by executing motion command.

Case2. If an alarm occurs in JOB Running status

- 6) JOB Run, Robot Running, Servo Status port turns “OFF”. In addition, JOB Pause, Robot Alarm port turns “ON”. Robot Ready port turns “OFF” after T2 time.

Alarm Reset

- 7) Robot Reset port turns “ON” when Robot Alarm port is in “ON” status and after T3 time of “OFF” of Robot Ready port.

※ T3 : Alarm Reset port operates after 120ms of point when Robot Ready port turned “OFF” by occurrence of an alarm.

- 8) When Alarm Reset port turns “ON”, Robot Alarm turns “OFF” if the condition to release Controller alarm is satisfied. In addition, motor main power supply relay turns “ON” and Robot Ready port turns “ON” within T4 time.

※ T4 : The main power supply relay (MC relay) of the motor turns “ON” after about 250ms after Alarm Reset. At this point, Robot Ready port turns “ON”.

JOB Restart

- 9) Parent controller (PLC or PC) checks the following port status before starting JOB program.

Sys In Enable Status	JOB Run	JOB Pause	Robot Ready	Robot Alarm	Robot ORG	Auto Mode
ON	OFF	ON	ON	OFF	ON	ON

- 10) When JOB Restart port turns “ON” in JOB Pause port is in “ON” status, it is restarted at the STEP where JOB program is stopped. Same with 5) procedure.

※ T1 : Operates once when the relevant port turns “ON” from “OFF” status and maintain it for enough time to process Background work inside the Controller for about 10ms



- 1) Check for any person in robot operating range before operating the Controller.
- 2) In case of Alarm Reset within T3, signal will be disregarded. If JOB Start, JOB Restart, Servo on/off signal is input for T4, “[4242] Main power fail” alarm can occur.

6. Run Monitoring

- 1) Check work detail and status values in real-time while operating RUN mode.
- 2) For provided functions, refer to the items below.

6.1 Run Monitoring item

GROUP		Description	Unit
Page 1	CURR	Robot current coordinate data	degree or mm
	GPNT	Global Point	degree or mm
	PNT	Point of the selected JOB file	degree or mm
	INT	Global Integer edit screen	-
	FLOAT	Global Float edit screen	-
	DIG I/O	Digital I/O edit screen	-
	FB I/O	Fieldbus I/O edit screen	-
	SAFE I/O	Safety I/O edit screen	-
	PRINT	User Log screen	-
Page 2	TRQ	Real-time torque value	%
	MAXTRQ	Max torque value	%
	VEL	Real-time velocity value	degree/s or mm/s
	MAXVEL	Max velocity value (degree/s or mm/s)	degree/s or mm/s
	LOAD	Real-time motor load value	%
	STURN	Real-time encoder Single turn value	-
	POSERR	※ Not currently supported.	-
	ENCTEMP	Real-time encoder temperature value	℃
	MVR	MVR value in case of robot MOV command	%
	DIST	※ Not currently supported.	-
Page 3	MTEMP	Main board temperature value	℃
	THREAD	Thread state	-
	E_LOSS	EtherCAT communication LOSS value	-

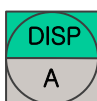
6.2 How to operate Run Monitoring

```
<ROBOT:INS>
F:MASTER  S:1      S
R:RA007   T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
EXIT START RE-ST WAY
```

When Manual Run or Auto Run screen is accessed for the first time, Monitoring mode is in INS mode.

```
<ROBOT:DISP>      1/3
1.CURR    2.GPNT
3.PNT     4.INT
5.FLOAT   6.DIG I/O
7.FB I/O  8.SAFEI/O
9.PRINT   A.CNETI/O
```

ITEM #



Select DISP key in Manual Run screen.

```
<ROBOT:DISP>      1/3
1.CURR    2.GPNT
3.PNT     4.INT
5.FLOAT   6.DIG I/O
7.FB I/O  8.SAFEI/O
9.PRINT   A.CNETI/O
```

ITEM #



~



Use number keys to select item.
Displayed screen differs depending on items.
For screen for each item, refer to chapter 5, section 6.

※ If data for each axis are displayed, input
AXIS CHG key to shift additional axis.

```
<ROBOT:INS>
F:MASTER  S:1      S
R:RA007   T:0 V: 50
SVON
WHILE 1
JMOV P0
DLAY 1000
EXIT START RE-ST WAY
```



Press ESC key to return to main screen.

6.3 How to turn pages in the Run Monitoring screen

<ROBOT:DISP>1/3

1.CURR2.GPNT

3.PNT4.INT

5.FLOAT6.DIG I/O

7.FB I/O8.SAFEI/O

9.PRINTA.CNETI/O

ITEM #



Use PgDn keys to turn screen page.

<ROBOT:DISP>2/3

1.TRQ2.MAXTRQ

3.VEL4.MAXVEL

5.LOAD6.STURN

7.POSERR8.MAXPOS

9.MVRA.DIST

ITEM #



Use PgUp, PgDn keys to turn screen page.



<ROBOT:DISP>3/3

1.MTEMP2.ENCTEMP

3.E_LOSS4.THREAD

5.E_STATE

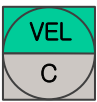
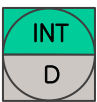
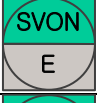
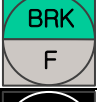
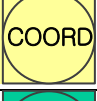
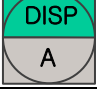
ITEM #



Press PgUp key to turn screen page.

6.4 Simple Run Monitoring

Use frequently used Run Monitoring items at one go by operating buttons in Run screen.

T/P key	Description
	Displays screen to display JOINT VEL. If repeatedly pressed, converted in the order of JOINT VEL → MAX VEL → RPM → MAX RPM → TRQ → MAX TRQ → OVER LOAD → JOINT VEL
	Displays screen to display GLOBAL INTEGER. If repeatedly pressed, global Integer and global real number edit window is repeatedly displayed.
	Displays screen to display servo on/off status.
	Displays screen to display Global Point.
	Displays screen to display current coordinate value of the robot.
	Press the relevant key in menu to output Point information to change coordinate system in the order of JOINT → BASE → USER → TOOL → JOINT.
	Displays screen to display monitoring menu.

6.5 Screen for each Run Monitoring item

6.5.1 CURR item screen

<SELECT ROBOT>
 NO TYPE
 R1 RA007L
 *R2 NO-EXIST
 R3 NO-EXIST

 SEL EXIT



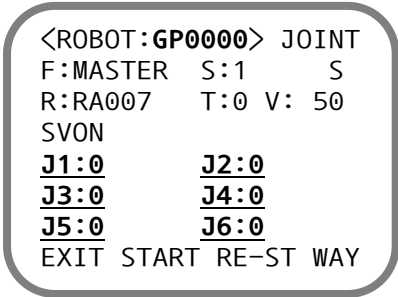
Use arrow keys to select robot channel.
Check current position with “*”.

<ROBOT:CURR> JOINT
 F:MASTER S:1 S
 R:RA007 T:0 V: 50
 SVON
 J1:0 J2:0
 J3:0 J4:0
 J5:0 J6:0
 EXIT START RE-ST WAY

Current axis position value is displayed in the 5 ~ 7th line.
Current coordinate system is displayed on top right.

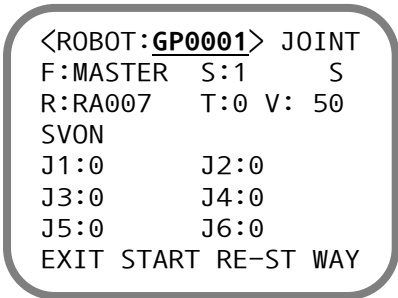
※ Use COORD key to convert coordinate system.

6.5.2 GPNT item screen

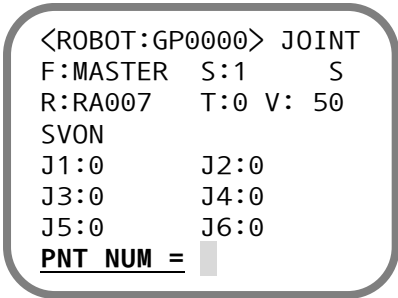


Global Point Index is displayed on top left.
The relevant Global Point value is displayed in the 5 ~ 7th line. Current coordinate system is displayed on top right.

※ Use STOP key to convert coordinate system.



Use PgUp, PgDn keys to change Global Point.



Input desired Point Index using JUMP key to change displayed Global Point.

6.5.3 PNT item screen

```

<SELECT ROBOT>
NO    TYPE
R1    RA007L
*R2    NO-EXIST
R3    NO-EXIST

SEL                                EXIT
  
```



Use arrow keys to select robot channel.
Check current position with “*”.

```

<PNT MENU>
F: 3
  0.BGTD
  1.BGTF
* 2.MASTER
  
```



Use arrow keys to select a JOB file.
Check current position with “*”.

```

<ROBOT:MASTER P000>
F:MASTER  S:1      S
R:RA007   T:0  V: 50
SVON
J1:0      J2:0
J3:0      J4:0
J5:0      J6:0
EXIT START RE-ST WAY
  
```



Enter key is to display Point value of the relevant JOB file.
A JOB file name and Point Index is displayed on top left.

```

<ROBOT:MASTER P001>
F:MASTER  S:1      S
R:RA007   T:0  V: 50
SVON
J1:0      J2:0
J3:0      J4:0
J5:0      J6:0
EXIT START RE-ST WAY
  
```



Use PgUp, PgDn keys to change Point.

```

<ROBOT:MASTER P000>
F:MASTER  S:1      S
R:RA007   T:0  V: 50
SVON
J1:0      J2:0
J3:0      J4:0
J5:0      J6:0
PNT NUM = 
  
```



Use JUMP key to input desired Point Index to change displayed Point.

6.5.4 INT item screen

```

<ROBOT: INTEGER>
I000  0
I001  0
I002  0
I003  0
I004  0
I005  0
EXIT  START  RE-ST  WAY

```



Press an arrow key or ENTER key to move to item to be edited.
Check current position with the cursor.

```

<ROBOT: INTEGER>
I000  12
I001  0
I002  0
I003  0
I004  0
I005  0
EXIT  START  RE-ST  WAY

```



~

Use number keys to enter value.



```

<ROBOT: INTEGER>
I000  12
I001  0
I002  0
I003  0
I004  0
I005  0
UPDATE? (ENT/ESC)

```



After entering value, press ENTER key.
Message to check update is displayed.

OR



※ Press ESC key to return to the value before editing.

```

<ROBOT: INTEGER>
I000: 12
I001: 0
I002: 0
I003: 0
I004: 0
I005: 0
EXIT  START  RE-ST  WAY

```



After pressing ENTER key again, entered value is saved

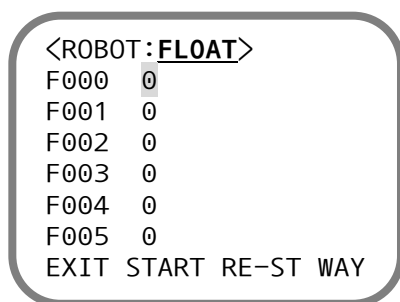
```

<ROBOT: INTEGER>
I000  12
I001  0
I002  0
I003  0
I004  0
I005  0
INTEGER NUM =

```

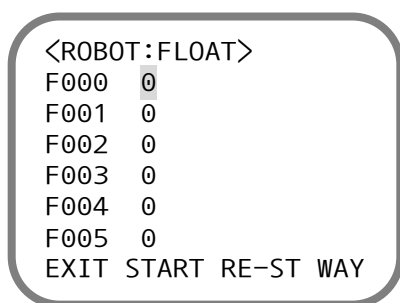


Use JUMP key to input desired Integer Index to change displayed Integer Point.

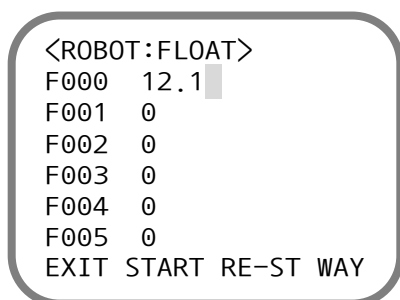


Press INT key in INTEGER mode to directly convert into FLOAT mode.

6.5.5 FLOAT item screen

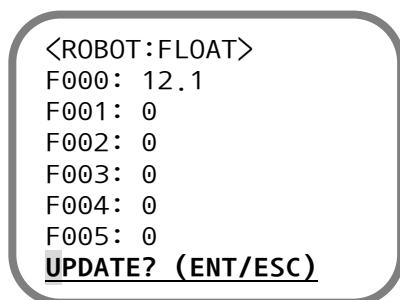


Press an arrow key or ENTER key to move to item to be edited.
Check current position with the cursor.



~

Use number keys to enter value.

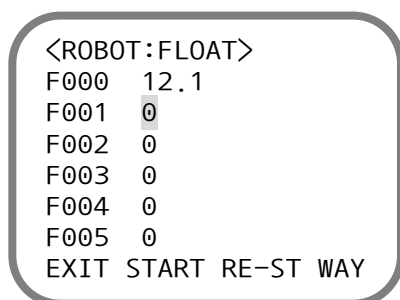


OR

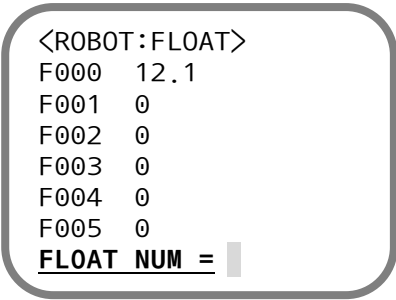


After entering value, press ENTER key.
Message to check update is displayed.

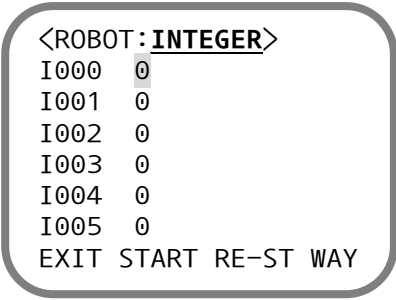
※ Press ESC key to return to the value before editing.



After pressing ENTER key again, entered value is saved

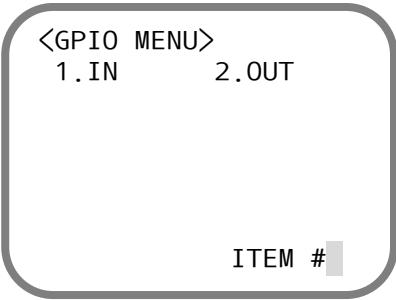


Use JUMP key to input desired Float Index to change displayed Float Point.



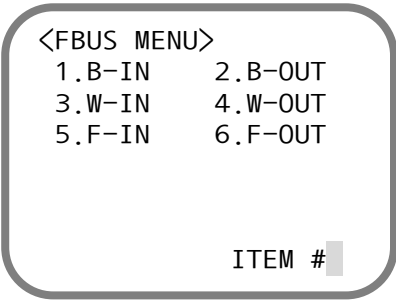
Press INT key in FLOAT mode to directly convert into INTEGER mode.

6.5.6 DIG I/O item screen



Refer to Digital I/O in chapter 7, section 2.

6.5.7 FBUS I/O item screen



Refer to Fieldbus I/O in chapter 7, section 4.

6.5.8 SAFETY I/O item screen

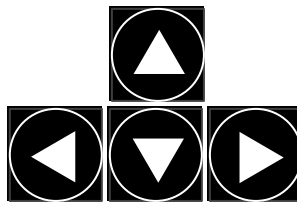
<SAFETY MENU>
 1.IN 2.OUT

 ITEM #

Refer to Safety I/O in chapter 7, section 3.

6.5.9 PRINT item screen

<ROBOT:ULOG>
 000:[0:0]<-11.860,8.
 001:[0.0]1,DATA,12.4
 002:
 003:
 004:
 005:
 EXIT START RE-ST WAY



The screen can be monitored if JOB command PRINT () is used.
Use arrow keys to move displayed screen.

<ROBOT:ULOG>
 000:[0:0]<-11.860,8.
 001:[0.0]1,DATA,12.4
 002:
 003:
 004:
 005:
INDEX # =



Use JUMP key to input desired Index to move to desired LOG screen.

6.5.10 TRQ item screen

<SELECT ROBOT>
 NO TYPE
 R1 RA007L
 *R2 NO-EXIST
 R3 NO-EXIST

 SEL EXIT



Use arrow keys to select robot channel.
Check current position with “*”.

```

<ROBOT:TRQ>
F:MASTER S:1 S
R:RA007 T:0 V: 50
SVON
J1:0      J2:0
J3:0      J4:0
J5:0      J6:0
EXIT START RE-ST WAY

```

Current Torque value is displayed in the 5 ~ 7th line.

※ Press VEL key to move to MAX TRQ item.

6.5.11 MAXTRQ item screen

```

<SELECT ROBOT>
NO      TYPE
R1      RA007L
*R2    NO-EXIST
R3      NO-EXIST

SEL      EXIT

```



Use arrow keys to select robot channel.
Check current position with “*”.

```

<ROBOT:MAX TRQ>
F:MASTER S:1 S
R:RA007 T:0 V: 50
SVON
J1:0      J2:0
J3:0      J4:0
J5:0      J6:0
EXIT START RE-ST WAY

```

Max Torque value is displayed in the 5 ~ 7th line.

※ Press VEL key to move to OVER LOAD item.

※ Press RESET key to reset to 0.

6.5.12 VEL item screen

```

<SELECT ROBOT>
NO    TYPE
R1    RA007L
*R2  NO-EXIST
R3    NO-EXIST

SEL                                EXIT

```



Use arrow keys to select robot channel.
Check current position with “*”.

```

<ROBOT: JOINT VEL>
F:MASTER  S:1      S
R:RA007    T:0  V: 50
SVON
J1:0      J2:0
J3:0      J4:0
J5:0      J6:0
EXIT  START  RE-ST  WAY

```

Current velocity value (degree/s or mm/s) is displayed in the 5 ~ 7th line.

※ Press VEL key to move to MAX VEL item.

6.5.13 MAX VEL item screen

```

<SELECT ROBOT>
NO    TYPE
R1    RA007L
*R2  NO-EXIST
R3    NO-EXIST

SEL                                EXIT

```



Use arrow keys to select robot channel.
Check current position with “*”.

```

<ROBOT: MAX VEL>
F:MASTER  S:1      S
R:RA007    T:0  V: 50
SVON
J1:0      J2:0
J3:0      J4:0
J5:0      J6:0
EXIT  START  RE-ST  WAY

```

Max velocity value (degree/s or mm/s) is displayed in the 5 ~ 7th line.

※ Press VEL key to move to RPM item.

※ Press RESET key to reset it to 0.

6.5.14 RPM item screen

<SELECT ROBOT>	
NO	TYPE
R1	RA007L
<u>*R2</u>	NO-EXIST
R3	NO-EXIST
SEL EXIT	



Use arrow keys to select robot channel.
Check current position with “*”.

<ROBOT: <u>RPM</u> >	
F: MASTER	S: 1 S
R: RA007	T: 0 V: 50
SVON	
<u>J1: 0</u>	<u>J2: 0</u>
<u>J3: 0</u>	<u>J4: 0</u>
<u>J5: 0</u>	<u>J6: 0</u>
EXIT START RE-ST WAY	

Real-time RPM value is displayed in the
5 ~ 7th line.

※ Press VEL key to move to MAX RPM item.

6.5.15 MAX RPM item screen

<SELECT ROBOT>	
NO	TYPE
R1	RA007L
<u>*R2</u>	NO-EXIST
R3	NO-EXIST
SEL EXIT	



Use arrow keys to select robot channel.
Check current position with “*”.

<ROBOT: <u>MAX RPM</u> >	
F: MASTER	S: 1 S
R: RA007	T: 0 V: 50
SVON	
<u>J1: 0</u>	<u>J2: 0</u>
<u>J3: 0</u>	<u>J4: 0</u>
<u>J5: 0</u>	<u>J6: 0</u>
EXIT START RE-ST WAY	

Max RPM value is displayed in the 5 ~ 7th line.

※ Press VEL key to move to TRQ item.

※ Press RESET key to reset to 0.

6.5.16 LOAD item screen

<SELECT ROBOT>	
NO	TYPE
R1	RA007L
<u>*R2</u>	NO-EXIST
R3	NO-EXIST
SEL EXIT	



Use arrow keys to select robot channel.
Check current position with “*”.

<ROBOT: OVER LOAD >		
F:MASTER	S:1	S
R:RA007	T:0	V: 50
SVON		
<u>J1:0</u>	<u>J2:0</u>	
<u>J3:0</u>	<u>J4:0</u>	
<u>J5:0</u>	<u>J6:0</u>	
EXIT START RE-ST WAY		

Real-time load value is displayed in the 5 ~ 7th line.

※ Press VEL key to move to VEL item.

6.5.17 STURN item screen

<SELECT ROBOT>	
NO	TYPE
R1	RA007L
<u>*R2</u>	NO-EXIST
R3	NO-EXIST
SEL EXIT	



Use arrow keys to select robot channel.
Check current position with “*”.

<ROBOT: STURN >		
F:MASTER	S:1	S
R:RA007	T:0	V: 50
SVON		
<u>J1:0</u>	<u>J2:0</u>	
<u>J3:0</u>	<u>J4:0</u>	
<u>J5:0</u>	<u>J6:0</u>	
EXIT START RE-ST WAY		

Real-time Single Turn value is displayed in the 5 ~ 7th line.

6.5.18 POSERR item screen ※ Not currently supported.

6.5.19 ENCTEMP item screen

```

<SELECT ROBOT>
NO      TYPE
R1      RA007L
*R2    NO-EXIST
R3      NO-EXIST

SEL                                EXIT
  
```



Use arrow keys to select robot channel.
Check current position with “*”.

```

<ROBOT: ENCTEMP>
F:MASTER  S:1      S
R:RA007   T:0  V: 50
SVON
J1:0      J2:0
J3:0      J4:0
J5:0      J6:0
EXIT START RE-ST WAY
  
```

Real-time encoder temperature value is
displayed in the 5 ~ 7th line.

6.5.20 MVR item screen

```

<SELECT ROBOT>
NO      TYPE
R1      RA007L
*R2    NO-EXIST
R3      NO-EXIST

SEL                                EXIT
  
```



Use arrow keys to select robot channel.
Check current position with “*”.

```

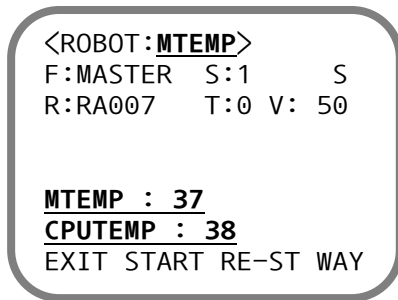
<ROBOT: MVR>
F:MASTER  S:1      S
R:RA007   T:0  V: 50
SVON
MVR : 0

EXIT START RE-ST WAY
  
```

Motion progress is displayed by percentage in
the 6th line.

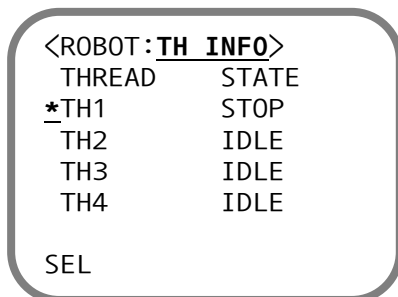
6.5.21 DIST item screen ※ Not currently supported.

6.5.22 MTEMP item screen

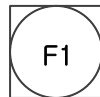
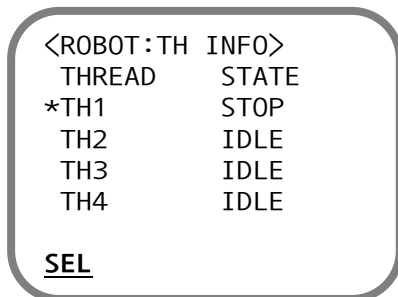


Interface board temperature is displayed in the 6th line, CPU temperature is displayed in the 7th line.

6.5.23 THREAD item screen

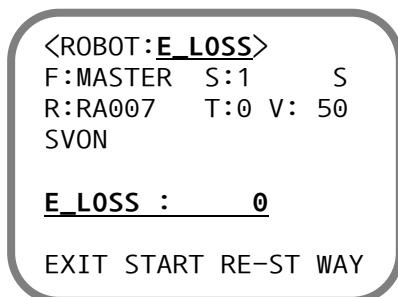


Thread operating status is displayed.
Use arrow keys to select thread.
Check current position with “*”.



Press F1 (SEL) Function key to monitor the selected thread.

6.5.24 E_LOSS item screen



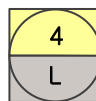
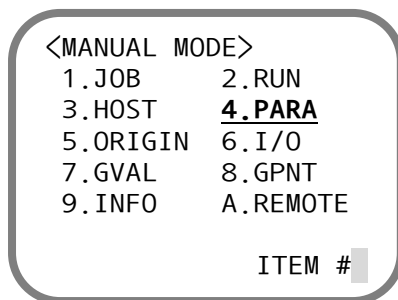
EtherCAT Flame Loss count value is displayed in the 6th line.

Chapter 6 Parameter Operation

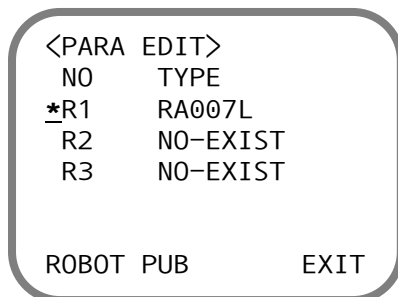
1. Overview

- 1) Parameter means setting values for robot type and operating environment.
- 2) Be sure to check setup before robot (manipulators + Controller) operation. If needed, reset it.
 - A. Mechanical, electrical standard related data of the robot
 - B. Basic operating method for special functions of the robot
 - C. Data communication protocol with the PC
- 3) Default parameters of the robot (manipulators + Controller) are set at the factory.
- 4) To change setup, be sure to record or backup setup to the computer preparing for problems due to use error or others.
- 5) The parameter is largely divided into Robot Parameter, Public Parameter and detailed items.

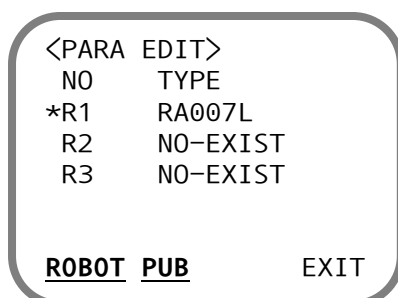
2. How to enter into parameter screen



Input number key in the main menu screen to select "4.PARA".



Use arrow keys to select robot channel.
Check current position with : "x".



Select Robot Parameter item.

OR



Select PUB parameter item.

3. Flowchart of Robot Parameter

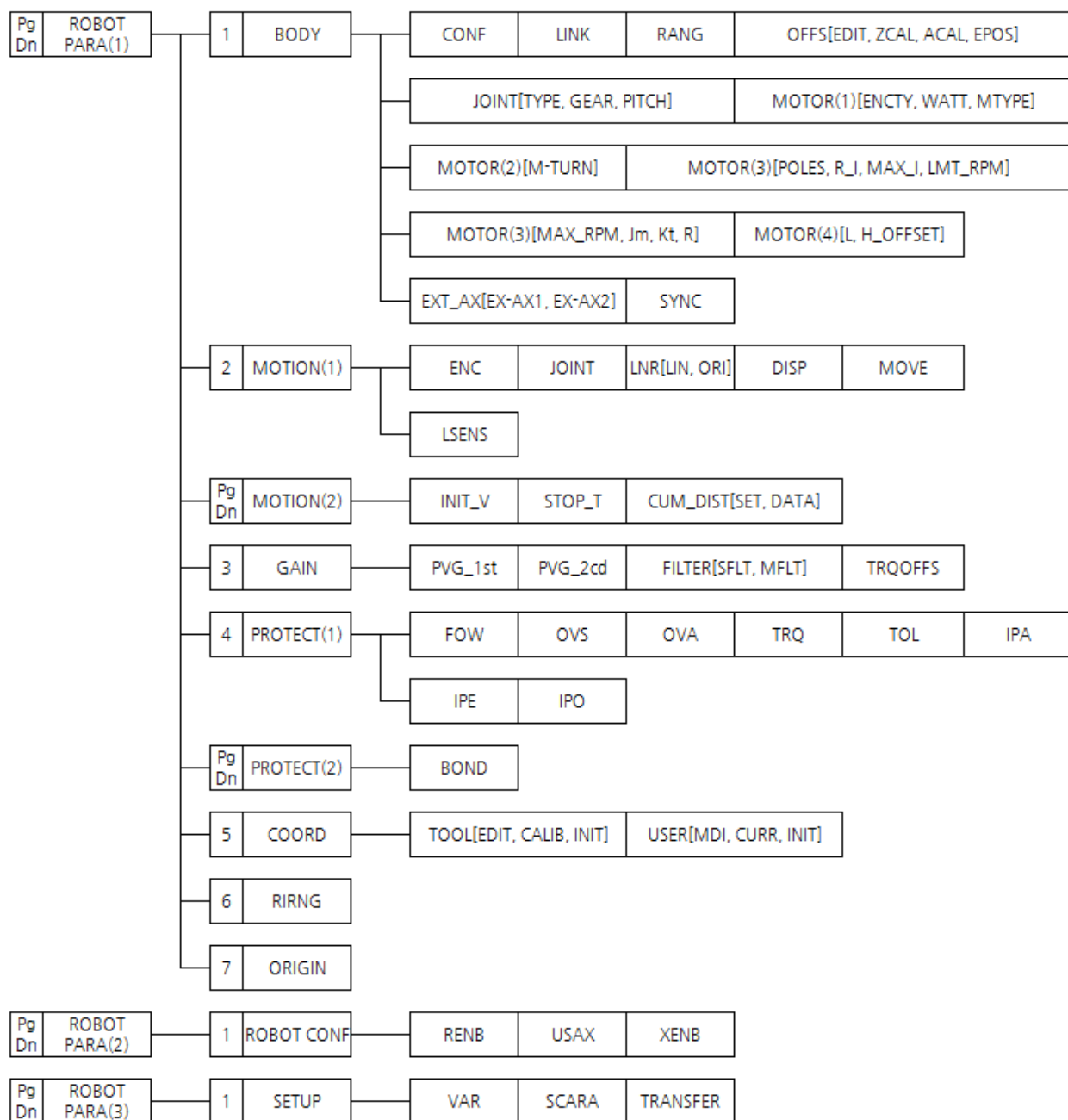


Figure 6-1 Flowchart of Robot Parameter

4. How to edit parameter

4.1 How to edit Compact T/P parameter

4.1.1 How to input value using the number keys

<RA005:USAX>
USING AXIS SET

J1:1	J2:2
J3:3	J4:4
J5:5	J6:6



Press an arrow key or ENTER key to move to item to be edited.

<RA005:USAX>
USING AXIS SET

J1:7	J2:2
J3:3	J4:4
J5:5	J6:6



~

Use number keys to enter value.



<RA005:USAX>
USING AXIS SET

J1:7	J2:2
J3:3	J4:4
J5:5	J6:6



After entering value, press ENTER key.

※ If inputting is cancelled by pressing ESC key, return to the value before editing.

<RA007:USAX>
USING AXIS SET

J1:7	J2:2
J3:3	J4:4
J5:5	J6:6

UPDATE? (ENT/ESC)



Press ESC key to save parameter.
Message to check update is displayed.

OR

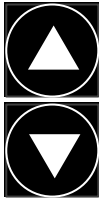


※ Press ENTER key to complete saving.
※ Press ESC key not to save edited parameter and to close edit screen.

4.1.2 How to change value using ENTER key

<RA007:XENB>
AXIS ENABLE SET

J1:DIS	J2:ENB
J3:ENB	J4:ENB
J5:ENB	J6:ENB



Use arrow keys to move cursor to the item to be edited.

<RA007:XENB>
AXIS ENABLE SET

J1: ENB	J2:ENB
J3:ENB	J4:ENB
J5:ENB	J6:ENB



ENTER key is to change value for each parameter.

<RA007:XENB>
AXIS ENABLE SET

J1:ENB	J2:ENB
J3:ENB	J4:ENB
J5:ENB	J6:ENB

UPDATE? (ENT/ESC)



OR



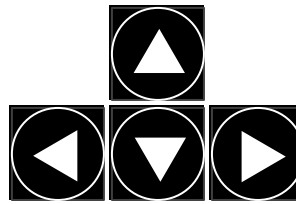
Press ESC key to save parameter.
Message to check update is displayed.

※ Press ENTER key to complete saving.
※ Press ESC key not to save edited parameter and to close edit screen.

4.1.3 How to input 2 data at 1 item

<RA005:RANG (1/2)>

SOFT LIMIT RANGE	
J1:-170	170
J2:-80	110
J3:-60	80
J4:-190	80



Use arrow keys to move item to be edited.

<RA005:RANG (1/2)>

SOFT LIMIT RANGE	
J1:-160	170
J2:-80	110
J3:-60	80
J4:-190	80



~

Use number keys to enter value.



<RA007:RANG(1/2)>

SOFT LIMIT RANGE	
J1:-160	170
J2:-80	110
J3:-60	80
J4:-190	80



After entering value, press ENTER key.

※ If inputting is cancelled by pressing ESC key, return to the value before editing.

<RA007:RANG(1/2)>

SOFT LIMIT RANGE	
J1:-160	170
J2:-80	110
J3:-60	80
J4:-190	80

UPDATE? (ENT/ESC)



Press ESC key to save parameter.
Message to check update is displayed.

OR



※ Press ENTER key to complete saving.
※ Press ESC key not to save edited parameter and to close edit screen.

4.1.4 How to select menu or function using Function key

<RA007:CUR> ZERO POS CALIB(1/2) J1:10.82 J2:0.8 J3:30.53 J4:-54.2 <u>J1</u> <u>J2</u> <u>J3</u> <u>J4</u>		Select information displayed on the bottom using F1 (J1) ~ F4 (J4) Function keys.
		
<RA007:CUR> ZERO POS CALIB(1/2) J1:10.82 J2:0.8 J3:30.53 J4:-54.2 <u>SAVE J1? (ENT/ESC)</u>		Press ESC key to save parameter. Message to check update is displayed.
	OR 	

※ Press ENTER key to complete saving.
 ※ Press ESC key not to save edited parameter and to close edit screen.

4.1.5 How to select in list

<PUB:XML> SELECT XML FILE CUR:N2_V12_442111 0:N2_V12_442111 * 1:N2_V12_774111 2:N2M_V12_442111 3:N2M_V12_774111	 	Press an arrow key to move “*” symbol to the item to be selected.
CUR:N2_V12_442111 NEW:N2_V12_774111 <u>UPDATE? (ENT/ESC)</u>		Press ESC key to save parameter. Message to check update is displayed.
	OR 	

※ Press ENTER key to complete saving.
 ※ Press ESC key not to save edited parameter and to close edit screen.

4.2 How to edit compact T/P servo parameter

4.2.1 Servo parameter overview

Configuration of N2 series is based on the servo driver and EtherCAT communication.

Parameter needed for motor operation must be sent to the servo driver during Initial setup of the Controller

In addition, if the parameter saved at the servo driver differs from the parameter value saved at the Controller when editing servo driver parameter, Parameter Mismatch notice is displayed and Overwrite check procedure will be taken.

Monitors and edit servo parameter using the exclusive servo driver program after connecting cable to servo driver through external PC.

4.2.2 Servo parameter list

GROUP1	GROUP2	GROUP3	Description	Reference
BODY	JNT	TYPE	Sets joint type.	5.1.5.1
		GEAR	Reduction ratio of motor and manipulator	5.1.5.2
		PITCH	Moving distance of the manipulator per 1 motor rotation	5.1.5.3
	MOTOR	ENCTY	Sets encoder Type.	5.1.6.1
		WATT	Sets Motor capacity.	5.1.6.2
		MTYPE	Sets Motor type.	5.1.6.3
		M_TURN	Sets m-turn data Clear.	5.1.7.1
MOTION	ENC		Sets pulse count (bit) per 1 rotation of encoder	5.2.1
GAIN	PVGAIN		Sets position, velocity gain of each axis.	5.4.1
PROTECT	FILTER		Sets filter value for each axis.	5.4.2
	FOW		Sets Following Error.	5.5.1
	BOND		Sets Brake on Delay.	5.6.1

4.2.3 How to edit Servo parameter

<RA007:ENCTY> ENCODER TYPE IND = 3, MISSMATCH!! <u>OVERWRITE? (ENT/ESC)</u>		Parameter value saved at the servo driver is loaded.
OR		
<RA007:ENCTY> ENCODER TYPE J1:INC J2:INC J3:INC J4:INC J5:INC J6:INC <u>UPDATE? (ENT/ESC)</u>		Parameter value saved at the Controller is loaded.
OR		
		In case of changing entered value, message to check update is displayed if ESC key is input.
OR		
		※ Press ENTER key to complete saving. ※ Press ESC key not to save edited parameter and to close edit screen.



- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed. However, operation is not normal due to no communication with the servo driver.

5. Robot Parameters

PAGE	GROUP	Description	Reference
PARA (1)	BODY	Sets robot machine related parameter.	5.1
	MOTION	Sets robot operation related parameter.	5.2
	GAIN	Sets gain parameter of each robot joint.	5.4
	PROTECT	Sets protective parameter used for robot operation.	5.5
	COORD	Sets robot coordinate system related parameter.	5.7
	RIRNG	Sets user In Range.	5.8
	ORIGIN	Sets origin related parameter.	5.9
PARA (2)	ROBOT CONF	Sets use of robot and each axis.	5.9
PARA (3)	SETUP	Resets Robot Parameter.	5.11

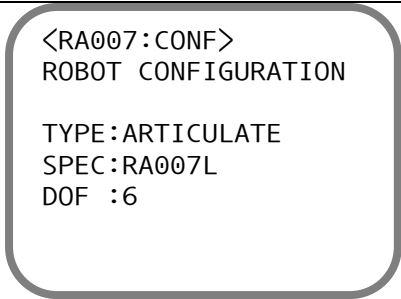
※ The reference section in the list is a detailed item in Chapter 6 Section 5.

5.1 BODY

GROUP	Description	Reference
CONF	Displays current setting robot information.	5.1.1
LINK	Sets robot link length.	5.1.2
RANG	Sets operating area of the manipulator.	5.1.3
OFFS	Sets manipulator coordinate origin and Controller coordinate origin.	5.1.4
JNT	Sets TYPE, reduction ratio, PITCH of each manipulator axis.	5.1.5
MOTOR	Sets encoder TYPE, capacity, Multi turn of each manipulator axis.	5.1.6
EXT_AX	Sets environment of additional axis.	5.1.8
SYNC	Sets sync environment of each axis.	5.1.9

※ The reference section in the list is a detailed item in Chapter 6 Section 5.

5.1.1 CONF (Configuration)

DEPTH	PARA (1) - BODY - CONF
T/P screen	
Parameter description	Displays current setting robot information.
How to edit	Can't be edited.
Related alarm	-
Related parameter	PARA(3) - SETUP PARA(1) - BODY - EXT_AX

■ Additional explanation

Item	Description
TYPE	Robot classification such as Vertical Articulated, SCARA, etc.
NAME	A robot model name. In "RA007L", RA is robot classification, last 3 rd digit number is payload and alphabet is model type (S : Standard type, L : Long type).
DOF	Number of robot joint. If an additional axis is used, max 8 axes can be used.



- 1) Parameter function is limited depending on robot type. In case of accessing to unusable function on the T/P screen, "NOT SUPPORTED" message is displayed.

5.1.2 LINK (Link) ※ Not currently supported.

5.1.3 RANG (Range)

DEPTH	PARAMETER (1) - BODY - RANG
T/P screen	<RA007:RANG(1/2)> SOFT LIMIT RANGE J1:-170 170 J2:-90 140 J3:-205 67 J4:-190 190 <RA007:RANG(2/2)> SOFT LIMIT RANGE J5:-125 125 J6:-360 360
Parameter description	The parameter is to set operating area of each axis.
How to edit	Refer to chapter 6, section 4.1.3.
Related alarm	[1423] Over Range error
Related parameter	PARAMETER (3) - SETUP PARAMETER (1) - BODY - OFFS PARAMETER (1) - BODY - JNT - GEAR PARAMETER (1) - MOTION (1) - ENC

■ Additional explanation

Item	Description
Unit	If parameter [5.1.5.1 TYPE] value is "REV" (Revolute Joint, rotation axis), it is degree. If "TRAN" (Translational Joint, parallel moving axis), mm.
Input range	-999,999 ~ 999,999
Value	Left item means min LIMIT value, right item means max LIMIT value.

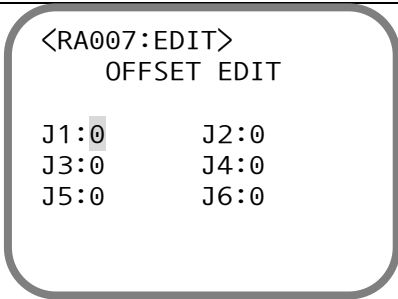


- 1) RANG parameter is software LIMIT. It must be compacted than hardware LIMIT.
- 2) In case of move command of current manipulator position to the position that exceeds parameter LIMIT range or point that exceeds LIMIT during motion operation, "[1423] Over Range error" alarm occurs.

5.1.4 OFFS (Offset)

GROUP		Description
EDIT		Changes robot's software origin.
ZCAL	MDI	Sets parameter as much as robot's hardware origin and software origin error.
	CUR	Inputs current position as software origin after moving robot's mechanical origin.
ACAL		※ Not currently supported.
EPOS		※ Not currently supported.

5.1.4.1 EDIT (Edit)

DEPTH	PARA (1) - BODY - OFFS - EDIT
T/P screen	
Parameter description	This is a parameter to change software origin after completing setup of robot's hardware origin and software origin. The parameter is to set parameter as much as desired compensation value.
How to edit	Refer to chapter 6, section 4.1.1
Related alarm	[1423] Over Range error
Related parameter	PARA(1) - BODY - RANG PARA(1) - BODY - JNT - GEAR PARA(1) - MOTION(1) - ENC

■ Additional explanation

Item	Description
Unit	If parameter [5.1.5.1 TYPE] value is "REV" (Revolute Joint, rotation axis), the unit is degree. If it is "TRAN" (Translational Joint, parallel moving axis), the unit is mm.
Input range	-9,999 ~ 9,999
Use point	1) If teaching Point is not correct due to position change (twist) due to manipulator collision 2) If position changes after replacing the motor 3) If interpolation operation (LMOV, AMOV, CMOV) is incorrect



- 1) If the changed current coordinate exceeds RANG parameter range, "[1423] Over Range error" alarm occurs.
- 2) If an additional axis is used, move it using PgDn key.

5.1.4.2 ZCAL (Zero Calibration) MDI mode

DEPTH	PARAMETER (1) - BODY - OFFS - ZCAL - MDI
T/P screen	<RA007:ZCAL> ZERO POS CALIB 1.MDI 2.CUR ITEM # <RA007:MDI> ZERO POS CALIB J1:0 J2:0 J3:0 J4:0 J5:0 J6:0
Parameter description	The parameter is to set parameter as much as error of robot's hardware origin and software origin. Set error compensation by adding or subtracting the existing value. Check setting value after setting origin in CUR mode.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	[1108] Not Completed Org
Related parameter	PARAMETER(1) - BODY - JNT - GEAR PARAMETER(1) - MOTION(1) - ENC PARAMETER(1) - BODY - SYNC PARAMETER(2) - ROBOT CONF - XENB PARAMETER(1) - BODY - MOTOR(1) - ENCTY

■ Additional explanation

Item	Description
Unit	If parameter [5.1.5.1 TYPE] value is "REV" (Revolute Joint, rotation axis), the unit is degree. If "TRAN" (Translational Joint, parallel moving axis), it is mm.
Use point	1) If teaching Point is not correct due to position change (twist) due to manipulator collision. 2) If position changes after replacing the motor. 3) To reset Controller coordinate origin. 4) If ORG LED on the T/P is off.



- 1) If the changed current coordinate exceeds RANG parameter range, "[1423] Over Range error" alarm occurs.
- 2) If an additional axis is used, move it using PgDn key.
- 3) Same function with that of EDIT parameter.

5.1.4.3 ZCAL (Zero Calibration) CUR mode

DEPTH	PARA (1) - BODY - OFFS - ZCAL - MDI
T/P screen	<RA007:ZCAL> ZERO POS CALIB 1.MDI <u>2.CUR</u> ITEM # <RA007:CUR> ZERO POS CALIB(1/2) J1:10.82 J2:0.8 J3:30.53 J4:-54.2 J1 J2 J3 J4
Parameter description	The parameter is to input current position as software origin after moving robot's hardware origin. To set it, change robot current position to 0.
How to edit	Refer to chapter 6, section 4.1.4.
Related alarm	[1108] Not Completed Org
Related parameter	PARA(1) - BODY - JNT - GEAR PARA(1) - MOTION(1) - ENC PARA(1) - BODY - SYNC PARA(1) - BODY - MOTOR(1) - ENCTY PARA(2) - ROBOT CONF - XENB

■ Additional explanation

Item	Description
Unit	If parameter [5.1.5.1 TYPE] value is "REV" (Revolute Joint, rotation axis), the unit is degree. If "TRAN" (Translational Joint, parallel moving axis), mm.
Use point	1) If teaching Point is not correct due to position change (twist) due to manipulator collision. 2) If position changes after replacing the motor. 3) To reset Controller coordinate origin. 4) If ORG LED on the T/P is off.



- 1) If the changed current coordinate exceeds RANG parameter range, "[1423] Over Range error" alarm occurs.
- 2) Move to the next page using PgDn key.
- 3) Before calibration, be sure to move the manipulator to hardware origin.
- 4) When origin return of all axis parameters of which USAX parameter is not 0 and XENB parameter ENB is complete, ORG LED on the T/P turns on and origin return is complete.

5.1.4.4 ACAL (Auto Calibration) ※ **Not currently supported.**

5.1.4.5 EPOS (End-Effector Position) ※ **Not currently supported.**

5.1.5 JNT (Joint)

GROUP	Description
TYPE	Sets joint type.
GEAR	Displayed ratio of motor and manipulator reduction.
PITCH	Displayed moving distance of the manipulator per 1 motor rotation.

5.1.5.1 TYPE (Type)

DEPTH	PARAMETER (1) - BODY - JNT - TYPE
T/P screen	<RA007:JOINT> JOINT MECHANISM 1.TYPE 2.GEAR 3.PITCH ITEM # <RA007:TYPE> JOINT TYPE J1:REV J2:REV J3:REV J4:REV J5:REV J6:REV
Parameter description	The parameter is to set joint type.
How to edit	Refer to chapter 6, section 4.1.2 and chapter 6, section 4.2.
Related alarm	-
Related parameter	-

■ Additional explanation

	Item	Description
Change list	REV (Revolute Joint)	Set it if joint type is rotation axis.
	LINK (Link)	Set it if joint type is link type (TR robot).
	TRAN (Translational Joint)	Set it if joint type is straight moving axis.



- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed, but not normally operated due to no communication with the servo driver.

5.1.5.2 GEAR (Gear Ratio)

DEPTH	PARAMETER (1) - BODY - JNT - GEAR
T/P screen	<RA007:JOINT> JOINT MECHANISM 1. TYPE 2. GEAR 3. PITCH ITEM # <RA007:GEAR> GEAR RATIO J1:80 J2:101 J3:81 J4:63.75 J5:60 J6:41
Parameter description	The parameter is to set motor reduction ratio. Set it to reduction ratio added during configuration of the reducer and the pulley.
How to edit	Refer to chapter 6, section 4.1.1 and chapter 6, section 4.2.
Related alarm	-
Related parameter	PARAMETER(1) - BODY - OFFS

■ Additional explanation

Item	Description
Unit	Reduction ratio of the robot manipulator.
Input range	0 ~ 1,000



- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed, but not normally operated due to no communication with the servo driver.
- 2) Input the value marked on the robot nameplate for reduction ratio.
- 3) If actual reduction ratio differs from the entered parameter, command position value and actual robot movement amount may differ.

5.1.5.3 PITCH (Pitch Ratio)

DEPTH	PARA (1) - BODY - JNT - PITCH
T/P screen	<RA007:JOINT> JOINT MECHANISM 1.TYPE 2.GEAR 3.PITCH ITEM # <RA007:PITCH> PITCH RATIO J1:1 J2:1 J3:1 J4:1 J5:1 J6:1
Parameter description	Moving distance of the manipulator per 1 motor rotation.
How to edit	Refer to chapter 6, section 4.1.1 and chapter 6, section 4.2.
Related alarm	-
Related parameter	-

■ Additional explanation

Item	Description
Unit	mm
Range	0.1 ~ 10,000



- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed, but not normally operated due to no communication with the servo driver.
- 2) Enter the value marked on the robot nameplate for pitch.
- 3) If actual manipulator pitch differs from the entered parameter, command position value and actual robot movement amount may differ.

5.1.6 MOTOR

GROUP		Description
MOTOR (1)	ENCTY	Sets encoder Type.
	WATT	Sets Motor capacity.
	MTYPE	Sets Motor Type.
MOTOR (2)	M-TURN	Sets m-turn data Clear.

5.1.6.1 ENCTY (Encoder Type)

DEPTH	PARAMETER (1) - BODY - MOTOR (1) - ENCTY
T/P screen	<RA007:ENCTY> ENCODER TYPE J1:INC J2:INC J3:INC J4:INC J5:INC J6:INC
Parameter description	The parameter is to set encoder type.
How to edit	Refer to chapter 6, section 4.1.2 and chapter 6, section 4.2.
Related alarm	[4235] Low battery err
Related parameter	PARAMETER(1) - BODY - MOTOR(2) - M-TURN

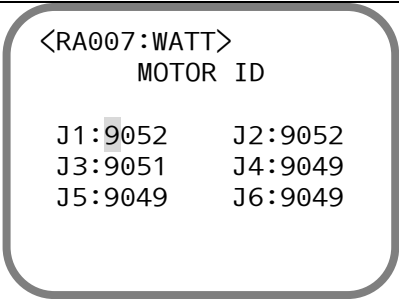
■ Additional explanation

Item		Description
Change list	ABS (Absolute)	Always maintains position value using a battery regardless of Controller power status.
	INC (Incremental)	Measures only relative position based on specific Point (Origin). Searches origin again in case of power shutoff.



- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed, but not normally operated due to no communication with the servo driver.
- 2) After changing the parameter, normal operation is possible after turning on and OFF Controller power.
- 3) “[4235] Low battery err” alarm can occur according to battery status after changing ABS parameter.

5.1.6.2 WATT

DEPTH	PARA (1) - BODY - MOTOR (1) - WATT
T/P screen	
Parameter description	The parameter is to set motor ID and capacity.
How to edit	Refer to chapter 6, section 4.1.1 and chapter 6, section 4.2.
Related alarm	[4720] Setup, [4233] Motor ID setting
Related parameter	PARA(1) - MOTION(1) - ENC

■ Additional explanation

model name	capacity	setting value	model name	capacity	setting value
MHMD10	1,000W	9035	MSRE10	1,000W	9041
MSMR08	750W	9034	MSRE08	750W	9040
MSMR04	400W	9033	MSRE04	400W	9039
MSMR02	200W	9032	MSRE02	200W	9038
MSMR01	100W	9031	MSRE01	100W	9037
MSMR5A	50W	9030	MSRE5A	50W	9036
model name	capacity	setting value	model name	capacity	setting value
MSMF09	1,000W	9047	MHMF09	1,000W	9053
MSMF08	750W	9046	MHMF08	750W	9052
MSMF04	400W	9045	MHMF04	400W	9051
MSMF02	200W	9044	MHMF02	200W	9050
MSMF01	100W	9043	MHMF01	100W	9049
MSMF5A	50W	9042	MHMF5A	50W	9048



- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed, but not normally operated due to no communication with the servo driver.
- 2) After changing the parameter, normal operation is possible after turning on and OFF Controller power.
- 3) It is set during default setup of each robot. If change is needed, be sure to input only setting value mentioned in Additional explanation.
- 4) If parameter change is needed, be sure to contact customer support team or agency of Robostar.
- 5) If driver capacity is different from actual motor capacity, “[4720] Setup” warning can occur.

5.1.6.3 MTYPE (Motor Type)

DEPTH	PARAMETER (1) - BODY - MOTOR (1) - MTYPE
T/P screen	<RA007:MTYPE> MOTOR TYPE J1:ROT J2:ROT J3:ROT J4:ROT J5:ROT J6:ROT
Parameter description	The parameter is to set motor type. ※ Only ROT (Rotary Motor) is currently supported.
How to edit	Refer to chapter 6, section 4.1.2 and chapter 6, section 4.2.
Related alarm	-
Related parameter	-

■ Additional explanation

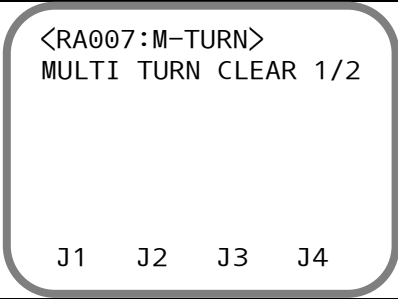
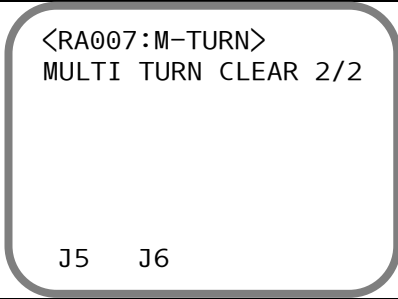
Item		Description
Change list	ROT (Rotary Motor)	Sets if motor operation is rotating type.
	LIN (Linear Motor)	Sets if motor operation is straight type.



- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed, but not normally operated due to no communication with the servo driver.
- 2) After changing the parameter, normal operation is possible after turning on and OFF Controller power.
- 3) LIN item is not currently supported.

5.1.7 MOTOR (2)

5.1.7.1 M-TURN (Multi-Turn)

DEPTH	PARAMETER (1) - BODY - MOTOR (2) - M-TURN	
T/P screen		
Parameter description	Resets motor m-turn data of each axis. Release the alarm after resetting m-turn data even when encoder low voltage alarm occurs.	
How to edit	Refer to chapter 6, section 4.1.4.	
Related alarm	[4235] Low battery err, [1429] ENC Count error	
Related parameter	PARAMETER(1) - BODY - OFFS	



- 1) If XNEB of the changed axis is DIS or if USAX value is 0, Multi Turn Clear won't be performed.
- 2) If a motor or battery is replaced, "[4235] Low battery err" alarm occurs. Reset encoder m-turn data to release occurred alarm.
- 3) Current coordinate data of the relevant axis can change while resetting encoder m-turn. Edit OFFS parameter to reset origin.
- 4) When the alarm of Low battery error occurs and you try to reset the Multi-turn data, the Controller must be rebooted to release the alarm.

5.1.8 EXT_AX (External Axis)

DEPTH	PARAMETER (1) - BODY - EXT_AX
T/P screen	<RA007:EXT_AX> EXTRA AXIS SETTING <u>1.EX-AX1</u> 2.EX-AX2 ITEM # <RA007:EXT AX 1> EX-AX SETTING ENB :DIS TYPE:ENDEFFECTOR
Parameter description	The parameter is to set environment of additional axis that separately operates from the robot and to set up to 2 additional axes.
How to edit	Refer to chapter 6, section 4.1.2.
Related alarm	-
Related parameter	PARAMETER(1) - BODY - CONF

■ Additional explanation

Item		Description
ENB (Enable)	ENB	Enables additional axis.
	DIS	Disables additional axis.
TYPE	BASE	Sets additional axis type to Base.
	ENDEFFECTOR	Sets additional axis type to end-effector.



- 1) ENDEFFECTOR item is not currently supported.
- 2) If DOF(Degree of freedom) increases when additional axis is ENB.
- 3) If parameter setup for additional axis is needed, press AXIS CHG key or PgDn, PgUp keys in the relevant parameter screen to display additional axis.
- 4) In case of changing number of robot joint, it can change JOB file structure resulting in occurrence of the existing JOB file FAULT.

5.1.9 SYNC (Synchronization)

DEPTH	PARA (1) - BODY - SYNC
T/P screen	<RA004:SYNC> AXIS SYNC SETTING TYPE: SYNC_BT DIR : (+) GEAR: 41.000
Parameter description	The parameter is to set parameter for compensation of mechanical sync each robot.
How to edit	Refer to chapter 6, section 4.1.2.
Related alarm	-
Related parameter	-

■ Additional explanation

Item			Description
Change list	TYPE	SYNC_BT	In case of Vertical Articulated robot type, sync set J5 axis and J6 axis.
		SYNC_ZW	In case of Scara robot type, sync set Z-AXIS and W-axis.
		NONE	Not performs sync setup.
	DIR	-	Sets sync direction.
		+	
	GEAR		Set the synchronous gear ratio between J5 axis and J6 axis. ※ When selecting a robot type, it is automatically calculated and changed.

5.2 MOTION (1)

GROUP	Description
ENC	Sets pulse count (bit) per 1 rotation of the motor encoder.
JOINT	Sets robot joint move related variable.
LNR	Sets robot interpolation move related variable.
DISP	Sets motor rotating direction.
MOVE	Sets rotating direction of robot joint. ※ Not currently supported.
LSENS	Sets direction and type of limit sensor. ※ Not currently supported.

5.2.1 ENC (Encoder)

DEPTH	PARA (1) - MOTION (1) - ENC						
T/P screen	<RA007:ENC> ENCODER RES (BIT) <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">J1:23</td><td style="width: 50%;">J2:23</td></tr> <tr> <td>J3:23</td><td>J4:23</td></tr> <tr> <td>J5:23</td><td>J6:23</td></tr> </table>	J1:23	J2:23	J3:23	J4:23	J5:23	J6:23
J1:23	J2:23						
J3:23	J4:23						
J5:23	J6:23						
Parameter description	The parameter is to set pulse (bit) per 1 rotation of the motor encoder.						
How to edit	Refer to chapter 6, section 4.1.1 and chapter 6, section 4.2.						
Related alarm	-						
Related parameter	-						

■ Additional explanation

Item	Description
Unit	BIT
Input range	0 ~ 25



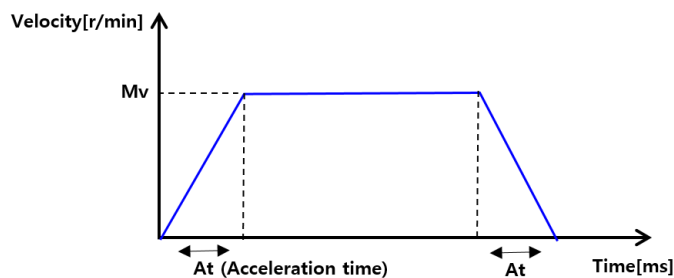
- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed, but not normally operated due to no communication with the servo driver.
- 2) Enter the value marked on the robot nameplate.
- 3) Since setting value differs depending on motor type, be sure to check motor standard.

5.2.2 JOINT (Joint Motion)

DEPTH	PARA (1) - MOTION (1) - JOINT
T/P screen	<pre> <RA007:JOINT> JOINT MOTION SET: J1 Mv:337.5 At:0.2 Jv:33.75 Jt:0.2 Ia:1 [RPM]----- Mv:4500 Jv:450 J1 J2 J3 J4 </pre>
Parameter description	The parameter is to set joint moving condition related variable.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	[1424] Over Speed error, [1425] Over Accel error
Related parameter	-

■ Additional explanation

Item	Description	unit	Input range
Mv	Sets max velocity of each axis. ※ Press AXIS CHG key to input by RPM unit.	3 rd line Mv : degree/s 7 th line Mv : RPM	10 ~ 2,500
At	Sets Accel/Decel time.	sec	0.05 ~ 5
Jv	Sets max velocity (degree/s) for JOG move. ※ Press AXIS CHG key to input by RPM unit. ※ In general, input 10% of max velocity Mv of each axis.	3 rd line Jv : degree/s 7 th line Jv : RPM	5 ~ 200
Jt	Input deceleration time for JOG move.	sec	0.05 ~ 5
Ia	Input moving distance in inching JOG unit.	degree	1 ~ 100



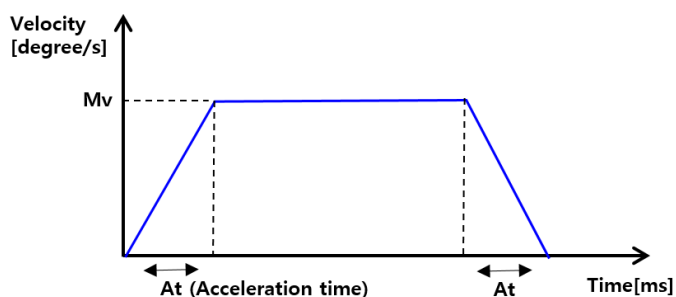
- 1) Excessive set of velocity and acceleration reduces mechanical lifetime of the robot.

5.2.3 LNR (Linear Motion) [LIN, ORI]

DEPTH	PARAMETER (1) - MOTION (1) - LNR [LIN (Linear), ORI (Orientation)]	
T/P screen	<RA007:LNR> POSITION (mm/s) Mv:1000 At:0.30 Jv:100 Jt:0.30 Ia:1 LIN ORI	<RA007:LNR> ORIENTATION(deg/s) Mv:360 At:0.30 Jv:25 Jt:0.30 Ia:1 LIN ORI
Parameter description	The parameter is to set robot interpolation moving velocity related variable.	
How to edit	Refer to chapter 6, section 4.1.1.	
Related alarm	[1424] Over Speed error, [1425] Over Accel error	
Related parameter	-	

■ Additional explanation

Item	Description	Unit	Input range
Mv	Sets max interpolation move velocity	LIN : mm/s ORI : degree/s	10 ~ 3,000
At	Sets Accel/Decel time of interpolation move.	sec	0.05 ~ 5
Jv	Sets max velocity of interpolation move during JOG move	LIN : mm/s ORI : degree/s	5 ~ 500
Jt	Sets Accel/Decel time during JOG move.	sec	0.05 ~ 5
Ia	Sets inching JOG unit moving distance	LIN : mm ORI : degree	0.01 ~ 500



- 1) Excessive set of velocity and acceleration reduces mechanical lifetime of the robot.

5.2.4 DISP (Display)

DEPTH	PARA (1) - MOTION (1) - DISP
T/P screen	<RA007:DISP> ENC DIR SETTING J1:- J2:+ J3:+ J4:+ J5:+ J6:-
Parameter description	The parameter is to set rotating direction of the robot.
How to edit	Refer to chapter 6, section 4.1.2.
Related alarm	-
Related parameter	-

■ Additional explanation

Item		Description
Change list	+	Sets + direction of motor rotation to axis.
	-	Sets - direction of motor rotation to axis.



- 1) After changing the parameter, be sure to check if JOG axis moving direction is correct.
- 2) If axis direction is different from the direction stipulated in the manual, interpolation move command won't be normally executed.

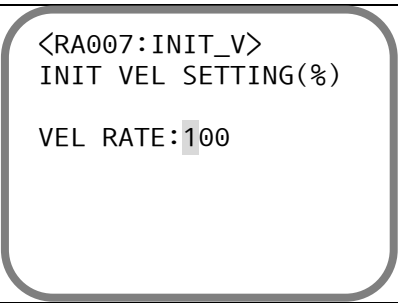
5.2.5 MOVE (Move) ※ **Not currently supported.**

5.2.6 LSENS (Latch Sensor) ※ **Not currently supported.**

5.3 MOTION (2)

GROUP	Description
INIT_V	Limits velocity of robot move command (JMOV, LMOV, etc.).
STOP_T	Sets deceleration time according to robot move stop condition.
CUM_DIST	Sets use of moving distance accumulation function of each axis and setting value for initialization. ※ Not currently supported.

5.3.1 INIT_V (Initial Velocity)

DEPTH	PARAMETER (1) - MOTION (2) - INIT_V
T/P screen	
Parameter description	The parameter is to limit velocity of robot move command (JMOV, LMOV, etc.). Moving velocity is limited by percentage according to setting value.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	-
Related parameter	-

■ Additional explanation

Item	Description
Unit	%
Input range	1 ~ 100
Value	Sets max velocity rate for robot move. Ex) If VEL RATE 50% is set, operated at 500 that is 50% when VEL 1,000 is set in JOB.

5.3.2 STOP_T (Stop Time)

DEPTH	PARAMETER (1) - MOTION (2) - STOP_T
T/P screen	<RA007:STOP_T> STOP RATE SET(%):J1 EMG :100 MOVE:100 JOG :100 J1 J2 J3 J4
Parameter description	The parameter is to set deceleration time rate in case of stopping according to robot move stop condition.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	-
Related parameter	PARAMETER(1) - MOTION(1) - JOINT PARAMETER(1) - MOTION(1) - MOVE

■ Additional explanation

Item	Description
EMG	Sets robot deceleration time rate when an alarm occurs.
MOVE	Sets deceleration time rate when the robot stops in normal status.
JOG	Sets deceleration time rate when the robot stops during JOG operation.
Unit	%
Input range	50 ~ 300 Ex) 100 : use 100% of At setting value 10 : use 10% of At setting value



1) If you reduce the stop time, the manipulator may be vibrated while it stops..

5.3.3 CUM_DIST (Cumulated Distance) [SET, DATA] ※ **Not currently supported.**

5.4 GAIN

GROUP	Description
PVG_1st	Sets position, velocity gain of each axis.
FILTER	Sets filter value for each axis.
TRQOFFS	※ Not currently supported.

5.4.1 PVG_1st (Position Velocity Gain)

DEPTH	PARAM (1) - GAIN - PVG_1st	
T/P screen	<RA007:PVG_1st> SELECT AXIS <u>1.J1</u> 2.J2 3.J3 4.J4 5.J5 6.J6 ITEM #	<RA007:PVG_1st> POS/VEL GAIN: J1 Kpp:40 Kvf:0 Kvp:50 Kvi:50 Ktf:5 IR :900
Parameter description	The parameter is to set position, velocity gain of each axis.	
How to edit	Refer to chapter 6, section 4.1.1 and chapter 6, section 4.2.	
Related alarm	[1426] Inposition error, [4211] IPM temperature, [4221] Continuous overload, [4250] Over speed limit, [4251] POS following	
Related parameter	-	

■ Additional explanation

Item	Description	Unit	Input range
Kpp position proportional gain (Position Proportional)	Positioning decision parameter to reduce position deviation.	1/s	1 ~ 500
Kvf velocity feed forward gain (Velocity Feed forward)	Parameter to reduce position deviation for velocity command.	%	0 ~ 100
Kvp velocity proportional gain (Velocity Proportional)	Parameter to decide velocity responsiveness.	Hz	1 ~ 2,000
Kvi velocity integral gain (Velocity Integral)	Parameter to reduce position deviation when the robot stops.	ms	1 ~ 1,000
Ktf torque command filter time constant (Torque Command Filter)	Applies Low-pass filter for torque command	ms	0 ~ 1,000

Item	Description	Unit	Input range
IR load Inertia ratio (Inertia Ratio)	Parameter to decide ratio of load Inertia to motor inertia (Inertia ratio : load inertia/motor inertia * 100 (%))	%	0 ~ 3,000

■ Default value

1) Common initial gain value of vertical articulated robot

	J1 axis	J2 axis	J3 axis	J4 axis	J5 axis	J6 axis
Kpp	35	35	35	35	35	35
Kvf	0	0	0	0	0	0
Kvp	40	40	40	40	40	40
Kvi	30	30	30	30	30	30
Ktf	5	5	5	5	5	5
IR	650	950	950	1,200	900	700



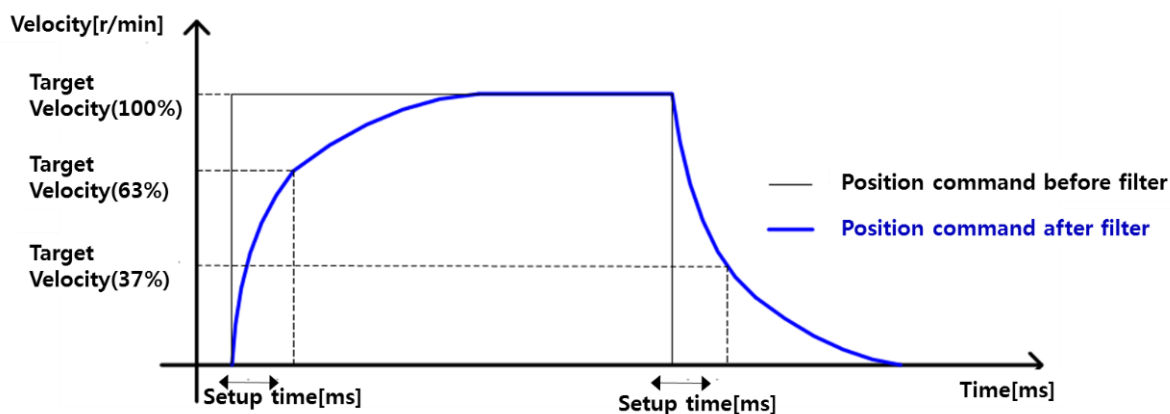
- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed, but not normally operated due to no communication with the servo driver.

5.4.2 FILTER (Filter) [SFLT, MFLT]

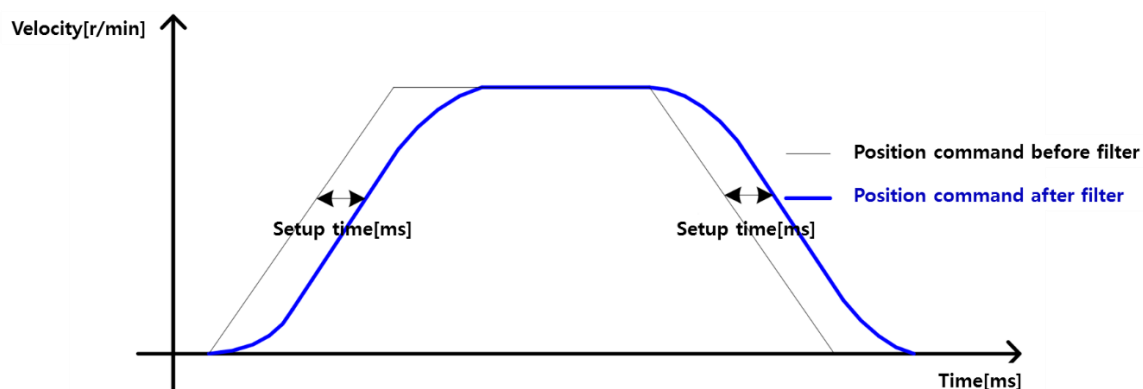
DEPTH	PARAMETER (1) - GAIN - FILTER [SFLT (Smooth Filter), MFLT (Moving Average Filter)]
T/P screen	<RA007:SFLT> SMOOTH FILTER(ms) J1:30 J2:30 J3:30 J4:30 J5:30 J6:30 <RA007:MFLT> MOVE AVG FILTER(ms) J1:0 J2:0 J3:0 J4:0 J5:0 J6:0
Parameter description	The parameter is to set filter value for each axis.
How to edit	Refer to chapter 6, section 4.1.1 and chapter 6, section 4.2.
Related alarm	-
Related parameter	PARAMETER(1) - MOTION(1) - JOINT PARAMETER(1) - MOTION(1) - LNR PARAMETER(1) - GAIN - PVG_1st

■ Additional explanation

Item	Description	Unit	Range
SFLT (Smoothing)	Prevents rapid change of position command. If large filter value is set, it can increase time constant value and it can cause deformation of robot trajectory.	ms	0 ~ 1,000
MFLT (Moving Average)	The parameter is to get moving average to position command to mitigate rapid command. ※ Not currently supported.	ms	0 ~ 1,000



[When position command filter is applied]



[When position command average filter is applied]



- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed, but not normally operated due to no communication with the servo driver.
- 2) If you reduce the stop time, the manipulator may be vibrated while it stops..

5.4.3 TRQOFFS ※ Not currently supported.

5.5 PROTECT (1)

GROUP	Description
FOW	Sets reference parameter that occurs following position deviation alarm.
OVS	Sets reference parameter that occurs over speed alarm of each robot joint.
OVA	Sets reference parameter that occurs Accel/Decel alarm of each robot joint.
TRQ	Sets reference torque parameter that occurs torque limit alarm of each robot joint.
TOL	Sets reference torque parameter that occurs torque limit alarm of each robot joint.
IPA	Sets allowable target position error range.
IPE	Sets allowable max time value until reaching to target position.
IPO	Sets min holding time to judge reaching to target position.

5.5.1 FOW (Following Error)

DEPTH	PARA (1) - PROTECT (1) - FOW						
T/P screen	<RA007:FOW> FOLLOWING(M REV) <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">J1:3</td> <td style="width: 50%;">J2:3</td> </tr> <tr> <td>J3:3</td> <td>J4:3</td> </tr> <tr> <td>J5:3</td> <td>J6:3</td> </tr> </table>	J1:3	J2:3	J3:3	J4:3	J5:3	J6:3
J1:3	J2:3						
J3:3	J4:3						
J5:3	J6:3						
Parameter description	The parameter is to set reference parameter that occurs following position deviation alarm. If deviation of position command and robot position feedback becomes larger than the setting value, "[4251] POS following" alarm occurs.						
How to edit	Refer to chapter 6, section 4.1.1 and chapter 6, section 4.2.						
Related alarm	[4251] POS following Err						
Related parameter	-						

■ Additional explanation

Item	Description
Unit	rev (Number of motor revolutions)
Input range	0 ~ 20
Value	If deviation of Controller position command and robot position feedback becomes larger than the setting value, "[4251] POS following" alarm occurs.



- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed, but not normally operated due to no communication with the servo driver.
- 2) If interference in moving path occurs due to external device, an alarm can occur during robot move. Hence, check external environment.
- 3) If robot load value is higher than initial gain value, adjust the gain value.
- 4) Adjust max velocity (Mv), Accel/Decel time (At) value.

5.5.2 OVS (Over Speed Error)

DEPTH	PARAMETER (1) - PROTECT (1) - OVS
T/P screen	<RA007:OVS> OVER SPEED (%) J1:130 J2:130 J3:130 J4:130 J5:130 J6:130
Parameter description	Sets reference value for over speed alarm of each robot joint and sets ratio for Mv parameter setting value of JOINT. If the robot moves above setting value, "[1424] Over Speed error" alarm occurs.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	[1424] Over Speed error
Related parameter	PARAMETER(1) - MOTION(1) - JOINT

■ Additional explanation

Item	Description
Unit	%
Input range	10 ~ 1,000
Value	Velocity of individual axis can increase above JOINT Mv parameter value that is rated velocity near robot's singularity during interpolation move (LMOV, CMOV, and AMOV) operation. At this point, Over Speed error alarm occurs.



► If "[1424] Over Speed error" alarm occurs, check the followings.

- 1) Check for error of the motor encoder.
- 2) If rapid direction move occurs when the robot moves to the next position in consecutive interpolation operation, edit teaching position to make moving path smooth.

5.5.3 OVA (Over Acceleration Error)

DEPTH	PARA (1) - PROTECT (1) - OVA
T/P screen	<RA007:OVS> OVER SPEED(%) J1:130 J2:130 J3:130 J4:130 J5:130 J6:130
Parameter description	The parameter is to set over acceleration alarm reference value of each robot joint and set ratio of At parameter setting value of JOINT. If the robot moves above setting value, “[1425] Over Accel error” alarm occurs.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	[1425] Over Accel error
Related parameter	PARA(1) - MOTION(1) - JOINT

■ Additional explanation

Item	Description
Unit	%
Input range	10 ~ 1,000
Value	Velocity of individual axis can increase above JOINT MV parameter value that is rated velocity near robot's singularity during interpolation move (LMOV, CMOV, and AMOV) operation. At this point, Over Accel error alarm occurs.



- If “[1424] Over Speed error” alarm occurs, check the followings.
- 1) Check for error of the motor encoder.
 - 2) If rapid direction move occurs when the robot moves to the next position in consecutive interpolation operation, edit teaching position to make moving path smooth.

5.5.4 TRQ (Torque Limit)

DEPTH	PARA (1) - PROTECT (1) - TRQ
T/P screen	<RA007:TRQ> TRQ LIMIT(%) J1:300 J2:300 J3:300 J4:300 J5:300 J6:300
Parameter description	The parameter is to set reference torque parameter that occurs torque limit alarm of each robot joint. Execute TRQ command to make "[1434] Torque Limit Err" alarm to occur.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	[1434] Torque Limit Err
Related parameter	PARA(1) - PROTECT(1) - TOL

■ Additional explanation

Item	Description
Unit	%
Input range	1 ~ 300



- 1) To sensitively react to external impact, lower TRQ value.

5.5.5 TOL (Torque Limit Time)

DEPTH	PARA (1) - PROTECT (1) - TOL
T/P screen	<RA007:TOL> TRQ LIMIT TIME(ms) J1:500 J2:500 J3:500 J4:500 J5:500 J6:500
Parameter description	The parameter is to set reference time parameter that occurs torque limit alarm of each robot joint.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	[1434] Torque Limit Err
Related parameter	PARA(1) - PROTECT(1) - TRQ

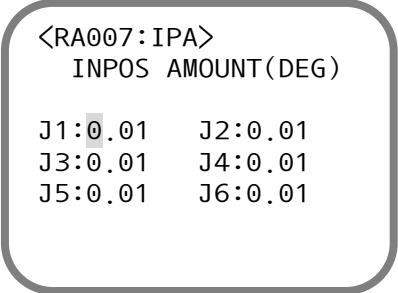
■ Additional explanation

Item	Description
Unit	ms
Input range	1 ~ 2,000
Value	Torque Limit alarm occurs when torque value above TRQ value set during robot operation is created above the time set in TOL.



- 1) To sensitively react to external impact, lower TOL value.
- 2) Execute TRQ command to make Torque Limit Err alarm occur.

5.5.6 IPA (In-position Amount)

DEPTH	PARA (1) - PROTECT (1) - IPA
T/P screen	
Parameter description	The parameter is to set allowable target position error range. If fails to reach to target position within allowable time, “[1426] Inposition error” alarm occurs.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	[1426] Inposition error
Related parameter	PARA(1) - PROTECT(1) - IPE PARA(1) - PROTECT(1) - IPO

■ Additional explanation

Item	Description
Unit	degree
Input range	0 ~ 5
Value	Means In position allowable deviation.



► If “[1426] Inposition error” alarm occurs, check the followings.

- 1) If interference in moving path occurs due to external device, an alarm can occur during robot move. Hence, check external environment.
- 2) If robot load value is higher than initial gain value, adjust the gain value.

5.5.7 IPE (In-position Error)

DEPTH	PARA (1) - PROTECT (1) - IPE
T/P screen	<RA007:IPE> INPOS ERR TIME(ms) J1:1000 J2:1000 J3:1000 J4:1000 J5:1000 J6:1000
Parameter description	The parameter is to set allowable max time value until reaching to target position. If fails to reach to target position within allowable time, "[1426] Inposition error" alarm occurs. If IPE is set to "0", INPOSITION is not checked during JOB operation. At this point, use INPOS command in JOB.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	[1426] Inposition error
Related parameter	PARA(1) - PROTECT(1) - IPA PARA(1) - PROTECT(1) - IPO

■ Additional explanation

Item	Description
Unit	ms
Input range	0 ~ 5,000
Value	Means In position allowable time.



- If "[1426] Inposition error" alarm occurs, check the followings.
- 1) If interference in moving path occurs due to external device, an alarm can occur during robot move. Hence, check external environment.
 - 2) If robot load value is higher than initial gain value, adjust the gain value.

5.5.8 IPO (In-position On-time)

DEPTH	PARAMETER (1) - PROTECT (1) - IPO						
T/P screen	<RA007: IPO> INPOS ON TIME(ms) <table> <tr> <td>J1:1</td> <td>J2:1</td> </tr> <tr> <td>J3:1</td> <td>J4:1</td> </tr> <tr> <td>J5:1</td> <td>J6:1</td> </tr> </table>	J1:1	J2:1	J3:1	J4:1	J5:1	J6:1
J1:1	J2:1						
J3:1	J4:1						
J5:1	J6:1						
Parameter description	The parameter is to set min holding time to judge reaching to target position.						
How to edit	Refer to chapter 6, section 4.1.1.						
Related alarm	[1426] Inposition error						
Related parameter	PARAMETER(1) - PROTECT(1) - IPA PARAMETER(1) - PROTECT(1) - IPE						

■ Additional explanation

Item	Description
Unit	ms
Input range	0 ~ 5,000
Value	Means min holding time to judge reaching to target position



► If “[1426] Inposition error” alarm occurs, check the followings.

- 1) If interference in moving path occurs due to external device, an alarm can occur during robot move. Hence, check external environment.
- 2) If robot load value is higher than initial gain value, adjust the gain value.

5.6 PROTECT (2)

5.6.1 BOND (Brake On Delay)

DEPTH	PARA (1) - PROTECT (2) - BOND
T/P screen	<RA007:BOND> BRK ON DELAY(ms) J1:100 J2:100 J3:100 J4:100 J5:100 J6:100
Parameter description	The parameter is to set Brake on Delay.
How to edit	Refer to chapter 6, section 4.1.1 and chapter 6, section 4.2.
Related alarm	-
Related parameter	-

■ Additional explanation

Item	Description
Unit	ms
Input range	0 ~ 500
Value	Means Brake on Delay time.



- 1) If XNEB of the changed axis is DIS or if USAX value is 0, the Controller parameter can be changed, but not normally operated due to no communication with the servo driver.
- 2) Operation to brake In-positioning motor with a Brake. Hence, excessive Brake on/off Delay can cause damage of the motor and the Brake.
- 3) Compensation with Brake on Delay is possible with servo on/off of the manipulator of the robot that has weight toward gravity direction.

5.7 COORD

GROUP	Description
TOOL	Sets offset value of the work tool mounted on the robot.
USER	Sets random coordinate system in robot operation area to user coordinate system.

5.7.1 TOOL (Tool Coordinate System)

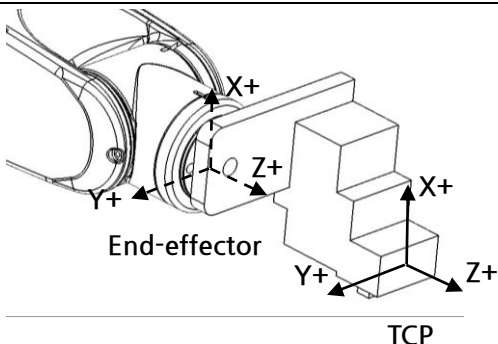
GROUP	Description
EDIT	Manually sets offset value of the work tool mounted on the robot.
CALIB	Auto sets Tool offset value after teaching 1 random Point with 4 postures.
INIT	Resets saved Tool offset value.

5.7.1.1 EDIT

DEPTH	PARA (1) - COORD - TOOL - EDIT
T/P screen	<RA007:EDIT> SELECT NUM: 1 USED dX:0 dY:0.5 dZ:85 RX:0 RY:0 RZ:0
Parameter description	The parameter is to manually set offset value of the work tool mounted on the robot.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	-
Related parameter	-

■ Additional explanation

Item	Description
Unit	mm
Input range	-9,999 ~ 9,999

Example	
 End-effector TCP	Offset : X-AXIS 3mm, Y-AXIS 1mm, Z-AXIS 4mm <RA007:EDIT> SELECT NUM: 1 USED dX:3 dY:1 dZ:4 RX:0 RY:0 RZ:0

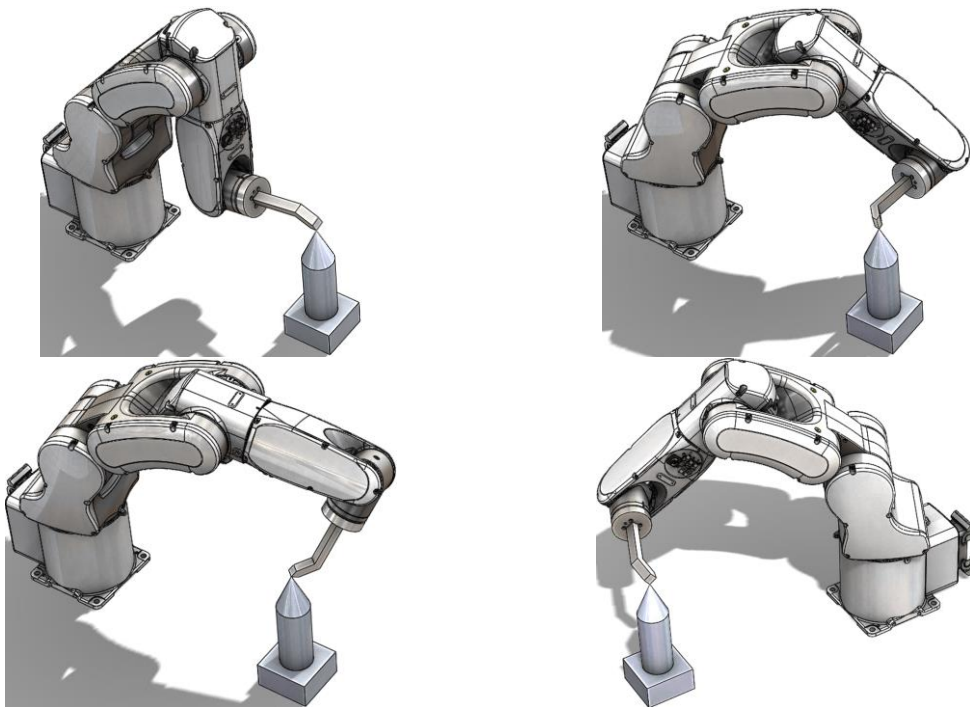


- 1) TOOL number 0 means 6-axis origin. It can't be deleted and edited.
- 2) Correctly input position value of tool end from robot hand origin.
- 3) When tool coordinate system is normally created after saving the parameter, USED is displayed on the T/P screen.

5.7.1.2 CALIB (Calibration)

DEPTH	PARA (1) - COORD - TOOL - CALIB	
T/P screen	<RA007:CALIB> SELECT NUM: 1 USED 1.TCP MDI 2.TCP CURR 3.ROT MDI 4.ROT CURR 5.METHOD ITEM #	<CUR JOINT> V: 5BL TOOL1 TC1 NW J1:-17.68 J2:-16.57 J3:-21.85 J4:-20.38 J5:-63.01 J6:-123.6 SAVE CORD FWRD
Parameter description	Parameter to auto acquire Tool offset value after teaching 1 random Point with 4 postures.	
How to edit	Refer to chapter 3, section 6.2	
Related alarm	-	
Related parameter	PARA(1) - COORD - TOOL - (TOOL number selection) - EDIT	

■ Examples of Tool Calibration Points



- 1) Use PgDn, PgUp keys to move to TC1 ~ TC4 Point.
- 2) Calibration result is saved in EDIT parameter. Directly input Rx, Ry, Rz value.

5.7.1.3 INIT (Initialize)

DEPTH	PARA (1) - COORD - TOOL - INIT
T/P screen	<RA007:TOOL> SELECT NUM: 1 USED 1.EDIT 2.CALIB 3.INIT CLEAR T1?(ENT/ESC) <RA007:TOOL> SELECT NUM: 1 USED 1.EDIT 2.CALIB 3.INIT TOOL[1] INITIALIZE
Parameter description	The parameter is to reset Tool parameter.
How to edit	Refer to chapter 6, section 4.1.1
Related alarm	-
Related parameter	PARA(1) - COORD - TOOL - (TOOL number selection) - EDIT PARA(1) - COORD - TOOL - (TOOL number selection) - CALIB



- 1) TOOL number 0 means 6-axis origin. It can't be deleted and edited.
- 2) EDIT, CALIB parameter will be deleted when parameter is initialized. Hence, use caution.
- 3) Status of the relevant TOOL number will be converted into NEW after initialization.

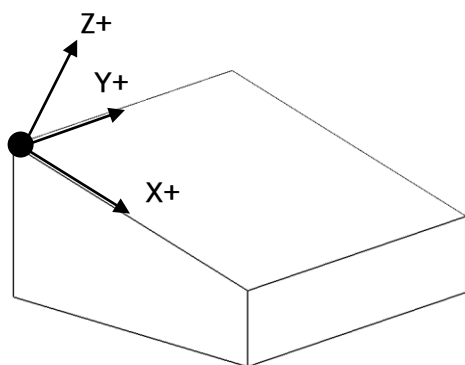
5.7.2 USER (User Coordinate System)

GROUP	Description
MDI	Directly input value of each axis to set it to user coordinate system.
CURR	Sets current coordinate system to user coordinate system.
INIT	Resets the selected user coordinate system.

※ Reference Teaching order for User coordinate system

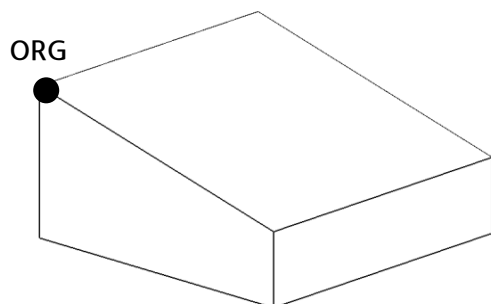
Set random coordinate system at work position.

JOG or Forward robot to check robot Stroke.



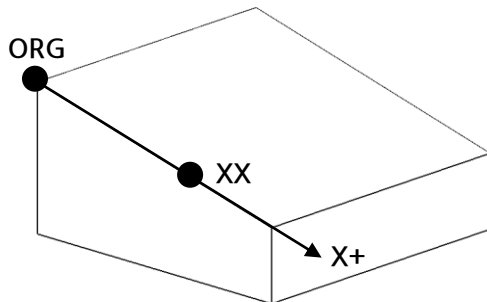
1) Teaching ORG (Origin) coordinate

Perform teaching of the Point relevant to origin (0, 0,0) of user coordinate system in MDI, CURR mode.



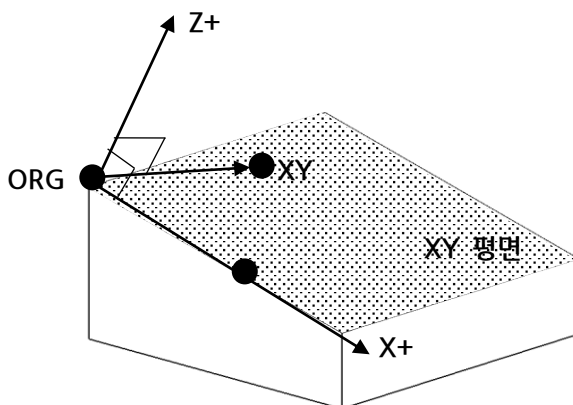
2) Teaching XX (Point on the X-axis) coordinate

Perform teaching of random Point on X-AXIS of user coordinate system in MDI, CURR mode.
At this point, perform teaching of Point located away more than 1mm from ORG coordinate.
For correct calculation, perform teaching of Point away from ORG as much as possible.



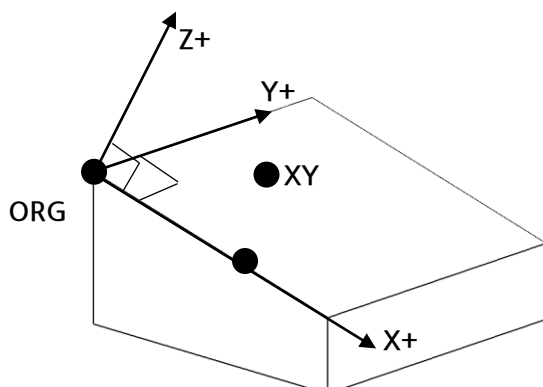
3) Teaching XY (Point on the XY-plane) coordinate

Perform teaching of arbitrary Point on XY plane of user coordinate system in MDI, CURR mode.
At this point, perform teaching of Point located away more than 1mm from ORG and XX coordinate. For correct calculation, the Points should be away from those as much as possible.
Direction of Z-AXIS is decided by XY Point. Hence, be cautious of symbol.
Z-AXIS is decided according to Right Hand Rule.



4) Completing ORG, XX, XY teaching

Form Y-AXIS at right angles to Z-AXIS and X-AXIS to complete creating user coordinate system.



5.7.2.1 MDI (Manual Direct Input)

DEPTH	PARA (1) - COORD - USER - MDI
T/P screen	<RA007:USER> SELECT NUM: 1 USED 1.MDI 2.CURR 3.INIT ITEM # <MDI JOINT> V: 5BL USER1 ORG NW J1:-17.68 J2:-16.57 J3:-21.85 J4:-20.38 J5:-63.01 J6:-123.6 SAVE CORD FWRD
Parameter description	The parameter is to set coordinate value to manual.
How to edit	Refer to chapter 3, section 5
Related alarm	-
Related parameter	-



- 1) USER number 0 means 6-axis origin. It can't be deleted and edited.
- 2) When user coordinate system is normally created after saving the parameter, USED is displayed on the T/P screen
- 3) Use PgDn, PgUp keys to move to ORG ~ XY Point.

5.7.2.2 CURR (Current Mode Teaching)

DEPTH	PARA (1) - COORD - USER - CURR
T/P screen	<RA007:USER> SELECT NUM: 1 USED 1.MDI 2.CURR 3.INIT ITEM # <CUR JOINT> V: 5BL USER1 ORG NW J1:-17.68 J2:-16.57 J3:-21.85 J4:-20.38 J5:-63.01 J6:-123.6 SAVE CORD FWRD
Parameter description	The parameter is to set coordinate value.
How to edit	Refer to chapter 3, section 6
Related alarm	-
Related parameter	-



- 1) USER number 0 means 6-axis origin. It can't be deleted and edited.
- 2) When user coordinate system is normally created after saving the parameter, USED is displayed on the T/P screen
- 3) Use PgDn, PgUp keys to move to ORG ~ XY Point.

5.7.2.3 INIT (Initialize)

DEPTH	PARA (1) - COORD - USER - INIT
T/P screen	<RA007:USER> SELECT NUM: 1 USED 1.CURR 2.MDI 3.INIT CLEAR U1? (ENT/ESC) <RA007:USER> SELECT NUM: 1 USED 1.CURR 2.MDI 3.INIT USER[1] INITIALIZE
Parameter description	The parameter is to reset USER parameter that is already set.
How to edit	Refer to chapter 6, section 4.1.1
Related alarm	-
Related parameter	PARA(1) - COORD - USER - (USER number selection) - MDI PARA(1) - COORD - USER - (USER number selection) - CURR



- 1) USER number 0 means 6-axis origin. It can't be deleted and edited.
- 2) User XX ~ XZ Point will be deleted after initializing the parameter. Hence, use caution.
- 3) Status of the relevant USER number is changed to NEW after initialization.

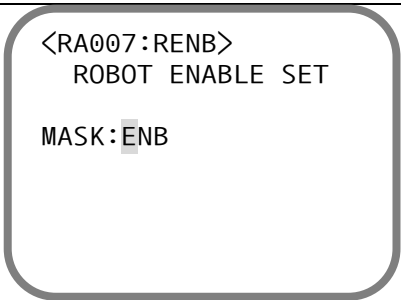
5.8 RIRNG (Robot In-Range) ※ Not currently supported.

5.9 ORIGIN ※ Not currently supported.

5.10 ROBOT CONF (Robot Configuration)

GROUP	Description
RENB	Sets use of ROBOT in robot channel.
USAX	Sets output axis of servo driver.
XENB	Sets use of each axis.

5.10.1 RENB (Robot Enable)

DEPTH	PARAMETER (2) - ROBOT CONF - RENB
T/P screen	
Parameter description	The parameter is to set use of robot of the selected channel. (ENB / DIS)
How to edit	Refer to chapter 6, section 4.1.2.
Related alarm	-
Related parameter	-

■ Additional explanation

Item		Description
Change list	DIS	Not allows use of robot of the current channel.
	ENB	Allows use of robot of the current channel.



- 1) If RENB parameter is DIS, "ENABLE ROBOT FIRST!" message is displayed on the T/P for teaching and for entering into the most of parameter edit screens and the function is limited.

5.10.2 USAX (Using Axis)

DEPTH	PARA (2) - ROBOT CONF - USAX						
	<RA007:USAX> USING AXIS SET <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">J1:1</td><td style="width: 50%;">J2:2</td></tr> <tr> <td>J3:3</td><td>J4:4</td></tr> <tr> <td>J5:5</td><td>J6:6</td></tr> </table>	J1:1	J2:2	J3:3	J4:4	J5:5	J6:6
J1:1	J2:2						
J3:3	J4:4						
J5:5	J6:6						
Parameter description	The parameter is to set Controller servo driver output terminal of each axis.						
How to edit	Refer to chapter 6, section 4.1.1						
Related alarm	-						
Related parameter	-						

■ Additional explanation

Item	Description	
Input range	0	Not use axis.
	1 ~ 8	Sets axis.



- 1) USAX axis number starts from 1. If 0 is entered, which means that it is not used.
- 2) In case of using an additional axis, press AXIS CHG key to move to additional axis setup screen.
- 3) After changing the parameter, normal operation after Controller rebooting.

5.10.3 XENB (Axis Enable)

DEPTH	PARA (2) - ROBOT CONF - XENB
	<RA007:XENB> AXIS ENABLE SET J1:ENB J2:ENB J3:ENB J4:ENB J5:ENB J6:ENB
Parameter description	The parameter is to set whether to enable axis.
How to edit	Refer to chapter 6, section 4.1.2.
Related alarm	-
Related parameter	-

■ Additional explanation

Item		Description
Change list	DIS	Not allows use of the current axis.
	ENB	Allows use of the current axis.



- 1) If XENB parameter is in DIS status, some outputs and setup of parameter axis are limited.

5.11 SETUP

DEPTH	PARA (3) - SETUP
T/P screen	CHANGE ROBOT MODEL Do you want to Change? (ENT/ESC) <INUIT-ROBOT TYPE> 1. VAR 2. SCARA 3. TRANSFER
Parameter description	The parameter is to decide robot specification to be operated and to reset it to default parameter of the relevant robot.
How to edit	Refer to chapter 6, section 4.1.5.
Related alarm	-
Related parameter	-

■ Additional explanation

Item	Description
VAR	DEFAULT (A4 Motor Vertical Articulated type) / RA004S / RA005S / RA007L
	RA012S / RA020S / RA030S / RA050S
SCARA	※ Not currently supported.
TRANSFER	※ Not currently supported.



- 1) To select robot type, check reset of Robot Parameter and common parameter.
- 2) Back up parameter through Unihost first before resetting parameter.
- 3) If setting robot type differs from actual robot, reduction ratio, manipulator information may different. Hence, performance of correct motion of command is not possible.
- 4) SCARA, TRANSFER robot types are not currently supported.

6. Flowchart of Public Parameter

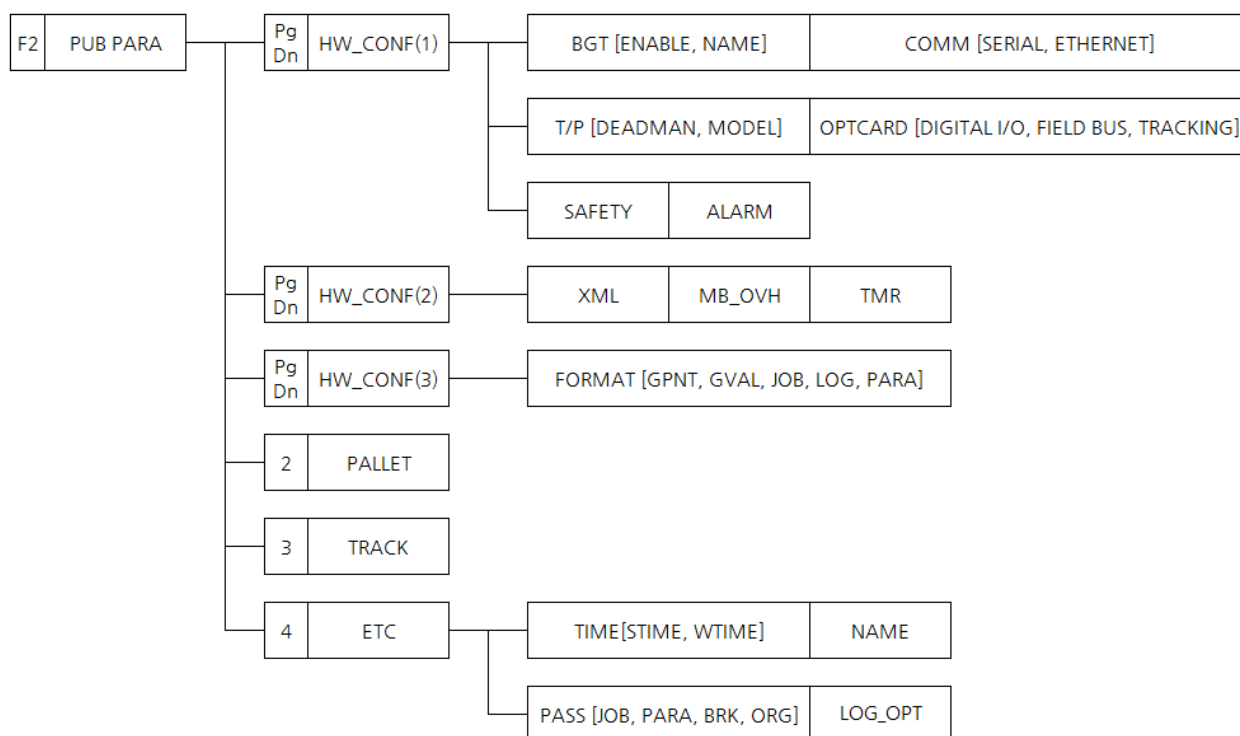


Figure 6-2 Public Parameter flowchart

7. Public Parameters

GROUP	Description	Reference
HW_CONF	Sets environment to use robot channel.	7.1
PALLET	※ Not currently supported.	7.2
TRACK	※ Not currently supported.	7.3
ETC	Sets environment to use additional Interface.	7.4

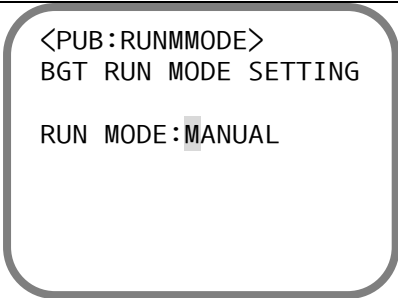
7.1 HW_CONF (Hardware Configuration)

PAGE	GROUP	Description	Reference
HW_CONF (1)	BGT	Sets auto execution of Background Task and JOB file to be executed.	7.1.1
	COMM	Sets communication standard between the parent controller and the Controller.	7.1.2
	T/P	Sets T/P EMG Type, Deadman, and Model.	7.1.3
	OPTCARD	Sets use of Digital I/O and fieldbus card.	7.1.4
	SAFETY	※ Not currently supported.	7.1.5
	ALARM	Sets output of FAN, BUZZER, and BATTERY alarm.	7.1.6
HW_CONF (2)	XML	Sets servo driver information.	7.1.7
	MB_OVH	Sets Main board limit temperature.	7.1.8
	TMR	Sets Timer Counter parameter.	7.1.9
HW_CONF (3)	FORMAT	Initializes JOB, PARA, XML, Global Variable, LOG.	7.1.10

7.1.1 BGT (Background Task)

GROUP	Description
ENABLE	Sets auto execution of Background Task.
NAME	Sets Background Task JOB to be executed.

7.1.1.1 ENABLE (Enable)

DEPTH	PUB - HW_CONF (1) - BGT - ENABLE
T/P screen	
Parameter description	The parameter is to set auto execution of Background Task JOB file.
How to edit	Refer to chapter 6, section 4.1.2.
Related alarm	[1315] Compile error
Related parameter	PUB - HW_CONF(1) - BGT - NAME

■ Additional explanation

Item		Description
Change list	MANUAL	Not executes Background Task.
	AUTO	Auto executes Background Task.



- 1) Correctly set BGT NAME before using BGT.
- 2) If BGT JOB file does not exist in the Controller, “BGTD.JOB NOT EXIST” message is displayed.
- 3) If there is a grammatical error in JOB to be called in BGT JOB file or BGT JOB, “[1315] Compile error” alarm occurs and BGT program won’t run.
- 4) Reboot the Controller after setting the parameter to run BGT program.

7.1.1.2 NAME (Name)

DEPTH	PUB - HW_CONF (1) - BGT - NAME
T/P screen	<PUB:NAME> BGT JOB NAME SETTING BGT NAME:BGTD
Parameter description	The parameter is to set Background Task JOB file to be executed.
How to edit	Refer to chapter 6, section 4.1.2.
Related alarm	-
Related parameter	PUB - HW_CONF(1) - BGT - ENABLE

■ Additional explanation

Item		Description
Change list	BGTD	Set communication Interface with parent controller to Digital I/O.
	BGTF	Set communication Interface with parent controller to Fieldbus I/O.



- 1) Correctly set BGT NAME after checking communication standard with the parent controller.
- 2) If BGT JOB file does not exist in the Controller, "BGTD.JOB NOT EXIST" message is displayed.
- 3) If there is a grammatical error in JOB programs to be called in BGT JOB file or BGT JOB, "[1315] Compile error" alarm occurs and BGT program won't be executed.

7.1.2 COMM (Communication)

GROUP	Description
SERIAL	Sets RS-232C communication standard.
ETHERNET	Sets ETHERNET communication IP and GATEWAY.

7.1.2.1 SERIAL (Serial)

DEPTH	PUB - HW_CONF (1) - COMM - SERIAL
T/P screen	<PUB:SERIAL> SERIAL PORT SETTING PROTOCOL :HOST BAUDRATE :115200 DELIMITER:CRLF
Parameter description	The parameter is to set RS-232C communication standard.
How to edit	Refer to chapter 6, section 4.1.2.
Related alarm	-
Related parameter	-

■ Additional explanation

Item			Description
Change list	PROTOCOL	HOST	UNI-HOST communication use
		STRCOM	STRING command use
		CNET	CNET communication use
	BAUDRATE		9,600 ~ 115,200bps
	DELIMITER	CR+LF	Judges character string end time with CR+LF to send/receive character string
		CR	Judges character string end time with CR to send/receive character string
		LF	Judges character string end time with LF to send/receive character string

※ CR : Carriage Return, LF : Line Feed



- 1) In case of using HOST communication, BAUDRATE is fixed to 115,200bps, DELIMITER is fixed to CRLF.
- 2) Since there is only one Serial RS-232 port, PROTOCOL must be set to HOST to use HOST for normal communication. If not, communication won't be connected.
- 3) If PROTOCOL parameter is set to STRCOM, move to 3.HOST in the main menu without parameter change to enable Communication with PC through Unihost.

7.1.2.2 ETHERNET (Ethernet)

DEPTH	PUB - HW_CONF (1) - COMM - ETHERNET
T/P screen	<PUB:ETHERNET> ETHERNET PORT SET IP : 192.168.1.193 GATE: 192.168.1.4 MONI: ENB
Parameter description	The parameter is to set ETHERNET communication IP address and Gateway address.
How to edit	Refer to chapter 6, section 4.1.1 and chapter 6, section 4.1.2
Related alarm	-
Related parameter	-

■ Additional explanation

Item		Description
Change list	IP	Sets ETHERNET IP address.
	GATE	Sets ETHERNET Gateway address.
	MONI	ENB Enables monitoring function.
		DIS Disables monitoring function.



- 1) In addition to the IP address, a TCP port number is required to send and receive strings with the Controller via Ethernet communication from the outside.
- 2) The N2 Controller supports 38201, 38202, and 38203 as TCP port numbers.
 ※ Refer to the TCP IP dedicated command in the N2 programming manual (N2-PM- □□□)

7.1.3 T/P (Teach pendant)

GROUP	Description
DEADMAN	Sets use of Deadman switch.
MODEL	Sets Teach pendant model.

7.1.3.1 DEADMAN (Deadman)

DEPTH	PUB - HW_CONF (1) - T/P - DEADMAN - ENB
T/P screen	<PUB:DEADMAN> <u>1.ENB</u> ITEM # <PUB:DEADMAN> DEADMAN ENABLE JOG:DIS RUN:DIS ORG:DIS
Parameter description	The parameter is to set whether to use Deadman switch.
How to edit	Refer to chapter 6, section 4.1.2
Related alarm	-
Related parameter	-

■ Additional explanation

Item			Description
Change list	JOG	ENB	Checks Deadman switch status during JOG operation.
		DIS	Not use Deadman for JOG operation.
	RUN	ENB	Checks Deadman switch status during Manual Run operation.
		DIS	Not use Deadman for Manual Run operation.
	ORG	ENB	Checks Deadman switch status during Origin operation.
		DIS	Not uses Deadman for Origin operation.



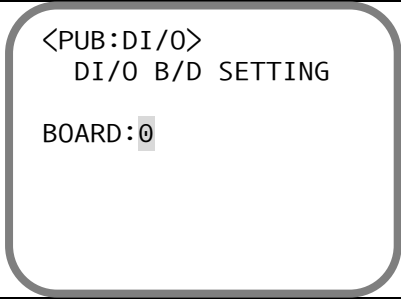
- 1) For Deadman switch operation method, refer to N2 Instruction Manual (N2-IM-□□□).
- 2) To secure safety, it is recommended that setup of the Deadman is kept to ENB.

7.1.3.2 MODEL ※ Not currently supported.

7.1.4 OPTCARD (Option Card)

GROUP	Description
DIGITAL I/O	Sets use number of Option Digital I/O card.
FIELD BUS	Sets FIELD BUS type and standard.
TRACKING	※ Not currently supported.

7.1.4.1 DIGITAL I/O (Digital I/O)

DEPTH	PUB - HW_CONF (1) - OPTCARD - DIGITAL I/O
T/P screen	
Parameter description	The parameter is to set use number of Option Digital I/O card.
How to edit	Refer to chapter 6, section 4.1.1
Related alarm	-
Related parameter	-

■ Additional explanation

Item	Description
Change list	0 Default I/O (20 points per IN/OUT)
	1 Default I/O (20 points per IN/OUT) + OPTION I/O (32 points per IN/OUT)
	2 Default I/O (20 points per IN/OUT) + OPTION I/O * 2 (64 points per IN/OUT)



- 1) Be sure to change parameter after installing Option D I/O for I/O monitoring and editing on the T/P.

7.1.4.2 FIELD BUS (Fieldbus)

7.1.4.2.1 TYPE

DEPTH	PUB - HW_CONF (1) - OPTCARD - FIELD BUS - TYPE	
T/P screen	<PUB:FIELD BUS> 1. TYPE 2. ENDIAN 3. IP CONF 4. SIZE ITEM # <PUB:TYPE> FBUS CARD SETTING CARD: CCLINK_V1	
Parameter description	The parameter is to select fieldbus communication method.	
How to edit	Refer to chapter 6, section 4.1.2.	
Related alarm	-	
Related parameter	PUB - HW_CONF(1) - OPTCARD - FIELD BUS - SIZE	

■ Additional explanation

Item		Description
Change list	NONE	Not uses fieldbus communication.
	CCLINKV1	Uses CC-Link V1 fieldbus communication.
	CCLINKV2	Uses CC-Link V2 fieldbus communication.
	ETHERNET_IP	Uses Ethernet IP fieldbus communication
	DEVICENET	Uses DeviceNET fieldbus communication



- After changing the parameter, the Update related message below can be displayed on bottom of the T/P screen.
 - "VERSION UPDATE ERROR" : failed to change fieldbus communication method.
 - "CYCLIC UPDATE ERROR!" : failed to change fieldbus communication data size.
 - "SAVE ERROR!" : failed to save fieldbus parameter.
 - "CC_LINK RESET ERROR!" : failed to set fieldbus parameter.
- If any of above messages is displayed, recheck option card setup and reset it.
- If any of above messages is continuously displayed, contact customer support team or agency of Robostar.

7.1.4.2.2 ENDIAN (Endian) ※ Not currently supported.

7.1.4.2.3 IPCONF (IP Configuration)

DEPTH	PUB - HW_CONF (1) - OPTCARD - IPCONF	
T/P screen	<PUB:FIELD BUS> 1. TYPE 2. ENDIAN <u>3. IPCONF</u> 4. SIZE ITEM # <PUB:IPCONF> IP CONFIGURATION SET IP : 192.168.1.193 GATE: 192.168.1.4	
Parameter description	The parameter is to set IP for Communication with MASTER PLC.	
How to edit	Refer to chapter 6, section 4.1.1 and chapter 6, section 4.1.2	
Related alarm	-	
Related parameter	PUB - HW_CONF(1) - OPTCARD - FIELD BUS - TYPE	

■ Additional explanation

Item		Description
Change list	IP	Sets Ethernet IP address.
	GATE	Sets Ethernet Gateway address.

7.1.4.2.4 SIZE (Size)

DEPTH	PUB - HW_CONF (1) - OPTCARD - SIZE
T/P screen	<PUB:FIELD BUS> 1.TYPE 2.ENDIAN 3.IPCONF <u>4.SIZE</u> ITEM # <PUB:SIZE> FBUS DATA SIZE SET SIZE: 32X32
Parameter description	The parameter is to set Fieldbus data size.
How to edit	Refer to chapter 6, section 4.1.2.
Related alarm	-
Related parameter	PUB - HW_CONF(1) - OPTCARD - FIELD BUS - TYPE

■ Additional explanation

Item	TYPE	DATA	Bit Size	Word Size	Description
Change list	NONE	32X32	-	-	-
		64X64	-	-	-
		128X128	-	-	-
		256X256	-	-	-
	CCLINKV1	1CYCLIC	128	16	1 Cyclic communication
	CCLINKV2	1CYCLIC	112	16	1 Cyclic communication
		2CYCLIC	224	32	2 Cyclic communication
		4CYCLIC	448	64	4 Cyclic communication
		8CYCLIC	896	128	8 Cyclic communication
	ETHERNET_IP	128X128	-	-	-
	DEVICENET	8X8	-	-	-
		48X48	-	-	-
		92X92	-	-	-
		128X128	-	-	-

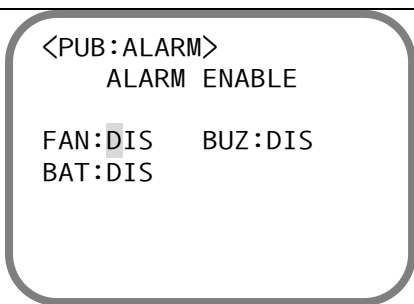


- 1) After changing the parameter, the Update related message below can be displayed on bottom of the T/P screen.
- "CYCLIC UPDATE ERROR!" : failed to change fieldbus communication data size.
 - "SAVE ERROR!" : failed to save fieldbus parameter.
 - "CC_LINK RESET ERROR!" : failed to set fieldbus parameter

7.1.4.2.5 TRACKING ※ Not currently supported.

7.1.5 SAFETY ※ Not currently supported.

7.1.6 ALARM (Alarm)

DEPTH	PUB - HW_CONF (1) - ALARM
T/P screen	
Parameter description	The parameter is to set whether to display FAN, BUZZER, and BATTERY related warning.
How to edit	Refer to chapter 6, section 4.1.2.
Related alarm	-
Related parameter	-

■ Additional explanation

Item			Description
Change list	FAN	ENB	Occurs warning if FAN Fault occurs.
		DIS	Disregards warning if FAN Fault occurs.
	BUZ	ENB	※ Not currently supported.
		DIS	※ Not currently supported.
	BAT	ENB	※ Not currently supported.
		DIS	※ Not currently supported.

7.1.7 XML (Xml)

DEPTH	PUB - HW_CONF (2) - XML
T/P screen	<pre> <PUB:XML> SELECT XML FILE CUR:N2_V12_774111 * 0.N2M_V12_774111 1.N2M_V12_7741113K 2.N2_V12_774111 3.N2_V12_442111 4.N2M_V12_7741113K </pre>
Parameter description	The parameter is to set EtherCAT XML file connected to the Controller.
How to edit	Refer to chapter 6, section 4.1.5.
Related alarm	[4502] EtherCAT Comm fail
Related parameter	PARA(3) - SETUP

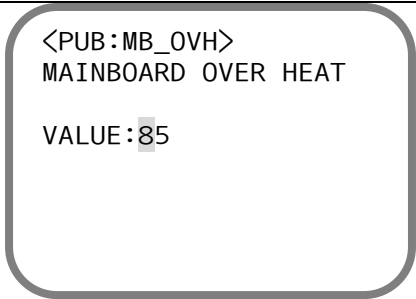
■ Additional explanation

Item		Description
XML name description	N2	Controller series.
	V12	XML version
	774111	Servo driver capacity.



- 1) XML change value will be applied after rebooting the Controller.

7.1.8 MB_OVH (Main Board Over Hit)

DEPTH	PUB - HW_CONF (2) - MB_OVH
T/P screen	
Parameter description	The parameter is to set Mainboard allowable temperature.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	[2115] Main Board Tmp error
Related parameter	-

■ Additional explanation

Item	Description
Unit	℃ (centigrade)
Input range	0 ~ 110
°F (Fahrenheit) conversion formula	$^{\circ}\text{F} = ^{\circ}\text{C} \times 1.8 + 32$ $^{\circ}\text{C} = (^{\circ}\text{F} - 32)/1.8$



- 1) If Mainboard temperature is higher than setting parameter value, "[2115] Main Board Tmp error" alarm occurs.
- 2) If an alarm occurs, check fan operation and error. If replacement is needed, replace it.

7.1.9 TMR (Timer)

DEPTH	PUB - HW_CONF (2) - TMR
T/P screen	<PUB:TIMER> TIMER INIT VALUE TIMER 1:100 TIMER 2:100
Parameter description	The parameter is to set timer initial count value if timer (TMR) variable is used by robot program command.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	-
Related parameter	-

■ Additional explanation

Item	Description
TIMER 1	Sets timer initial count value of timer variable 1.
TIMER 2	Sets timer initial count value of timer variable 2.
Unit	10ms

7.1.10 FORMAT (Format)

DEPTH	PUB - HW_CONF (3) - FORMAT	
T/P screen	<PUB:FORMAT(1/2)> 1.GPNT 2.GVAL 3.JOB 4.LOG ITEM # <PUB:FORMAT(2/2)> 1.PARA ITEM #	
Parameter description	The parameter is to reset the selected item.	
How to edit	Refer to chapter 6, section 4.1.5	
Related alarm	-	
Related parameter	-	

■ Additional explanation

Item	Description
GPNT	Resets Global Point.
GVAL	Resets Global Variable (Global Integer, Global Float).
PARA	Resets Robot Parameter.
JOB	Resets JOB file.
LOG	Resets LOG.

7.2 PALLET (Palletizing) ※ Not currently supported.

7.3 TRACK (Tracking) ※ Not currently supported.

7.4 ETC (Etcetera)

GROUP	Description
TIME	Sets SYSTEM time and WORKING time.
NAME	Sets Controller name.
PASS	Sets whether to use password to enter into JOB, parameter, BRAKE, ORIGIN menu

7.4.1 TIME (Time)

GROUP	Description
STIME	Changes reference time used in the system.
WTIME	Displays time after power input to N2 Controller.

7.4.1.1 STIME (System Time)

DEPTH	PUB - ETC - TIME - STIME
T/P screen	<PUB:TIME> 1.STIME 2.WTIME ITEM # <PUB:STIME> SYSTEM TIME SETTING C:20/01/30 17:41:38 N:20/01/30 17:41:38
Parameter description	The parameter is to parameter to change reference time used in the system.
How to edit	Refer to chapter 6, section 4.1.1.
Related alarm	-
Related parameter	-

■ Additional explanation

Item	Description
Screen description	C is abbreviation for Current. Current setting time. N is abbreviation for New. Set time to be changed.

7.4.1.2 WTIME (Working Time)

DEPTH	PUB - ETC - TIME - WTIME
T/P screen	<PUB:TIME> 1.STIME 2.WTIME ITEM # <PUB:WTIME> WORKING TIME 0D/16H/37M/27S INIT
Parameter description	The parameter is to measure and display operation time after power input to N2 Controller.
How to edit	Refer to chapter 6, section 4.1.4.
Related alarm	-
Related parameter	PARA(3) - SETUP

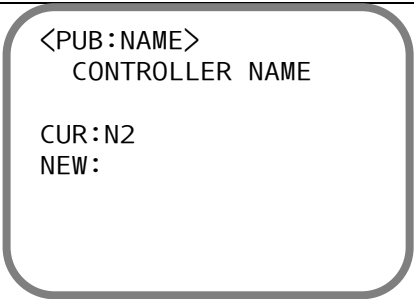
■ Additional explanation

Item	Description
INIT	Resets WORKING TIME.
Range	Records up to 9,999 days 23 hr 59 min 59 sec.



- 1) During Unihost backup, Displays up to ms unit.
- 2) Editing through Unihost is not available. To reset common parameters, reset them to 0.

7.4.2 NAME (Controller Name)

DEPTH	PUB - ETC - NAME
T/P screen	
Parameter description	The parameter is to change N2 Controller name. If there are many installed N2 Controllers, division by name is possible for Controller data backup through HOST.
How to edit	-
Related alarm	-
Related parameter	-

7.4.3 PASS (Password)

GROUP	Description
JOB	Sets password to enter into JOB menu.
PARA	Sets password to enter into parameter menu.
BRK	Sets password to enter into BREAK STATE menu
ORG	Sets password to enter into ORIGIN menu.

7.4.3.1 PASS [JOB, PARA, BRAKE, ORG]

DEPTH	PUB - ETC - PASS - JOB	
T/P screen	<PUB:JOB> PASSWORD SETTING ENABLE:DIS VALUE :1111 <PUB:PARA> PASSWORD SETTING ENABLE:DIS VALUE :1111 <PUB:BRK> PASSWORD SETTING ENABLE:DIS VALUE :1111 <PUB:ORG> PASSWORD SETTING ENABLE:DIS VALUE :1111	
Parameter description	The parameter is to set password to use individual function. If ENABLE parameter is "ENB", message to ask parameter for menu access or function operation is displayed.	
How to edit	Refer to chapter 6, section 4.1.1 and chapter 6, section 4.1.2	
Related alarm	-	
Related parameter	-	

Chapter 7 Other Operations

1. Global Variable

Characteristic of Global Variable is that it maintains values to the present even when program running stops or when Controller power is turned off. In addition, select one of integer type, real number type, and Point according to intended use. Change data in screen or check current data. Data can be referred in all JOB files. It differs from Global Variable in the program in the point that details are maintained even when the program ends.

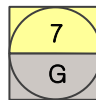
The following is description of the method to edit integer, real type variable.

1.1 Overview of Global Variable

GROUP	Description	Index range	Input range
INT	Integer type variable	0 ~ 999	-32,768 ~ 32,767
FLOAT	Real number type variable	0 ~ 999	-999,999 ~ 999,999

1.2 How to edit Global Variable

<MANUAL MODE>
 1.JOB 2.RUN
 3.HOST 4.PARA
 5.ORIGIN 6.I/O
7.GVAL 8.GPNT
 9.INFO A.REMOTE
 ITEM #



Input number key in the main menu screen to select "7.GVAL".

<GVAL EDIT>
1.INT 2.FLOAT
 INPUT #



~



Use number keys to select data type menu to be edited.

<INTEGER EDIT>
 I0 0
 I1 0
 I2 0
 I3 0
 I4 0
 I5 0
 BACK NEXT JUMP EXIT



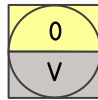
Press an arrow key or ENTER key to move to item to be edited.

Check current position with the cursor.

```

<INTEGER EDIT>
I0    1
I1    0
I2    0
I3    0
I4    0
I5    0
BACK NEXT JUMP EXIT

```



~

Use number keys to enter value.



```

<INTEGER EDIT>
I0    1
I1    0
I2    0
I3    0
I4    0
I5    0
UPDATE? (ENT/ESC)

```



After entering value, press ENTER key.
Message to check update is displayed.

OR



※ Press ESC key to return to the value before editing.

```

<INTEGER EDIT>
I0    1
I1    0
I2    0
I3    0
I4    0
I5    0
BACK NEXT JUMP EXIT

```



After pressing ENTER key again, entered value is saved

※ Press ESC key or arrow key to return to the value before editing.

```

<MANUAL MODE>
1.JOB      2.RUN
3.HOST     4.PARA
5.ORIGIN   6.I/O
7.GVAL     8.GPNT
9.INFO     A.REMOTE

ITEM #

```



To finally auto save changed variable data, input the ESC key to move out of edit mode.

1.3 Editing Global Variable

GROUP	Description
BACK	Moves to the previous page screen.
NEXT	Moves to next page screen.
JUMP	Moves to entered INDEX screen.
EXIT	Saves and ends screen.

1.3.1 BACK, NEXT functions

<INTEGER EDIT>
I6 0
I7 0
I8 0
I9 0
I10 0
I11 0
BACK **NEXT** JUMP EXIT



Moves to the previous page screen.

OR



Moves to next page screen.

1.3.2 JUMP function

<INTEGER EDIT>
I006 0
I007 0
I008 0
I009 0
I010 0
I011 0
INTEGER NUM =



Press F3 (JUMP) Function key to input Index number to be moved.

<INTEGER EDIT>
I006 0
I007 0
I008 0
I009 0
I010 0
I011 0
INTEGER NUM =55



~



Use number keys to enter Index number to be moved.

<INTEGER EDIT>
I055 0
I056 0
I057 0
I058 0
I059 0
I060 0
BACK NEXT JUMP EXIT



Enter value and press Enter key to move to the relevant Index number.

1.3.3 Precautions

<INTEGER EDIT>
I055 0
I056 0
I057 0
I058 0
I059 0
I060 0
INTEGER NUM =9999



~



Value that exceeds allowable Index range is input.

<INTEGER EDIT>
I055 0
I056 0
I057 0
I058 0
I059 0
I060 0
OUT OF BOUND



Returns to the previous screen after “OUT OF BOUND” notice message.

2. Digital I/O

Describes input/output connection method with parent controller and external device.

For cable wiring method and standard, interface information, refer to N2 Instruction Manual (N2-IM-□□□).

2.1 Digital I/O overview

In case of N2 series, it basically provides I/O 20 points.

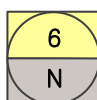
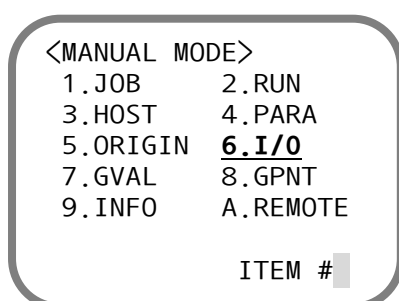
Additionally up to 2 DIGITAL I/O boards, I/O 32 points per board, can be installed.

If optional DIGITAL I/O board is installed, normal operation after setting the parameter.

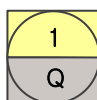
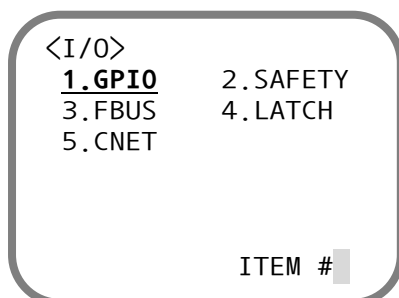
Digital I/O for editing parameter, refer to Digital I/O in chapter 6, section 7.1.4.1.

DIGITAL I/O parameter	Number of IN port	Number of OUT port	Remark
0	20	20	Default
1	52	52	When 1 Digital I/O board is installed
2	84	84	When 2 Digital I/O boards are installed

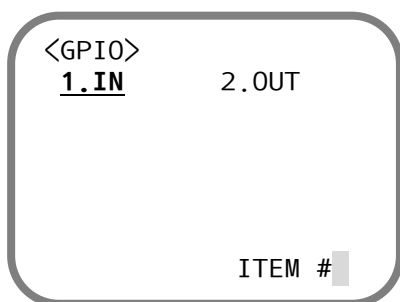
2.2 How to edit Digital I/O Input port



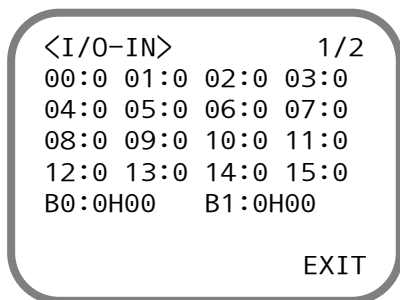
Input number key in the main menu screen to select "6.I/O".



Input number key in I/O menu screen to select "1.GPIO".

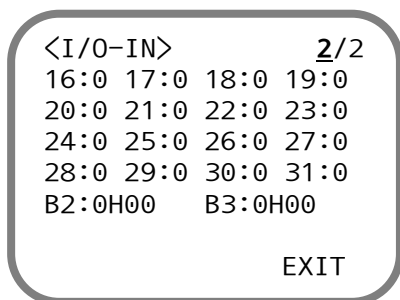


Input number key in GPIO menu screen to select "1.IN".



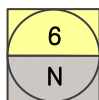
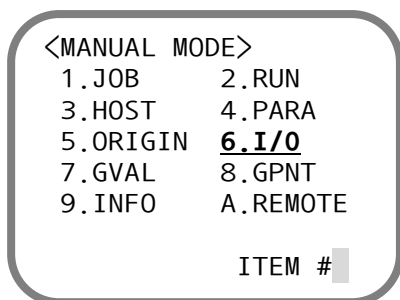
Real-time monitoring of 16 ports in 1 page.
If it is 0, means signal "OFF". If 1, means signal "ON".

※ Page number changes according to
DIGITAL I/O value of Public Parameter.

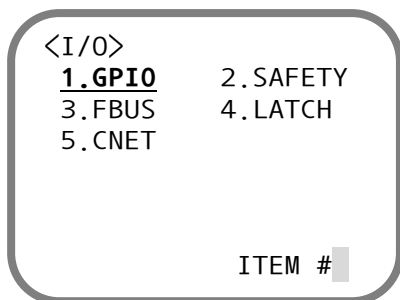


Use PgUp, PgDn keys to turn screen page.
Max page is differently applied according to
Digital I/O parameter.

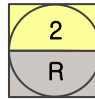
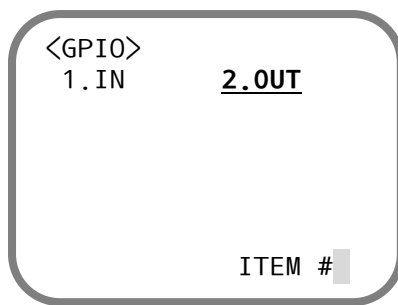
2.3 How to edit Digital I/O Output port



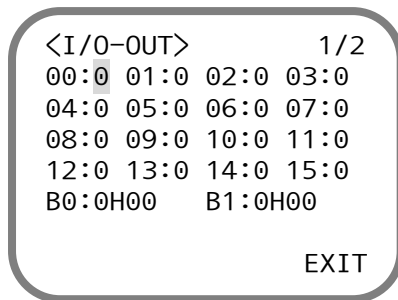
Input number key in the main menu screen to select "6.I/O".



Input number key in I/O menu screen to select "1.GPIO".

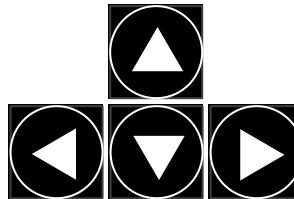
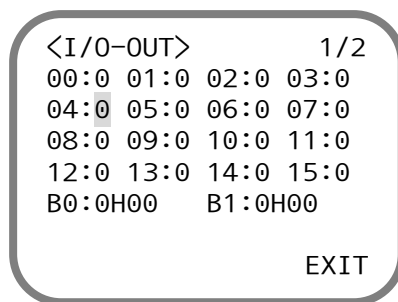


Input number key in GPIO menu screen to select 2.OUT.



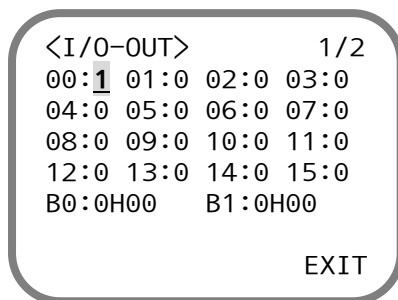
Real-time monitoring of 16 ports in 1 page. If it is 0, means signal "OFF". If 1, means signal "ON".

※ page number is changed according to DIGITAL I/O value of Public Parameter.



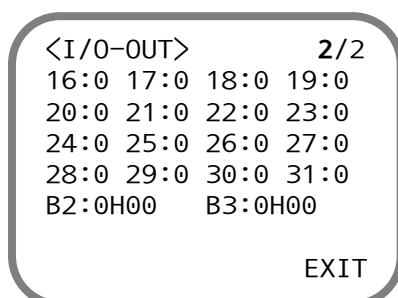
Use arrow keys to move item to be edited.

Check current position with the cursor.



Use Enter key to change output status.

If it is 0, means signal "OFF". If 1, means signal "ON".



Use PgUp, PgDn keys to turn screen page.

Max page is differently applied according to Digital I/O parameter.

3. Safety I/O

Safety I/O is hardware port of emergency of external interface (ankle detection, Door Open, etc.). Regardless of internal Controller, it is to take measures against emergency situations caused by external device using hardware method to shut off robot (motor) operating power. For cable wiring method and standard, interface information, refer to N2 Instruction Manual (N2-IM-□□□).

3.1 Safety I/O port

type	Name		Description	T/P Output
IN	MC1_RD	Magnetic Connector	Status of number port, MC Relay port number 1	1 : Normal
	MC2_RD		Status of number port, MC Relay port number 2	1 : Normal
	A_EMG	Auto Emergency (Interlock Auto)	2 NC type ports status If signal is received when C_MODE signal is 0, Auto Emergency alarm occurs. If signal of 2 ports is different, Mode Mismatch alarm occurs	0 : Normal
	M_EMG	Manual Emergency (Interlock Manual)	2 NC type ports status If signal is received when C_MODE signal is 1, Manual Emergency alarm occurs. If signal of 2 ports is different, Mode Mismatch alarm occurs	0 : Normal
	A_MODE	Index Mode: AUTO	1 NC type port, Auto/Manual mode division Auto mode if A_MODE close, M_MODE open Manual mode if A_MODE open, M_MODE close	0 : MANUAL 1 : AUTO
	M_MODE	Index Mode: Manual		1 : MANUAL 0 : AUTO
	S_EMG	System Emergency (IN)	If 2 NC type ports signal is received, System Emergency alarm occurs If signal of 2 ports is different, Mode Mismatch alarm occurs	0 : Normal
	TP_EMG	Teaching Pendant Emergency	Input 1 NC type port, T/P EMG status	0 : Normal
	SMPS_F	AC Fail	Signal generates if 1 NC type port, Controller AC power not turns on,	0 : Normal
	FAN_F	Fan Fault	If 1 NC type port, signal is received, Fan warning occurs	0 : Normal
	DUMMY2 ~ 8		Reserved	0 : Normal

type	Name		Description	T/P Output
OUT	MC_RST	Magnetic Connector Reset	1 NC type port, MC RESET signal output	0 : Normal
	S_EMG	System Emergency (Out)	If alarm occurs at 2 NC type ports, main or interface, output signal occurs.	0 : Normal
	C_MODE	Controller Mode	1 NC type port, actual program run mode output ※ Refer to the table below	1 : MANUAL 0 : AUTO
	SVSTO	Servo Driver STO (Safe Torque Off)	1 NC type port, safety specification, it sends signal that prevents and stops driver from applying torque on the motor shaft.	0 : Normal

3.1.1 Controller mode and occurrence condition of Interlock alarm

Index Mode	T/P MODE	Controller Mode	Interlock A (A_EMG)	Interlock M (M_EMG)	status
Auto	AUTO	AUTO	ON	-	[2104] Auto Emergency
	MANUAL	MANUAL	ON	-	Normal
	AUTO	AUTO	-	ON	Normal
	MANUAL	MANUAL	-	ON	[2105] Manual Emergency
Manual	AUTO	MANUAL	ON	-	Normal
	MANUAL	MANUAL	ON	-	Normal
	AUTO	MANUAL	-	ON	[2105] Manual Emergency
	MANUAL	MANUAL	-	ON	[2105] Manual Emergency

3.1.2 Deadman Mute signal

type	Name	Description	T/P Output
IN	DeadMan Mute	If Deadman Enable Pin Mute is removed regardless of setting of use of NC type 2port, use Public Parameter Deadman key, MC turns "OFF" if Deadman is "OFF". If Deadman is "ON", MC turns "ON".	-

3.2 How to edit Safety I/O Input port

<MANUAL MODE>

1.JOB	2.RUN
3.HOST	4.PARA
5.ORIGIN	<u>6.I/O</u>
7.GVAL	8.GPNT
9.INFO	A.REMOTE

ITEM # █



Input number key in the main menu screen to select "6.I/O".

<I/O>

1.GPIO	<u>2.SAFETY</u>
3.FBUS	4.LATCH
5.CNET	

ITEM # █



Input number key in I/O menu screen to select "2.SAFETY".

<SAFETY>

<u>1.IN</u>	2.OUT
--------------------	-------

ITEM # █



Input number key in SAFETY menu screen to select "1.IN".

<SAFETY IN>

MC1_RD:1	MC2_RD:0
A_EMG :0	M_EMG :0
A_MODE:0	M_MODE:1
S_EMG :0	TP_EMG:0
SMPS_F:0	FAN_F :0
F_EMG :0	UPS_F :0

For description of each item, refer to Safety I/O port description in chapter 7, section 3.1.

3.3 How to edit Safety I/O Output port

<MANUAL MODE>

1.JOB

2.RUN

3.HOST

4.PARA

5.ORIGIN

6.I/O

7.GVAL

8.GPNT

9.INFO

A.REMOTE

ITEM #



Input number key in the main menu screen to select “6.I/O”.

<I/O>

1.GPIO

2.SAFETY

3.FBUS

4.LATCH

5.CNET

ITEM #



Input number key in I/O menu screen to select “2.SAFETY”.

<SAFETY>

1.IN

2.OUT

ITEM #



Input number key in SAFETY menu screen to select “2.OUT”.

<SAFETY OUT>

MC_RST:0

S_EMG :0

C_MODE:1

SVSTO :0

For description of each item, refer to Safety I/O port description in chapter 7, section 3.1.

4. Fieldbus I/O

Describes the method for input/output connection with parent controller and external device. For cable wiring method and standard, interface information, refer to N2 Instruction Manual (N2-IM-□□□).

4.1 Fieldbus I/O overview

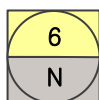
If an optional Fieldbus I/O board is installed, normal operation is performed after setting the parameter.

For editing parameter, refer to chapter 6, section 7.1.4.2 FIELDBUS.

Fbus type parameter	Fbus data	Bit Size	Word Size	Remark
NONE	32X32	-	-	-
	64X64	-	-	-
	128X128	-	-	-
	256X256	-	-	-
CCLINKV1	1CYCLIC	128	16	1 Cyclic communication
CCLINKV2	1CYCLIC	112	16	1 Cyclic communication
	2CYCLIC	224	32	2 Cyclic communication
	4CYCLIC	448	64	4 Cyclic communication
	8CYCLIC	896	128	8 Cyclic communication
ETHERNET_IP	128X128	-	-	-
DEVICENET	8X8	-	-	-
	48X48	-	-	-
	92X92	-	-	-
	128X128	-	-	-

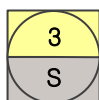
4.2 How to edit Fieldbus I/O

<MANUAL MODE>
 1.JOB 2.RUN
 3.HOST 4.PARA
 5.ORIGIN **6.I/O**
 7.GVAL 8.GPNT
 9.INFO A.REMOTE
 ITEM #



Input number key in the main menu screen to select "6.I/O".

<I/O>
 1.GPIO 2.SAFETY
3.FBUS 4.LATCH
 5.CNET
 ITEM #



Input number key in I/O menu screen to select "3.FBUS".

<FIELDBUS>

1.B-IN	2.B-OUT
3.W-IN	4.W-OUT
5.F-IN	6.F-OUT

ITEM #

If Fbus type parameter matches with the installed option Fieldbus card, the next menu screen is displayed.

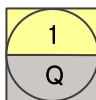
※ If Fbus type parameter is NONE, "NOT SUPPORTED" message on the bottom of the T/P.

4.2.1 How to edit Fieldbus I/O Bit Input port

<FIELDBUS>

<u>1.B-IN</u>	2.B-OUT
3.W-IN	4.W-OUT
5.F-IN	6.F-OUT

ITEM #



Input number key in Fieldbus I/O menu screen to select "1.B-IN".

<FBUS-BIN>

1/16

000:0	001:0
002:0	003:0
004:0	005:0
006:0	007:0
B000:0H00	

PJUMP

EXIT

Real-time monitoring of 8 ports in 1 page.
If it is 0, means signal "OFF". If 1, means signal "ON".

<FBUS-BIN>

2/16

008:0	009:0
010:0	011:0
012:0	013:0
014:0	015:0
B001:0H00	

PJUMP

EXIT



Use PgUp, PgDn keys to turn screen page.
Max page is differently applied according to Fbus data parameter.



<FBUS-BIN>

2/16

008:0	009:0
010:0	011:0
012:0	013:0
014:0	015:0
B001:0H00	

BIT =



F1 (PJUMP) Function key or JUMP key are to monitor desired Bit port.

OR



※ If an value above max port is entered, "OUT OF BOUND" message will be displayed.

4.2.2 How to edit Fieldbus I/O Bit Output port

<FIELDBUS>

1.B-IN	2.B-OUT
3.W-IN	4.W-OUT
5.F-IN	6.F-OUT

ITEM #



Input number key in Fieldbus I/O menu screen to select "2.B-OUT".

<FBUS-BOUT> 1/16

000:0	001:0
002:0	003:0
004:0	005:0
006:0	007:0
B000:0H00	

PJUMP EXIT

Real-time monitoring of 8 ports in 1 page.
If it is 0, means signal "OFF". If 1, means signal "ON".

<FBUS-BOUT> 2/16

008:0	009:0
010:0	011:0
012:0	013:0
014:0	015:0
B001:0H00	

PJUMP EXIT



Use PgUp, PgDn keys to turn screen page.
Max page is differently applied according to Fbus data parameter.

<FBUS-BOUT> 2/16

008:0	009:0
010:0	011:0
012:0	013:0
014:0	015:0
B001:0H00	

BIT =



OR



F1 (PJUMP) Function key or JUMP key are to monitor desired Bit port.

※ If an value above max port is entered,
"OUT OF BOUND" message will be displayed.

4.2.3 How to edit Fieldbus I/O Word Input port

<FIELDBUS>

1. B-IN	2. B-OUT
3. W-IN	4. W-OUT
5. F-IN	6. F-OUT

ITEM #



Input number key in Fieldbus I/O menu screen to select "3.W-IN".

<FBUS-WIN> 1/4

IN	VALUE
CWI0	0
CWI1	0
CWI2	0
CWI3	0

PJUMP EXIT

Real-time monitoring of 4 Word areas in 1 page.

<FBUS-WIN> 2/4

IN	VALUE
CWI4	0
CWI5	0
CWI6	0
CWI7	0

PJUMP EXIT



Use PgUp, PgDn keys to turn screen page.
Max page is differently applied according to Fbus data parameter.

<FBUS-WIN> 2/4

IN	VALUE
CWI4	0
CWI5	0
CWI6	0
CWI7	0

PORT =



OR



F1 (PJUMP) Function key or JUMP key are to monitor desired port.

※ If an value above max port is entered,
"OUT OF BOUND" message will be displayed.



- 1) W-IN and F-IN use Fieldbus WORD area in common.
- 2) 1 Port of W-IN MEANS 1-WORD (4byte), 1 Port of F-IN means 2-WORD (8byte).

4.2.4 How to edit Fieldbus I/O Word Output port

```

<FIELDBUS>
1.B-IN      2.B-OUT
3.W-IN      4.W-OUT
5.F-IN      6.F-OUT

ITEM # █
  
```



Input number key in Fieldbus I/O menu screen to select "4.W-OUT".

```

<FBUS-WOUT>      1/4
OUT      VALUE
*CW00      0
CW01      0
CW02      0
CW03      0

PJUMP SET      EXIT
  
```



Press an arrow key to move to the item to be edited.

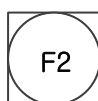


Check current position with "*".

```

<FBUS-WOUT>      1/4
OUT      VALUE
*CW00      0
CW01      0
CW02      0
CW03      0

PJUMP SET      EXIT
  
```



Place "*" at port position to be edited and press F2 (SET) Function key to input value.

```

<FBUS-WORD (OUT)>

CW00 : 0
NEW  : █

EXIT
  
```



Currently displayed data are displayed in the top line.

~

Use number keys to enter a new value in the line below.



Input range is -32,768 ~ 32,767.

```

<FBUS-WORD (OUT)>

CW00 : 0
NEW  : 666 █

EXIT
  
```



After entering value, press ENTER key.

※ Press ESC key to return to the value before editing.

<FBUS-WOUT>		2/4
OUT	VALUE	
*CW04	0	
CW05	0	
CW06	0	
CW07	0	
PJUMP SET		EXIT



Use PgUp, PgDn keys to turn screen page change.



Max page is differently applied according to Fbus data parameter.

<FBUS-WOUT>		2/4
OUT	VALUE	
*CW04	0	
CW05	0	
CW06	0	
CW07	0	
<u>PORT</u> =		



F1 (PJUMP) Function key or JUMP key are to monitor desired port.

OR



※ If an value above max port is entered, "OUT OF BOUND" message will be displayed.



- 1) W-OUT and F-OUT ARE COMMONLY USE Fieldbus WORD area are used in common.
- 2) 1Port of W-OUT means 1-WORD (4byte), 1Port of F-OUT means 2-WORD (8byte).
- 3) When value is input in CWO0 area, CFO0 area is also changed.

4.2.5 How to edit Fieldbus I/O Float Input port

<FIELDBUS>

1.B-IN	2.B-OUT
3.W-IN	4.W-OUT
<u>5.F-IN</u>	6.F-OUT

ITEM #



Input number key in Fieldbus I/O menu screen to select "5.F-IN".

<FBUS-FIN> 1/2

IN	VALUE
CFI0	0
CFI1	0
CFI2	0
CFI3	0

PJUMP EXIT

Real-time monitoring 8 Word areas in 1 page.
CFI0 = CWI0 ~ CWI1

<FBUS-FIN> 2/2

IN	VALUE
CFI4	0
CFI5	0
CFI6	0
CFI7	0

PJUMP EXIT



Use PgUp, PgDn keys to turn screen page change.



Max page is differently applied according to Fbus data parameter.

<FBUS-FIN> 2/2

IN	VALUE
CFI4	0
CFI5	0
CFI6	0
CFI7	0

PORT =



F1 (PJUMP) Function key or JUMP key are to monitor desired port.

OR



※ If an value above max port is entered,
"OUT OF BOUND" message will be displayed.



- 1) W-IN and F-IN use Fieldbus WORD area in common.
- 2) 1 Port of W-IN MEANS 1-WORD (4byte), 1 Port of F-IN means 2-WORD (8byte).

4.2.6 How to edit Fieldbus I/O Float Output port

```

<FIELDBUS>
1.B-IN      2.B-OUT
3.W-IN      4.W-OUT
5.F-IN      6.F-OUT

ITEM #
  
```



Input number key in Fieldbus I/O menu screen to select "6.F-OUT".

```

<FBUS-FOUT>      1/2
OUT      VALUE
*CF00    0
CF01     0
CF02     0
CF03     0

PJUMP SET      EXIT
  
```



Press an arrow key to move to the item to be edited.

Check current position with "*".

```

<FBUS-FOUT>      1/2
OUT      VALUE
*CF00    0
CF01     0
CF02     0
CF03     0

PJUMP SET      EXIT
  
```



Place "*" at port position to be edited and press F2 (SET) Function key to input value.

```

<FBUS-FLOAT (OUT)>
CF00 : 0
NEW  : 
EXIT
  
```



Currently displayed data are displayed in the top line.

Use number keys to enter a new value in the line below.

Input range is -999,999 ~ 999,999.

If a value outside the range is entered, "RANGE OVER !!" message is displayed at the bottom and the input is canceled.

~



```

<FBUS-FLOAT (OUT)>
CF00 : 0
NEW  : 999
EXIT
  
```



After entering value, press ENTER key.

※ Press ESC key to return to the value before editing.

<FBUS-FOUT>		2/2
OUT	VALUE	
*CF04	0	
CF05	0	
CF06	0	
CF07	0	
PJUMP SET		EXIT



Use PgUp, PgDn keys to turn screen page.
Max page is differently applied according to Fbus data parameter.

<FBUS-FOUT>		2/2
OUT	VALUE	
*CF04	0	
CF05	0	
CF06	0	
CF07	0	
PORT =		



OR



F1 (PJUMP) Function key or JUMP key are to monitor desired port.

※ If an value above max port is entered,
“OUT OF BOUND” message will be displayed.

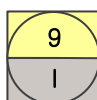
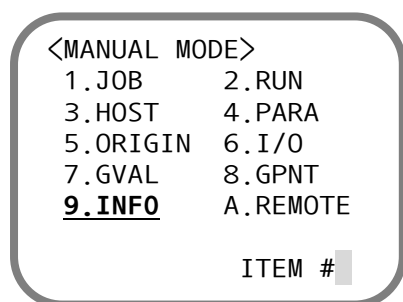


- 1) W-OUT and F-OUT ARE COMMONLY USE Fieldbus WORD area.
- 2) 1Port of W-OUT means 1-WORD (4byte), 1Port of F-OUT means 2-WORD (8byte).
- 3) When a value is entered in CWO0 area, CFO0 area is also be changed.

5. INFO (Information)

INFO menu provides robot information, Controller information and information of the installed optional board, Log information, USB Backup / Upload function.

5.1 How to access to INFO menu



Input number key in the main menu screen to select "9.INFO".

5.2 INFO menu group

GROUP 1	GROUP 2	Description	Reference
ROBOT	SEL	Checks setup information of robot type/classification/model name.	5.3.1
	NAME	Sets robot name.	5.3.2
CONT		Checks Controller and Interface board, optional board F/W information.	5.4
LOG	SYSTEM	Monitors system log.	5.5.1
	ALARM	Monitors alarm log.	5.5.2
	USER	Monitors user save log.	5.5.3
	COMM	※ Not currently supported.	5.5.4
USB	UPLOAD	Updates Files saved in the USB to the Controller.	5.6.3
	BACKUP	BACKUP files saved in the Controller in a USB.	5.6.4

5.3 ROBOT

Checks setup information of robot type/classification/model name.

5.3.1 SEL

```

<INFO>
1.ROBOT    2.CONT
3.LOG       4.USB
5.COMM      6.E_STATE

ITEM #
  
```

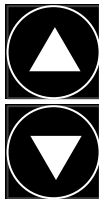


Input number key in INFO menu screen to select "1.ROBOT".

```

<INFO:ROBOT>
NO      TYPE
*R1    RA007L
R2      NO-EXIST
R3      NO-EXIST

SEL  NAME      EXIT
  
```



Use arrow keys to select channel.
Check current position with "*".

```

<ROBOT1 INFO>

NAME: NONE
TYPE: ARTICULATE
SPEC: RA007L

EXIT
  
```



Press F1 (SEL) Function key to display robot information of the selected channel.

NAME	Robot name set by a user.
TYPE	Robot classification
SPEC	Robot model name

```

<INFO:ROBOT>
NO      TYPE
*R1    RA007L
R2      NO-EXIST
R3      NO-EXIST

SEL  NAME      EXIT
  
```



OR



Input the ESC key or F4 (EXIT) Function key to move to channel select screen.

5.3.2 NAME

```

<INFO>
  1.ROBOT    2.CONT
  3.LOG      4.USB
  5.COMM     6.E_STATE

ITEM #
  
```



Input number key in INFO menu screen to select "1.ROBOT".

```

<INFO:ROBOT>
NO      TYPE
*R1    RA007L
R2      NO-EXIST
R3      NO-EXIST

SEL  NAME      EXIT
  
```



Use arrow keys to select robot channel.



Check current position with "*".

```

<ROBOT1 INFO>

NAME: NONE

NEW : 
  
```



F2 (NAME) Function key is to display current robot name in the 3rd line.
Use keypad to change robot name.

```

<ROBOT1 INFO>

NAME: NONE

NEW : ABCD
  
```



Input a new robot name and press ENTER key to temporarily save entered name value.

```

<ROBOT1 INFO>

NAME: NONE

NEW : ABCD

UPDATE? (ENT/ESC)
  
```



To save and apply robot name, press ESC key.
Message to check update is displayed.

OR



※ Press ENTER key to complete saving.
※ Press ESC key not to save edited parameter and to close edit screen.

5.4 CONT (Control)

Checks Controller F/W information, Interface board F/W information, and Optional board information.

※ When Public Parameter backup is performed through Unihost or USB, board information can be backed up.

```

<INFO>
1.ROBOT    2.CONT
3.LOG      4.USB
5.COMM     6.E_STATE

ITEM #
  
```



Input number key in INFO menu screen to select "2.CONT".

```

<INFO:CONT(1/5)>
N2-SERIES
MAIN B/D VER.

01.00.02-C3
(AR 200123_STD)

PRE NEXT      EXIT
  
```



Press F2 (NEXT) Function key to display Controller firmware information of the selected channel.

```

<INFO:CONT(2/5)>
N2-SERIES
INTERFACE B/D VER.
H/W: 1.20
S/W: 01.00.2A-190813
OP1: 0001 OP2: 0001

PRE NEXT      EXIT
  
```



OR



H/W	Hardware F/W of Interface board
S/W	Software F/W of Interface board
OP1	Optional board F/W of slot number 1
OP2	Optional board F/W of slot number 2

```

<INFO:CONT(3/5)>
N2-SERIES
OPTION B/D ID
OP1: CCEA OP2: 494F

PRE NEXT      EXIT
  
```



OR



Information of the installed optional board.

CCEA	CC-Link communication board
494F	Digital I/O (I/O Extension) board
00E2	Ethernet IP communication board
DEEA	DeviceNET communication board



- 1) OP1, OP2 is divided by the optional board switch, not by Controller slot position.
- 2) If ID of optional board differs from the installed board, it doesn't operate normally.
- 3) If an error occurs, port customer support team of Robostar or a product agency.

5.5 LOG

Monitors various Logs saved in the Controller.

5.5.1 SYSTEM

System related log of EtherCAT communication connection status and Controller booting process will be recorded.

<INFO>
1.ROBOT 2.CONT
3.LOG 4.USB
5.COMM 6.E_STATE

ITEM #



Input number key in INFO menu screen to select “3.LOG”.

<INFO:LOG>
1.SYSTEM 2.ALARM
3.USER 4.COMM
5.OPER 6.MOVING
7.TRACE

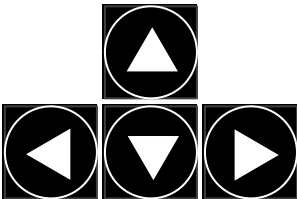
ITEM #



Input number key in INFO menu screen to select “1.SYSTEM”.

SYSTEM LOG
00:2020-01-30|13:36:
01:2020-01-30|13:36:
02:2020-01-30|13:36:
03:2020-01-30|13:36:
04:2020-01-30|13:36:

EXIT



Use arrow keys to move LOG screen.

SYSTEM LOG
98:2020-04-25|10:03:

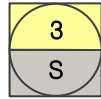
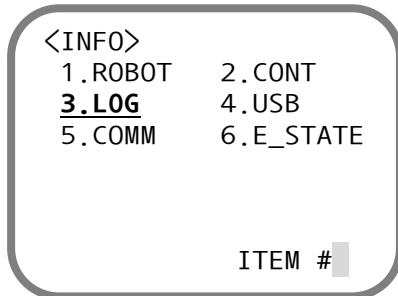
EXIT



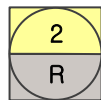
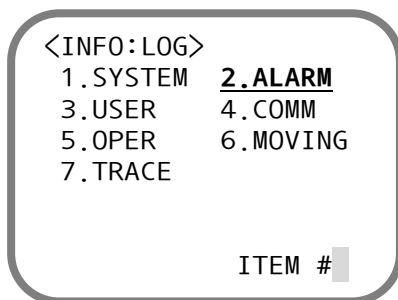
Use PgUp, PgDn keys to turn screen page

5.5.2 ALARM

History of Alarm occurs in the Controller will be recorded.



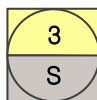
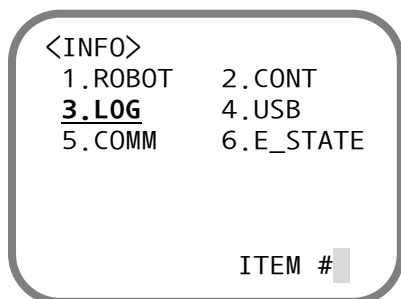
Input number key in INFO menu screen to select "3.LOG".



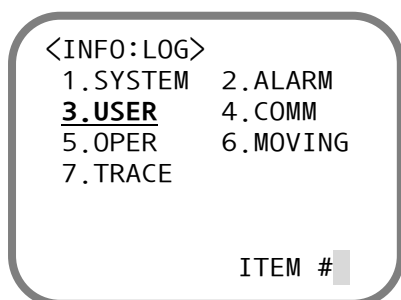
Input number key in INFO menu screen to select "2.ALARM".

5.5.3 USER

Check USER LOG to write and run JOB program to record USER LOG.



Input number key in INFO menu screen to select "3.LOG".



Input number key in INFO menu screen to select "3.USER".

※ If there is no USER LOG, "NO USER LOG" message is displayed.

5.5.4 COMM ※ Not currently supported.

5.6 USB

Backs up file inside the Controller using a USB or Uploads file inside a USB to the Controller.

5.6.1 USB folder path

※ To use N2 USB function, be sure to save file in the folder below. Yellow items in the Figure below are folders, and the other items mean files saved in the folder.

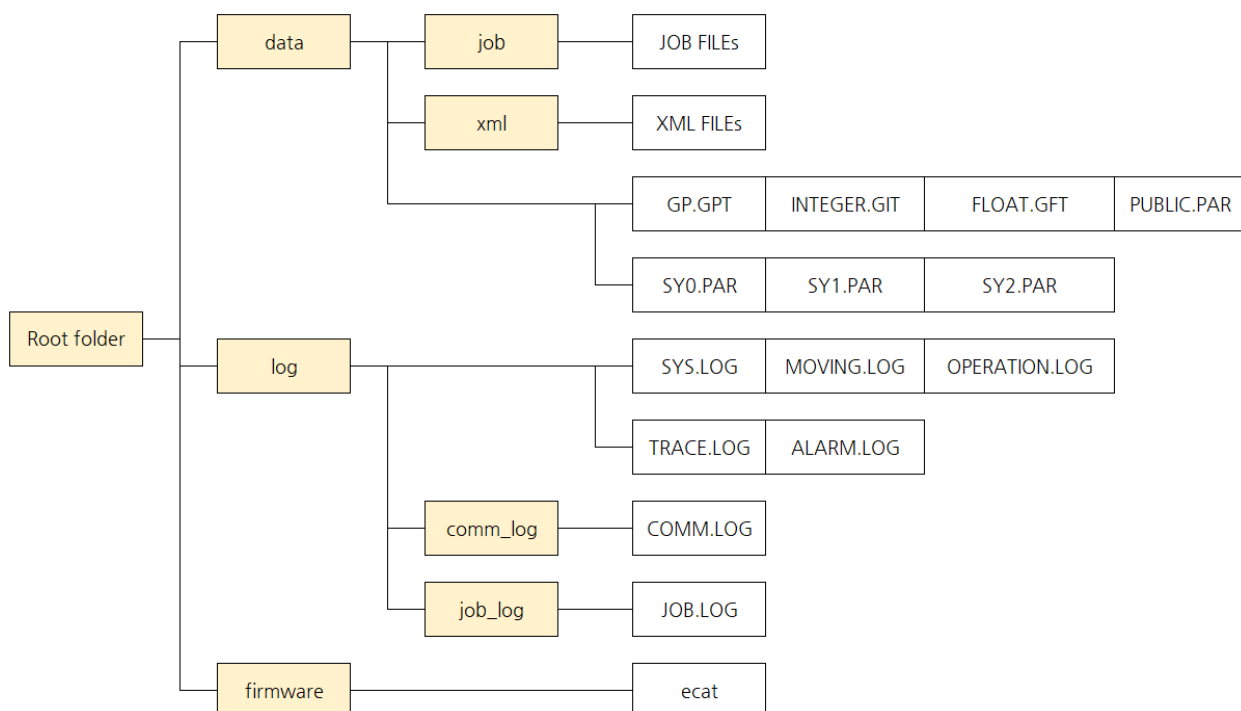
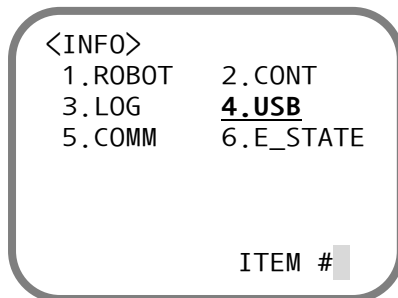
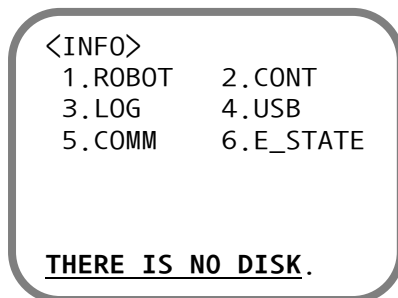


Figure 7-1 USB folder path

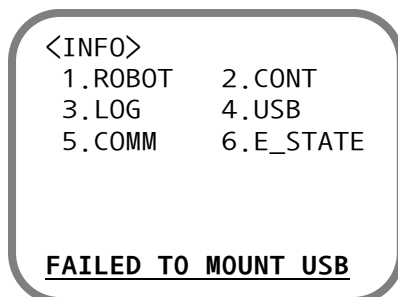
5.6.2 USB Enter screen



Input number key in INFO menu screen to select "4. USB".



If no USB is inserted into the Controller or if USB is not recognized, "There is no DISK." message is displayed on bottom of the T/P.



A USB is inserted but not recognized due to connection error or USB error, "FAILED TO MOUNT USB" message is displayed on bottom of the T/P.



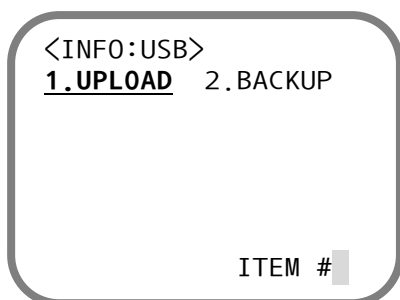
Use arrow keys to select installed USB.
Check current position with "*".



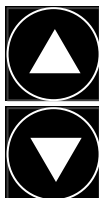
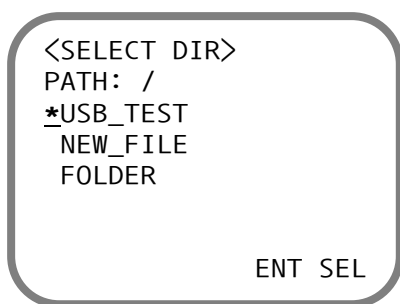
Input ENTER key to move to the selected USB screen.

5.6.3 UPLOAD

- ※ To use USB UPLOAD function, files must be correctly exist in USB folder path.
- ※ If folder path of the USB is unknown, create a folder in a USB using USB BACKUP function and change the relevant file.

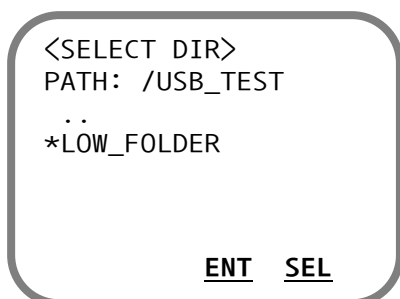


Input number key in INFO menu screen to select "1.UPLOAD".



Folder of USB most significant path is displayed.

Use arrow keys to select desired folder.
 Check current position with "*".

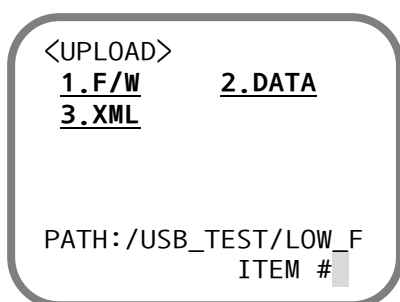


Press F3 (ENT) Function key to display sub folders of the selected folder.

OR

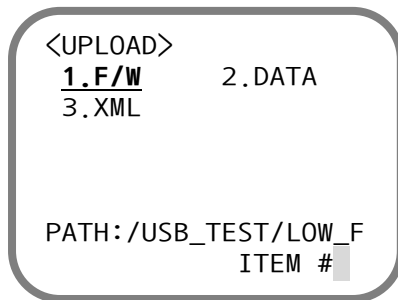


Use F4 (SEL) Function key to upload files in the selected folder to the Controller.

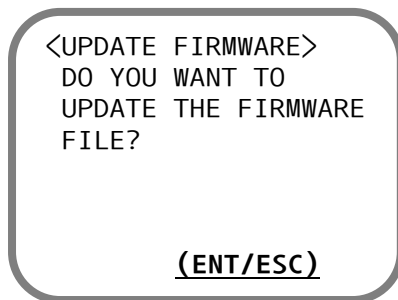


F/W	Firmware of Controller
DATA	File data saved in the Controller
XML	XML file

5.6.3.1 F/W UPLOAD



Input number key in UPLOAD menu screen to select "1.F/W".



Upload Firmware.

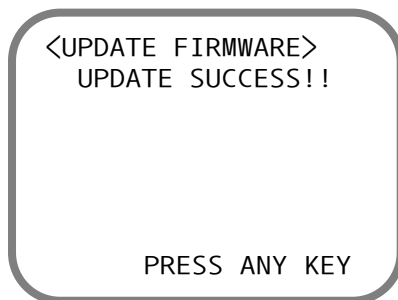
OR



Not Upload Firmware.



If the USB is removed or Controller power turns off while uploading Firmware, boot to the old Firmware.



Press any key to move out of the screen.



- 1) In case of power failure or shutoff during Firmware Upload, it can cause damage of the firmware.
- 2) Perform not power on/off but Shutdown for Firmware Upload to successfully apply changed Firmware.

5.6.3.2 DATA UPLOAD

<UPLOAD>
 1.F/W **2.DATA**
 3.XML

PATH: /USB_TEST/LOW_F
 ITEM #



Input number key in UPLOAD menu screen to select "2.DATA".

<UPLOAD:DATA>
1.JOB **2.GPNT**
3.GINT **4.GFLT**
5.PARA
0.ALL

PATH: /USB_TEST/LOW_F
 ITEM #

JOB	JOB file
GPNT	Global Point file
GINT	Global Integer file
GFLT	Global Float file
PARA	Parameter file
ALL	All files

<UPLOAD **JOB FILE**>
 DO YOU WANT TO
 UPLOAD THE JOB
 FILES?

(ENT/ESC)



Upload JOB file.

OR



Not Upload JOB file.

<UPLOAD JOB FILE>
 [CAUTION]
 BGTF.JOB
 ALREADY EXISTS!!
 DO YOU WANT TO
 OVERWRITE IT?

ONE **ALL** **SKIP** **STOP**

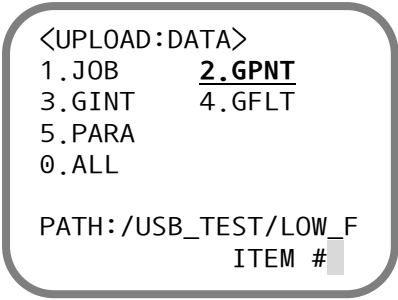
ONE	Overwrites only the current file
ALL	Overwrites all files
SKIP	Not Overwrites only the current file
STOP	Stop UPLOAD

<UPLOAD JOB FILE>
 PLEASE WAIT!!

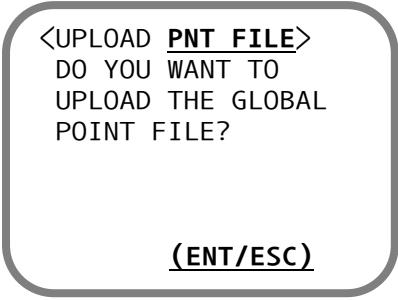
If the USB is removed or Controller power turns off during JOB FILE Upload, it can cause file damage.



Press any key to move out of the screen.



Use number key in UPLOAD DATA menu to select "2. GPNT".



Upload Global Point file.

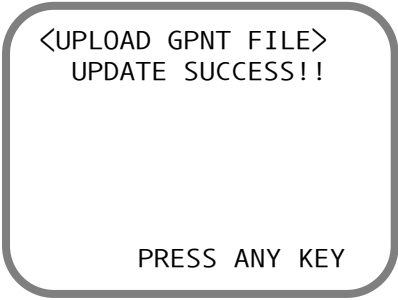
OR



Not upload Global Point file.



If the USB is removed or Controller power turns off during GPNT FILE Upload, it can cause file damage.



Press any key to move out of the screen.

<UPLOAD:DATA>

1.JOB 2.GPNT
3.GINT 4.GFLT
5.PARA
0.ALL

PATH:/USB_TEST/LOW_F
ITEM #



Use number key in UPLOAD DATA menu to select "3. GINT".

<UPLOAD GIT FILE>
DO YOU WANT TO
UPLOAD THE GIT
FILE?



Upload Global Integer file.

OR



Not Upload Global Integer file.

(ENT/ESC)

<UPLOAD GIT FILE>
PLEASE WAIT!!

If the USB is removed or Controller power turns off during GINT FILE Upload, it can cause file damage.

<UPLOAD GINT FILE>
UPLOAD SUCCESS!!

Press any key to move out of the screen.

PRESS ANY KEY

<UPLOAD:DATA>

1.JOB 2.GPNT
3.GINT 4.GFLT
5.PARA
0.ALL

PATH:/USB_TEST/LOW_F
ITEM #



Use number key in UPLOAD DATA menu to select "4. GFLT".

<UPLOAD GFT FILE>
DO YOU WANT TO
UPLOAD THE GFT
FILE?

(ENT/ESC)



Upload Global Float file.

OR



Not Upload Global Float file.

<UPLOAD GFLT FILE>
PLEASE WAIT!!

If the USB is removed or Controller power turns off during GFLT FILE Upload, it can cause file damage.

<UPLOAD GFLT FILE>
UPDATE SUCCESS!!

PRESS ANY KEY

Press any key to move out of the screen.

<UPLOAD:DATA>
1.JOB 2.GPNT
3.GINT 4.GFLT
5.PARA
0.ALL

PATH:/USB_TEST/LOW_F
ITEM #



Use number key in UPLOAD DATA menu to select 5. PARA.

<UPLOAD PARAMETER>
DO YOU WANT TO
UPLOAD THE
PARAMETER FILES?

(ENT/ESC)



Upload parameter file.

OR



Not upload parameter file.

<UPLOAD PARAMETER>
PLEASE WAIT!!

If the USB is removed or Controller power turns off during parameter Upload, it can cause file damage.

<UPLOAD PARAMETER>
UPLOAD SUCCESS!!

Press any key to move out of the screen.

PRESS ANY KEY



- 1) If the USB is removed or Controller power turns off during Data Upload, it can cause file damage.

5.6.3.3 XML UPLOAD

<UPLOAD>

1.F/W2.DATA

3.XML

PATH:/USB_TEST/LOW_F

ITEM #



Use number keys to select “3.XML”.

<UPLOAD XML FILE>

DO YOU WANT TO

UPLOAD THE XML

FILES?

(ENT/ESC)



Upload XML file.

OR



Not Upload XML file.

<UPLOAD XML FILE>

[CAUTION]

N2_V07_ONLYIF.xml

ALREADY EXISTS!!

DO YOU WANT TO

OVERWRITE IT?

ONE ALL SKIP STOP

ONE	Overwrites only the current file
ALL	Overwrites all files
SKIP	Not Overwrites only the current file
STOP	Stops UPLOAD

<UPLOAD XML FILE>

UPLOAD SUCCESS!!

PRESS ANY KEY

Press any key to move out of the screen.

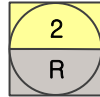
5.6.4 BACKUP

```

<INFO:USB>
1.UPLOAD  2.BACKUP

ITEM # █

```



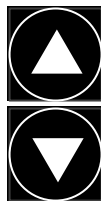
Input number key in INFO menu screen to select "2.BACKUP".

```

<SELECT DIR>
PATH: /
*USB_TEST
  NEW_FILE
  FOLDER

MAKE DEL ENT SEL

```



USB most significant path의 folder is displayed.

Use arrow keys to select folder.

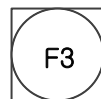
Check current position with "*".

```

<SELECT DIR>
PATH: /USB_TEST
*..
*LOW_FOLDER

MAKE DEL ENT SEL

```



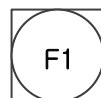
Press F3 (ENT) Function key to display sub folders of the selected folder.

```

Enter directory name

DIR= █

```



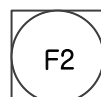
Press F1 (MAKE) Function key to create folder in the current path.

```

<SELECT DIR>
PATH: /USB_TEST
*LOW_FOLDER

MAKE DEL ENT SEL

```



Press F2 (DEL) Function key to delete the selected folder.

<SELECT DIR>
PATH: /USB_TEST
*LOW_FOLDER

DELETE OK?(ENT/ESC)



Delete the selected folder.

OR



Not delete the selected folder.

<SELECT DIR>
PATH: /USB_TEST
*LOW_FOLDER

MAKE DEL ENT SEL



Press F4 (SEL) Function key to backup files in the selected folder.

5.6.4.1 F/W BACKUP

<BACKUP>
1.F/W 2.DATA
3.XML 4.LOG

PATH: /USB_TEST/LOW_F
ITEM # █



Input number key in BACKUP menu screen to select "1.F/W".

<BACKUP FIRMWARE>
DO YOU WANT TO
BACKUP THE FIRMWARE
FILE?

(ENT/ESC)



Backup Firmware.

OR



Not Backup Firmware.

<BACK UP FIRMWARE>
[CAUTION]
FIRMWARE ALREADY
EXISTS!!
DO YOU WANT TO
OVERWRITE IT?

(ENT/ESC)



Overwrite Firmware.

OR



Not Overwrite Firmware.

<BACKUP FIRMWARE>
PLEASE WAIT!!

If the USB is removed or Controller power turns off during Firmware Backup, it can cause file damage.

<BACKUP FIRMWARE>
BACKUP SUCCESS!!

Press any key to move out of the screen.

PRESS ANY KEY



- 1) If the USB is removed or Controller power turns off during Firmware Backup, it can cause file damage.

5.6.4.2 DATA BACKUP

<BACKUP>
 1.F/W 2.DATA
 3.XML 4.LOG

PATH: /USB_TEST/LOW_F
 ITEM #



Use number key in BACKUP menu screen to select "2.DATA".

<BACKUP:DATA>
1.JOB 2.GPNT
3.GINT 4.GFLT
5.PARA
0.ALL

PATH: /USB_TEST/LOW_F
 ITEM #

JOB	JOB file
GPNT	Global Point file
GINT	Global Integer file
GFLT	Global Float file
PARA	Parameter file
ALL	All files

<BACKUP:DATA>
1.JOB 2.GPNT
 3.GINT 4.GFLT
 5.PARA
 0.ALL

PATH: /USB_TEST/LOW_F
 ITEM #



Use number key in BACKUP menu screen to select "1.JOB".

<BACK UP JOB FILE>
 DO YOU WANT TO
 BACKUP THE JOB
 FILES?

(ENT/ESC)



Backup JOB file.

OR



Not Backup JOB file.

<BACK UP JOB FILE>
 [CAUTION]
 BGTF.JOB
 ALREADY EXISTS!!
 DO YOU WANT TO
 OVERWRITE IT?

ONE ALL SKIP STOP



~



ONE	Overwrites only the current file
ALL	Overwrites all files
SKIP	Not Overwrites only the current file
STOP	Stops BACKUP

<BACK UP JOB FILE>
PLEASE WAIT!!

If the USB is removed or Controller power turns off during JOB FILE Backup, it can cause file damage.

<BACK UP JOB FILE>
BACKUP SUCCESS!!

Press any key to move out of the screen.

PRESS ANY KEY

<BACKUP:DATA>
1.JOB 2.GPNT
3.GINT 4.GFLT
5.PARA
0.ALL

PATH:/USB_TEST/LOW_F
ITEM #



Use number key in BACKUP DATA menu to select "2. GPNT".

<BACK UP GPNT FILE>
DO YOU WANT TO
BACKUP THE GLOBAL
POINT FILE?



Backup Global Point file.

OR



Not Backup Global Point file.

(ENT/ESC)

<BACK UP GPNT FILE>
[CAUTION]
GP.GPT
ALREADY EXISTS!!
DO YOU WANT TO
OVERWRITE IT?



Overwrite Global Point file.

OR



Not Overwrite Global Point file.

(ENT/ESC)

<BACK UP GPNT FILE>
PLEASE WAIT!!

If the USB is removed or Controller power turns off during GPNT FILE Backup, it can cause file damage.

<BACK UP GPNT FILE>
BACKUP SUCCESS!!

PRESS ANY KEY

Press any key to move out of the screen.

<BACKUP:DATA>
1.JOB 2.GPNT
3.GINT 4.GFLT
5.PARA
0.ALL

PATH:/USB_TEST/LOW_F
ITEM #



Use number key in BACKUP DATA menu to select “3. GINT”.

<BACK UP GIT FILE>
DO YOU WANT TO
BACKUP THE GIT
FILES?

(ENT/ESC)



Backup Global Integer file.

OR



Not Backup Global Integer file.

<BACK UP GIT FILE>
[CAUTION]
GIT ALREADY
EXISTS!!
DO YOU WANT TO
OVERWRITE IT?

(ENT/ESC)



Overwrite Global Integer file.

OR



Not Overwrite Global Integer file.

<BACK UP GIT FILE>
PLEASE WAIT!!

If the USB is removed or Controller power turns off during GINT FILE Backup, it can cause file damage.

<BACK UP GIT FILE>
BACKUP SUCCESS!!

Press any key to move out of the screen.

PRESS ANY KEY

<BACKUP:DATA>
1.JOB 2.GPNT
3.GINT **4.GFLT**
5.PARA
0.ALL

PATH:/USB_TEST/LOW_F
ITEM #



Use number key in BACKUP DATA menu to select "4. GFLT".

<BACK UP **GFT FILE**>
DO YOU WANT TO
BACKUP THE GFT
FILES?



Backup Global Float file.

OR



Not Backup Global Float file.

(ENT/ESC)

<BACK UP GFT FILE>
[CAUTION]
GFT ALREADY
EXISTS!!
DO YOU WANT TO
OVERWRITE IT?



Overwrite Global Float file.

OR



Not Overwrite. Global Float file.

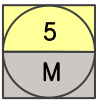
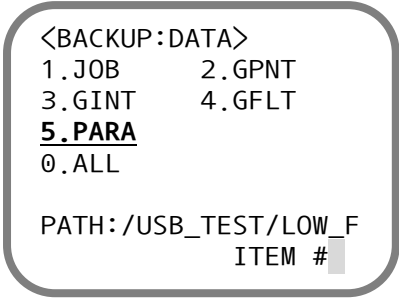
(ENT/ESC)



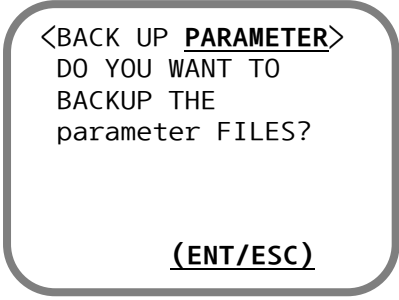
If the USB is removed or Controller power turns off during GFLT FILE Backup, it can cause file damage.



Press any key to move out of the screen.



Use number key in BACKUP DATA menu to select “5. PARA”.

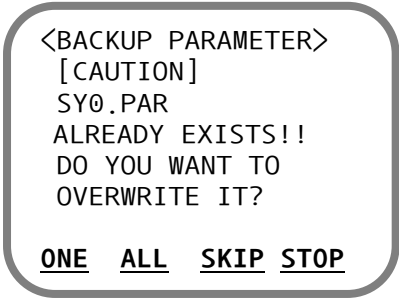


Backup parameter file.

OR



Not Backup parameter file.



~



ONE	Overwrites only the current file
ALL	Overwrites all files
SKIP	Not Overwrites only the current file
STOP	Stops BACKUP

<BACK UP PARAMETER>
PLEASE WAIT!!

If the USB is removed or Controller power turns off during parameter Backup, it can cause file damage.

<BACK UP PARAMETER>
BACKUP SUCCESS!!

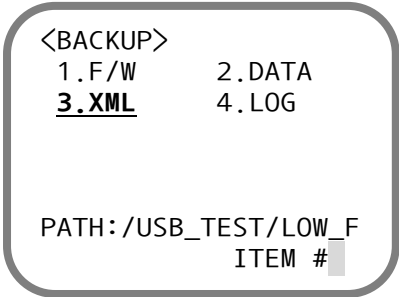
Press any key to move out of the screen.

PRESS ANY KEY

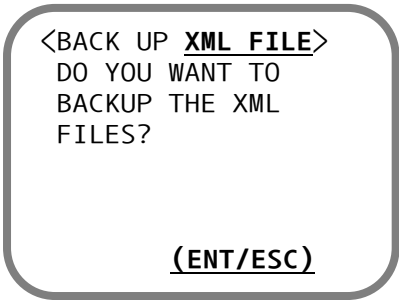


- 1) If the USB is removed or Controller power turns off during Data Backup, it can cause file damage.

5.6.4.3 XML BACKUP



Use number key in BACKUP DATA menu to select 3.XML.

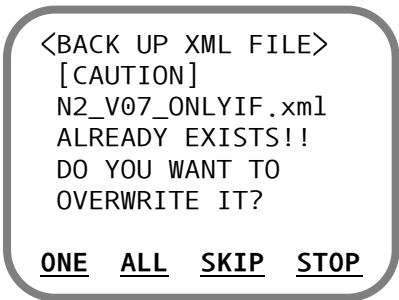


Backup XML file.

OR



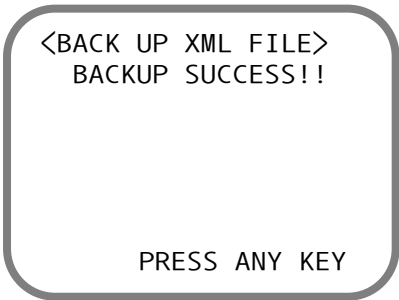
Not Backup XML file.



~



ONE	Overwrites only the current file
ALL	Overwrites all files
SKIP	Not Overwrites only the current file
STOP	Stops UPLOAD



Press any key to move out of the screen.

5.6.4.4 LOG BACKUP

<BACKUP>
 1.F/W 2.DATA
 3.XML **4.LOG**

PATH: /USB_TEST/LOW_F
 ITEM #



Use number key in BACKUP DATA menu to select "4.LOG".

<BACKUP:LOG>
1.SYSTEM 2.ALARM
3.JOB 4.COMM
5.OPER 6.MOVING
7.TRACE
0.ALL

PATH: /USB_TEST/LOW_F
 ITEM #

SYSTEM	System log file
ALARM	Alarm log file
JOB	JOB log file
COMM	※ Not currently supported.
ALL	All log files

<BACKUP:LOG>
1.SYSTEM 2.ALARM
 3.JOB 4.COMM
 5.OPER 6.MOVING
 7.TRACE
 0.ALL

PATH: /USB_TEST/LOW_F
 ITEM #



Use number key in BACKUP LOG menu to select "1.SYSTEM".

<BACKUP **S-LOG FILE**>
 DO YOU WANT TO
 BACKUP THE S-LOG
 FILES?

(ENT/ESC)



Backup system log file.

OR



Not Backup system log file.

<BACK UP S-LOG FILE>
 [CAUTION]
 SYS.LOG
 ALREADY EXISTS!!
 DO YOU WANT TO
 OVERWRITE IT?

ONE **ALL** **SKIP** **STOP**



~



ONE	Overwrites only the current file
ALL	Overwrites all files
SKIP	Not Overwrites only the current file
STOP	Stops BACKUP

<BACK UP S-LOG FILE>
PLEASE WAIT!!

If the USB is removed or Controller power turns off during system log file Backup, it can cause file damage.

<BACK UP S-LOG FILE>
BACKUP SUCCESS!!

PRESS ANY KEY

Press any key to move out of the screen.

<BACKUP:LOG>
1.SYSTEM 2.ALARM
3.JOB 4.COMM
0.ALL

PATH:/USB_TEST/LOW_F
ITEM #



Use number key in BACKUP LOG menu to select "2.ALARM".

<BACK UP A-LOG FILE>
DO YOU WANT TO
BACKUP THE A-LOG
FILES?

(ENT/ESC)



Backup alarm log file.

OR



Not Backup alarm log file.

<BACK UP A-LOG FILE>
[CAUTION]
ALARM.LOG
ALREADY EXISTS!!
DO YOU WANT TO
OVERWRITE IT?

ONE ALL SKIP STOP



~



ONE	Overwrites only the current file
ALL	Overwrites all files
SKIP	Not Overwrites only the current file
STOP	Stops BACKUP

<BACK UP A-LOG FILE>
PLEASE WAIT!!

If the USB is removed or Controller power turns off during alarm log file Backup, it can cause file damage.

<BACK UP A-LOG FILE>
BACKUP SUCCESS!!

Press any key to move out of the screen.

PRESS ANY KEY

<BACKUP:LOG>
1.SYSTEM 2.ALARM
3.JOB 4.COMM
5.OPER 6.MOVING
7.TRACE
0.ALL
PATH:/USB_TEST/LOW_F
ITEM #



Use number key in BACKUP LOG menu to select "3.JOB".

<BACK UP **J-LOG FILE**>
DO YOU WANT TO
BACKUP THE J-LOG
FILES?



Backup JOB log file.

OR



Not Backup JOB log file.

(ENT/ESC)

※ If no JOG LOG EXIST, "NO JOB LOG!!" message is displayed.

<BACK UP J-LOG FILE>
BACKUP SUCCESS!!

PRESS ANY KEY

Press any key to move out of the screen.



- 1) If the USB is removed or Controller power turns off during LOG Backup, it can cause file damage.

Chapter 8 Revision

Revision	Date	Details
1	2020-01-23	Initial distribution
2	2020-05-07	Revised the contents in T/P screen Chapter 4 JOB operation mode – Revised the flowchart of JOB mode Chapter 6 Parameter operation – Revised the flowchart of Robot Parameters Chapter 6 section 5 Robot Parameters – Revised to delete the page of specification for unsupported function in the Robot Parameters – Corrected the input range of value in the Robot Parameters Chapter 6 section 5.4 GAIN – Corrected the common initial gain value in Section 5.4 Chapter 6 section 5.7 COORD – Revised the figure of Examples of Tool Calibration points

A. Reference

In this chapter, we designate all documents needed for service, repair or installation of all robot systems that use the product.

The 1st letter of all document ID means Controller name, the 2nd letter is abbreviation of the relevant document. Last one is language and version of the relevant document.

Languages are marked according to the rules below.

- Korean : K
- English : E
- Chinese : C
- Vietnamese : V

Document ID	Description
N2-IM-E□□	Installation and handling manual This explains the Controller structure and installation as well as the methods to interface with external devices.
N2-OM-E□□	Operation manual This explains the method to use the Controller and Teach Pendant, parameter setting, JOB program editing and additional functions.
N2-PM-E□□	Programming manual This explains the method to create RRL (Robostar robot language) that is the Robostar Robot program and describes the commands.
N2-HM-E□□	Unihost manual This explains about Unihost that is Robostar on-line PC program.
N2-AM-E□□	Alarm and maintenance manual This explains the information on problems occurred in the Controller-based Robot system as well as solutions and procedure for the problems.

B. Danger levels and symbols

Symbol	Designation	Meaning
	DANGER	Indicates an imminently hazardous situation which, if failed to observe directions, will result in death or serious injury or serious product damage.
	WARNING	Indicates a potential hazardous situation which, if failed to observe directions, could result in death or serious injury or critical product damage.
	CAUTION	Indicates a potential hazardous situation which, if failed to observe directions, may result product damage.
	ELECTRICAL SHOCK	Electrical shock symbol indicates electrical hazardous that can cause death or serious injury.
	NOTE	Indicates important fact and condition.
	PROHIBITION	Indicates prohibitions to use normal product.

N2 Series Controller

Operating Manual

First edition, May 07, 2020

ROBOSTAR CO., LTD.
ROBOT R&D CENTER

Robostar