MITSUBISHI ELECTRIC

Mitsubishi Industrial Robot

CR800-Q series controller

The Sample Screen of GOT2000 Instruction Manual for iQ Platform Supporting Extended Function (GOT Script Version)

MELFA

BFP-A3640-B

⚠ Safety Precautions

Before use of robots, be sure to read the safety precautions below and the supplementary “Safety Manual” carefully and take appropriate measures.

A. See below for safety precautions based on the Ordinance on Labor Safety and Hygiene (Chapter 36,104, 150, and 151).

⚠CAUTION	All teaching work must be carried out by a specially-trained operator (including maintenance work with no power interruption) →Conduct safety training
⚠CAUTION	For teaching work, prepare a work plan related to the methods and procedures of robot operation and the mesures to be taken in case of an error and restart. (including maintenance work with no power interruption) →Prepare a work plan
⚠WARNING	Prepare a device that allows an immediate stop of operation during teaching work. (including maintenance work with no power interruption) →Set an emergency stop switch
⚠CAUTION	During teaching work, place a sign on a start switch etc. indicating that teaching work is in progress (including maintenance work with no power interruption) →Indicate teaching work in progress
⚠DANGER	Provide a rail or fence, during operation, to prevent contact with the operator and robot. →Install a safety fence
⚠CAUTION	To start an operation, establish a certain signaling method. →Give a signal to start an operation
⚠CAUTION	As a principle, turn the power off during the maintenance work and place a sign on a start switch etc. indicating that maintenance work is in progress. →Indicate maintenance work in progress
⚠CAUTION	Before operation, inspect the robot, emergency stop, other related devices etc. to make sure that everything is in order. →Perform a pre-operation check

B. See below for safety precautions given in the separate “Safety Manual”. For more details, refer to the “Safety Manual”.

⚠DANGER	For automatic operations of a robot with multiple controllers (GOT, PLC, and push button switch), create interlocks for each device on your own.
⚠CAUTION	Use a robot in the environment given in the specifications. Failure to do so may lead to lower reliability or failures. (temperature, humidity, atmosphere, noise environment, etc.)
⚠CAUTION	Transport a robot in the designated transporation position. Failure to do so may lead to personal injuries or failures.
⚠CAUTION	Install a robot on a secure table. Instable posture of the robot may lead to positional deviation and vibration.
⚠CAUTION	Wire the cable as far from the noise source as possible. When placed near the source, positional deviation or mulfunction may occur.
⚠CAUTION	Do not apply excessive force to the connector or bend the cable to an excessive degree. Failure to do so may cause loose connection or disconnection.
⚠CAUTION	Make sure that the workpiece weight, including the hand, does not exceed the rated loads or allowable torques. Exceeding these values may cause an alarm or failure.
⚠WARNING	Securely install the hand and tool and grasp the workpiece. Failure to do so may lead to personal injuries or damages if an object comes off or flies off during operation.
⚠WARNING	Securely ground the robot and controller. Failure to do so may lead to mulfunctions due to the noise or electric shock.
⚠CAUTION	Display the operation status during the robot operation. Lack of the status display may lead to an inappropriate access to the robot or an operation error.
⚠WARNING	To perform teaching work within the range of the robot movement, secure the priority right of the robot control. Without the right, external commands may start the robot, which may lead to personal injuries or damages.
⚠CAUTION	Keep the jog speed as low as possible and keep an eye on the robot. Failure to do so may lead to interference with the workpiece or peripheral device.
⚠CAUTION	Prior to the auto-operation after editing the program, confirm the operation in the step operation. Failure to do so may lead to interference with the peripheral device due to programming glitches etc.
⚠CAUTION	Make sure that the entrance door to the safety fence door is locked or the robot automatically stops when the door opens during automatic operation. Failure to do so may lead to personal injuries.
⚠CAUTION	Do not attempt a modification based on personal judgments or use non-designated maintenance parts. Failure to do so may cause malfunctions or failures.
⚠WARNING	Do not place hands or fingers in the opening when the robot arm has to be manually moved from the outside. Inappropriate posture may cause injuries to hands or fingers.

⚠CAUTION

Do not stop or apply an emergency stop on the robot by turning the main power to robot controller off. Doing so during the automatic operation may cause a negative impact on the robot accuracy or interfere with the peripheral device due to the fall or coasting of the arm.

⚠CAUTION

Do not turn off the main power to the robot controller while rewriting the internal information of the robot controller such as the programs, parameters, etc. The internal information of the robot controller may be corrupted.

⚠DANGER

To use the direct GOT functions, do not connect the handy GOT.
Handy GOT can perform automatic robot operation with or without the operation right and may cause property damages or physical injuries.

⚠DANGER

In using the iQ Platform-compatible products with CRnQ, do not connect the hand GOT to PLC.
Handy GOT can perform automatic robot operation with or without the operation right and may cause property damages or physical injuries.

⚠DANGER

Make sure to attach the cap to the SSCNETIII connector to avoid the dirt and dust. Failure to do so may deteriorate characteristics and lead to malfunction.

⚠DANGER

Do not remove the SSCNETIII cable while the multi-CPU system or servo amp is turned on. Do not directly face the light from the motion CPU, SSCNETIII connector of the servo amp, and the tip of the SSCNETIII cable. Irritation in the eyes may occur (the light source of SSCNETIII ranks as the Class 1 specified in J1SC6802 and IEC60825-1).

⚠CAUTION

Make sure all the wirings are correct. Connections that do not meet the specifications may cause malfunctions (ex. emergency stop cannot be cancelled).
To prevent a malfunction, make sure that all the functions of the robot controller operation, panel emergency stop, teaching box emergency stop, emergency stop by a user, and door switch etc. are operating properly after wiring is completed.

■ Revision History

Date of Print	Instruction Manual No.	Description
21/AUG/2018	BFP-A3640-*	The ‘2.1.7. Ethernet Setting’ is modified.
19/FEB/2019	BFP-A3640-A	Added the GOT screens for the preventive maintenance function. (*Notice) The preventive maintenance function is required the MELFA Smart Plus option.
27/SEP/2019	BFP-A3640-B	Added the GOT screens for the predictive maintenance function. (*Notice) The predictive maintenance function is required the MELFA Smart Plus option.

■Introduction

Thank you for purchasing the Mitsubishi Electric Industrial Robot MELFA manufactured by Mitsubishi Electric.
This instruction manual explains GOT operations to utilize the iQ Platform supporting expanded function for CR800 Series robot controller
With the shared memory between the GOT and robot, monitoring of robot status and data setting from GOT is made easy.

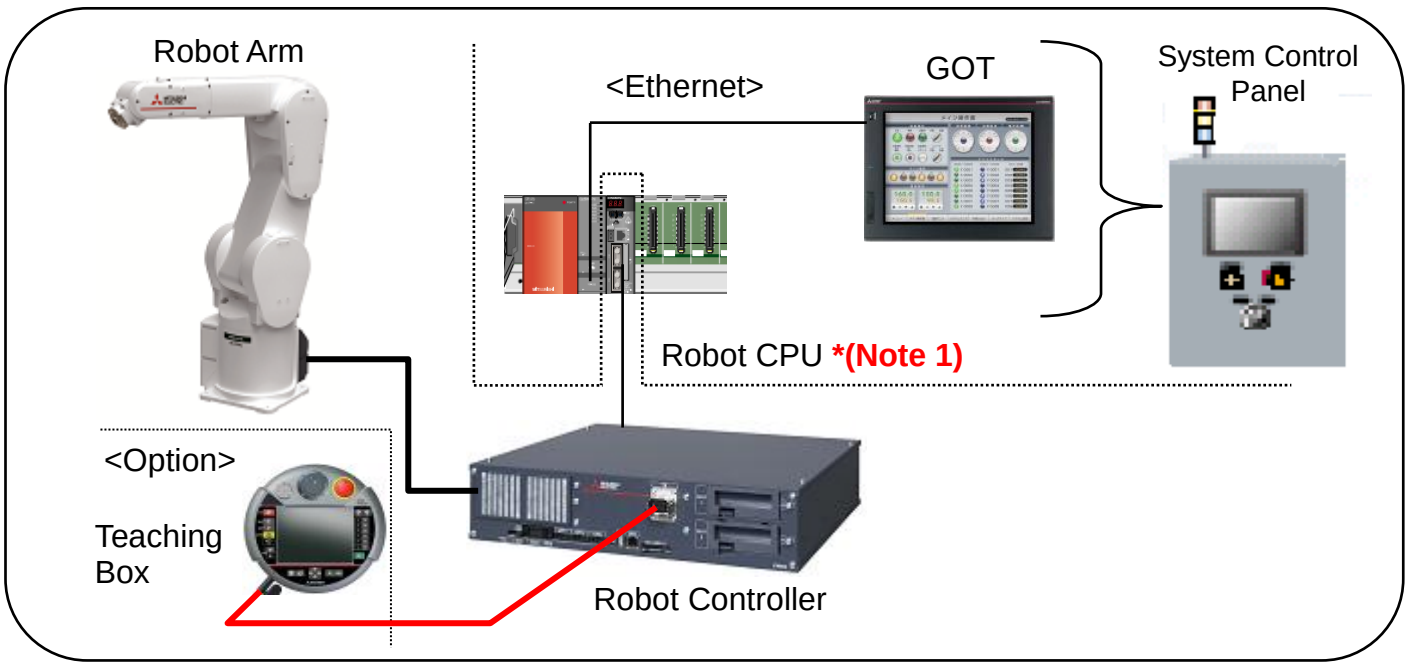
Read this instruction carefully before use.

Target Controllers
This instruction manual covers the robot controllers below:
- CR800-Q series controller: Ver. A2 or later
  Robot Language: MELFA BASIC VI or later

Contents

1. System Configuration

1.1 System Configuration



- **(Note 1) When use the GOT sample screen, attach the robot CPU (Q172DSRCPU) at the 2nd machine slot of the multiple CPU high-speed main base unit.**

GOT

GT Designer3 Version.	Version 1.205P
GOT Type	GOT2000 Series ・GT27 * GT27 can play the video by attaching the optional multi-media unit.
Type of Connecting Device	MELSEC-QnU,Q17nD/NC/DR,CRnD-700

Robot

Ver. of Controller	CR800-Q series controller: Version A2 or later(*1) (*1) The preventive maintenance function requires Version A3 or later. The predictive maintenance function requires Version A4 or later.
Controller Type	CR800-Q series
Option	MELFA Smart Plus (When use screens for the preventive/predictive maintenance function)

PLC

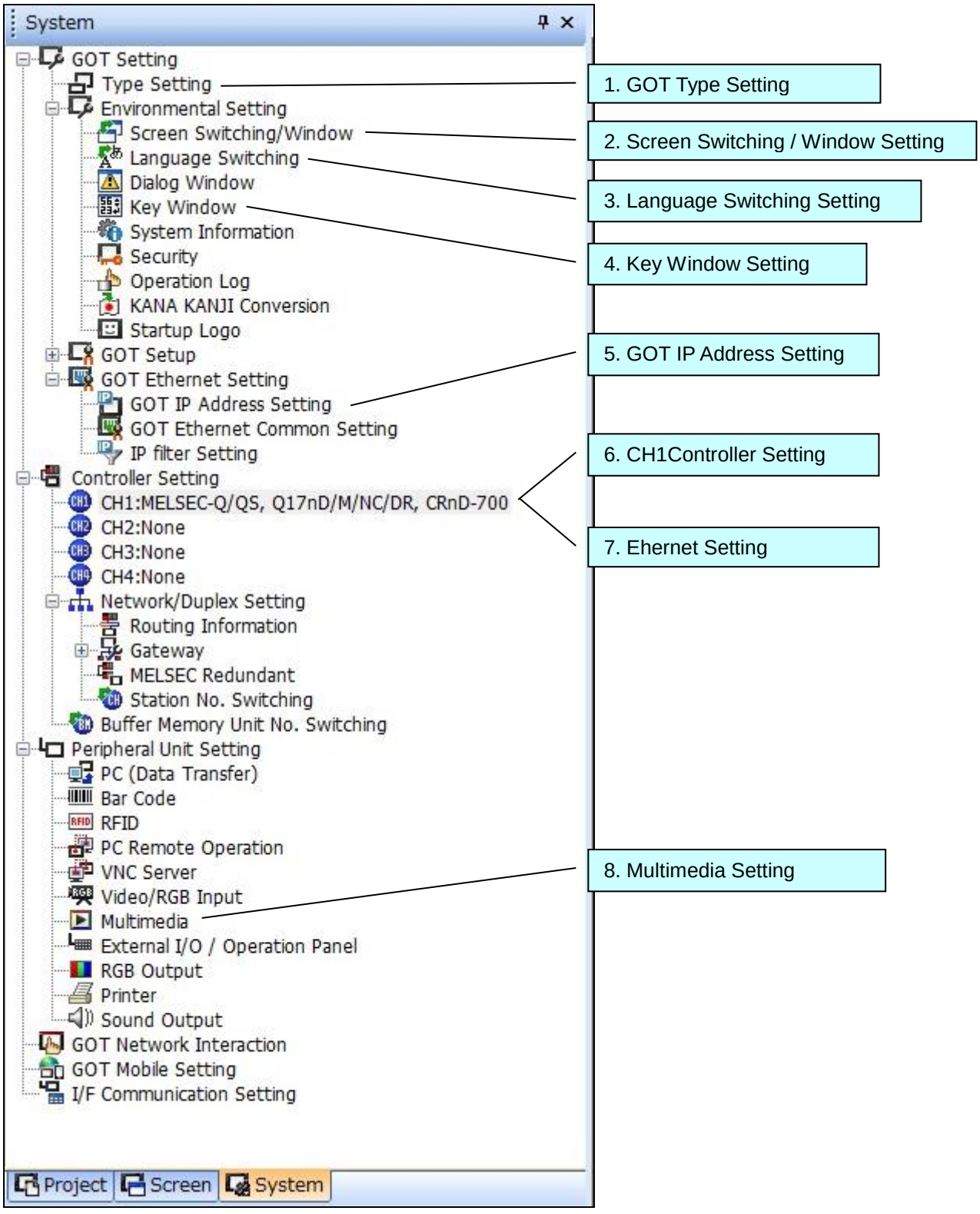
Base	Multiple CPU high speed main base unit ・Q35DB 5 slots ・Q38DB 8 slots ・Q312DB 12 slots
Power Supply	・Q61P ・Q62P ・Q63P ・Q64PN
PLC CPU	・Q03UD(E/V)CPU ・Q04,06UD(E/V)HCPU ・Q10UD(E)HCPU ・Q13UD(E/V)HCPU ・Q20UD(E)HCPU ・Q26UD(E/V)HCPU ・Q100UD(E)HCPU

MELFA Smart Plus function and compatible card

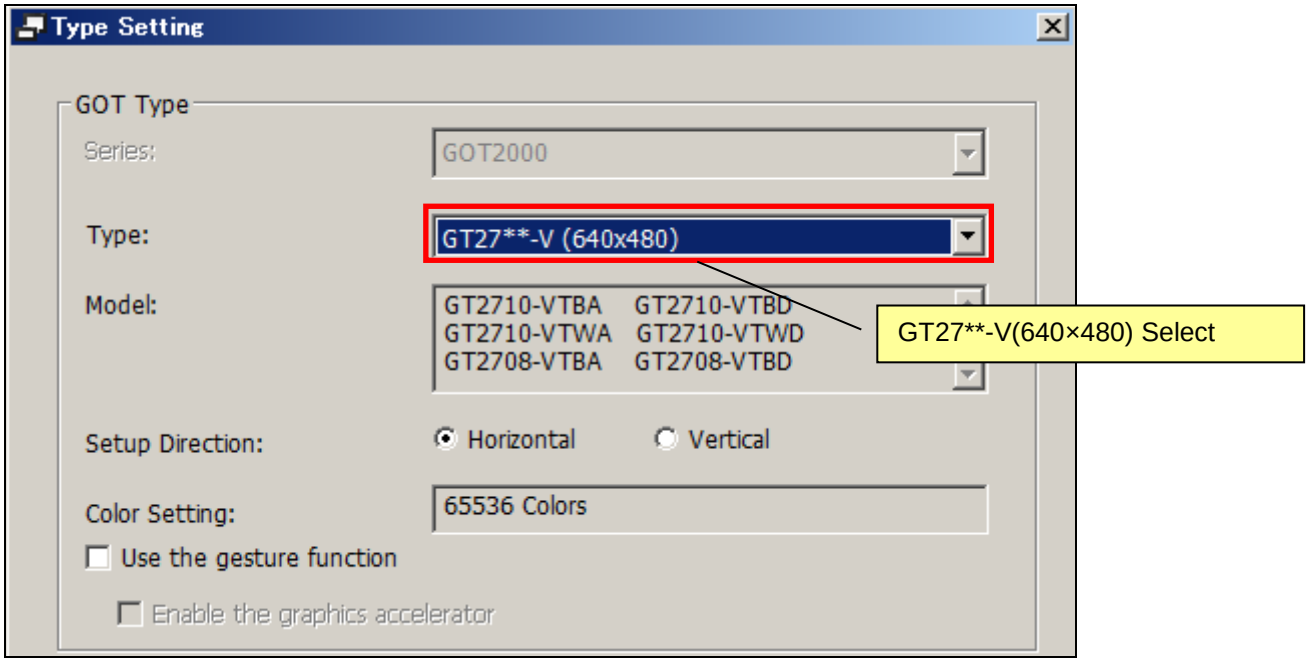
Function Name	MELFA Smart Plus card			
	Card A type	Card B type	Card Pack A type	Card Pack AB type
Preventive function	2F-DQ511	―	2F-DQ510	―
Predictive function	―	2F-DQ521	―	2F-DQ520

2 Setting

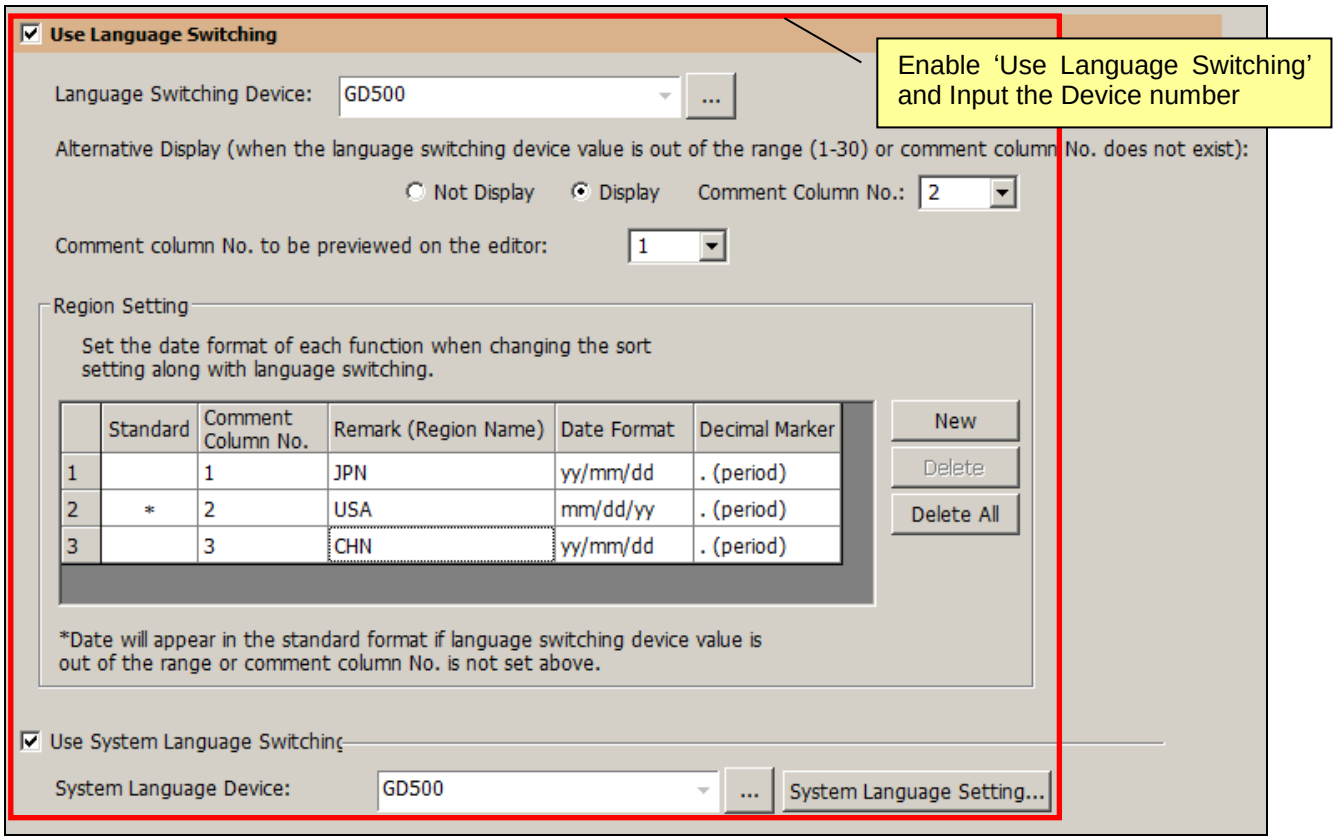
2.1 System Setting



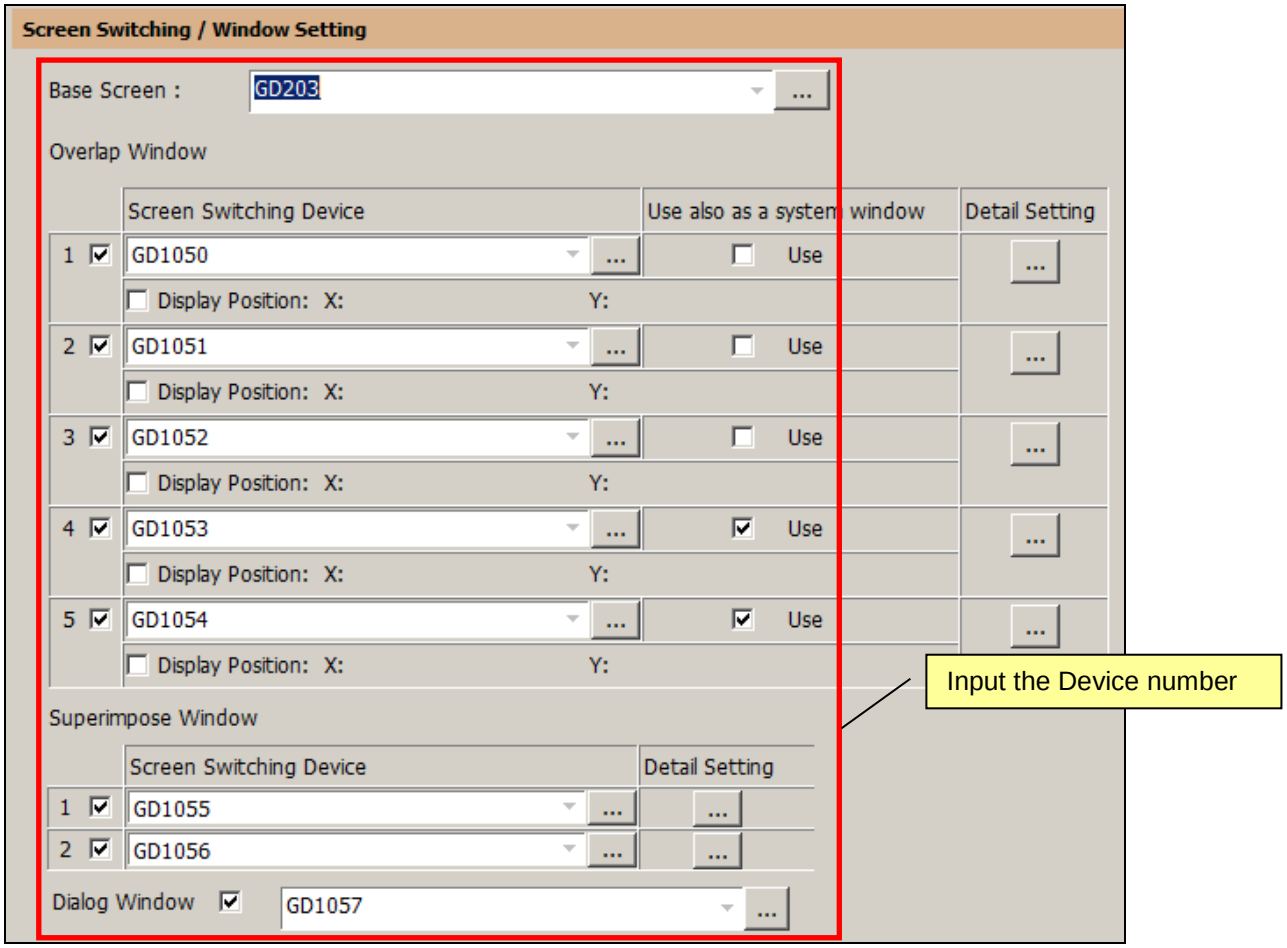
2.1.1 Type Setting



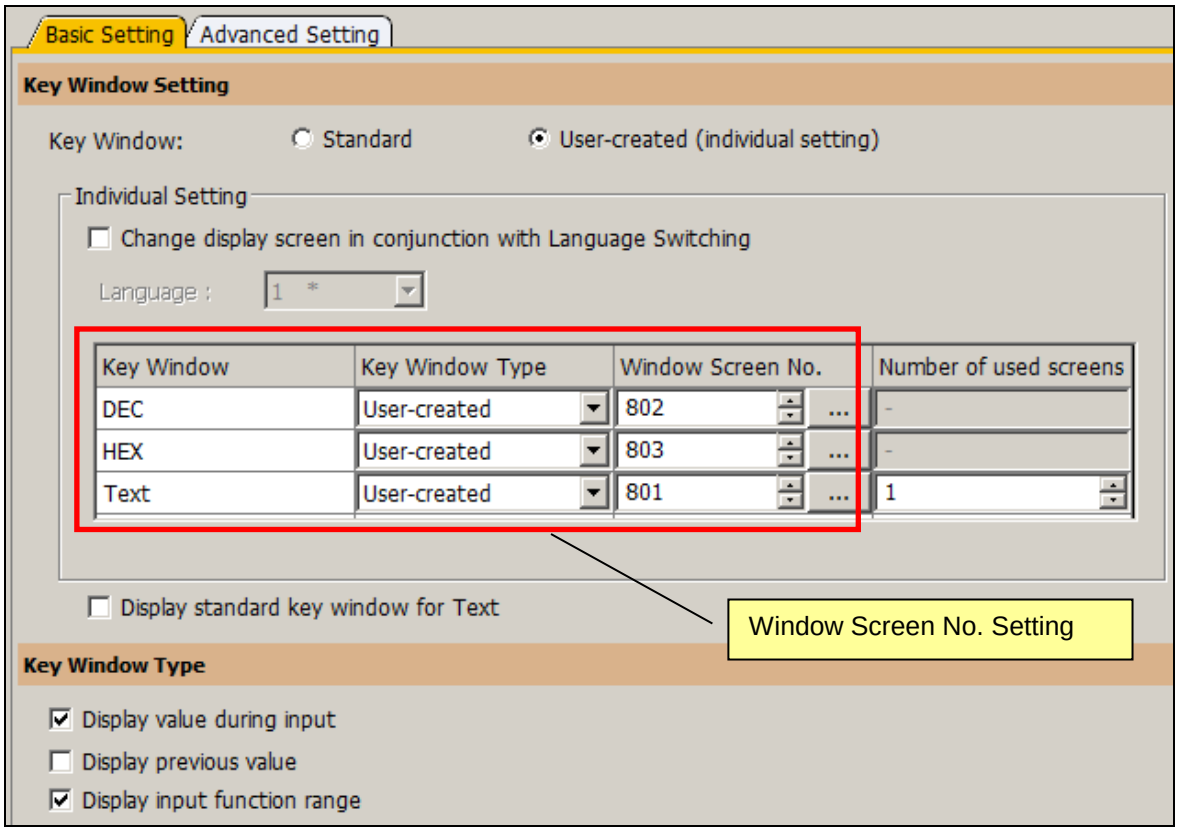
2.1.2 Use Language Switching Setting



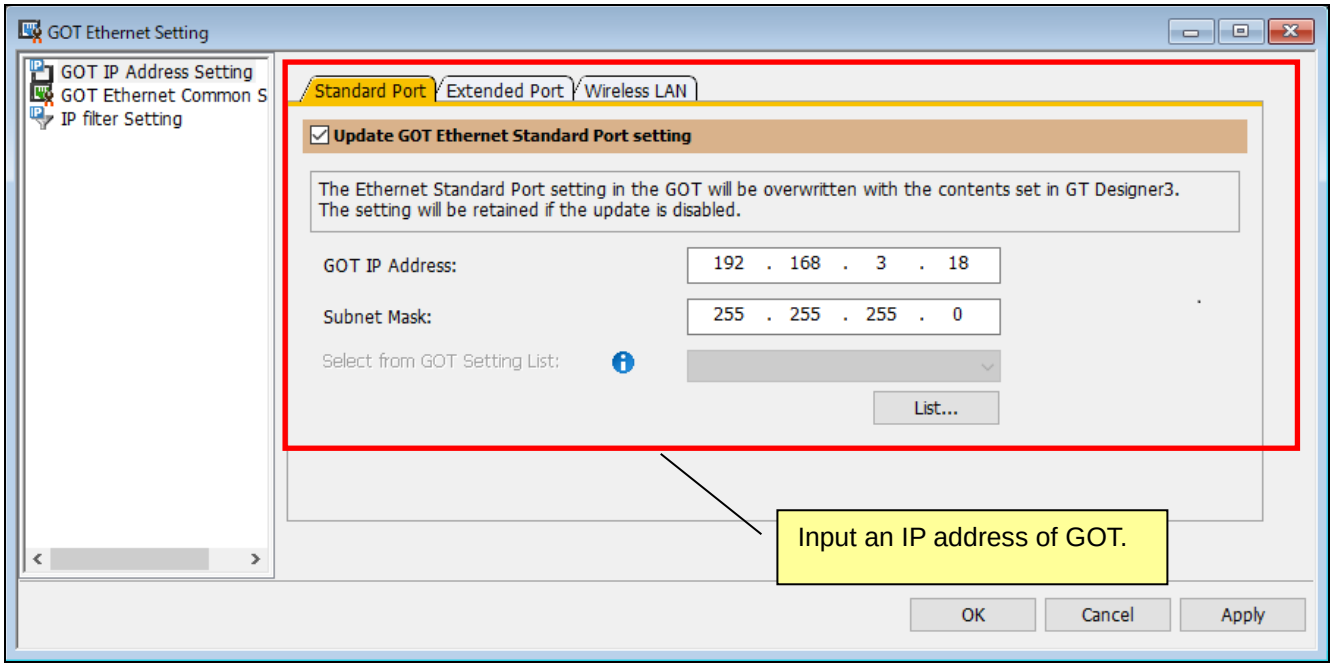
2.1.3 Screen Switch/Window Setting



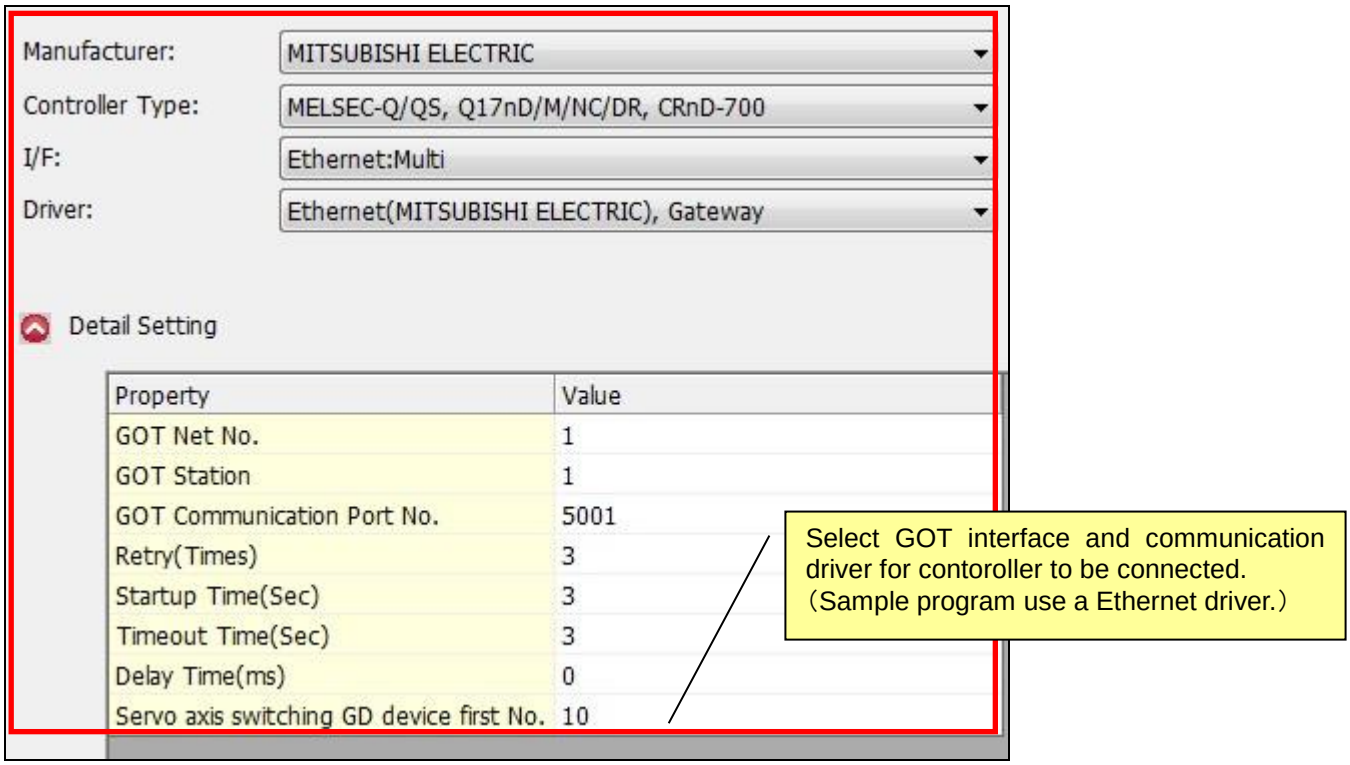
2.1.4 Key Window Setting



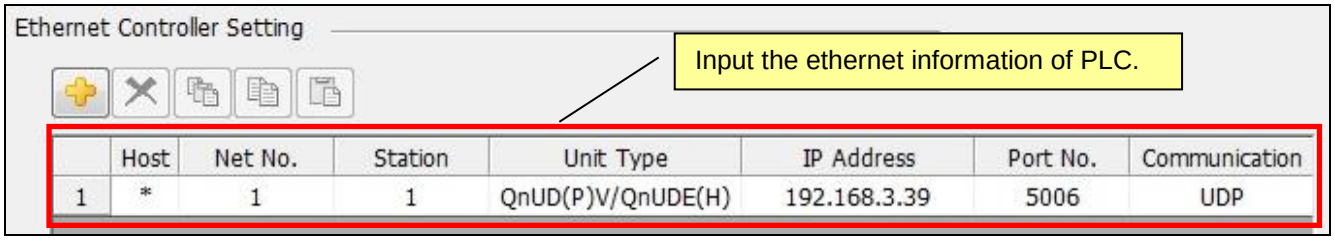
2.1.5 GOT Ethernet Setting



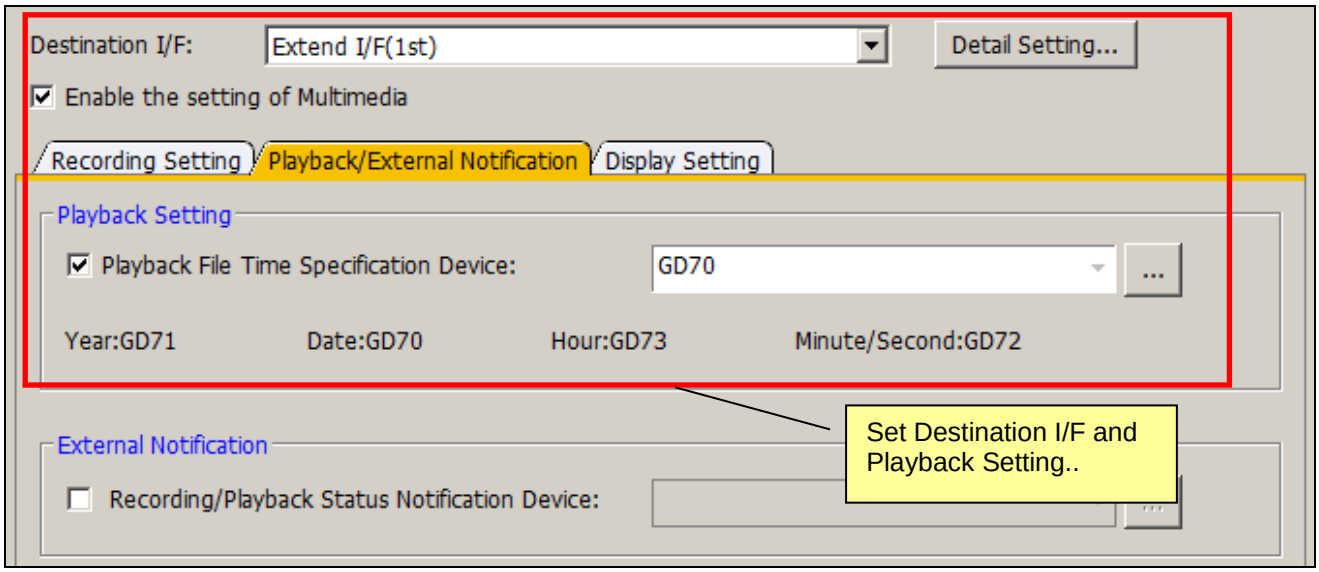
2.1.6 Controller Setting



2.1.7 Ethernet Setting



2.1.8 Multimedia Setting



2.2 Robot Parameter Setting

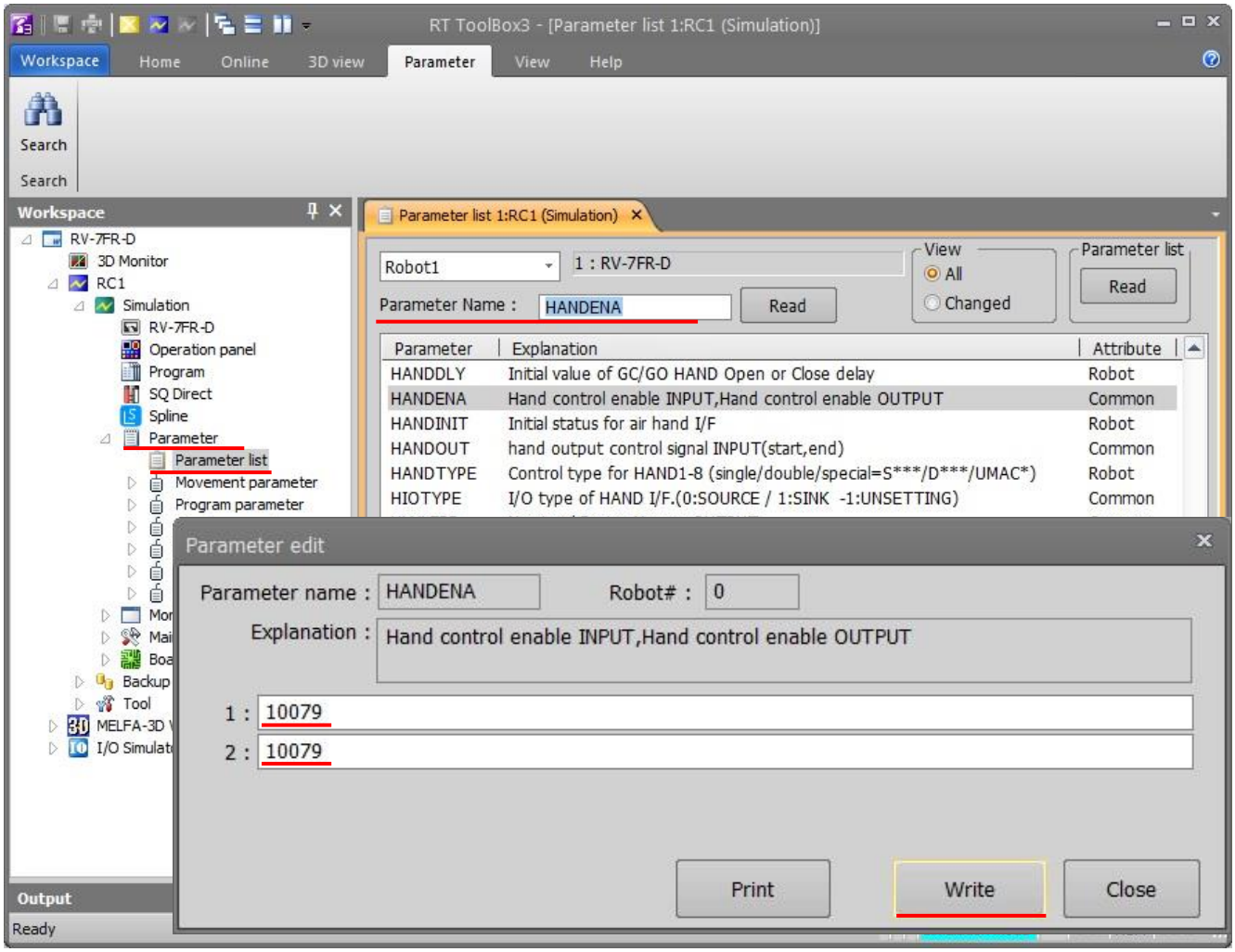
It is necessary to set the following parameters to use this sample GOT program.
The “RT ToolBox3 Instruction Manual (BFP-A3495)” of RT ToolBox3 descrive a way to set these parameters.

2.2.1 Shared-Memory Expansion Function Selection Parameter Setting

Set the parameters below.
Detailes of these parameter is discrived on the manual that name “CR800 series iQ Platform Supporting Extended Function Instruction Manual (BFP-A3528)”.
(1) Multi-Parameter Setting
Set the number of multiple CPU on ‘QMLTCPUN’ parameter and set the multiple CPU high speed transmission area on ‘QMLTCPU*’ that same as PLC settings.

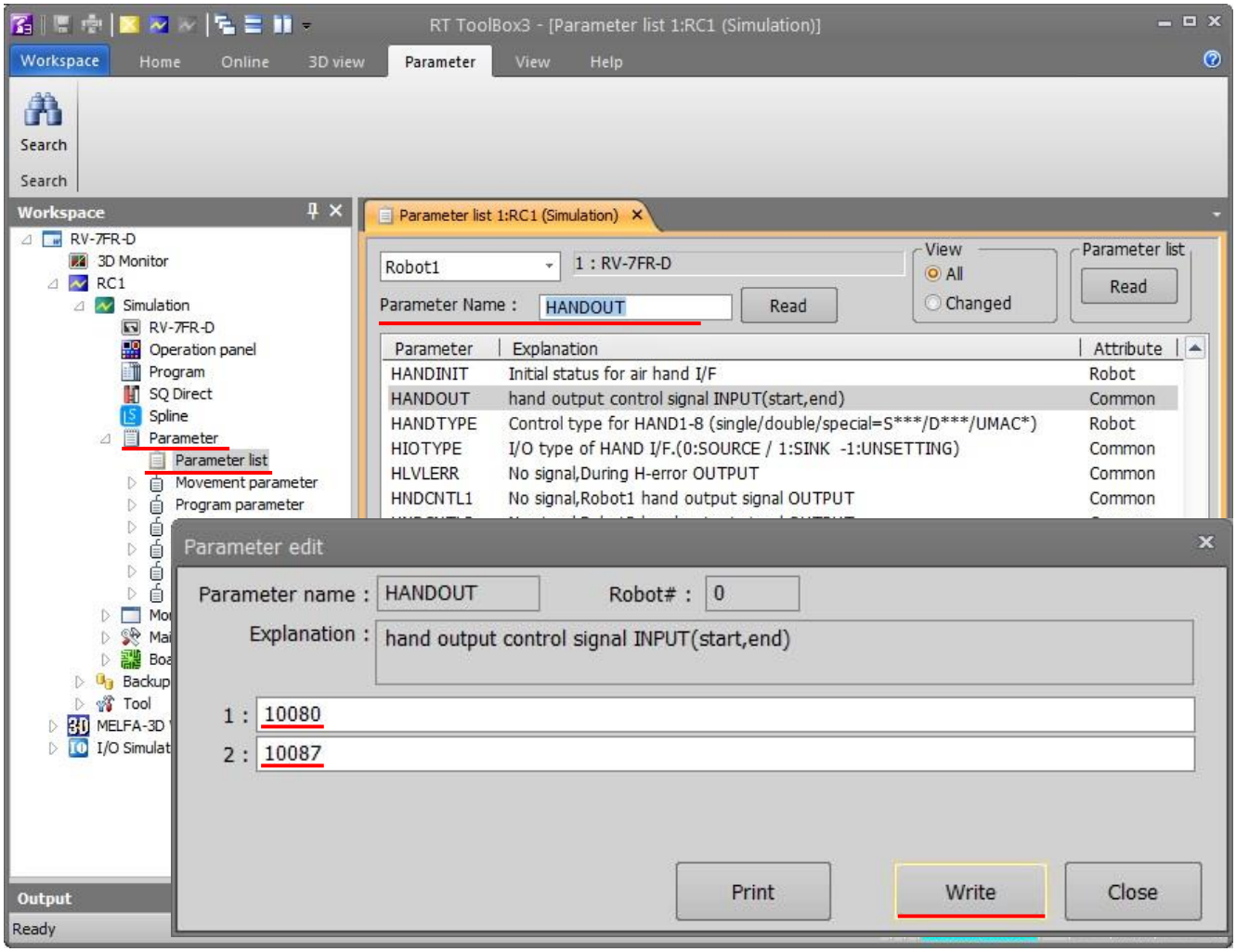
(2) Setting of Shared-Memory Expansion Function Selection Parameter
Change Bit 0 of the shared-memory expansion function selection parameter on ‘IQMEM’ to 1 (shared-memory expansion function enabled).

2.2.2 Parameter Setting of Hand Control Enable Input/Output Signals



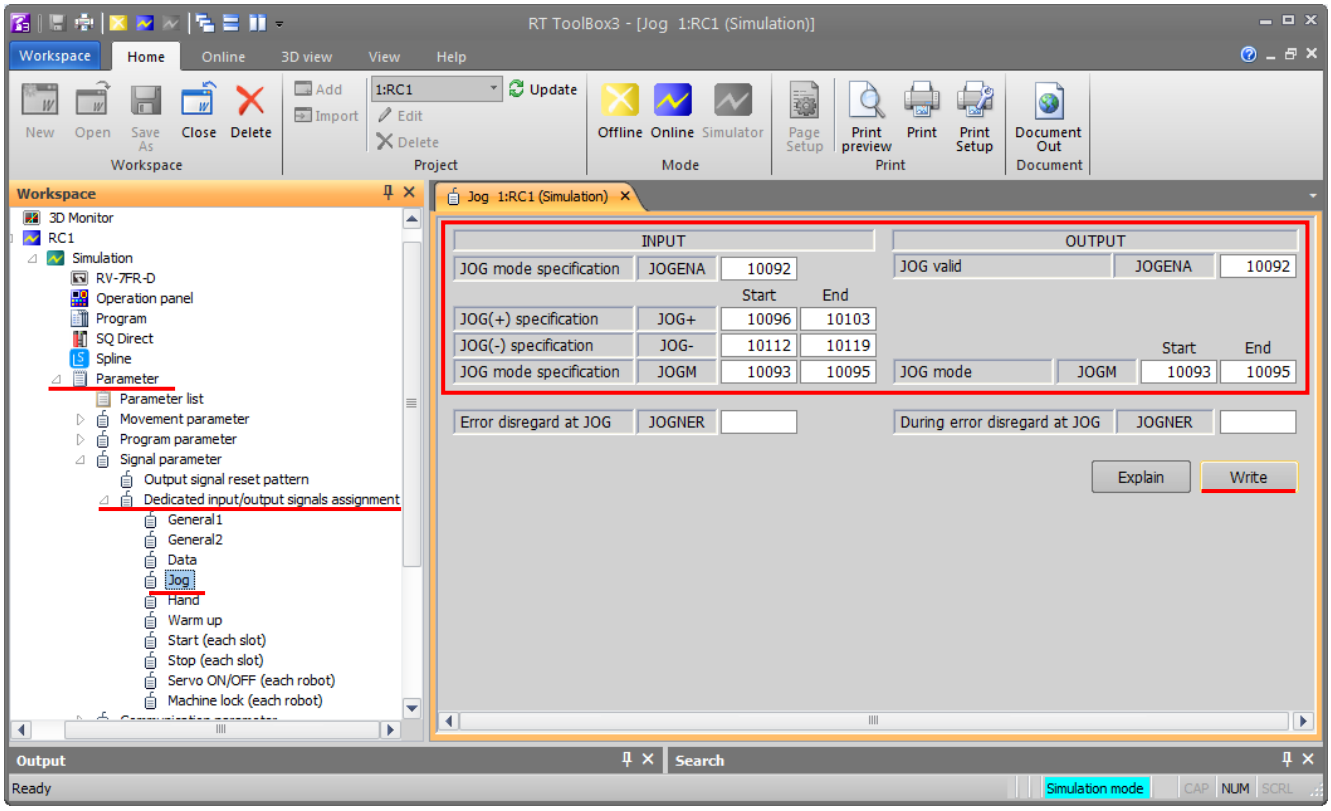
(1) Go to [**Parameter**] in the workspace and double-click on [**Parameter List**]
(2) Enter [**Parameter Name: HANDENA**] and click [Read (R)]
(3) [Parameter edit] window opens.
(4) Enter [**1: 10079**] [**2: 10079**]
(5) Click [**Write**] to write a parameter.
(6) [Do you want to write a parameter into the robot controller?] → click [**Yes (Y)**]
(7) [Restart the robot controller] → [**OK**]
* Continue to write other parameters without a restart

2.2.3 Hand Output Control Signal (Start/End number) Parameter Setting



(1) Open [**Parameter]** in the workspace and double-click on [**Parameter List**]
(2) Enter ［**Parameter Name: HANDOUT**］and click ［**Read (R)**］
(3) [**Parameter edit**] window opens
(4) Enter [**1: 10080**] [**2: 10087**]
(5) Click [**Write**] to write a parameter
(6) [Do you want to write a parameter into the robot controller?] → click [**Yes(Y)**]
(7) [Restart the robot controller] → [**OK**]
　　* Continue to write other parameters without a restart

2.2.4 Jog Parameter Setting to Assign Dedicated Input/Output Signals



(1) Open [**Parameter**] item and double-click [**Dedicated Input/Output Signals Assignment**]
(2) Double-click [**Jog**].
(3) Enter [**10092**] to [JOGENA] of the input signal.
And enter [**10092**] to [JOGENA] of the output signal.
(4) Enter [**Start (S): 10096**] and [**End (N): 10103**] to [Jog Feed＋ Side JOG＋] of the input signal.
(5) Enter [**Start (S): 10112**] and [**End (N): 10119**] to [Jog Feed － Side JOG－] of the input signal.
(6) Enter [**Start (S): 10093**] and [**End (N): 10095**] to [Jog Mode JOGM] of the input signal.
Enter [**Start (S): 10093**] and [**End (N): 10095**] to [Jog Mode JOGM] of the output signal.
(7) Click on [**Write (R)**] to write parameters.
(8) [Do you want to write parameters to the robot controller?]→ Click [**Yes (Y)**]
(9) [Restart the robot controller]→[**OK**]
(10) Restore the power of PLC (Off → On) of reset → run the PLC CPU.
(11) Parameter write is completed

2.2.5 Dedicated Input/Output Signals Parameter Setting

Parameter Name	Robot Input Signal Name	Robot Output Signal Name	Robot Mapping		GOT Mapping			
			Input	Output	Output (U3E0¥)	bit	Input (U3E1¥)	bit
STOP	Stop input	Pausing output	10000	10000	00000	000	00000	000
RCREADY	-	Controller power ON ready	-	10001	-	-	00000	001
ATEXTMD	-	Remote mode output	-	10002	-	-	00000	002
TEACHMD	-	Teaching mode output	-	10003	-	-	00000	003
ATTOPMD	-	Automatic mode output	-	10004	-	-	00000	004
IOENA	Operation rights input	Operation rights output	10005	10005	00000	005	00000	005
START	Start input	Operating output	10006	10006	00000	006	00000	006
STOPSTS	-	Stop signal input	-	10007	-	-	00000	007
SLOTINIT	Program reset input	Program selection enabled output	10008	10008	00000	008	00000	008
ERRRESET	Error reset input	Error occurring output	10009	10009	00000	009	00000	009
SRVON	Servo ON input	In servo ON output	10010	10010	00000	00A	00000	00A
SRVOFF	Servo OFF input	Servo ON disable output	10011	10011	00000	00B	00000	00B
CYCLE	Cycle stop input	In cycle stop operation output	10012	10012	00000	00C	00000	00C
SAFEPOS	Safe point return input	In safe point return output	10013	10013	00000	00D	00000	00D
BATERR	-	Battery voltage drop	-	10014	-	-	00000	00E
OUTRESET	General-purpose output signal reset	-	10015	-	00000	00F	-	-
HLVLERR	-	High level error output	-	10016	-	-	00001	000
LLVLERR	-	Low level error output	-	10017	-	-	00001	001
CLVLERR	-	Warning level error output	-	10018	-	-	00001	002
EMGERR	-	Emergency stop output	-	10019	-	-	00001	003
PRGSEL	Program selection input	-	10020	-	00001	004	-	-
OVRDSEL	Override selection input	-	10021	-	00001	005	-	-
PRGOUT	Program No. output request	Program No. output	10022	10022	00001	006	00001	006
LINEOUT	Line No. output request	Line No. output	10023	10023	00001	007	00001	007
OVRDOUT	Override value request	Override value output	10024	10024	00001	008	00001	008
ERROUT	Error No. output request	Error No. output	10025	10025	00001	009	00001	009
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
IODATA	Numeric value input 0	Numeric value output 0	10032	10032	00002	000	00002	000
↑	Numeric value input 1	Numeric value output 1	10033	10033	00002	001	00002	001
↑	Numeric value input 2	Numeric value output 2	10034	10034	00002	002	00002	002
↑	Numeric value input 3	Numeric value output 3	10035	10035	00002	003	00002	003
↑	Numeric value input 4	Numeric value output 4	10036	10036	00002	004	00002	004
↑	Numeric value input 5	Numeric value output 5	10037	10037	00002	005	00002	005
↑	Numeric value input 6	Numeric value output 6	10038	10038	00002	006	00002	006
↑	Numeric value input 7	Numeric value output 7	10039	10039	00002	007	00002	007
↑	Numeric value input 8	Numeric value output 8	10040	10040	00002	008	00002	008

↑	Numeric value input 9	Numeric value output 9	10041	10041	00002	009	00002	009
↑	Numeric value input 10	Numeric value output 10	10042	10042	00002	00A	00002	00A
↑	Numeric value input 11	Numeric value output 11	10043	10043	00002	00B	00002	00B
↑	Numeric value input 12	Numeric value output 12	10044	10044	00002	00C	00002	00C
↑	Numeric value input 13	Numeric value output 13	10045	10045	00002	00D	00002	00D
↑	Numeric value input 14	Numeric value output 14	10046	10046	00002	00E	00002	00E
↑	Numeric value input 15	Numeric value output 15	10047	10047	00002	00F	00002	00F
HNDCNTL1	Hand output 900	Hand output signal state 900		10048			00003	000
↑	Hand output 901	Hand output signal state 901		10049			00003	001
↑	Hand output 902	Hand output signal state 902		10050			00003	002
↑	Hand output 903	Hand output signal state 903		10051			00003	003
↑	Hand output 904	Hand output signal state 904		10052			00003	004
↑	Hand output 905	Hand output signal state 905		10053			00003	005
↑	Hand output 906	Hand output signal state 906		10054			00003	006
↑	Hand output 907	Hand output signal state 907		10055			00003	007
HNDSTS1	-	Hand output signal state 900	-	10056	-	-	00003	008
↑	-	Hand output signal state 901	-	10057	-	-	00003	009
↑	-	Hand output signal state 902	-	10058	-	-	00003	00A
↑	-	Hand output signal state 903	-	10059	-	-	00003	00B
↑	-	Hand output signal state 904	-	10060	-	-	00003	00C
↑	-	Hand output signal state 905	-	10061	-	-	00003	00D
↑	-	Hand output signal state 906	-	10062	-	-	00003	00E
↑	-	Hand output signal state 907	-	10063	-	-	00003	00F
USRAREA	-	User defined area 1	-	10064	-	-	00004	000
↑	-	User defined area 2	-	10065	-	-	00004	001
↑	-	User defined area 3	-	10066	-	-	00004	002
↑	-	User defined area 4	-	10067	-	-	00004	003
↑	-	User defined area 5	-	10068	-	-	00004	004
↑	-	User defined area 6	-	10069	-	-	00004	005
↑	-	User defined area 7	-	10070	-	-	00004	006
↑	-	User defined area 8	-	10071	-	-	00004	007
-	-	-	-	-	-	-	-	-

3 Description of Robot Screen

3.1 Common Operation

3.1.1 How To Change The Display Language

Press the ‘EARTH’ bottun and ‘Language Setting’ window is displayed. Select the language you want to use in list on the ‘Language Setting’ window.

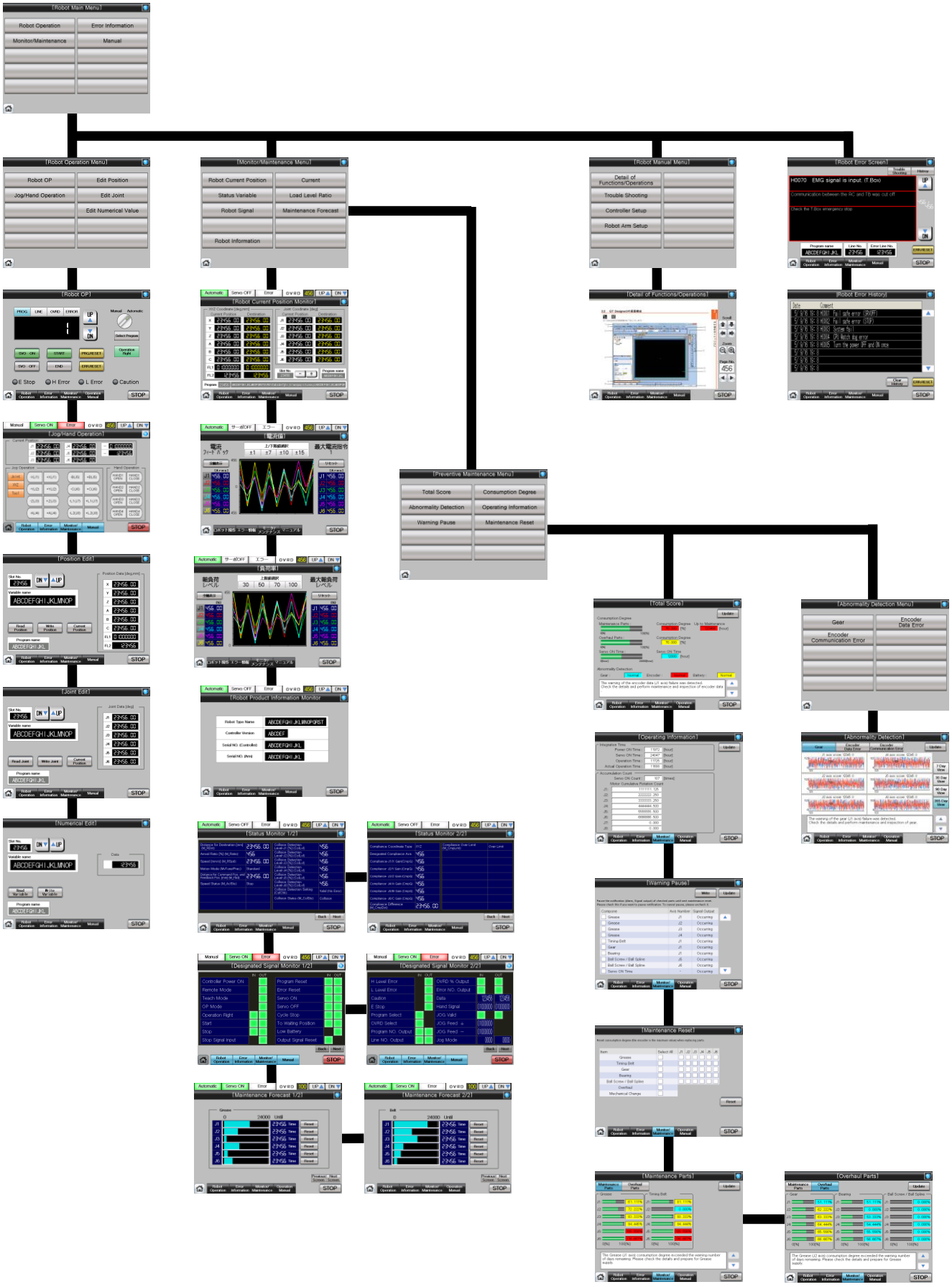
The ‘EARTH’ button is located at top-right corner on the every robot screens.

3.1.2 How To Exit the Robot Screen

When press the ‘HOME’ bottun, exit the robot screen and change display to 001 base screen.

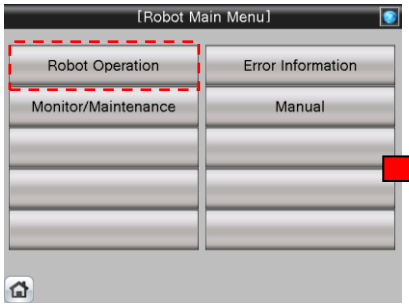
The ‘HOME’ button is located at bottom-left corner on the every robot screens.

3.2 Screen Tree

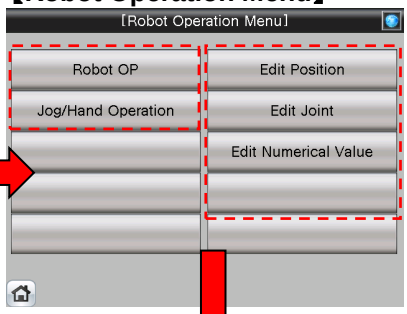


3.3 Robot Operation Screens

【Robot Main Menu】

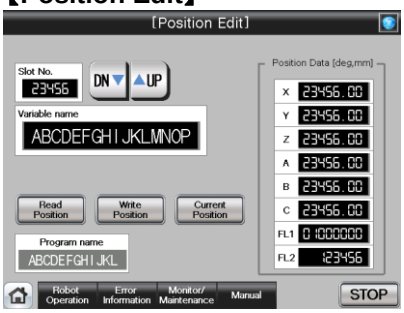


【Robot Operation Menu】

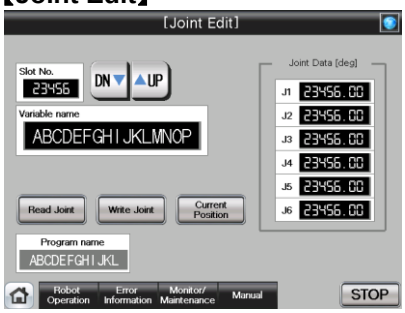


【Robot OP】

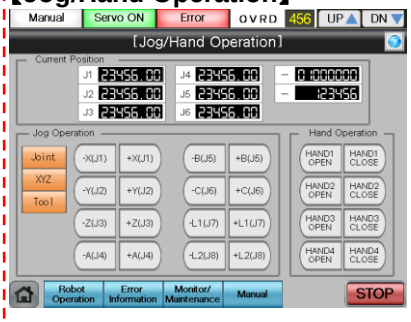
【Position Edit】



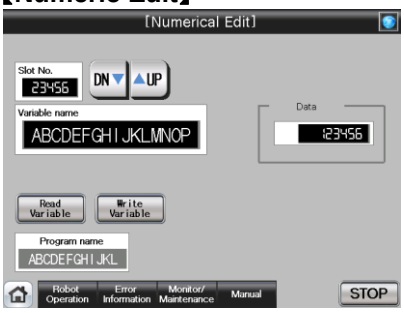
【Joint Edit】



【Jog/Hand Operation】

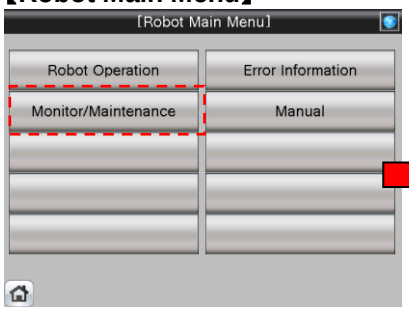


【Numeric Edit】

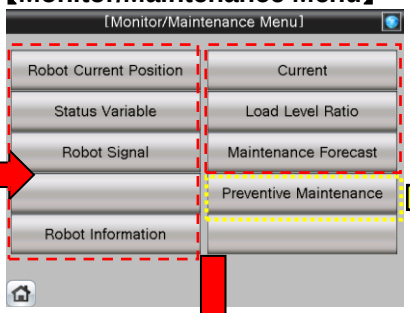


3.4 Monitor/Maintenance

【Robot Main Menu】

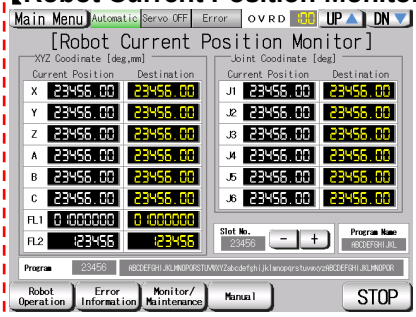


【Monitor/Maintenance Menu】



1)/ 2) MELFA SmartPlus

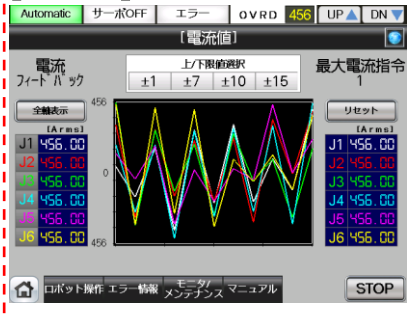
【Robot Current Position Monitor】



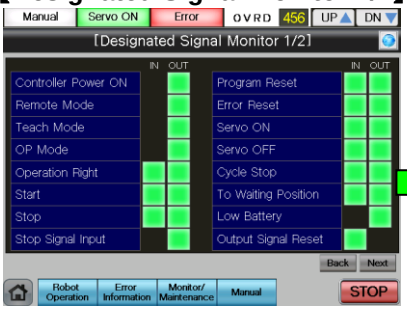
【Status Monitor 1/2】

【Status Monitor 2/2】

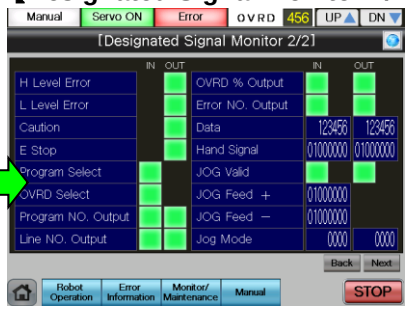
【Current】



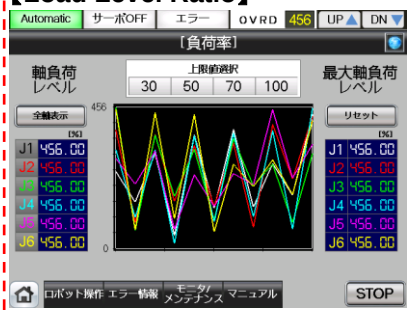
【Designated Signal Monitor 1/2】



【Designated Signal Monitor 2/2】

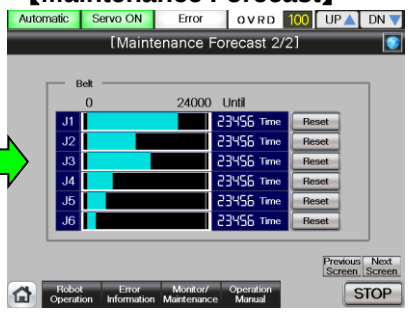


【Load Level Ratio】

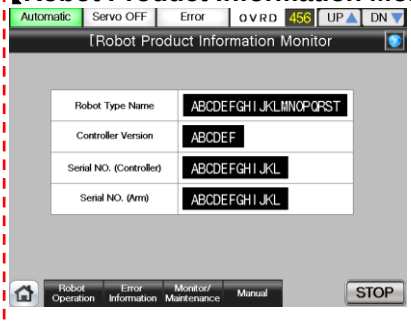


【Maintenance Forecast 1/2】

【Maintenance Forecast】



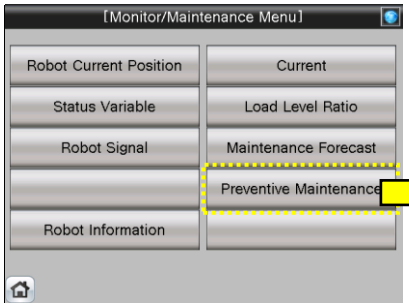
【Robot Product Information Monitor】



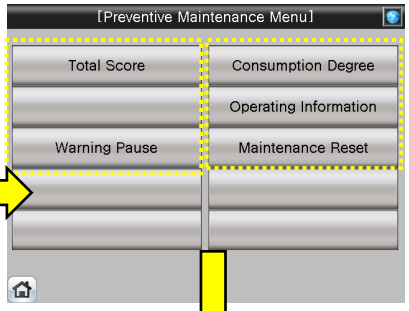
1) Preventive Maintenance (The MELFA Smart Plus option is required)

Notice) It is necessary to restart the GOT when activate the 'Preventive Maintenance Function'.

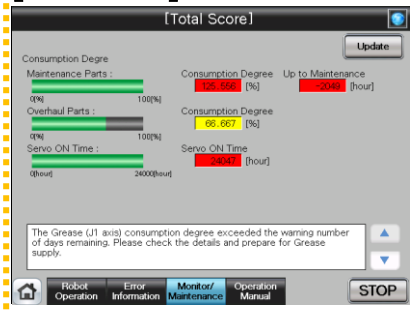
【Monitor/Maintenance Menu】



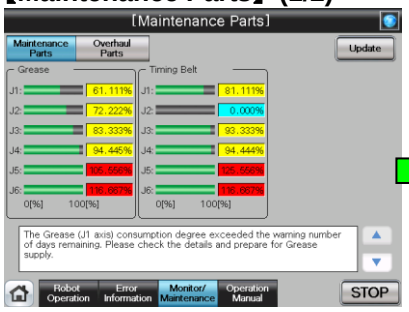
【Preventive Maintenance Menu】



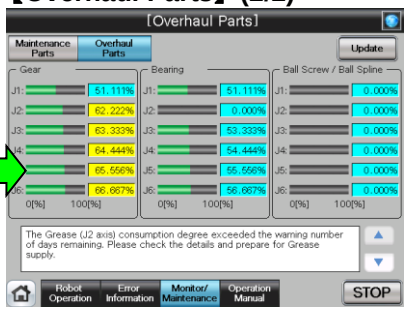
【Total Score】



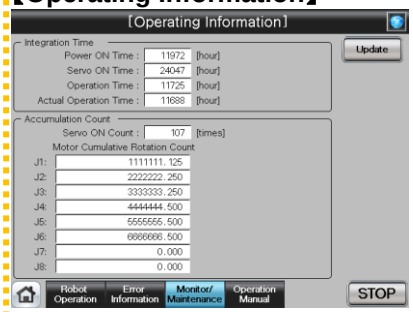
【Maintenance Parts】(1/2)



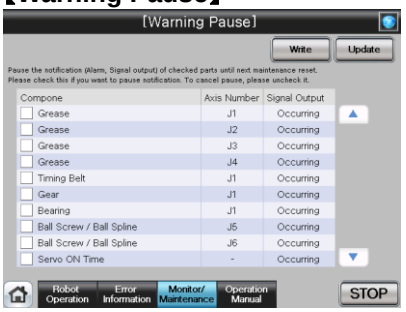
【Overhaul Parts】(2/2)



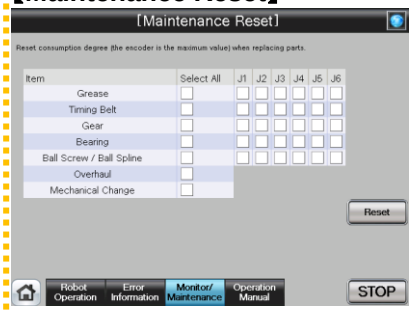
【Operating Information】



【Warning Pause】



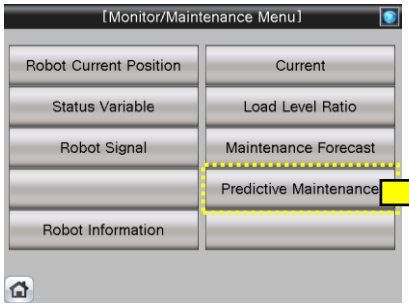
【Maintenance Reset】



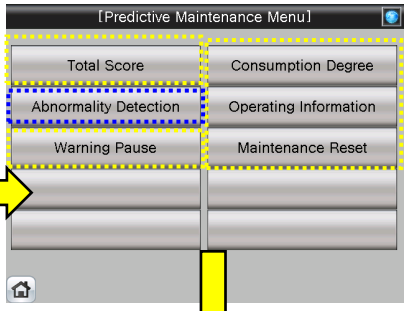
2) Predictive Maintenance (The MELFA Smart Plus option is required)

Notice) It is necessary to restart the GOT when activate the 'Predictive Maintenance Function'.

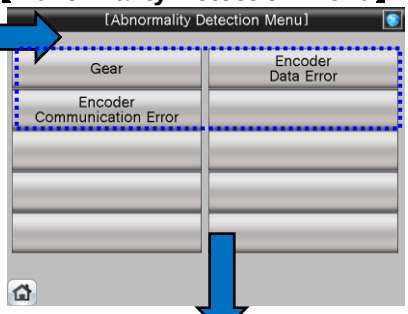
【Monitor/Maintenance Menu】



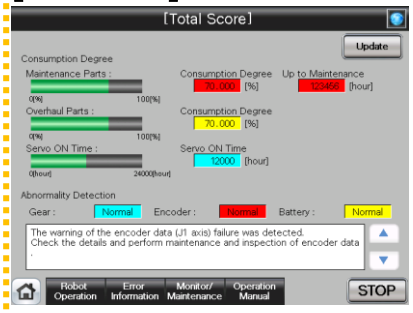
【Predictive Maintenance Menu】



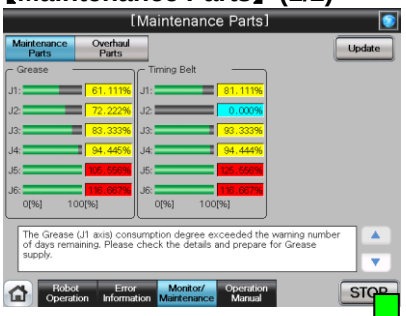
【Abnormality Detection Menu】



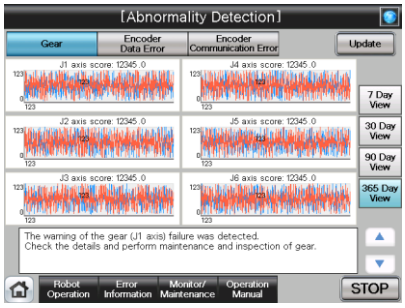
【Total Score】



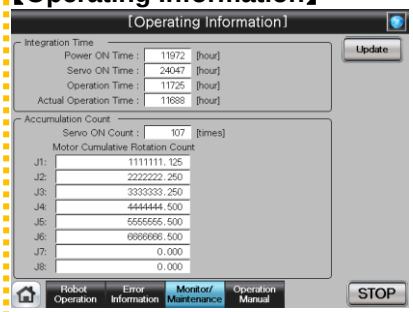
【Maintenance Parts】(1/2)



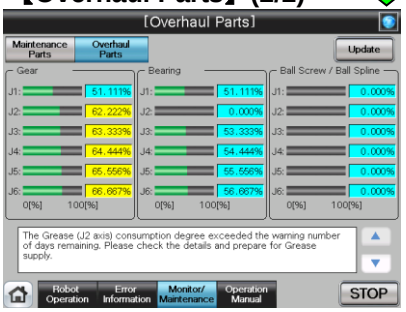
【Gear】



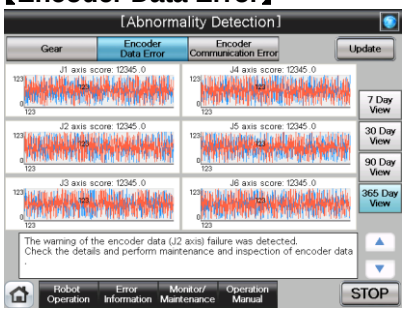
【Operating Information】



【Overhaul Parts】(2/2)

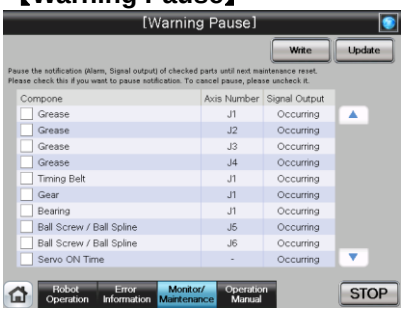


【Encoder Data Error】

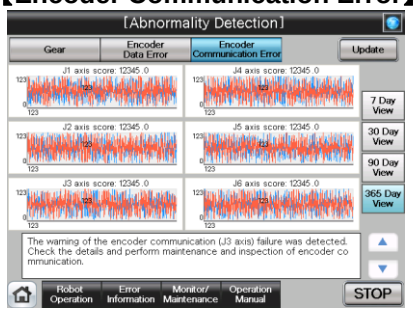


【Maintenance Reset】

【Warning Pause】

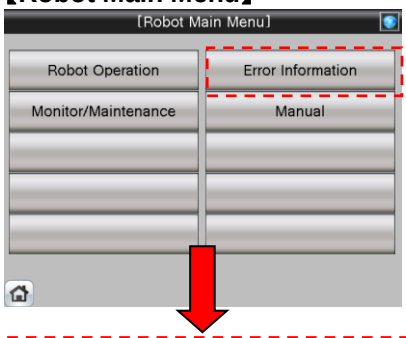


【Encoder Communication Error】

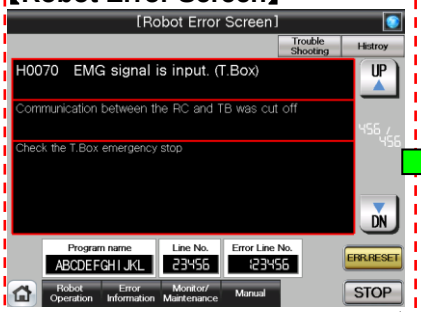


3.5 Error Information

【Robot Main Menu】

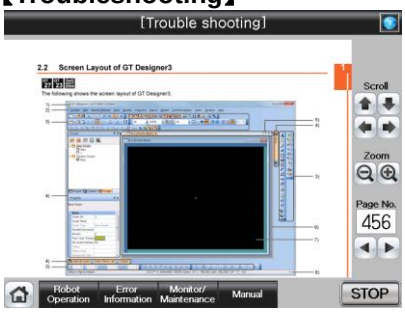


【Robot Error Screen】



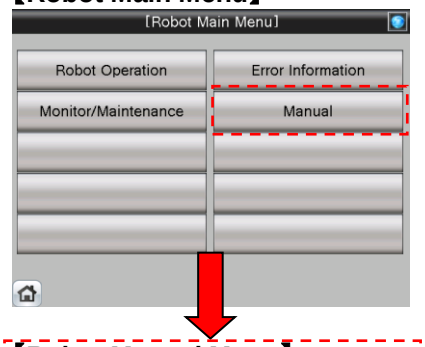
【Robot Error History】

【Troubleshooting】

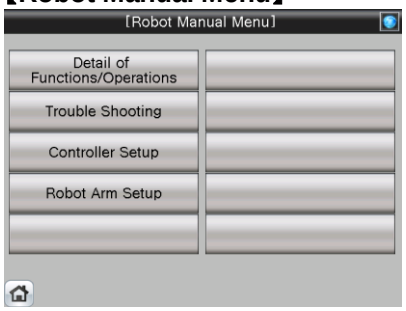


3.6 Manual

【Robot Main Menu】



【Robot Manual Menu】

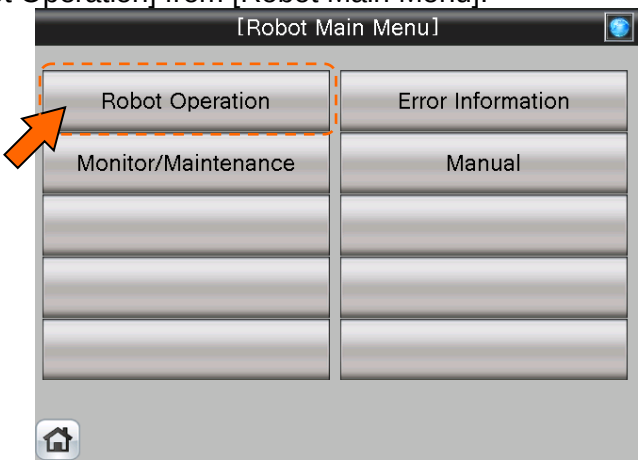


4 Screen Operation

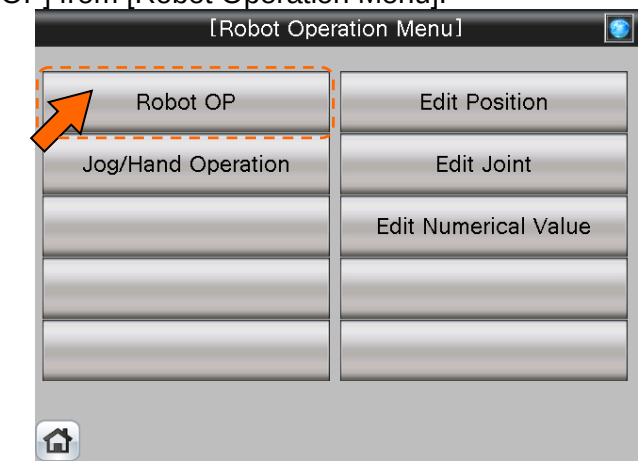
4.1 Robot Operation on GOT Screen

4.1.1 Select［Robot Operation］for setting and operation

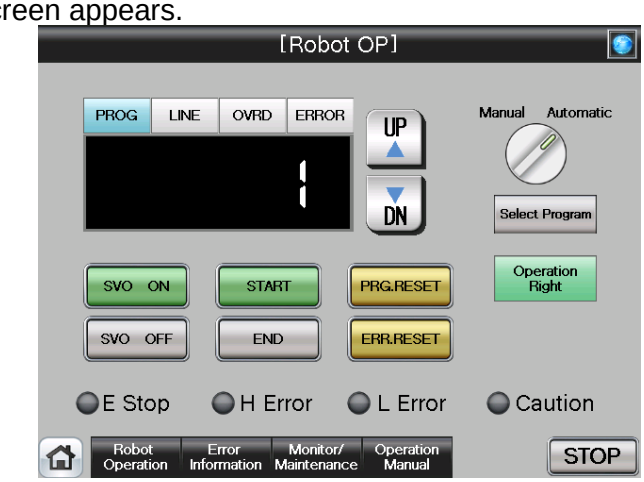
(1) Select [Robot Operation] from [Robot Main Menu].



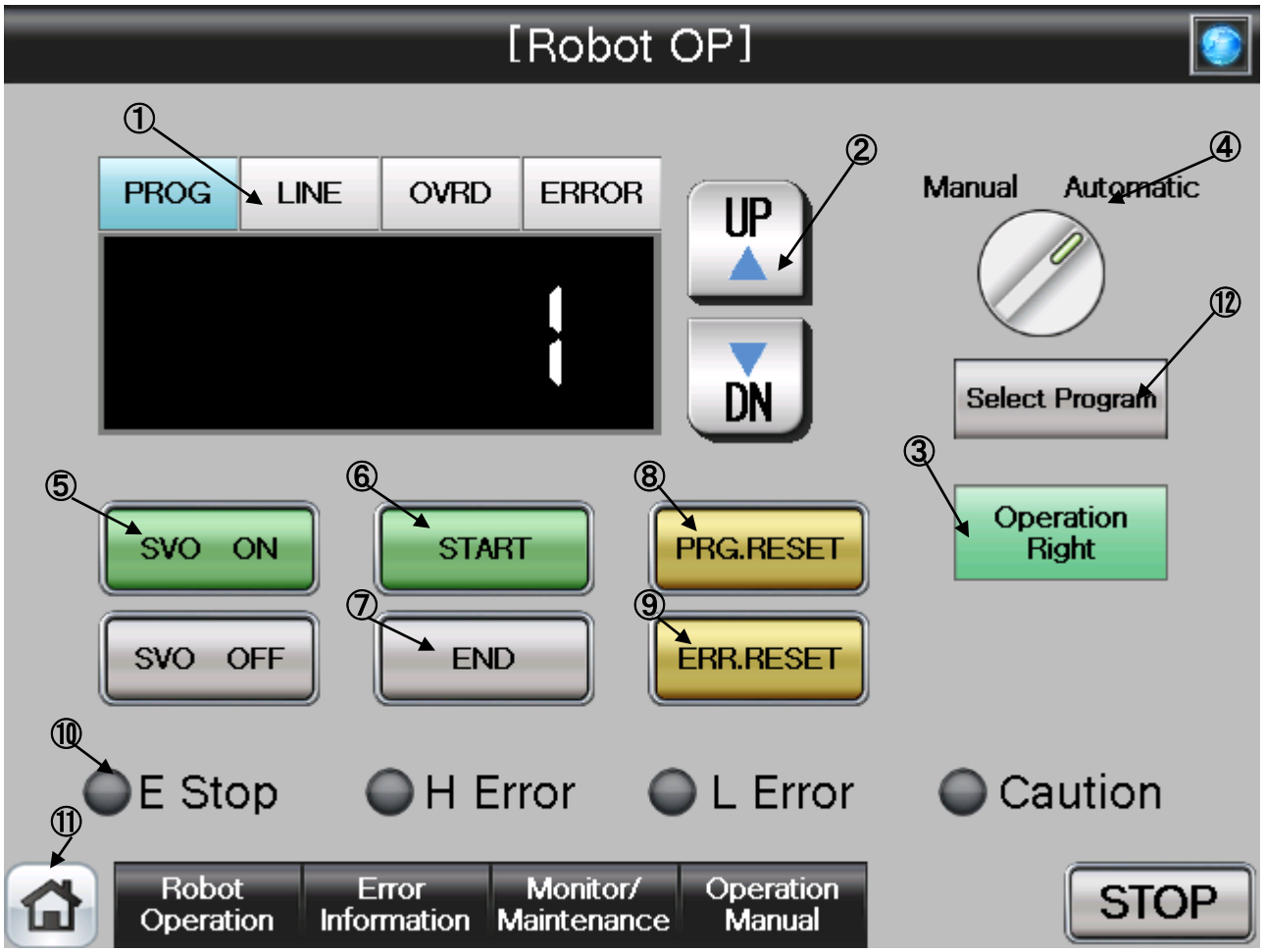
(2) Select [Robot OP] from [Robot Operation Menu].



(3) [Robot OP] screen appears.



(4) See below for details of the [Robot OP] screen. For details of each operation button, see “Table 4-1: Details and Roles of [Robot Operation] Buttons”.



【Screen Specification】

Screen for operation setting in the auto-operation mode

(1) Display Panel･･･**PROG** (program No.), **LINE** (program execution line) **OVRD** (operation speed setting), and **ERROR** (error No.)

(2) UP/DOWN･･･**UP** (up) and **DN** (down) display of the information on the display panel

(3) Operation Right Button･･･Obtains the robot operation right with the Operation Right on the GOT screen

(4) Mode Switching Display･･･Displays the operation mode during execution (**Manual**/**Automatic**)
***** Only drive unit can switch the modes from/to **Manual** and **Automatic**

(5) Servo Power Button･･･**SVO ON (Servo ON)** **SVO OFF (Servo OFF)**

(6) Start Button･･･Starts the program to run the robot

(7) End Button･･･Stops the robot program at the last line of the running program or END sentence.

(8) Program Reset Button･･･Cancels the operation and resets the program

(9) Error Reset Button･･･Resets the error

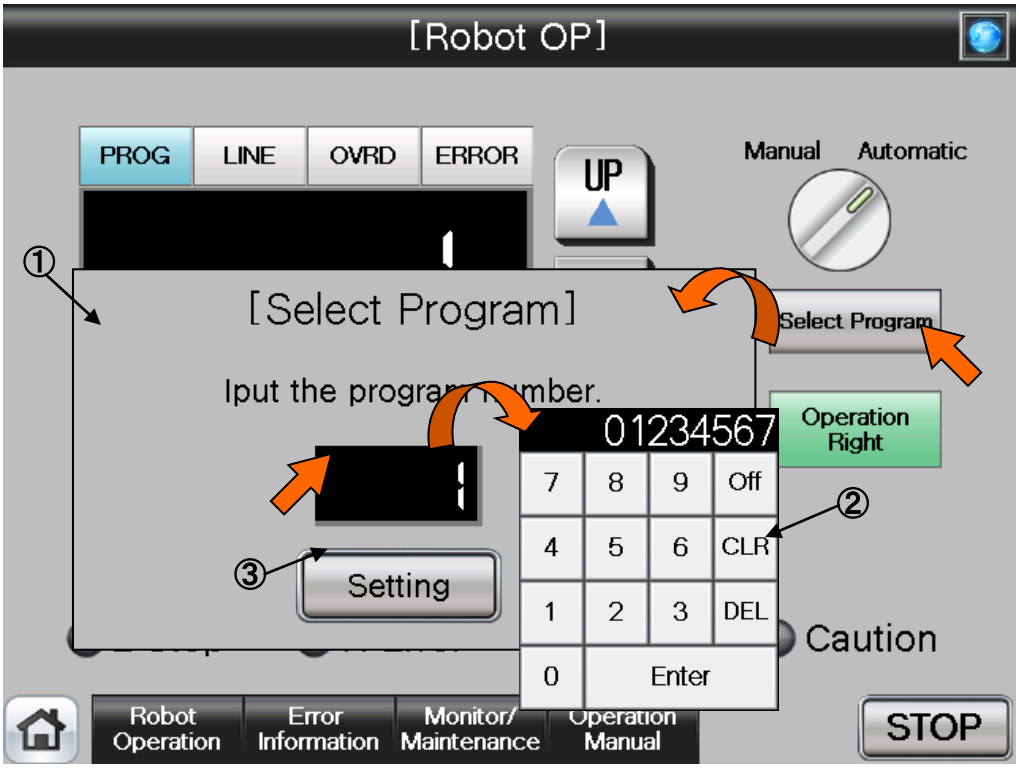
(10) Display of Running State･･･Displays the error status with **“Emergency stop” “High Error” “Low Error”** and **“Caution”**

(11) Common Buttons･･･Jump to each screen
* **“STOP”** stop a running program (Servo remains ON)

(12) Select PROG **(*1)**･･･Selects a **robot program**

(*1) To enter a program No., press **“Select Program”**. The screen for program selection appears

(5) See below for details of the program selection screen.



【Screen Specification】

Screen to select/set the program number

(1) Program selection screen･･･Selects/sets the program number

(2) Number input screen･･･Inputs the program number with a decimal-input key

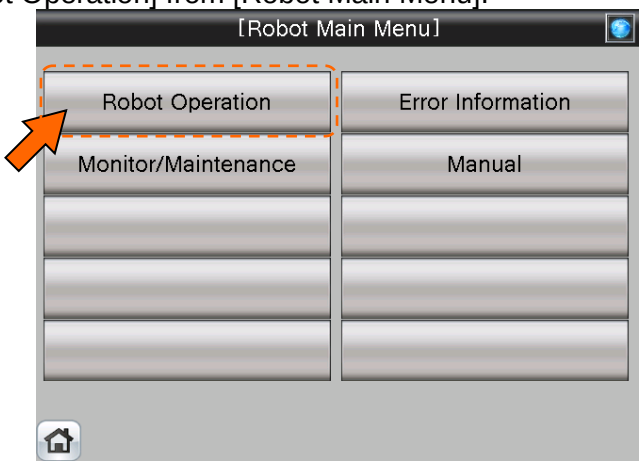
(3) Setting･･･Sets the selected program number

Table 4-1: Details and Roles of [Robot Operation] Buttons

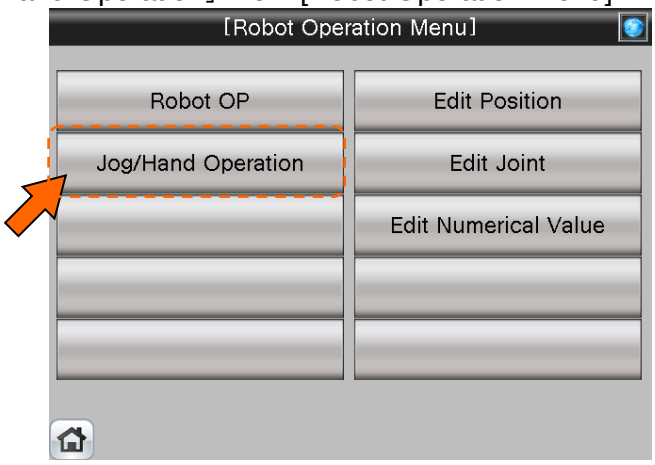
Classification	Name	Function Spec.		Note
Display Panel	PROG	Blue Light ON	Displays the selected robot program No.	Displays the value of each button that illuminates blue
	LINE	Blue Light ON	Displays the program execution line	
	OVRD	Blue Light ON	Displays the robot override value (speed changes when the value is entered)	
	ERROR	Blue Light ON	Displays the ongoing error No.	
	UP△	Gray Light ON	Increases the value of the button illuminating blue	Increases and decreases the value one by one
	DN▽	Gray Light ON	Decreases the value of the button illuminating blue	
	Display of Mode Switch	Green Light ON	Auto-mode operation in progress（Automatic）	Not operatable (Display only)
		Light OFF	Manual mode operation in progress（Manual）	
Auto-Operation	Operation Rights	Obtains the robot operation right in the HMI screen Operation rights are transferred to the drive unit when the button is held down with the operation right obtained		Button operations other than SVO OFF/STOP are enabled only when the automatic operation is in progress and operation rights are enabled.
		Green Light ON	Robot operation enabled in the HMI screen	
		Light OFF	Robot operation enabled in the drive unit	
	PRG.RESET	Resets the robot program sequence to the beginning of the program		
		Blue Light ON	Program reset （Valid only when the program stops）	
		Yellow Light ON	Program reset not performed	
	ERR.RESET	Resets the ongoing robot error		
		Blue Light ON	Robot error reset	
		Yellow Light ON	Error reset not performed	
	SVO ON	Turns the robot servo on		
		Green Light ON	Servo ON	
		Light OFF	Servo OFF	
	SVO OFF	Turns the robot servo off		
		Red Light ON	Servo OFF	
		Light OFF	Servo ON	
	START	Starts the robot program		
		Green Light ON	Program Running	
		Light OFF	Program is stopped or not selected	
	END	Stops the robot program sequence at the END statement of the operating robot program		
		Red Light ON	Stops the robot program sequence at the END statement	
		Light OFF	Continuous operation in progress	
	Select PROG	Selects a program No.		
		Blue Light ON	Program selection in progress	
		Light OFF	Program selection completed/ Program selection not performed	
Display of Running State	Emergency Stop	Red Light ON	Emergency stop in progress	—
	H Error	Red Light ON	High-level robot error	
	L Error	Red Light ON	Low-level robot error	
	Alarm	Red Light ON	Robot error alarm	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		—
		Red Light ON	Program stops	
		Light OFF	Program in operation	

4.1.2 Jog/Hand Operation

(1) Select [Robot Operation] from [Robot Main Menu].

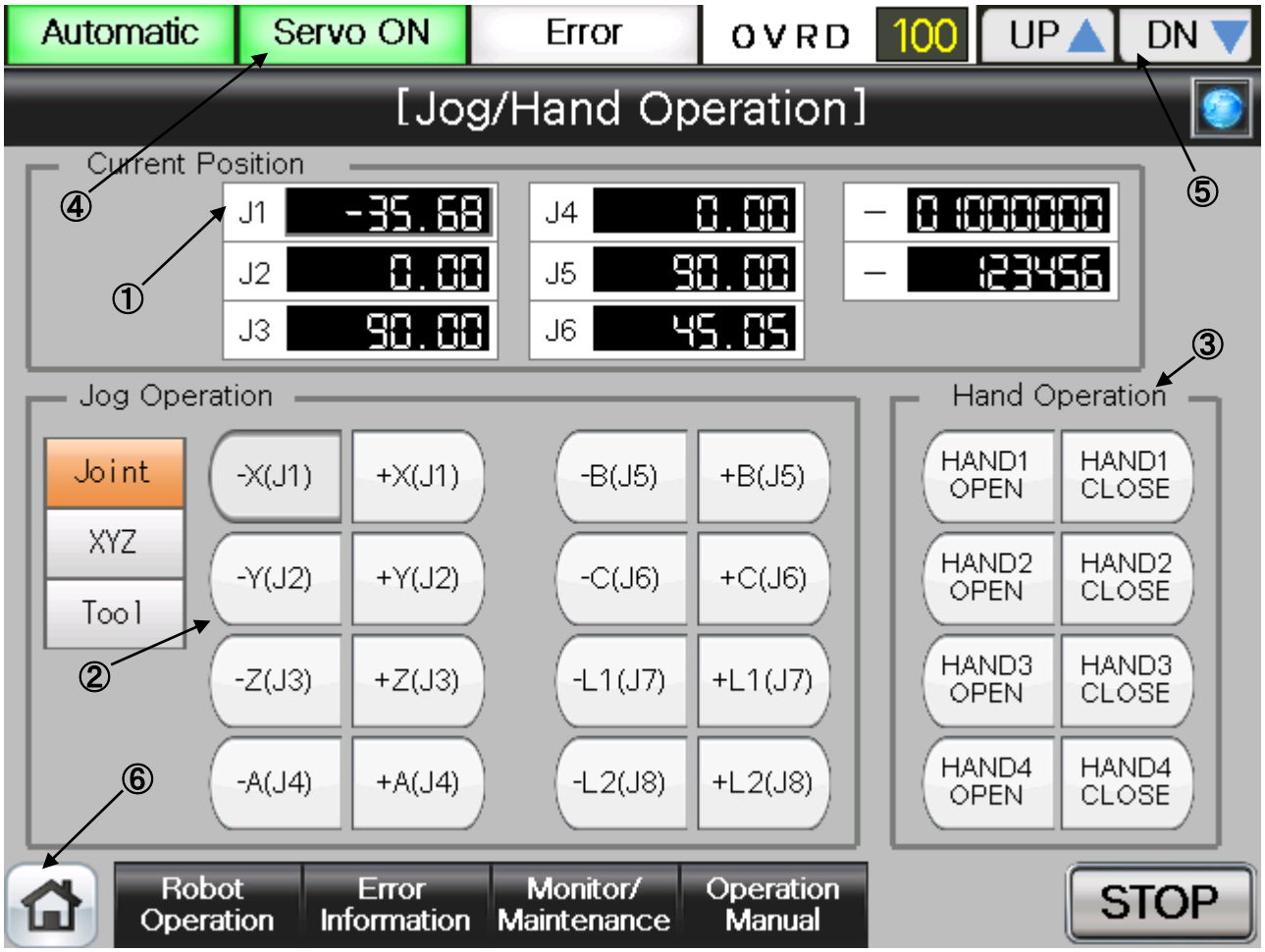


(2) Select ［Jog/Hand Operation］ from [Robot Operation Menu].



(3) ［Jog/Hand Operation］ screen appears.

(4) See below for the details of the [Jog/Hand Operation] screen. For details of each operation button, see “Table 4-2: ［Jog/Hand Operation］screen”.



【Screen Specification】

Screen for jog/hand operations

(1) Current Position･･･**Joint** jog operation→current position of 6 axes **XYZ** and **Tool** jog operation→Displays the coordinate value and postural axis

(2) Jog Operation･･･Jog operation of **each axis** (joint) and **coordinate** (XYZ and tool)

(3) Hand Operation･･･Switching operation of **each hand** (hand 1, 2, 3, and 4)

(4) Display of Running Status･･･Lights a lamp according to the running status of a robot

* **Auto-operation in progress** (green) **Servo Power ON** (green) **Error** (red) **Current Working Speed Value**（%）

(5) UP/DOWN Button･･･Changes the working speed value in the **OVRD Display UP** (speed-up), **DN** (speed-down)

(6) Common Buttons･･･Jump to each screen

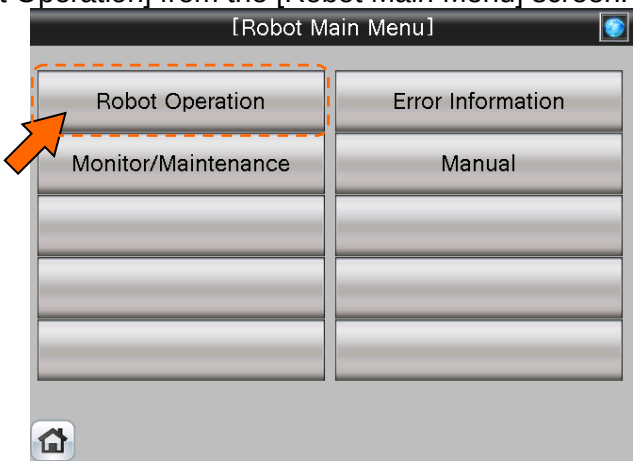
* **“STOP”** stop a running program (Servo remains ON)

Table 4-2: Details and Roles of［Jog/Hand Operation］Buttons

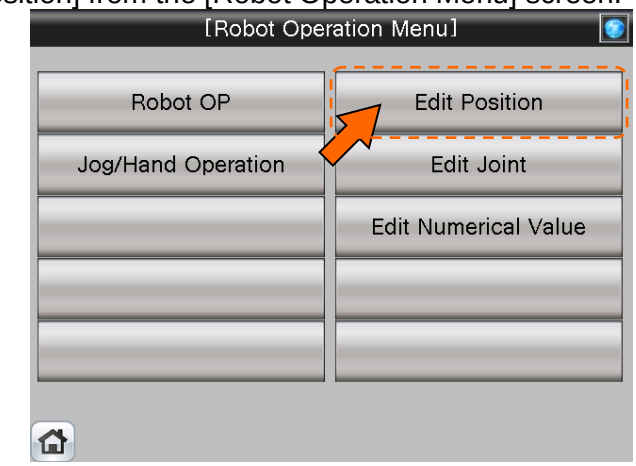
Classification	Name	Function Spec.		Note
Current Position	Current Position (Axis)	Displays the robot position (1) Joint jog operation Displays the angle of each axis（J1～J6） Displays the angle of additional axis（J7～J8） (2) When selecting the XYZ jog Displays the coordinate value mm of each axis（X·Y·Z） Displays the angle of each postural axis（A·B·C） Displays the coordinate value mm of each additional axis (L1·L2) **(*1)** **(*1) Parameter change is required. See "CRn-700 Series Additional Axis Interface Instruction Manual".**		Switches The display character string as well
Jog Operation	Joint	Executes joint jog operation		Operatable only when the servo is ON
		Orange Light ON	Selecting joint jog operation	
		Light OFF	Selecting XYZ or tool jog operation	
	XYZ	Executes XYZ jog operation		
		Orange Light ON	Selecting XYZ jog operation	
		Light OFF	Selecting jog or tool jog operation	
	Tool	Executes the tool jog operation		
		Orange Light ON	Selecting tool jog operation	
		Light OFF	Selecting jog or XYZ jog operation	
	＋	Executes a jog operation (while the button is being held) (1) When selecting a joint jog Operates counterclockwise direction for each axis angle (2) When selecting an XYZ/tool jog Operates for each axis in the unit of mm（XYZL1L2）and axis angle（ABC）		
	－	Executes a jog operation (while the button is being held) (1) When selecting a joint jog Operates counterclockwise direction for each axis angle (2) When selecting an XYZ/tool jog Operates for each axis in the unit of mm（XYZL1L2）and axis angle（ABC）		
Hand Operation	OPEN	Opens the hand (1~4)		
	CLOSE	Closes the hand (1~4)		
Display of Running State	Operation Mode	Displays the operation mode		—
		Green Light ON	Auto operation mode（Automatic）	
		Light OFF	Manual operation mode（Manual）	
	Servo ON	Displays the status of servo power		
		Green Light ON	Servo power ON	
		Light OFF	Servo power OFF	
	Error	Displays the robot error status		
		Red Light ON	Robot error in progress	
		Light OFF	No error	
	OVRD	Displays the current override value (%)		
		UP▲	Increases the override value	
		DN▼	Decreases the override value	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the error information display sub menu		
	Monitor/Maintenance	Jumps to the monitor/maintenance execution sub menu		
	Manual	Jumps to the manual display sub menu		
	STOP	Stops the running program (Servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.1.3 Editing of Position Data Which Have been Taught to the Robot

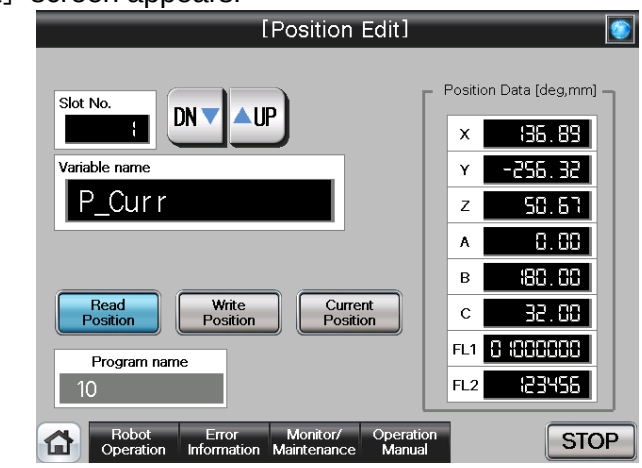
(1) Select [Robot Operation] from the [Robot Main Menu] screen.



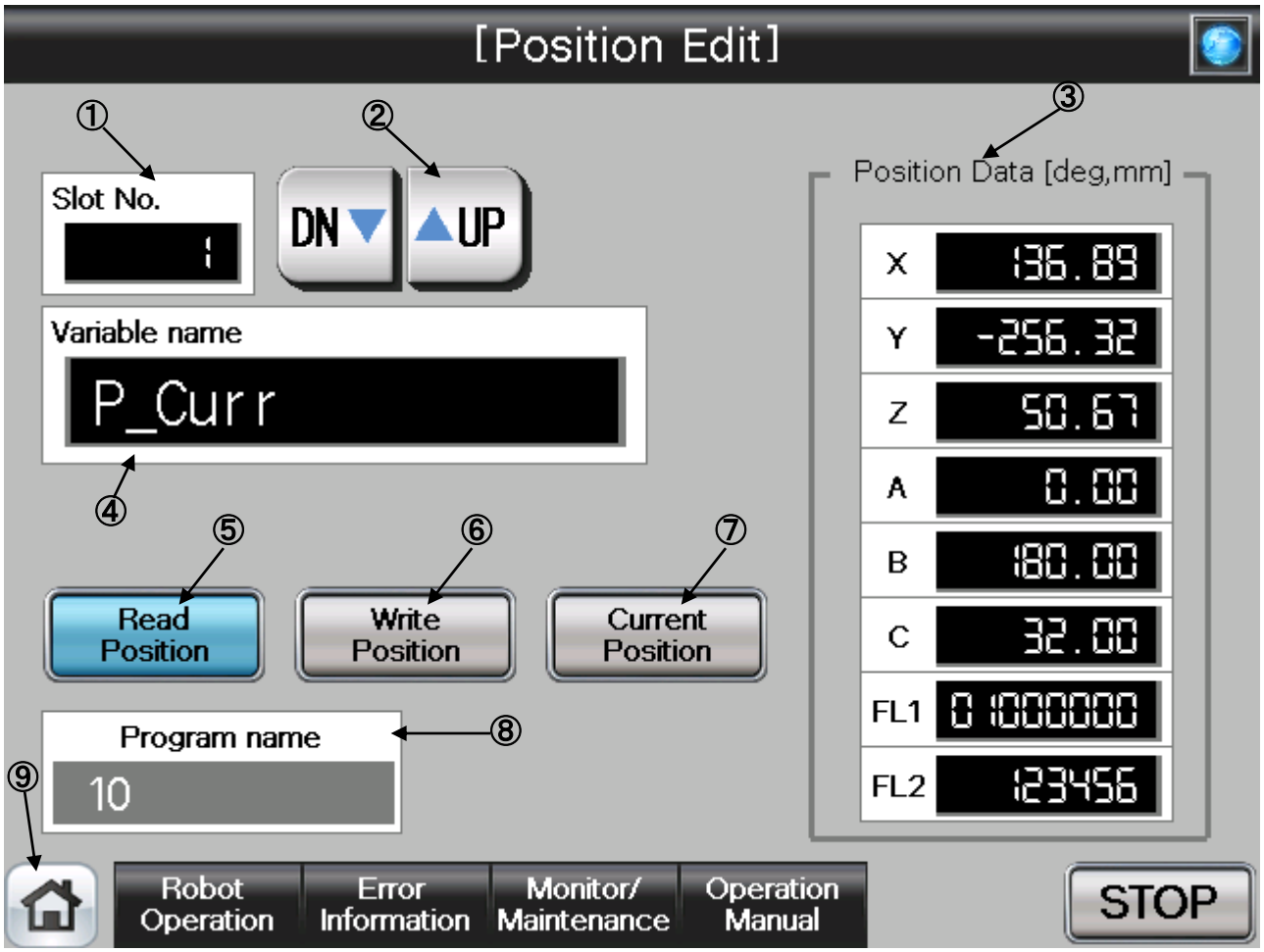
(2) Select [Edit Position] from the [Robot Operation Menu] screen.



(3) ［Position Edit］ screen appears.



(4) See below for the details of [Position Edit] screen. For details of each operation button, see "Table 4-3: Details and Roles of [Position Edit] Operational Buttons".



【Screen Specifications】

Operation screen to edit the position variable of the robot

* For the position data of the program specified in the robot OP screen

(1) Slot No.・・・Selects the **task slot No. (0~32)** to be edited

(2) UP/DOWN・・・Scrolls **UP** and **DN (down)** of the **task slot No.**

(3) Position Data **(*1)**・・・Edits the position data of **each axis** (X, Y, Z, A, B, C) and **configuration flag** (FL1 postural flag/FL2 multi-rotation data)

(4) Variable Name **(*2)**・・・Enters the **name of the position data** to be edited

(5) Read Position・・・Reads the **position data specified** in the variable name in the position edit

(6) Write Position・・・Writes the **edited position data** to the position edit

(7) Current Position・・・Reads the **current robot position data** and displays it in the **position data**

(8) Program Name・・・Displays the **program specified** in the robot OP screen

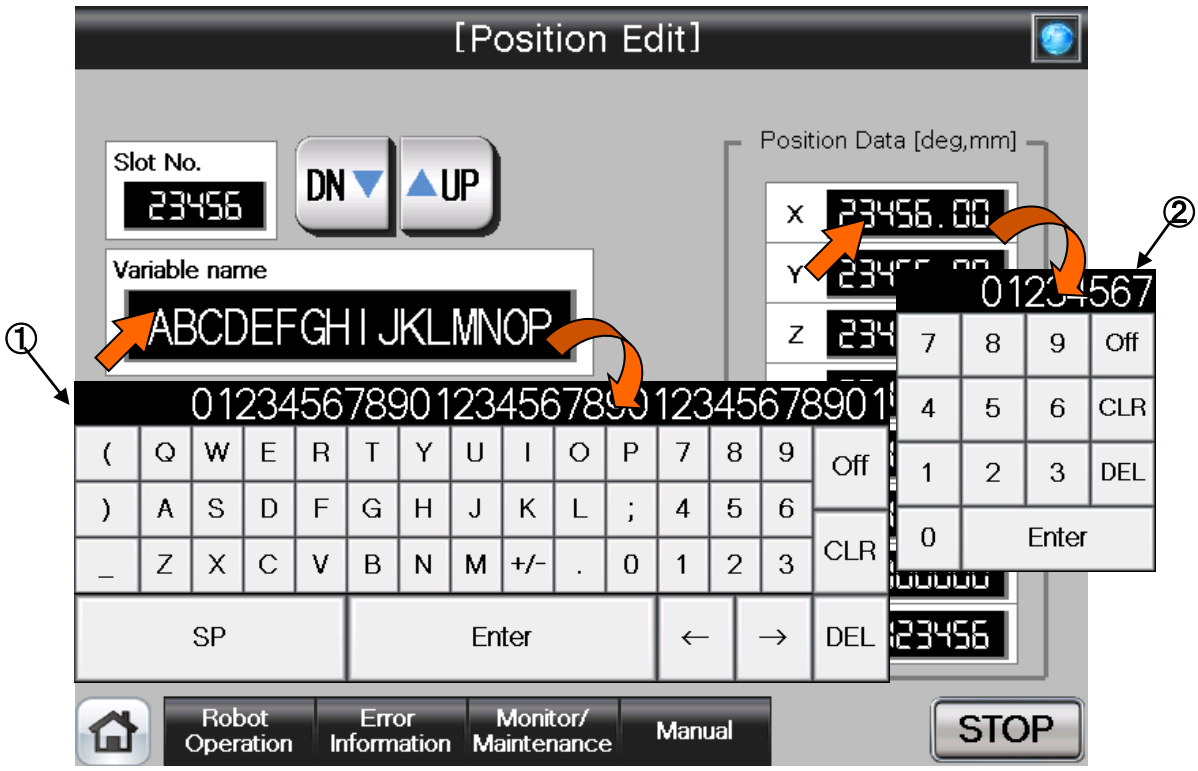
(9) Common Buttons・・・Jump to each screen

* **"STOP"** stop a running program (Servo remains ON)

(*1) To enter the variable name, press the numeric display. Character entry screen appears

(*2) To enter the position data, press the numeric display of the configuration flag (FL1: postural flat; FL2: multi-rotation data) of each axis (X, Y, Z, A, B, and C). Numeric entry screen appears

(5) See below for the character/number entry screens.



【Screen Specifications】

Operation screen to enter the variable name and position data

* For the position data of the program specified in the robot OP screen

(1) Character entry screen･･･enters the name of position variable with alphanumeric keys

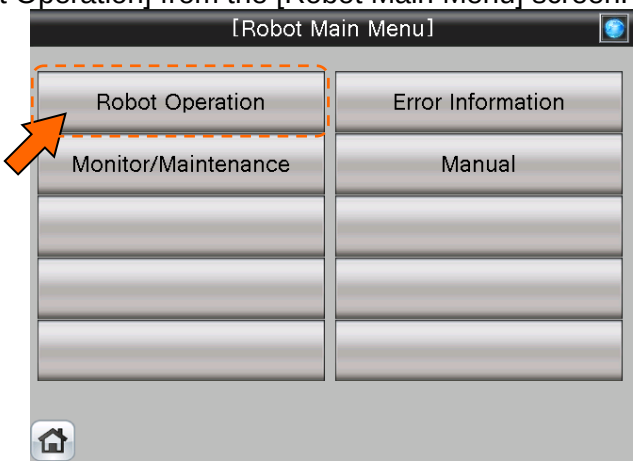
(2) Numeric value entry screen･･･enters position data with decimal input keys

Table 4-3: Details and Roles of [Position Edit] Operation Buttons

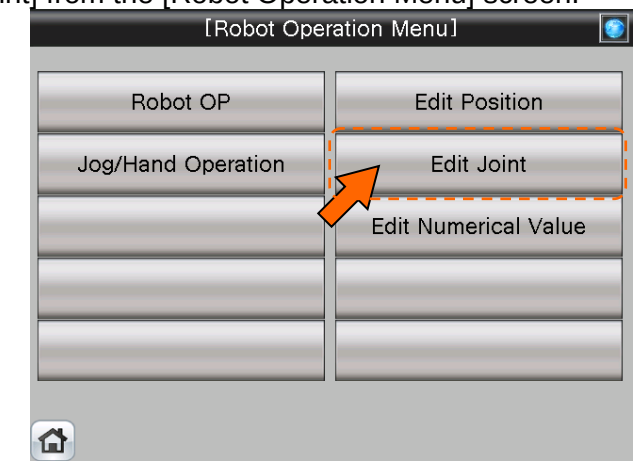
Classification	Name	Function Spec.		Note
Target Selection for Position Edit	Slot No.	Displays the task No.（0～32） to be edited * Task slot No. 0 can be specified in setting the external variable		—
		UP▲	Increases the slot No. one by one	
		DN▼	Decreases the slot No. one by one	
	Variable Name	Specifies the position variable with the position data to be edited To enter the target variable name, press the numeric display. The character entry screen appears.		
Edit	Read Position	Reads the specified position variable data		More than two edit operations cannot be performed at the same time
		Yellow Light ON	Position variable data reading in progress	
		Light OFF	Reading completed or not performed	
	Write Position	Writes the edited position data to the position variable		
		Yellow Light ON	Position variable data writing in progress	
		Light OFF	Writing completed or not performed	
	Current Position	Reads and displays the current position data		
		Yellow Light ON	Current position data reading in progress	
		Light OFF	Reading completed or not performed	
	Program Name	Displays the program name specified in the robot OP screen		
Position Data	Current Position (Axis Position)	Displays/edits the coordinate value [mm] of the axes (X, Y, and Z), angles of postural axes (A, B, and C) and configuration flag data (FL1 and FL2) To enter the target position data, press the numeric display. The numeric entry screen appears.		—
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the error Information display sub menu		
	Monitor/Maintenance	Jumps to the monitor/maintenance execution sub menu		
	Manual	Jumps to the manual display sub menu		
	STOP	Stops the running program (Servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.1.4 Editing of Joint Data Which Have been Taught to the Robot

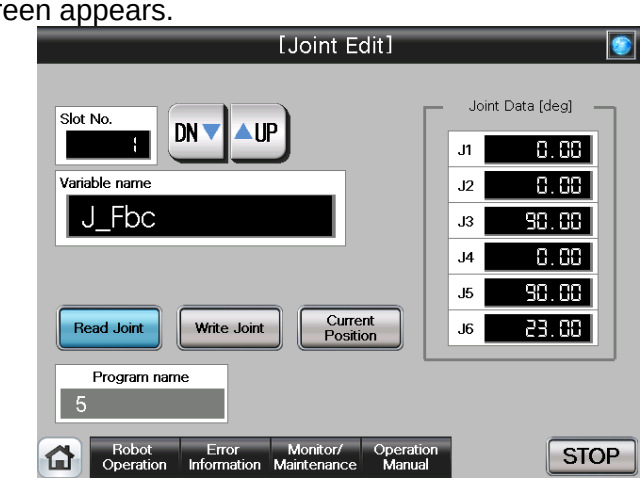
(1) Select [Robot Operation] from the [Robot Main Menu] screen.



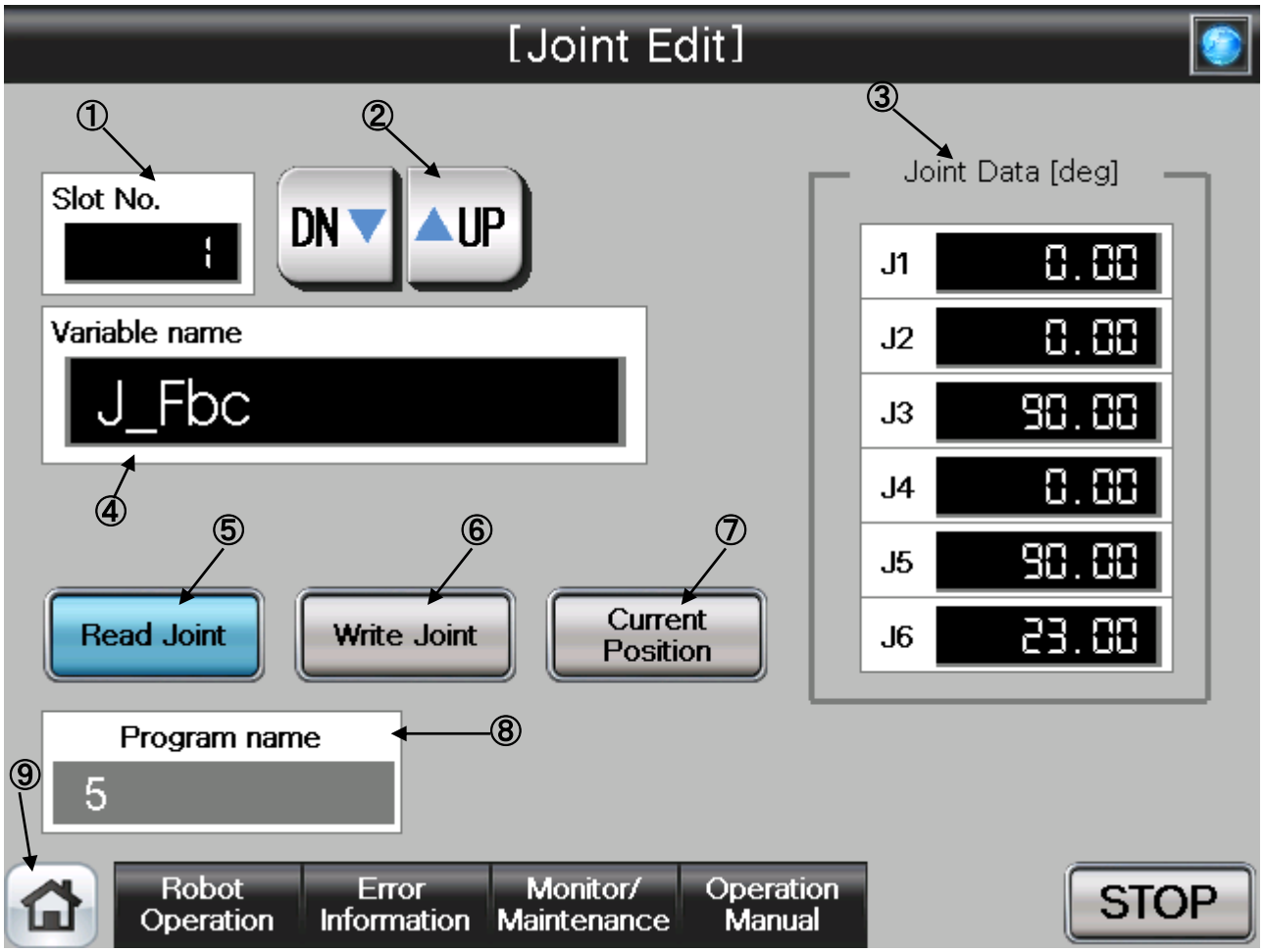
(2) Select [Edit Joint] from the [Robot Operation Menu] screen.



(3) [Joint Edit] screen appears.



(4) See below for the details of [Joint Edit] screen. For details of each operation button, see “Table 4-4: Details and Roles of [Joint Edit] Operational Buttons”.



【Screen Specification】

Operation screen to edit the robot joint variable

* For the joint data of the program specified in the robot OP screen

(1) Slot No.･･･Selects the **task slot No. (0~32)** to be edited

(2) UP/DOWN･･･Scrolls **UP** and **DN (down)** of the **task slot No.**

(3) Joint data **(*1)**･･･Edits the joint data of **each axis** (J1, J2, J3, J4, J5, J6)

(4) Variable Name **(*2)**･･･Enters the **name of joint data** to be edited

(5) Read Joint･･･Reads the **joint data** specified in the variable name in the position edit

(6) Write Joint･･･Writes the **edited joint data** in the position edit

(7) Current Position･･･Reads the **current joint data** of the robot and displays it in the joint data

(8) Program Name･･･Displays the **program specified** in the robot OP screen

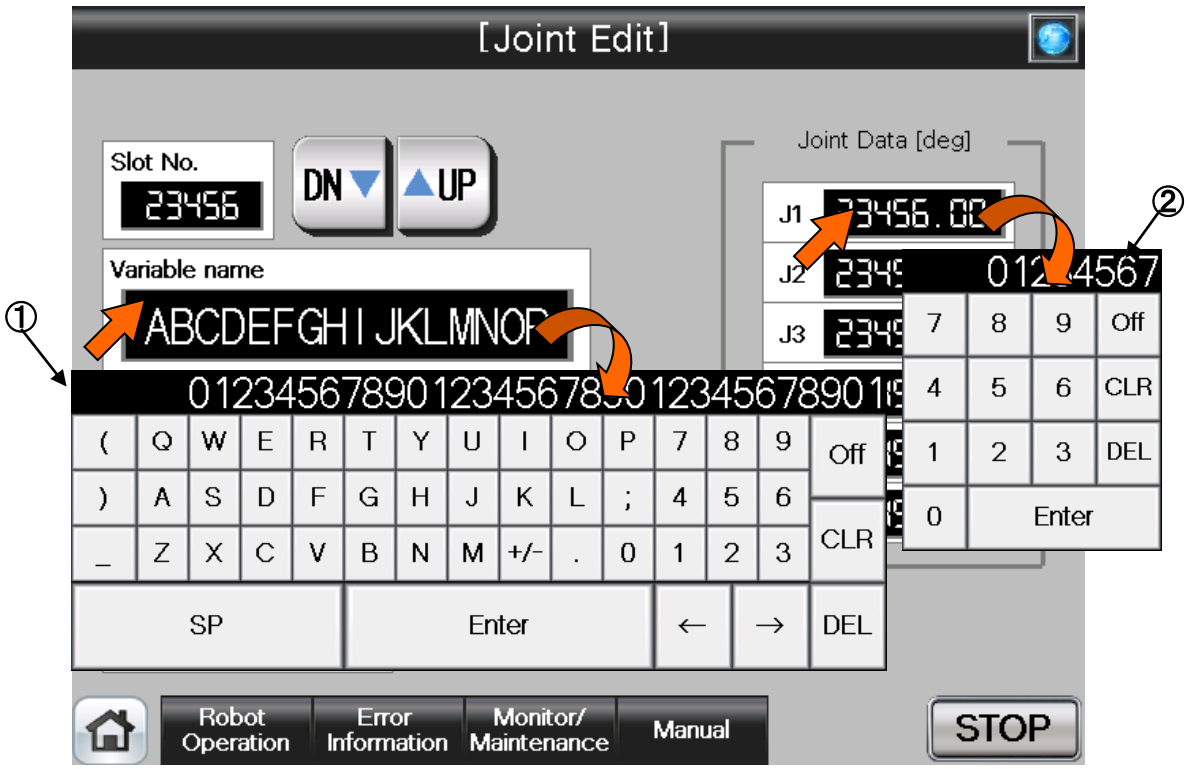
(9) Common Buttons･･･Jump to each screen

* **“STOP”** stop a running program (Servo remains ON)

(*1) To enter the variable name, press the numeric display. The character-entry screen appears

(*2) To enter the joint data, press the numeric display of each axis (J1, J2, J3, J4, J5, and J6). The numeric entry screen appears

(5) See below for the character/number entry screens.



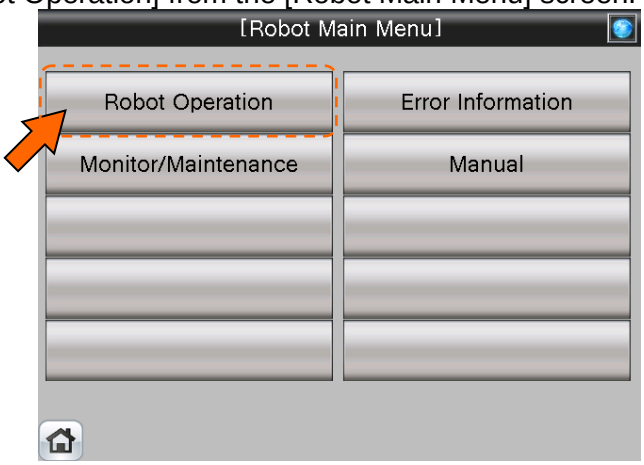
【Screen Specification】
Operation screen to enter the variable name/joint data
* For the joint data of the program specified in the robot OP screen
(1) Character entry screen･･･Enters the joint variable name with the alphabetic keys
(2) Number entry screen･･･Enters the joint data with the decimal input keys

Table 4-4: Details and Roles of [Joint Edit] Operation Buttons

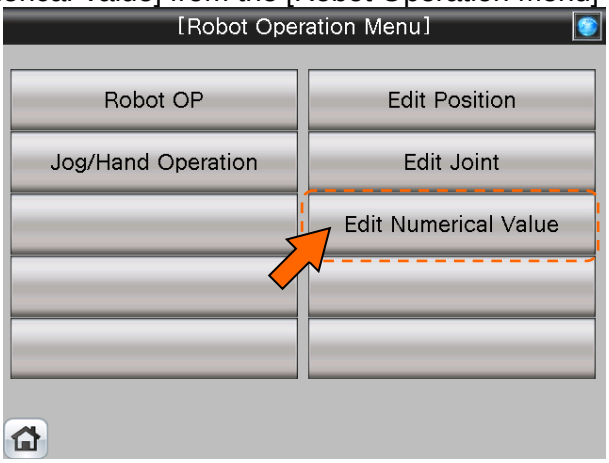
Classification	Name	Function Spec.		Note
Target Selection for Position Edit	Slot No.	Displays the task slot No.（0-32）to be edited. * Task slot No. can be specified in setting the external variable		—
		UP▲	Increases the slot No. one by one	
		DN▼	Decreases the slot No. one by one	
	Variable Name	Specifies the position variable with the position data to be edited To enter the target variable name, press the numeric display. The character entry screen appears.		
Edit	Read Joint	Reads the specified joint variable data		More than woo edit operations cannot be performed at the same time
		Yellow Light ON	Joint variable data reading in progress	
		Light OFF	Reading completed or not performed	
	Write Joint	Writes the edited joint data to the position variable		
		Yellow Light ON	Joint variable data writing in progress	
		Light OFF	Writing completed or not performed	
	Current Position	Reads and displays the current joint data		
		Yellow Light ON	Joint data reading in progress	
		Light OFF	Reading completed or not performed	
	Program Name	Displays the program name specified in the robot OP screen		
Position Data	Current Position (Each Joint Position)	Displays/edits the joint value [deg] of each axis (J1, J2, J3, J4, J5, and J6） To enter the target joint data, press the numeric display. The numeric entry screen appears.		—
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the error Information display sub menu		
	Monitor/Maintenance	Jumps to the monitor/maintenance execution sub menu		
	Manual	Jumps to the manual display sub menu		
	STOP	Stops the running program (Servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.1.5 Editing the Program Variable Data

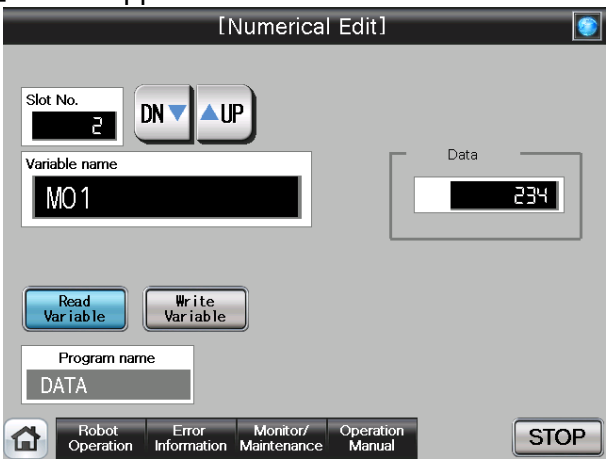
(1) Select [Robot Operation] from the [Robot Main Menu] screen.



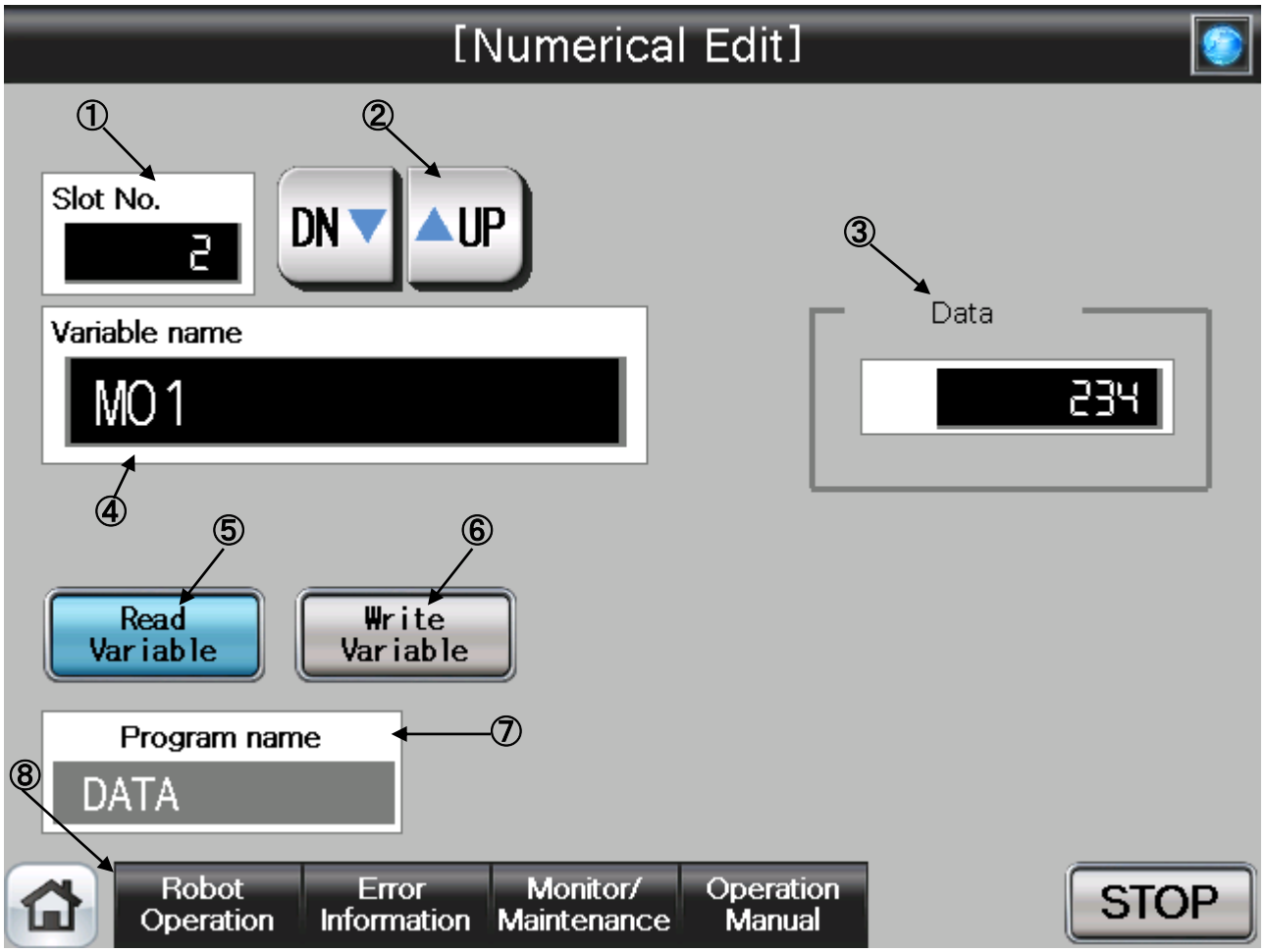
(2) Select [Edit Numerical Value] from the [Robot Operation Menu] screen.



(3) ［Numerical Edit］screen appears.



(4) See below for the［Numerical Edit］screen. For details of the operation buttons, see “Table 4-5: Details and roles of [Numerical Edit] Operation Buttons.”



【Screen Specifications】

Operation screen to set the numeric variable

* For the variable name of the program specified in the robot OP screen

(1) Slot No.･･･Selects the **task slot (0~32)** to be edited

(2) UP/DOWN･･･Scrolls **UP** and **DN (down)** of the **task slot No.**

(3) Numeric Variable **(*1)**･･･Edits the **numeric variable**

(4) Variable Name **(*2)**･･･Enters the variable name to be edited

(5) Read Variable･･･Reads the variable name **specified in the variable name**

(6) Write Variable･･･Writes the **edited variable name**

(7) Program Name･･･Displays the **program specified** in the robot OP screen

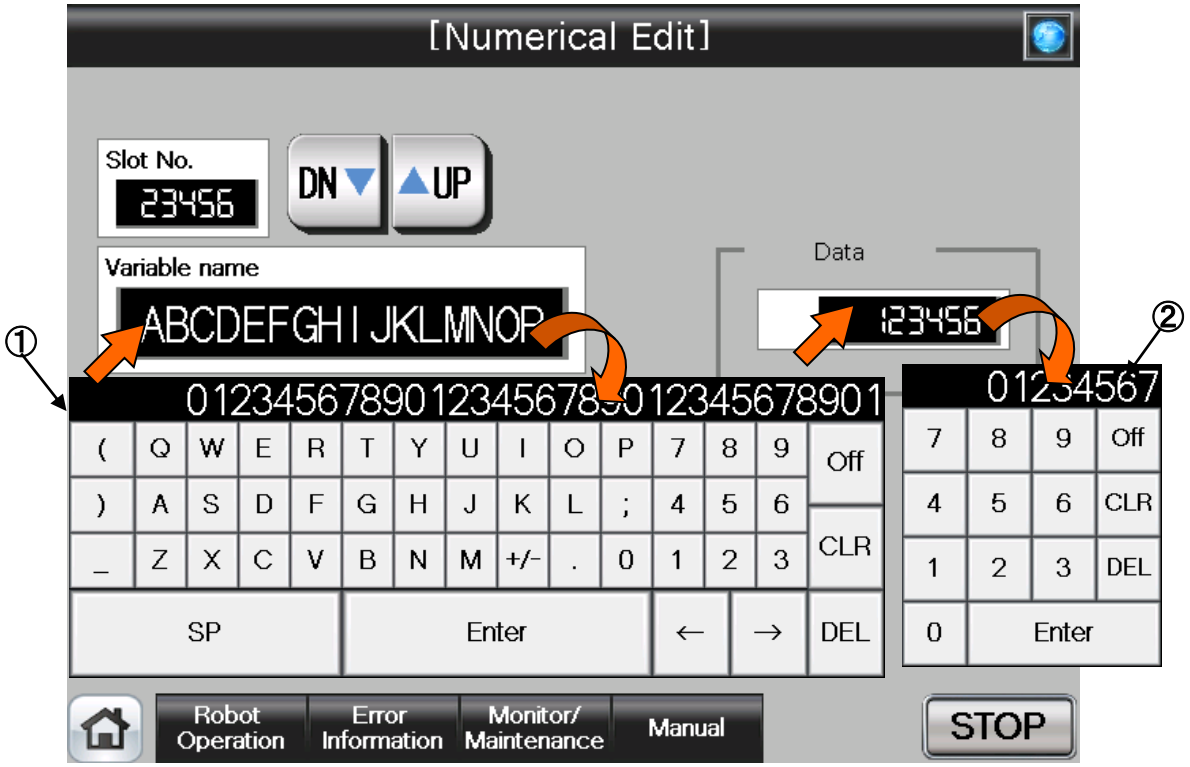
(8) Common Buttons･･･Jump to each screen

* **“STOP”** stop a running program (Servo remains ON)

(*1) To enter the variable name, press the numeric entry. The character entry screen appears

(*2) To enter the numeric variable data, press the numeric display. The numeric entry screen appears

(5) See below for the character/number entry screens.



【Screen Specifications】
Operation screen to enter the variable name/data
* For the joint data of the program specified in the robot OP screen
(1) Character entry screen･･･Enters the joint variable name with the alphameric keys
(2) Number entry screen･･･Enters the numeric value with the decimal input keys

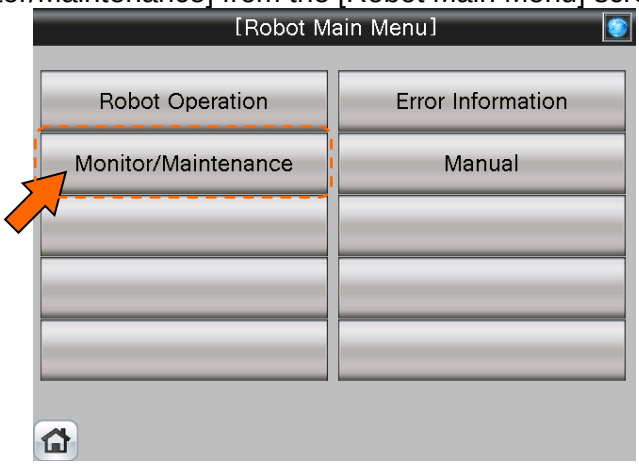
Table 4-5: Details and Roles of［Numerical Edit］Operation Buttons

Classification	Name	Function Spec.		Note
Target Selection for Position Edit	Slot No.	Displays the task slot No.（0～32） to be edited * Task slot No. can be specified in setting the external variable		—
		UP▲	Increases the slot No. one by one	
		DN▼	Decreases the slot No. one by one	
	Variable Name	Specifies the variable with the variable data to be edited To enter the target variable name, press the numeric display. The character entry screen appears.		
Edit	Read Variable	Reads the specified variable data		More than woo edit operations cannot be performed at the same time
		Yellow Light ON	Variable data reading in progress	
		Light OFF	Reading completed or not performed	
	Write Variable	Writes the edited variable data		
		Yellow Light ON	Variable data writing in progress	
		Light OFF	Writing completed or not performed	
	Program Name	Displays the program name specified in the robot OP screen		
Numeric Variable Data	Variable Value	Displays/edits the variable value To enter the target variable data, press the numeric display. The numeric entry screen appears.		—
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

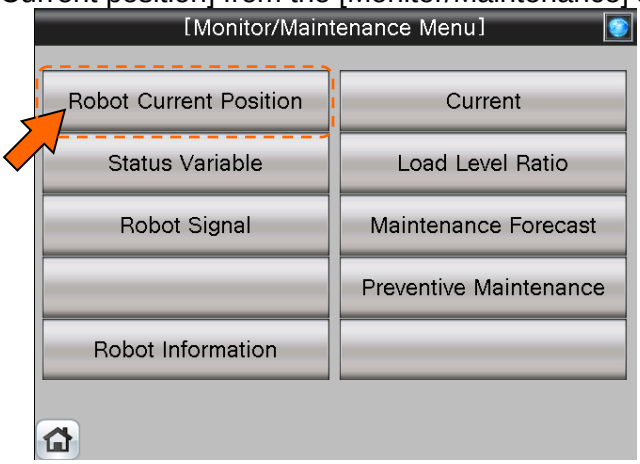
4.2 Monitoring/Maintenance Operation from GOT Screen

4.2.1 Monitoring of the Current Robot Position and Program Execution Line

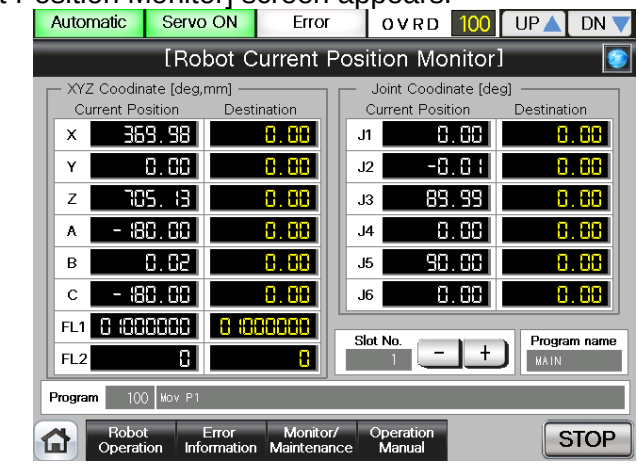
(1) Select [Monitor/Maintenance] from the [Robot Main Menu] screen.



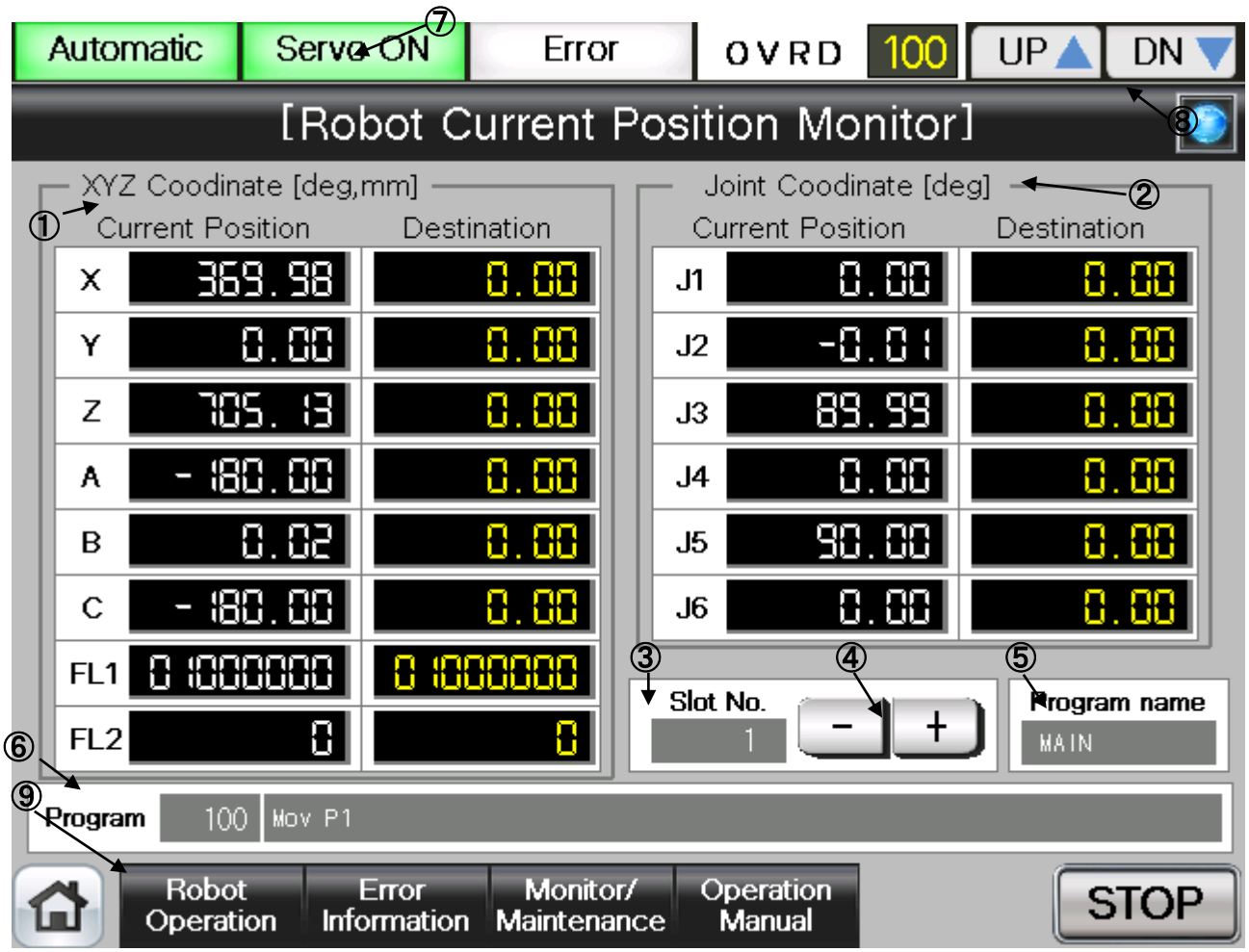
(2) Select [Robot Current position] from the [Monitor/Maintenance] screen.



(3) [Robot Current Position Monitor] screen appears.



(4) See below for the ［Robot Current Position Monitor］ screen. For details of the operation button, see “Table 4-6: Details and Roles of [Robot Current Position Monitor] Operation Button”.



【Screen Specifications 】

Screen to monitor the current position of each robot axis

(1) XYZ Coordinates･･･Displays the current position of each **coordinate** (X, Y, and Z axes: in mm), **postural axis** (A, B, and C: in angles), and **configuration flag** (FL1 **postural flag;** FL2 multiple-rotation data) in the XYZ coordinates

* **Current Position:** Current robot position

* **Destination:** Destination of the running program (displayed only when the program movement command is executed)

(2) Joint Coordinates･･･Displays the current position of **each axis** (J1, J2, J3, J4, J5, and J6: in angles) in the joint coordinates

* **Current Position:** Current robot position

* **Destination:** Destination of the running program (displayed only when the program movement command is executed)

(3) Slot No. **(*1)**･･･Selects the **task slot No. (1-32)**

(4) ＋/－ Buttons･･･Displays the **task slot No.** with ＋ (plus) and － (minus)

(5) Program Name･･･Displays the **program specified** in the robot OP screen

(6) Program･･･Displays **the line number of the running program and statement**

(7) Running Status･･･Lights the lamp according to the robot running status

* **Automatic Operation in Progress** (green) **Servo Power ON** (green) **Error** (red)

Current operation speed value（%）

(8) UP/DOWN･･･Changes the operation speed value in the **OVRD DISPLAY**

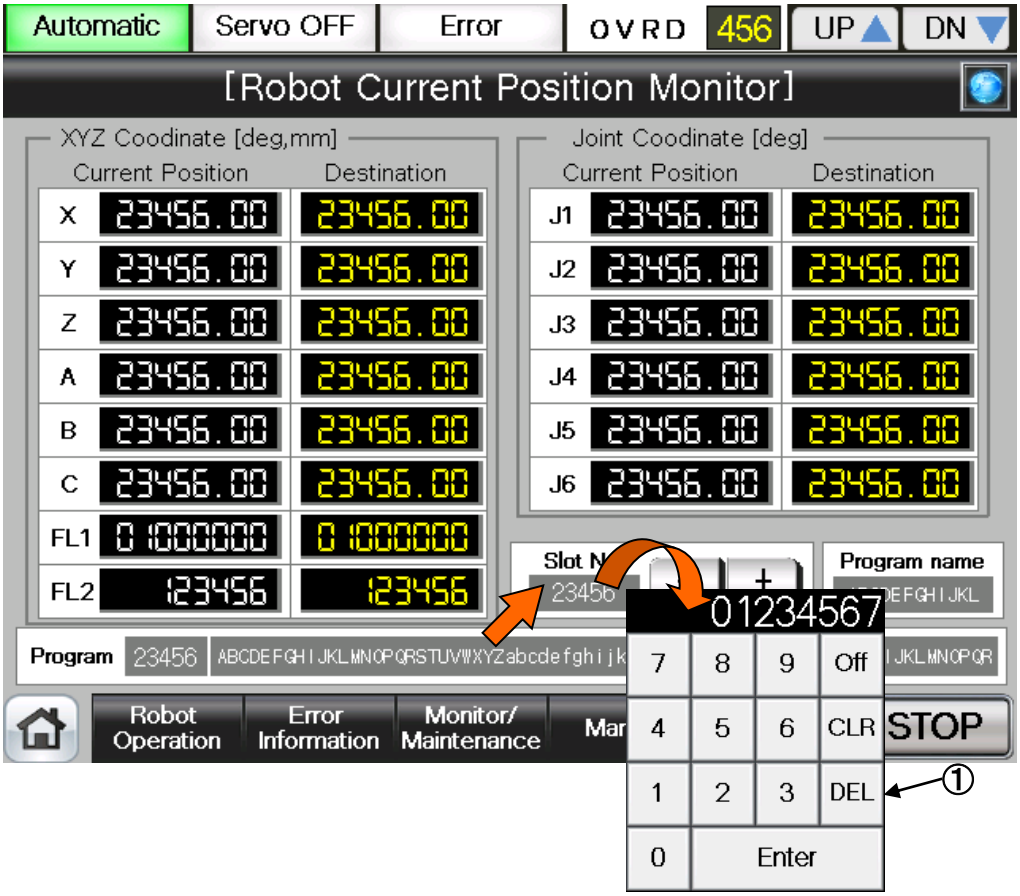
UP (speed-up) and **DN** (speed-down)

(9) Common Buttons･･･Jump to each screen

* **“STOP”** stop a running program (Servo remains ON)

(*1) To enter the task slot No, press the numeric display. The numeric entry screen appears.

(5) See below for the number-entry screen.



【Screen Specification】

Operation screen to enter the task slot No.

* For the joint data of the program specified in the robot OP screen

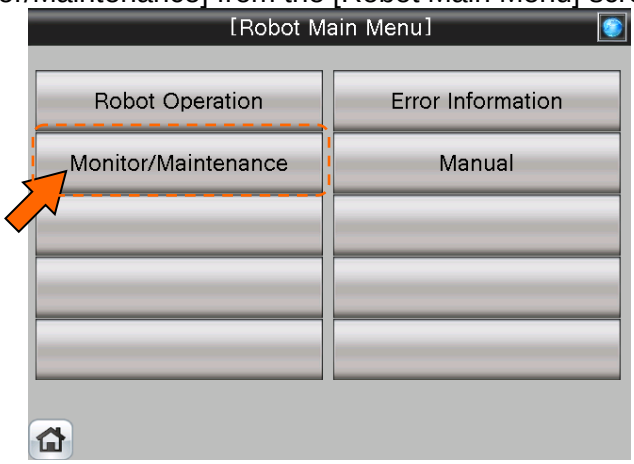
(1) Number Entry Screen･･･Enters the task slot No. with the decimal input keys

Table 4-6: Details and Roles of [Robot Current Position Monitor] Operation Buttons

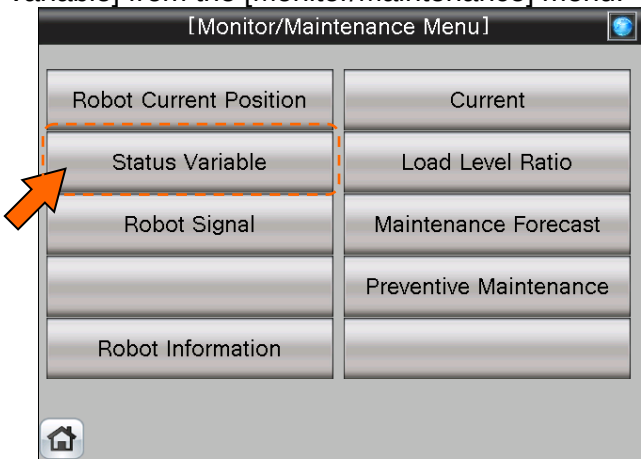
Classification	Name	Function Spec.		Note
Display Current Position	XYZ Coordinates	Displays the current position and destination of each axis (1) Coordinate Position (X/Y/Z axis: mm) (2) Postural axis (A/B/C axis: in angle) (3) Configuration flag (FL1 postural flag; FL2 multi-rotation data)		—
	Joint Coordinates	Displays the current position and destination of each axis ・Axes (J1-J6 in angles)		
Target Selection for Position Edit	Slot No.	Displays the task slot No. (1-32) to be edited		—
		Addition＋	Increases the slot No. one by one	
		Subtraction－	Decreases the slot No. one by one	
	Variable Name	Specifies the variable with the variable data to be edited To enter the target variable name, press the numeric display. The character entry screen appears.		
Edit	Program Name	Displays the program name specified in the robot OP screen		—
	Program	Displays the line No. of the running program and command		
Display of Running State	Operation Mode	Displays the operation mode		—
		Green Light ON	Auto-operation mode（Automatic）	
		Light OFF	Manual operation mode（Manual）	
	Servo ON	Displays the servo power status		
		Green Light ON	Servo power ON	
		Light OFF	Servo power OFF	
	Error	Displays the robot error status		
		Red Light ON	Robot error in progress	
		Light OFF	No error	
	OVRD	Displays the current override value (%)		
		UP▲	Increases the override value	
		DN▼	Decreases the override value	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.2 Monitoring of the Robot Status Variable

(1) Select [Monitor/Maintenance] from the [Robot Main Menu] screen.

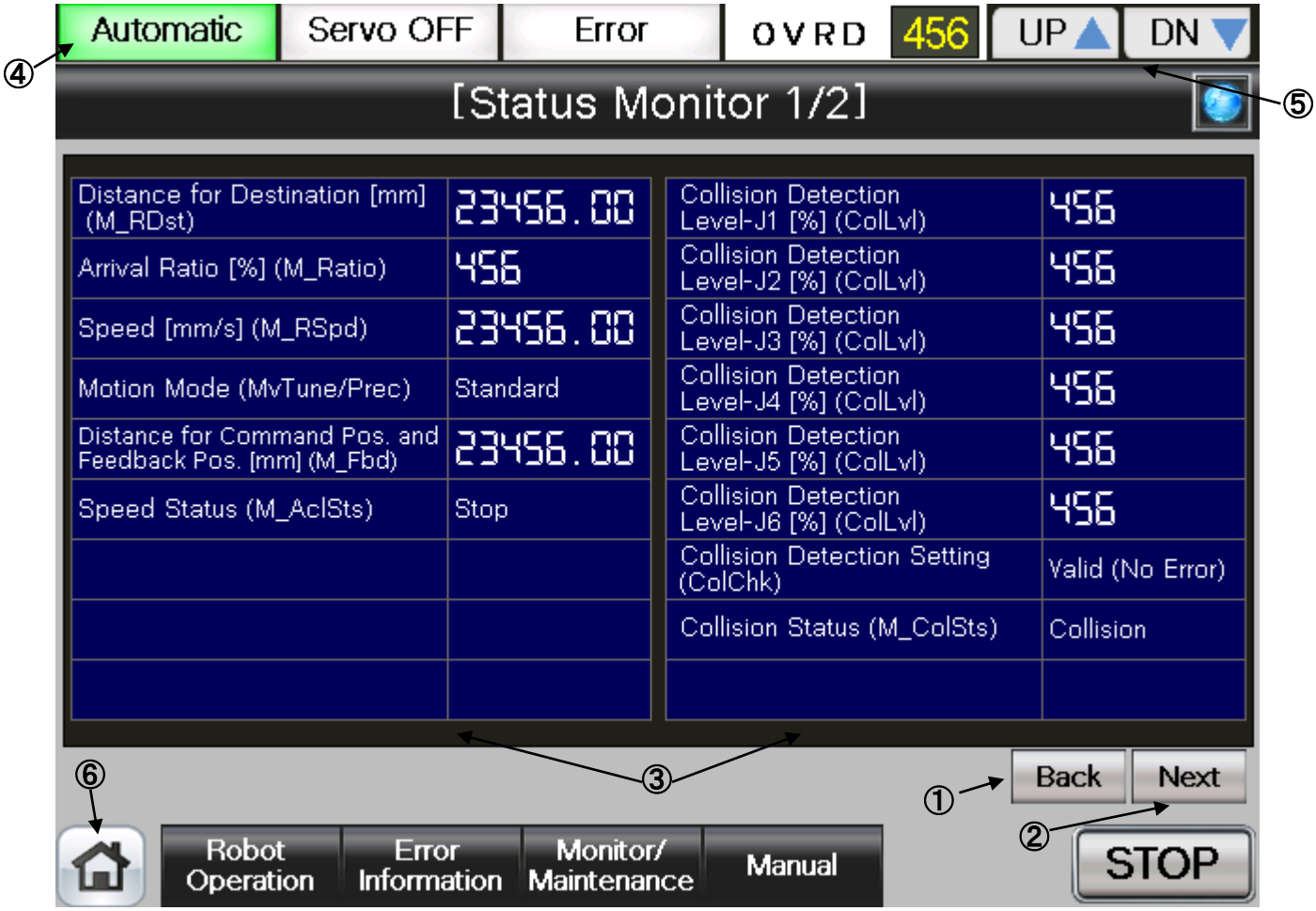


(2) Select [Status Variable] from the [Monitor/Maintenance] menu.



(3) ［Status Monitor 1/2］ screen appears.

(4) See below for［Status Variable Monitor 1/2］screen. For details of the operation button, see “Table 4-7: Details and Roles of [Status Variable Monitor] Operation Buttons”.



【Screen Specifications】

Screen to monitor the internal robot variable data

(1) Back･･･Switches the status variable monitor screens
［Status Variable Monitor 1/2］→［Status Variable Monitor 2/2］

(2) Next･･･Switches the status variable monitor screens
［Status Variable Monitor 1/2］→［Status Variable Monitor 2/2］

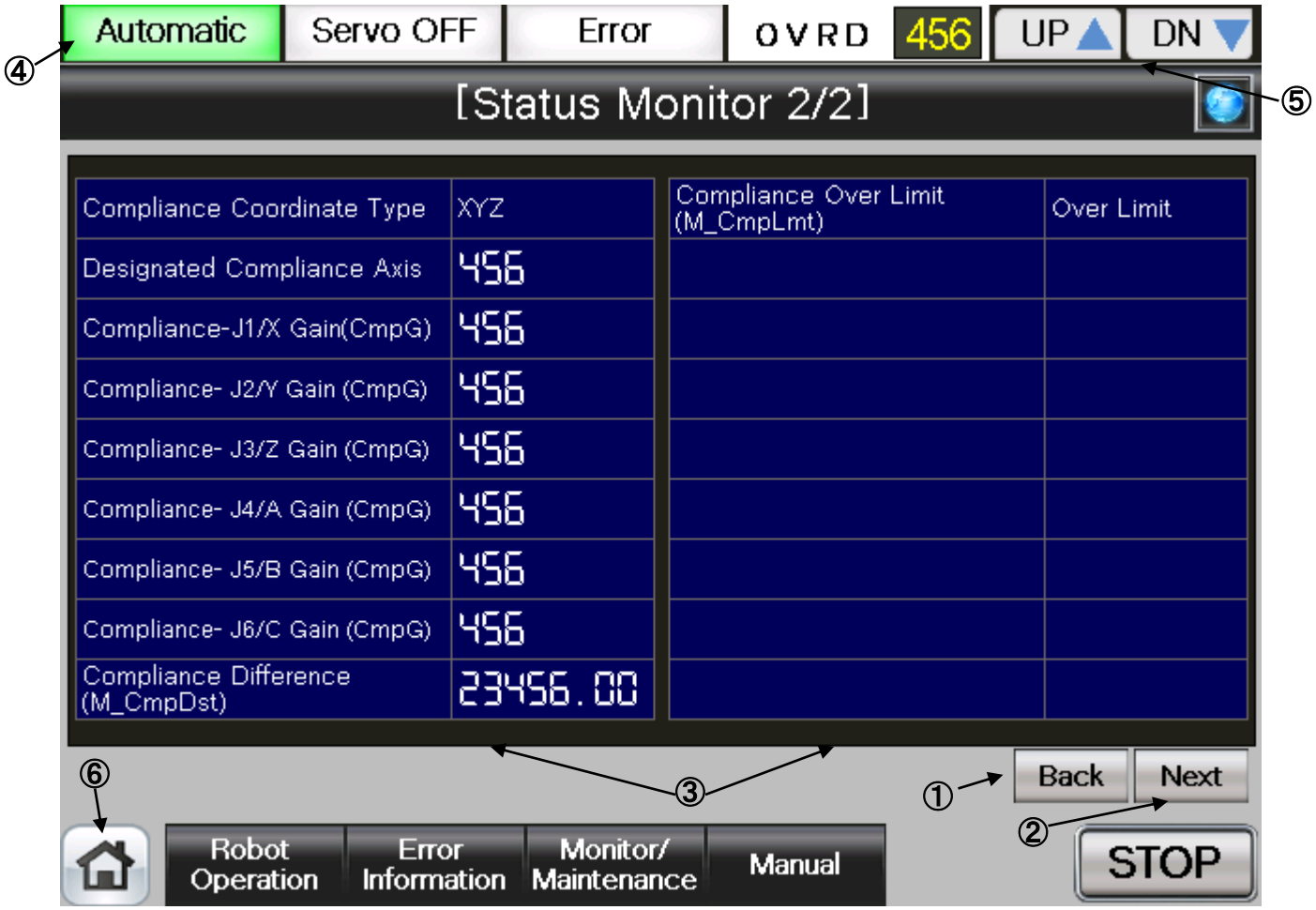
(3) Status Variable･･･Displays the **robot parameter data**（robot parameter setting values）
*** For details of the status variable, see “Table 4-8: Details of Status Variable “Status Variable Monitor 1/2”**

(4) Running Status･･･Lights the lamp according to the robot running status
* **Automatic Operation in Progress** (green) **Servo Power ON** (green) **Error** (red) **Current operation speed value**（%）

(5) UP/DOWN･･･Changes the operation speed in the **OVRD display UP** (speed-up), **DN** (speed-down)

(6) Common Buttons･･･Jump to each screen
* **“STOP”** stop a running program (Servo remains ON)

(4) See below for ［Status Variable Monitor 2/2］ screen. For details of the operation button, see “Table 4-7: Details and Roles of [Status Variable Monitor] Operation Buttons”.



【Screen Specifications】

Screen to monitor the internal variable data of the robot

(1) Back･･･Switches the status variable monitor screens
［Status Variable Monitor 2/2］→［Status Variable Monitor 1/2］

(2) Next･･･Switches the status variable monitor screens
［Status Variable Monitor 2/2］→［Status Variable Monitor 1/2］

(3) Status Variable･･･Displays the **robot parameter data**（robot parameter setting values）
*** For details of the status variable, see “Table 4-9: Details of Status Variable “Status Variable Monitor 2/2”**

(4) Running Status･･･Lights the lamp according to the robot running status
* **Automatic operation in progress** (green) **Servo Power ON** (green) **Error** (red)
Current operation speed value (%)

(5) UP/DOWN････Changes the operation speed in the **OVRD display UP** (speed-up),
DN (speed-down)

(7) Common Buttons･･･Jump to each screen
* **“STOP”** stop a running program (Servo remains ON)

Table 4-7: Details and Roles of [Status Variable Monitor] Operation Buttons

Classification	Name	Function Spec.		Note
Screen Switch	Back	Switches the state variable monitor screen in ascending order (2/2→1/2→2/2)		—
	Next	Switches the state variable monitor screen in descending order (1/2→2/2→1/2)		
Display of Running State	Operation Mode	Displays the operation mode		—
		Green Light ON	Auto-operation mode (Automatic)	
		Light OFF	Manual operation mode (Manual)	
	Servo ON	Displays the status of servo power		
		Green Light ON	Servo power ON	
		Light OFF	Servo power OFF	
	Error	Displays the robot error status		
		Red Light ON	Robot error in progress	
		Light OFF	No error	
	OVRD	Displays the current override value (%)		
		UP▲	Increases the override value	
		DN▼	Decreases the override value	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

Table 4-8: Details of Status Variable [Status Variable Monitor 1/2]

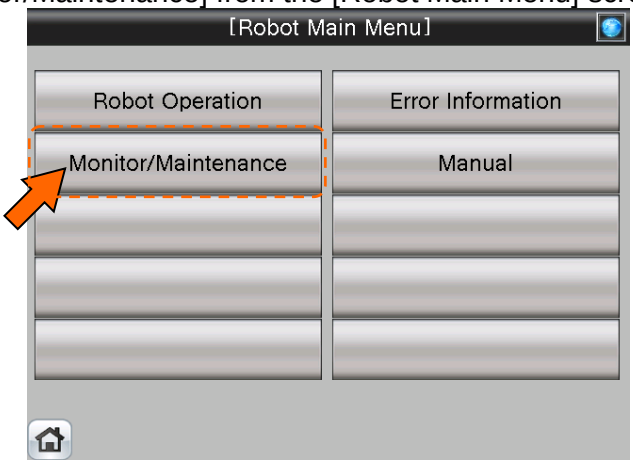
Variable Name	Unit	Description
M_RDst	[mm]	Remaining distance to the target position while the robot is in motion.
M_Ratio	[%]	Returns how much the robot has approached the target position (0 to 100%) while the robot is moving.
M_RSpd	[mm/s]	Current command speed
MvTune/Prec	—	Currently-set operation characteristic mode ［1: Standard/2: High-speed positioning mode/3: Trajectory priority mode/4: Vibration suppression］
M_Fbd	[mm]	Distance between the command position and feedback position
M_AclSts	—	Current acceleration/deceleration status [0=stop/1=acceleration/2=constant speed/3=deceleration]
Collision Detection Level (ColLvl)	[%]	Detection level (sensitivity) of tolerance to impact of each joint axis when program is running. ［Setting range 1 (most sensitive) – 500 (least sensitive)］
Collision Detection Setting (ColChk)	—	Setting status of the impact detection function ［ON(Error)/ON(No Error)/OFF］ * ON (Error): Outputs error in collision ON (No Error): No error output in collision
Collision Detection Status （M_ColSts）	—	Collision detection status ［1: Collision being detected/0: No collision detected］

Table 4-9: Details of Status Variable [Status Variable Monitor 2/2]

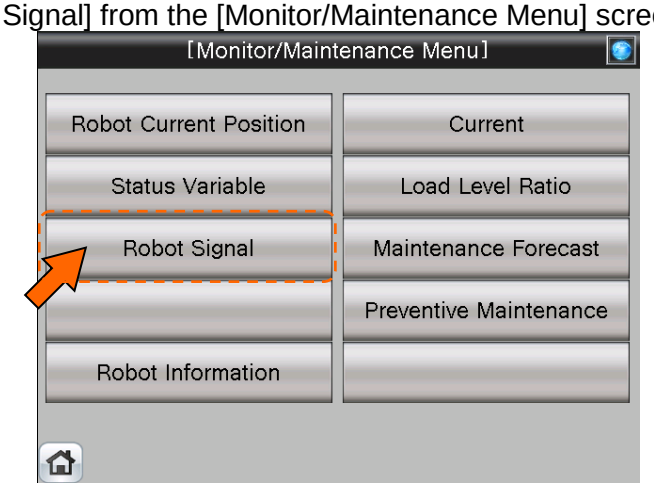
Variable Name	Unit	Description
Compliance Coordinate Type	—	Coordinate type of compliance function ［0: Joint coorcinate/1: XYZ corcinate/2: Tool］
Designated Compliance Axis	—	Designated compliance axis ［Designates 6 axes　1: Valid/0: Invalid］
Compliance Gain (CmpG)	—	Gain value of compliance specified for each axis (specified value of softness)
Compliance Difference (M_CmpOst)	—	Travel distance between the command value and actual position when executing the compliance function
Compliance Over Limit (M_CmpLmt)	—	Reports if the compliance function exceeds various limits [1: About to exceed the limit/0: Not about to exceed the limit]

4.2.3 Monitoring of Robot Signal

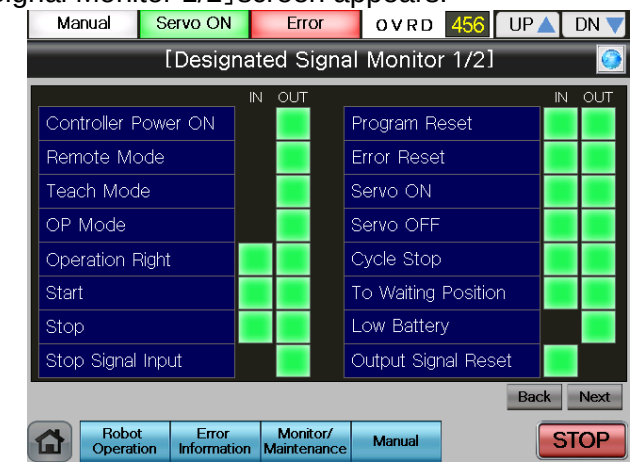
(1) Select [Monitor/Maintenance] from the [Robot Main Menu] screen.



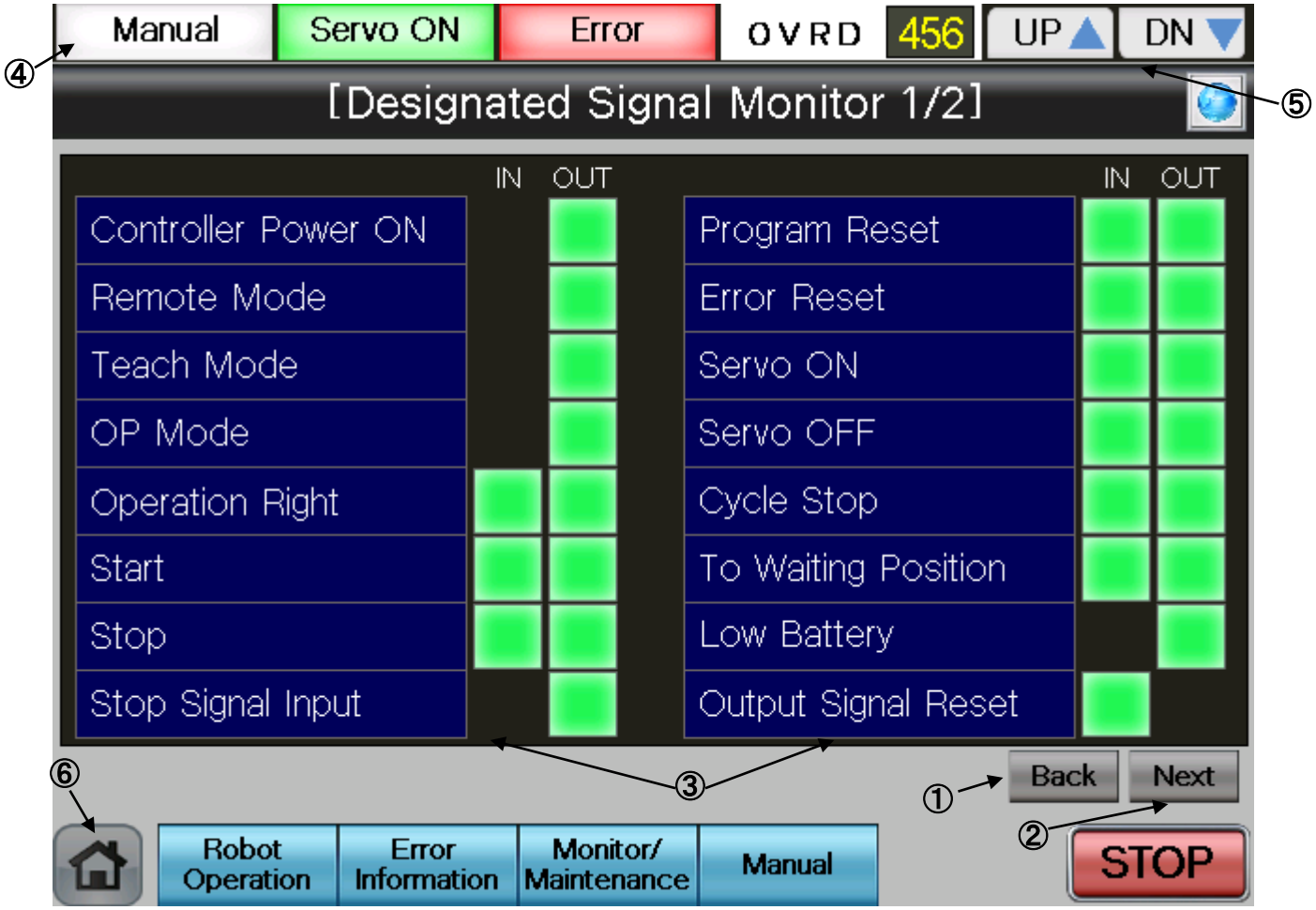
(2) Select [Robot Signal] from the [Monitor/Maintenance Menu] screen.



(3) [Designated Signal Monitor 1/2]screen appears.



(4) See below for the [Designated Signal Monitor 1/2] screen. For details of the operation button, see [Table4-10: Details and Roles of “Designated Signal Monitor” Operation Buttons].



【Screen Specifications】

Screen to monitor the designated robot input/output (I/O) signals

(1) Back･･･Switches the dedicated signal monitor screens［Dedicated Signal Monitor 1/2］→［Dedicated Signal Monitor 2/2］

(2) Next･･･Switches the dedicated signal monitor screens［Dedicated Signal Monitor 1/2］→［Dedicated Signal Monitor 2/2］

(3) Dedicated Signal･･･**Displays the dedicated I/O signal status of robot controller**

*** For details of the dedicated I/O signals, see [Table 4-11: Details of the Dedicated Signal Monitor “Dedicated Signal Monitor 1/2”]**

(4) Display of Running State･･･Lights the lamp according to the robot running status

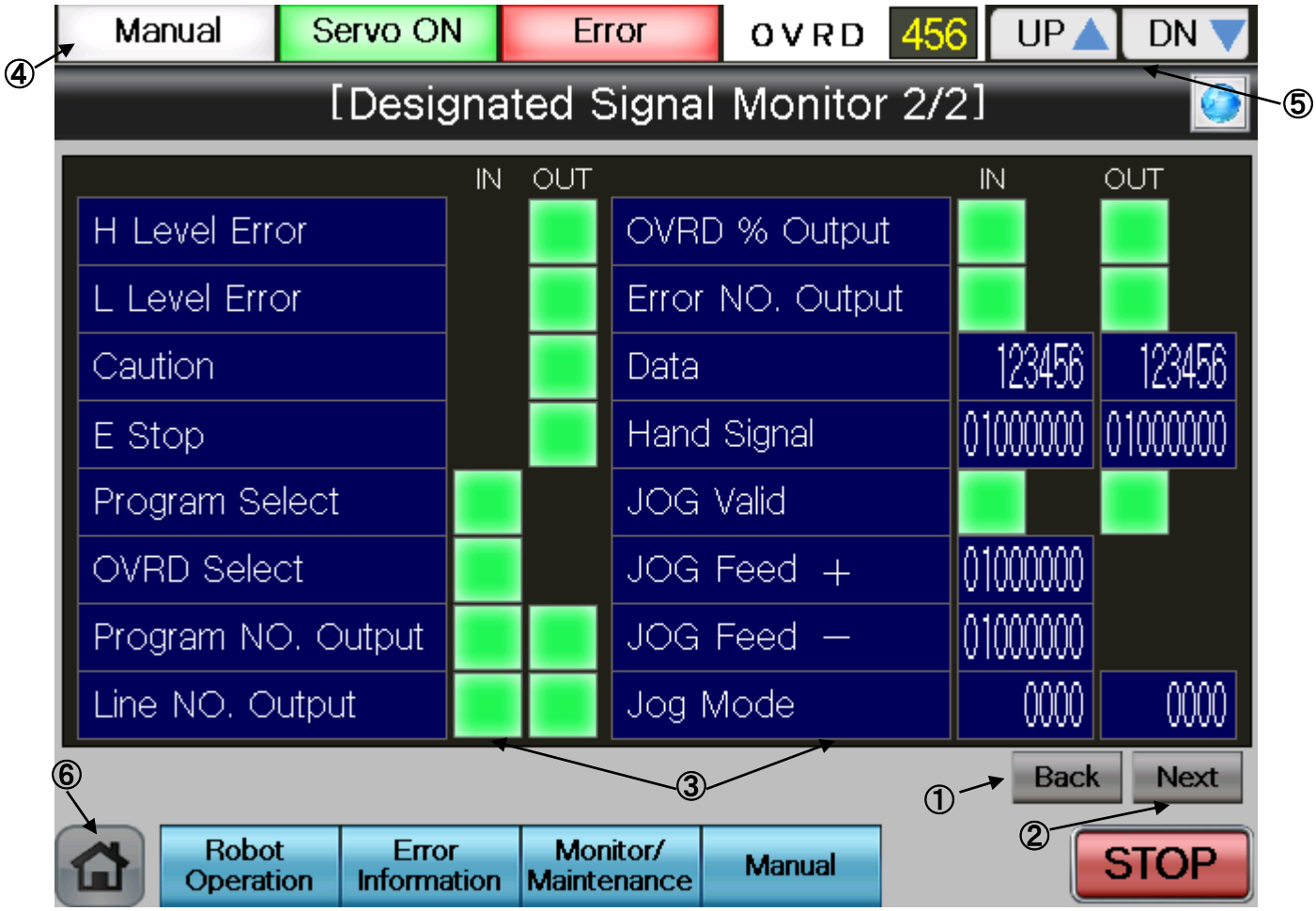
* **Automatic Operation in Progress** (green) **Servo power ON** (green) **Error** (red) **Current operation speed value** (%)

(5) UP/DOWN･･･Changes the operation speed in the **OVRD display UP** (speed-up), **DN** (speed-down)

(6) Common Buttons･･･Jump to each screen

* **“STOP”** stop a running program (Servo remains ON)

(5) See below for the [Dedicated Signal Monitor 2/2] screen. For details of the operation buttons, see [4-10: Details and Roles of “Dedicated Signal Monitor” Operation Buttons].



【Screen Specifications】

Screen to monitor the dedicated robot I/O signals

(1) Back･･･Switches the dedicated signal monitor screens［Dedicated Signal Monitor 2/2］→［Dedicated Signal Monitor 1/2］

(2) Next･･･Switches the dedicated signal monitor screens［Dedicated Signal Monitor 2/2］→［Dedicated Signal Monitor 1/2］

(3) Dedicated Signal･･･Displays the dedicated I/O signal status of robot controller

*** For details of the dedicated I/O signals, see [Table 4-12: Details of the Dedicated Signal Monitor “Dedicated Signal Monitor 2/2”]**

(4) Display of Running State･･･Lights the lamp according to the robot running status

* **Automatic Operation in Progress** (green) **Servo Power ON** (green) **Error** (red) **Current operation speed value** (%)

(5) UP/DOWN･･･Changes the operation speed in the **OVRD display UP** (speed-up), **DN** (speed-down)

(6) Common Buttons･･･Jump to each screen

* **“STOP”** stop a running program (Servo remains ON)

Table 4-10: Details and Roles of "Robot Signal Monitor" Operation Buttons

Classification	Name	Function Spec.		Note
Screen Switch	Back	Switches the state variable monitor screen in ascending order (2/2→1/2→2/2)		—
	Next	Switches the state variable monitor screen in descending order (1/2→2/2→1/2)		
Display of Execution Status	Operation Mode	Displays the operation mode		—
		Green Light ON	Auto-operation mode（Automatic）	
		Light OFF	Manual operation mode（Manual）	
	Servo ON	Displays the status of servo power		
		Green Light ON	Servo power ON	
		Light OFF	Servo power OFF	
	Error	Displays the robot error status		
		Red Light ON	Robot error in progress	
		Light OFF	No error	
	OVRD	Displays the current override value (%)		
		UP▲	Increases the override value	
		DN▼	Decreases the override value	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

Table 4-11: Details of the Dedicated Signal Monitor "Dedicated Signal Monitor 1/2"

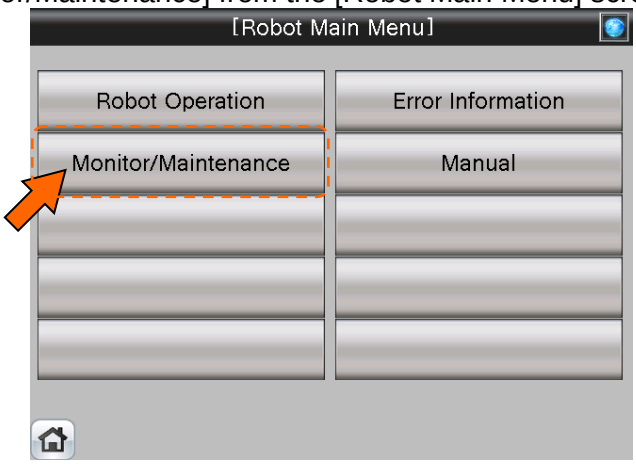
Variable Name	Classification	Description
Controller Power ON	Output	ON when the external input signal can be received after the power is ON
Remote Mode	Output	ON when the key switch on the operation panel is set to AUTO and remote operation is valid
Teach Mode	Output	ON when the key switch on the operation panel is set to the teach mode (TBD)
OP Mode	Output	ON when the key switch is in the AUTO mode and the operation panel is valid
Operation Right	Input/Output	[Input] ON when requesting the operation rights of the external signal control [Output] ON when in the AUTO mode and the operation right input signal is ON
Start	Input/Output	[Input] ON when requesting to start a program [Output] ON while the program is running
Stop	Input/Output	[Input] ON when requesting to stop the program in operation [Output] ON when program is interrupted
Stop Input	Output	ON the stop signal is input.
Program Reset	Input/Output	[Input] ON when cancelling the paused of the program and bringing the execution line to the top. [Output] ON when selecting a program
Error Reset	Input/Output	[Input] ON when requesting error status cancellation [Output] ON with an error status
Servo ON	Input/Output	[Input] ON when requesting to turn the servo on [Output] ON when the servo is on
Servo OFF	Input/Output	[Input] ON when requesting to turn the servo off [Output] ON when the servo cannot be on
Cycle Stop	Input/Output	[Input] ON when requesting the cycle stop [Output] ON during the operation to request the cycle stop
Safe Point Return	Input/Output	[Input] ON when requesting the safe point return operation [Output] ON during the safe point return
Battery Voltage Drop	Output	ON when the battery voltage of the controller is lowered
General Output Reset	Input	ON when requesting the general output signal reset

Table 4-12: Details of the Dedicated Signal Monitor "Dedicated Signal Monitor 2/2"

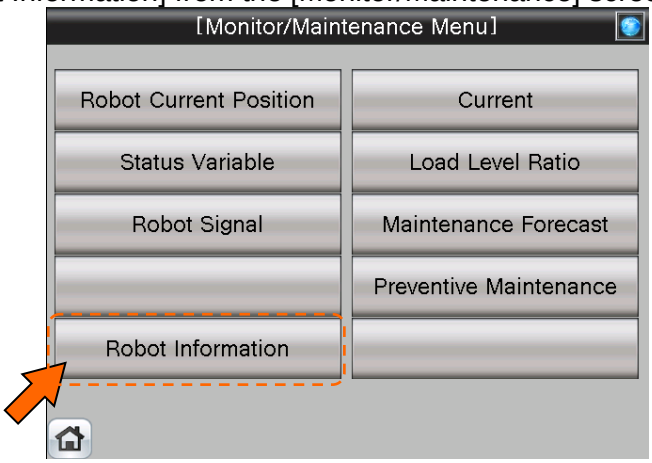
Variable Name	Classification	Description
High Level Error	Output	ON with a serious error
Low Level Error	Output	ON with a minor error
Warning Error Level	Output	ON with an alarm
Emergency Stop	Output	ON with an emergency stop
Program Selection	Input	ON when selecting a program
Override Selection	Input	ON when setting override
Program No. Output	Input/Output	[Input] ON when requesting Task 1 program No. output [Output] ON when outputting the program No.
Line Number Output	Input/Output	[Input] ON when requesting Task 1 program No. output [Output] ON when outputting the line No.
Override Value Output	Input/Output	[Input] ON when requesting an override value output [Output] ON when outputting the override value
Error No. Output	Input/Output	[Input] ON when requesting the error No. output [Output] ON when outputting the error No.
Numeric Value	Input/Output	[Input] Displays the numeric value when the No. output is requested [Output] Displays the output numeric value
Hand Signal	Input/Output	[Input] Displays the hand-input signal status [Output] Displays the hand-output signal status
Jog Valid	Input/Output	[Input] ON when requesting jog operation for the specified axis [Output] ON when the specified axis is in jog operation
Jog Feed＋	Input	Specifies the jog operation axis
Jog Feed－	Input	Specifies the jog operation axis
Jog Mode	Input/Output	[Input] Specifies a jot mode [joint=0/XUZ=1］ [Output] Displays the current jog mode

4.2.4 Confirming the Robot Product Information

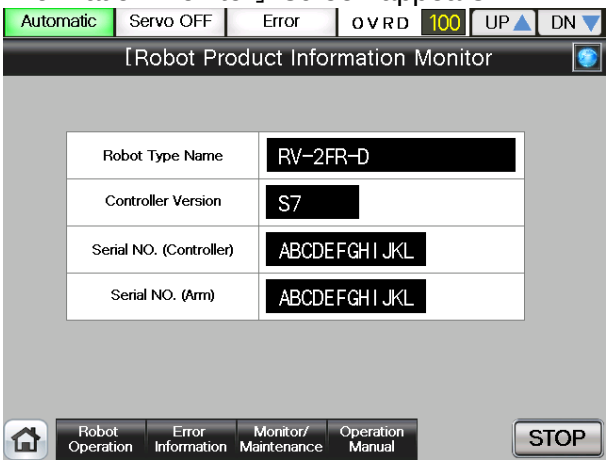
(1) Select [Monitor/Maintenance] from the [Robot Main Menu] screen.



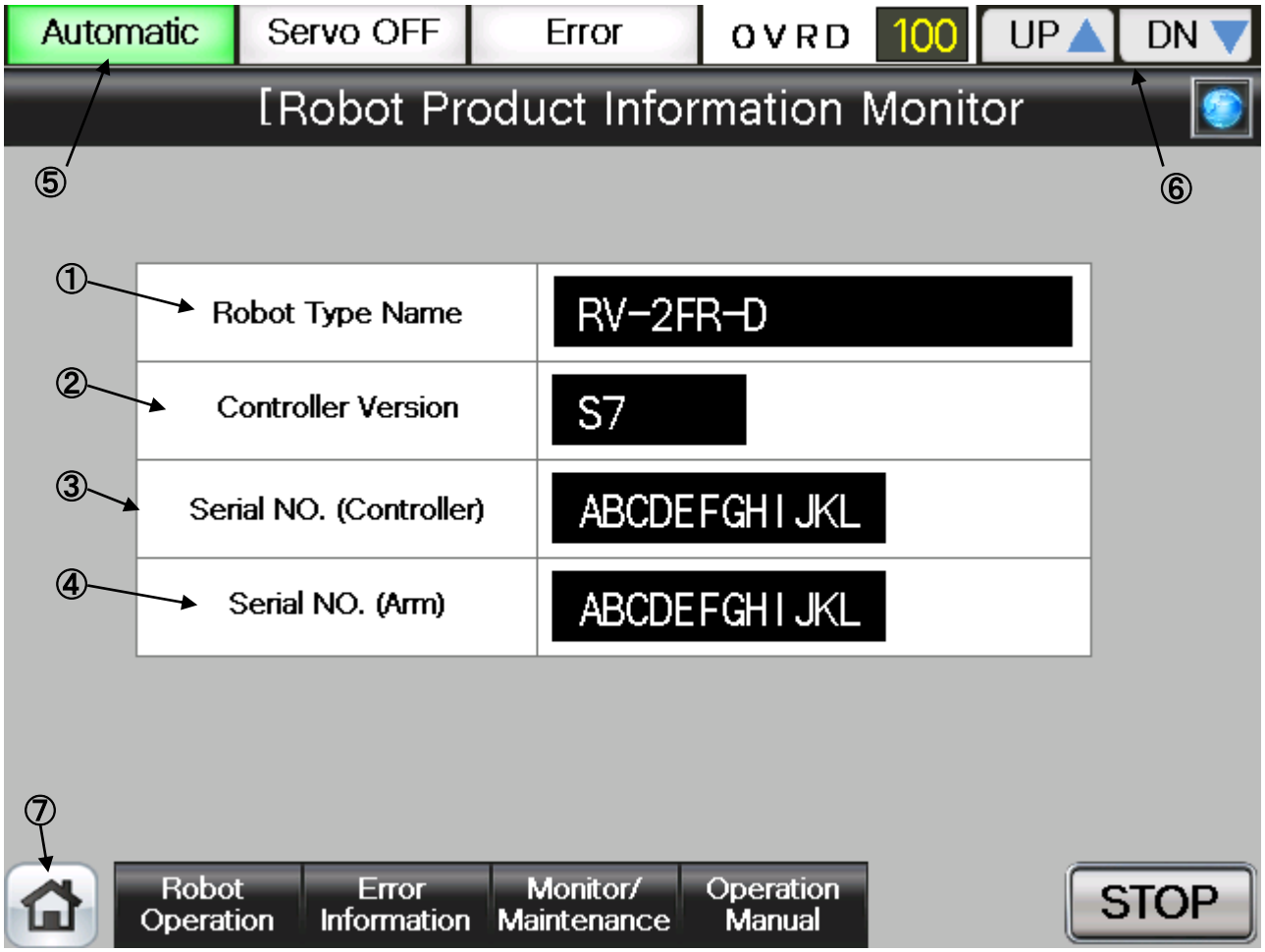
(2) Select [Robot Information] from the [Monitor/Maintenance] screen.



(3) ［Robot Product Information Monitor］ screen appears.



(6) See below for the [Robot Product Information Monitor] screen. For details of operation button, [Table 4-13: Details and Roles of the “Robot Production Information Monitor” Operation Buttons”].



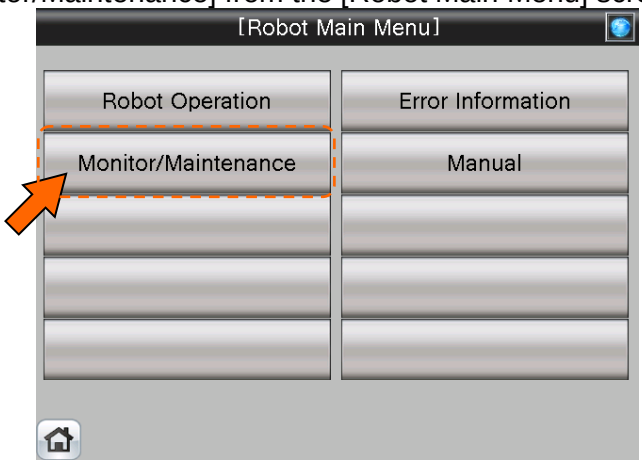
【Screen Specifications】
Screen to monitor the product information of the robot body and controller
(1) Robot Type Name･･･Type of the robot body
(2) Controller Version･･･S/W version of the controller
(3) Controller Serial No.･･･Specific serial No. to identify a controller
(4) Robot Serial No.･･･Specific serial No. to identify a robot
(5) Display of Running State･･･Lights the lamp according to the robot running status
* **Automatic Operation in Progress** (green) **Servo Power ON** (green) **Error** (red) **Current operation speed value** (%)
(6) UP/DOWN･･･Changes the operation speed in the **OVRD DISPLAY UP** (speed-up)
DN (speed-down)
(7) Common Buttons･･･Jump to each screen
* **“STOP”** stop a running program (Servo remains ON)

Table 4-13: Details and Roles of [Robot Product Info Monitor] Operation Buttons

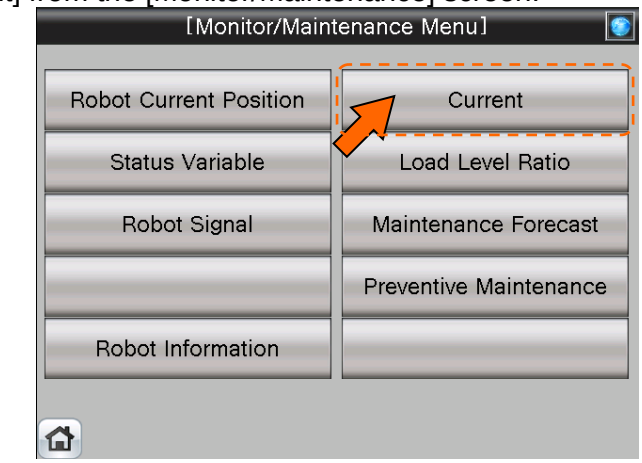
Classification	Name	Function Spec.		Note
Product Info	Product Info	Displays the robot body info (1) and (4) and robot controller info (2) and (3) (1) Robot Type Name (2) Controller Version (S/W Version) (3) Controller Serial No. (4) Robot Serial No.		—
Display of Running State	Operation Mode	Displays the operation mode		—
		Green Light ON	Automatic operation mode（Automatic）	
		Light OFF	Manual operation mode（Manual）	
	Servo ON	Displays the servo power status		
		Green Light ON	Servo power ON	
		Light OFF	Servo power OFF	
	Error	Displays the robot error status		
		Red Light ON	Robot error in progress	
		Light OFF	No error	
	OVRD	Displays the current override value (%)		
		UP▲	Increases the override value	
		DN▼	Decreases the override value	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.5 Monitoring of the Robot Current

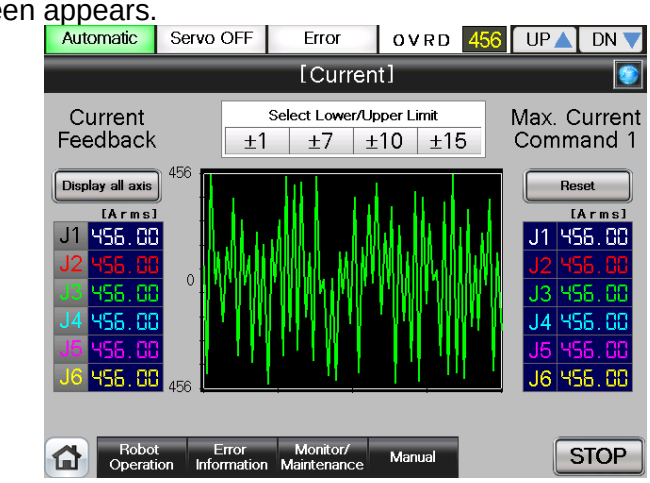
(1) Select [Monitor/Maintenance] from the [Robot Main Menu] screen.



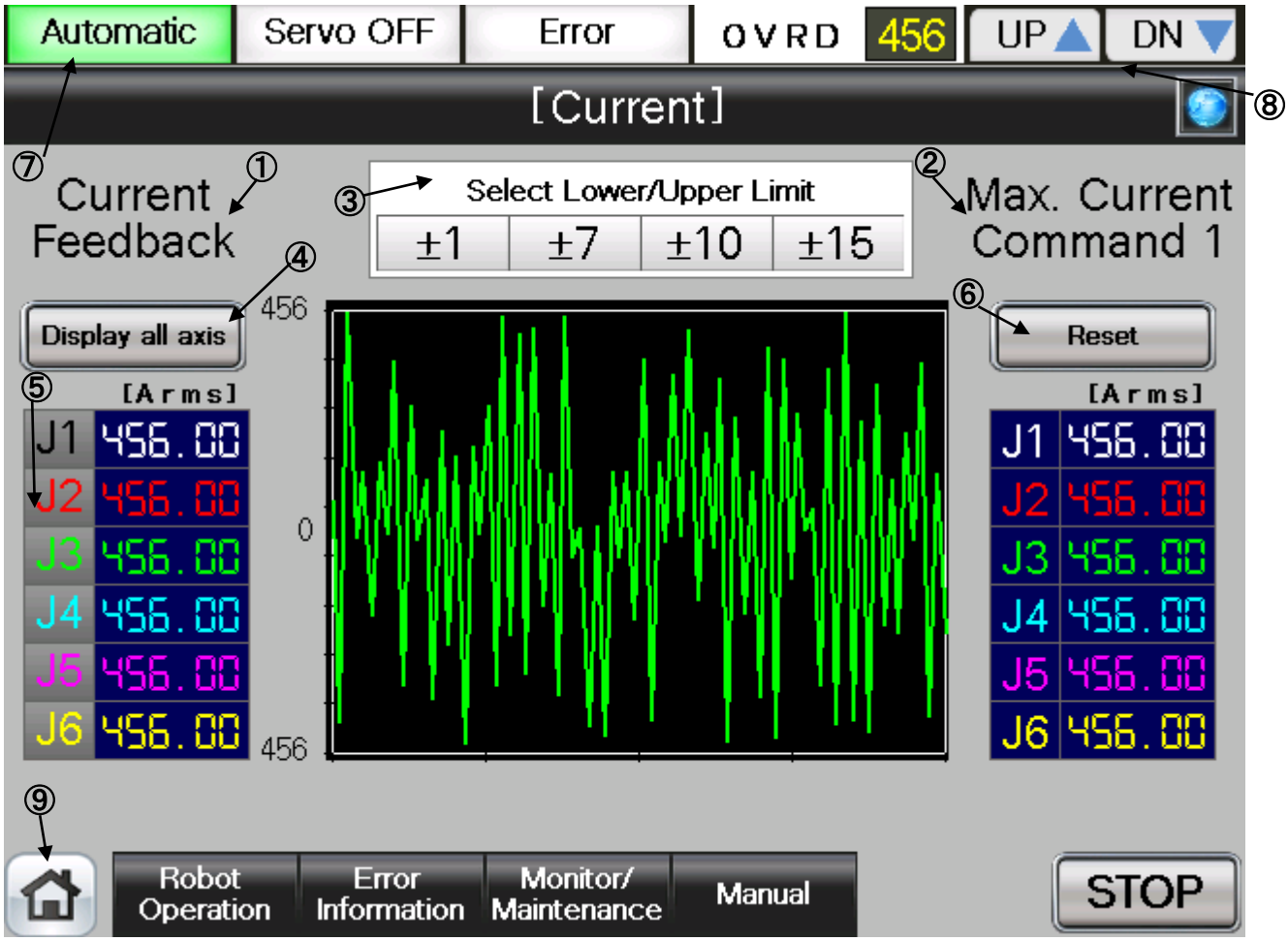
(2) Select [Current] from the [Monitor/Maintenance] screen.



(3) [Current] screen appears.



(4) See below for the [Current] screen. For details of the operation buttons, see [Table 4-14: Details and Roles of “Current” Operation Buttons].



【Screen Specifications】

Screen to monitor the current of each robot axis

(1) Current Feedback･･･Displays the **feedback value** from the servo

(2) Maximum Current Command･･･**Maximum current** in the robot operation

(3) Select Upper/Lower Limit･･･Switches the **scale of the current** (unit) shown on the chart

(4) Display All Axis･･･Displays the currents of **all axes** on the chart: J1(white), J2 (red), J3(green), J4 (blue), J5 (pink), and J6 (yellow)

(5) Display Each Axis･･･Displays the currents of **each axis** on the chart: J1(white), J2 (red), J3(green), J4 (blue), J5 (pink), and J6 (yellow)

(6) Reset･･･Resets the **maximum current command**

(7) Display of Running State･･･Lights the lamp according to the robot running status

* **Automatic Operation in Progress** (green) **Servo Power ON** (green) **Error** (red) **Current operation speed value**（%）

(8) UP/DOWN･･･Changes the operation speed in the **OVRD DISPLAY UP** (speed-up), **DN** (speed-down)

(9) Common Buttons･･･Jump to each screen

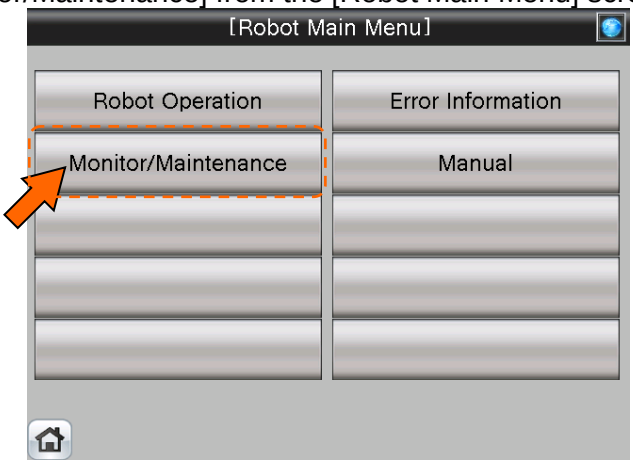
***”STOP”** stop a running program (Servo remains ON)

Table 4-14: Details and Roles of "Current" Operation Buttons

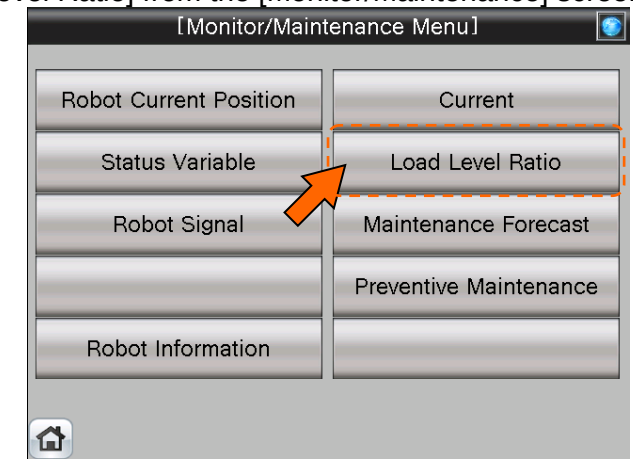
Classification	Name	Function Spec.		Note
Display Current	Display All Axes	Displays the currents of all axes（J1～J6）on the chart (1) Feedback value from the servo (2) Electric current value All axes are color-coded J1(white), J2 (red), J3(green), J4 (blue), J5 (pink), and J6 (yellow)		—
		Green Light ON	Displays the current values of all axes	
		Light OFF	Displays the current value of the selected axis	
	Select Upper/Lower Limit	Switches the scale of the current value for graphical display ［±15、±10、±7、±1］		
		Light Blue Light ON	Displays the current within the selected scale	
		Light OFF	Displays the current within the default scale	
	Display Each Axis	Selects an axis in graph form		
		Green Light ON	Displays the current within the selected scale	
		Light OFF	Displays the current within the default scale	
Display of Execution Status	Operation Mode	Displays the operation mode		—
		Green Light ON	Automatic operation mode（Automatic）	
		Light OFF	Manual operation mode（Manual）	
	Servo ON	Displays the servo power status		
		Green Light ON	Servo Power ON	
		Light OFF	Servo Power OFF	
	Error	Displays the robot error status		
		Red Light ON	Robot error in progress	
		Light OFF	No error	
	OVRD	Displays the current override value (%)		
		UP▲	Increases the override value	
		DN▼	Decreases the override value	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.6 Monitoring of the Robot Load Level Ratio

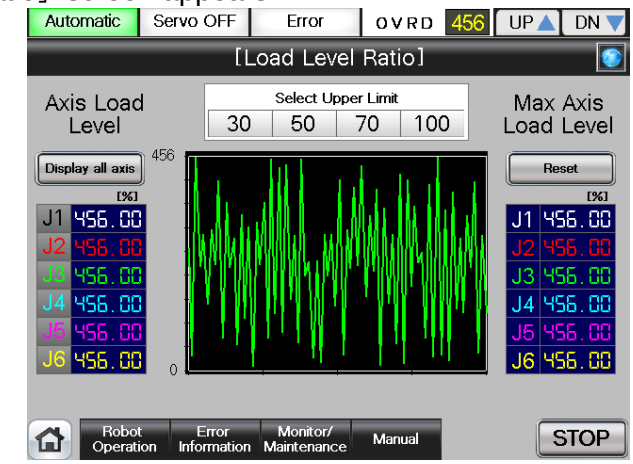
(1) Select [Monitor/Maintenance] from the [Robot Main Menu] screen.



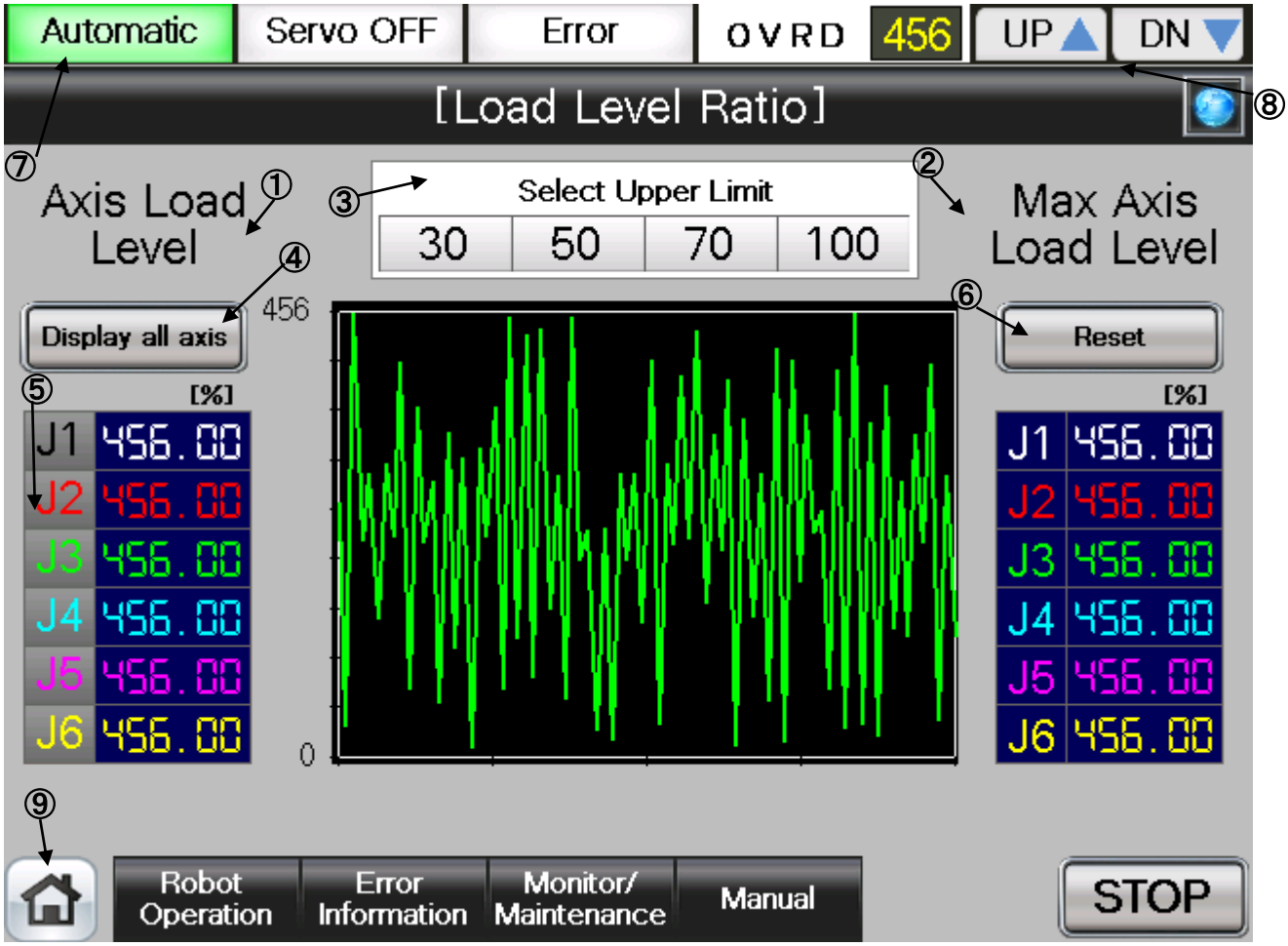
(2) Select [Load Level Ratio] from the [Monitor/Maintenance] screen.



(3) [Load Level Ratio] screen appears.



(4) See below for the [Robot Product Information Monitor] screen. For details of the operation buttons, see [Table 4-15: Details and Roles of “Load Level Ratio” Operation Buttons].



【Screen Specifications】

Screen to monitor the current of each robot axis

(1) Axis Load Level･･･Displays the current **load level of each axis**

(2) Maximum Axis Load Level･･･Displays the **maximum load level** calculated from when the operation starts

(3) Select Upper Limit ･･･Switches the **scale of the load level** (unit) shown on the chart

(4) Display All Axes･･･Displays the currents of **all axes** on the chart: J1(white), J2 (red), J3 (green), J4(blue), J5 (pink), and J6 (yellow)

(5) Display Each Axis･･･Displays the currents of **each axis** on the chart: J1(white), J2 (red), J3 (green), J4 (blue), J5 (pink), and J6 (yellow)

(6) Reset･･･Resets the **maximum axis load level**

(7) Display of Running State･･･Lights the lamp according to the robot running status

* **Automatic Operation in Progress** (green) **Servo Power ON** (green) **Error** (red) **Current operation speed value**（%）

(8) UP/DOWN･･･Changes the operation speed in the **OVRD DISPLAY UP** (speed-up), **DN** (speed-down)

(9) Common Buttons･･･Jump to each screen

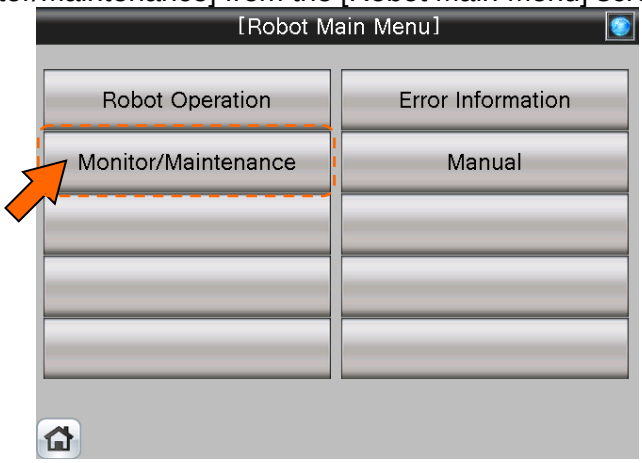
* **“STOP”** stop a running program (Servo remains ON)

Table 4-15: Details and Roles of "Load Level Ratio" Operation Buttons

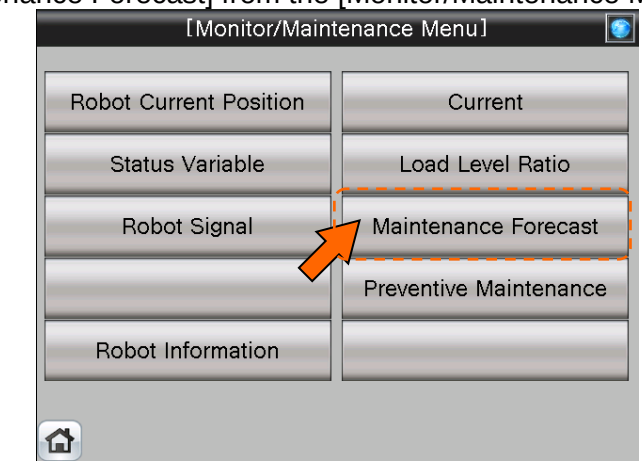
Classification	Name	Function Spec.		Note
Display Load Level	Display All Axes	Displays the load levels of all axes (J1～J6) on the chart (1) Axis Load Level (current load level of each axis) (2) Maximum Load Level (maximum load level measured after the operation starts) All axes are color-coded J1(white), J2 (red), J3 (green), J4 (blue), J5 (pink), and J6 (yellow)		—
		Green Light ON	Displays the load rates of all axes	
		Light OFF	Displays the load rate of a selected axis	
	Select Upper/ Lower Limit	Switches the scale of the load level ratio in graph form［30, 50, 70, 100］		
		Light Blue Light ON	Displays the current within the selected scale	
		Light OFF	Displays the current within the default scale	
	Display Each Axis	Selects the axis in graph form		
		Green Light ON	Displays the axis of the lighted button	
		Light OFF	No axis display	
Display of Running State	Operation Mode	Displays the operation mode		—
		Green Light ON	Automatic operation mode（Automatic）	
		Light OFF	Manual operation mode（Manual）	
	Servo ON	Displays the servo power status		
		Green Light ON	Servo power ON	
		Light OFF	Servo power OFF	
	Error	Displays the robot error status		
		Red Light ON	Robot error in progress	
		Light OFF	No error	
	OVRD	Displays the current override value (%)		
		UP▲	Increases the override value	
		DN▼	Decreases the override value	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.7 Robot Maintenance Forecast

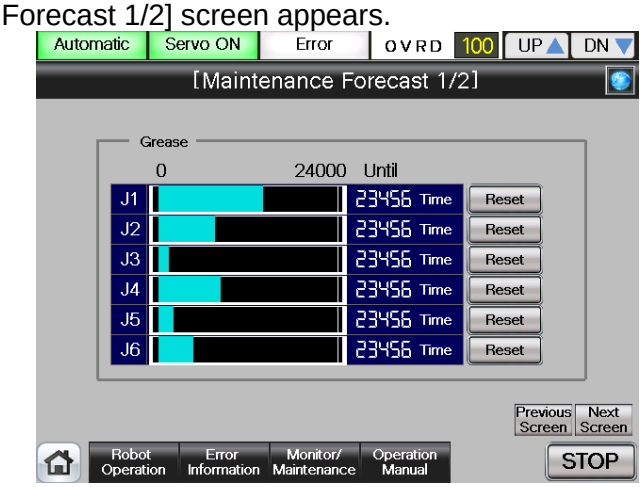
(1) Select [Monitor/Maintenance] from the [Robot Main Menu] screen.



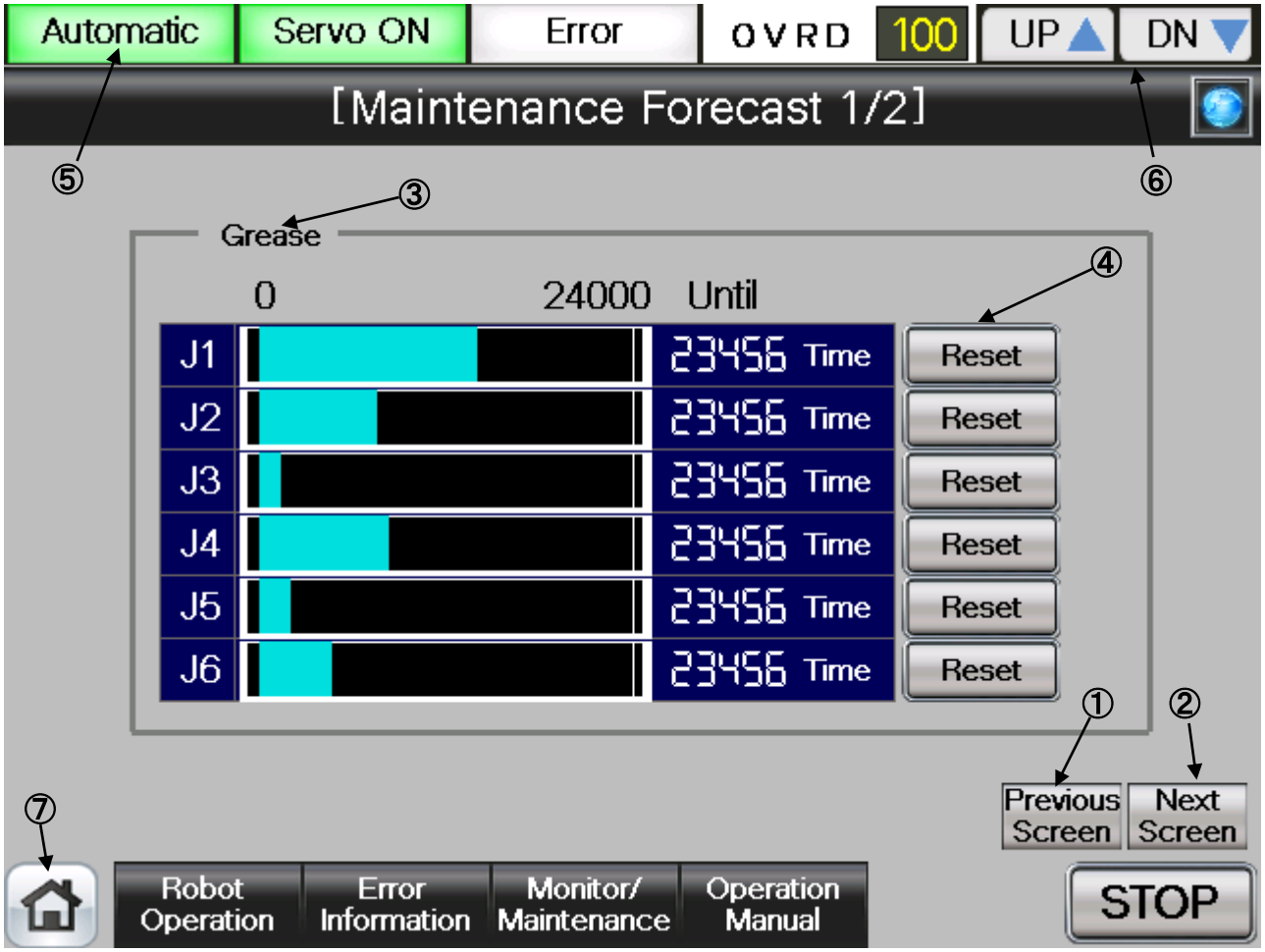
(2) Select [Maintenance Forecast] from the [Monitor/Maintenance Menu] screen.



(3) [Maintenance Forecast 1/2] screen appears.



(4) See below for the [Maintenance Forecast 1/2] screen. For details of the operation buttons, see [Table 4-16: Details and Roles of “Maintenance Forecast” Operation Buttons].



【Screen Specifications】

Screen to monitor the robot grease

(1) Back･･･Switches the dedicated signal monitor screens [Dedicated Signal Monitor 1/2] →[Dedicated Signal Monitor 2/2]

(2) Next･･･Switches the dedicated signal monitor screens [Dedicated Signal Monitor 1/2] →[Dedicated Signal Monitor 2/2]

(3) Grease･･･Displays the grease useable time for **each axis** (J1, J2, J3, J4, J5, and J6)

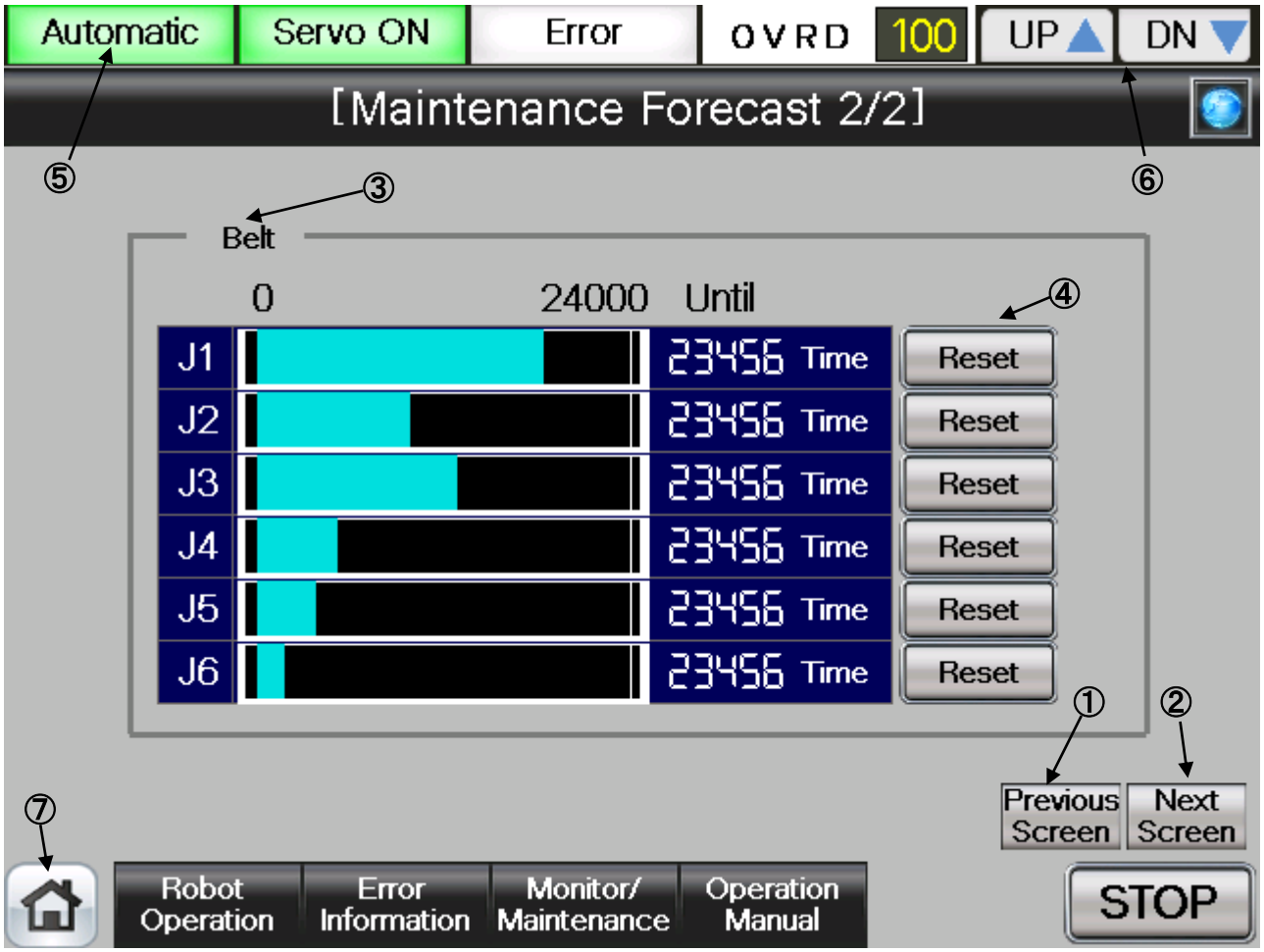
(4) Reset･･･Displays **6000 hours** for a reset (by each axis) **(currently unavailable)**
*** Grease is useable up to 6000 hours**

(5) Display of Running State･･･Lights the lamp according to the robot running status
* **Automatic Operation in Progress** (green) **Servo Power** (green) **Error** (red)
Current operation speed value (%)

(6) UP/DOWN･･･Changes the operation speed in the **OVRD DISPLAY UP** (speed-up), **DN** (speed-down)

(7) Common Buttons･･･Jump to each screen
* **“STOP”** stop a running program (Servo remains ON)

(5) See below for the [Maintenance Forecast 2/2] screen. For details of the operation buttons, see [Table 4-16: Details and Roles of “Maintenance Forecast” Operation Buttons].



【Screen Specifications】

Screen to monitor the dedicated robot input/output (I/O) signals

(1) Back･･･Switches the dedicated signal monitor screens [Dedicated Signal Monitor 2/2] →[Dedicated Signal Monitor 1/2]

(2) Next･･･Switches the dedicated signal monitor screens [Dedicated Signal Monitor 2/2] →[Dedicated Signal Monitor 1/2]

(3) Belt･･･Displays the usable time of the belt for driving of J5 axis

(4) Reset･･･Displays **35000 hours** for a belt reset **(currently unavailable)**

*** Belt is useable for up to 35000 hours**

(5) Display of Running State･･･Lights the lamp according to the robot running status

* **Automatic Operation in Progress** (green) **Servo Power ON** (green) **Error** (red) **Current operation speed value** (%)

(6) UP/DOWN･･･Changes the operation speed in the **OVRD DISPLAY UP** (speed-up), **DN** (speed-down)

(7) Common Buttons･･･Jump to each screen

* **“STOP”** stop a running program (Servo remains ON)

Table 4-16: Details and Roles of "Maintenance Forecast" Operation Buttons

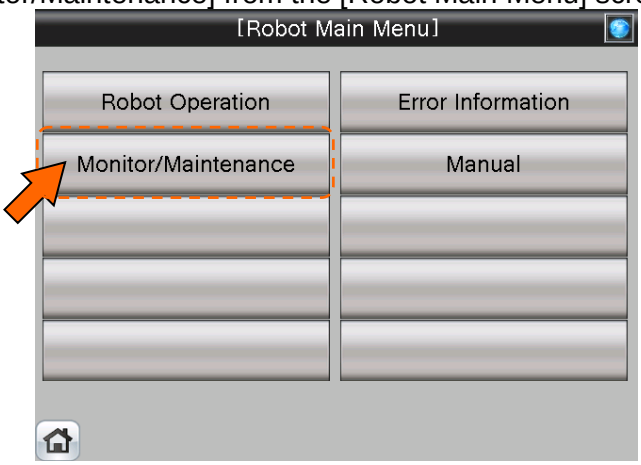
Classification	Name	Function Spec.		Note
Switch Screen	Back	Switches the state variable monitor screen in ascending order (2/2-01/2-2/2)		—
	Next	Switches the state variable monitor screen in descending order (1/2-2/2-1/2)		
Time Reset	Reset **(Currently Unavailable)**	Clears the elapsed time until now		—
		Yellow Light ON	Data reset	
		Light OFF	Displays the accumulated time	
Display of Running State	Operation Mode	Displays the operation mode		—
		Green Light ON	Automatic operation mode（Automatic）	
		Light OFF	Manual operation mode（Manual）	
	Servo ON	Displays the servo power status		
		Green Light ON	Servo Power ON	
		Light OFF	Servo Power OFF	
	Error	Displays the robot error status		
		Red Light ON	Robot error in progress	
		Light OFF	No error	
	OVRD	Displays the current override value (%)		
		UP▲	Increases the override value	
		DN▼	Decreases the override value	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.8 Preventive Maintenance

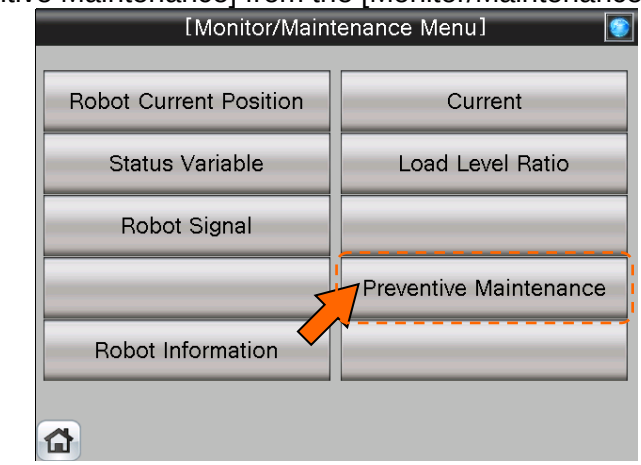
The MELFA Smart Plus option is nessessary when use the preventive maintenance function. Refer to "Preventive Maintenance Function Operation Manual (bfp-a3625)" for details of display contents.

Notice) It is necessary to restart the GOT when activate the 'Preventive Maintenance Function'.

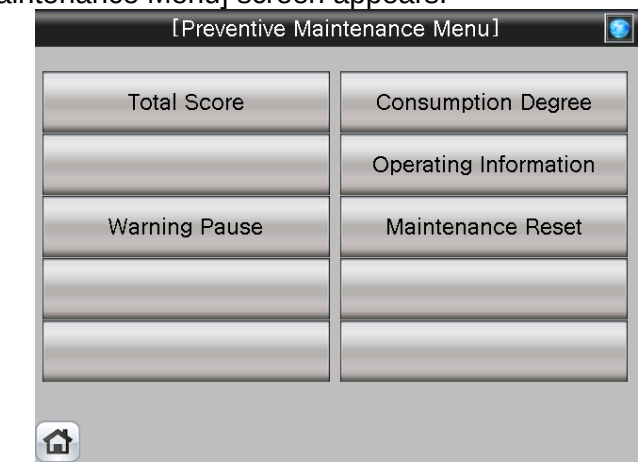
(1) Select [Monitor/Maintenance] from the [Robot Main Menu] screen.



(2) Select [Preventive Maintenance] from the [Monitor/Maintenance Menu] screen.

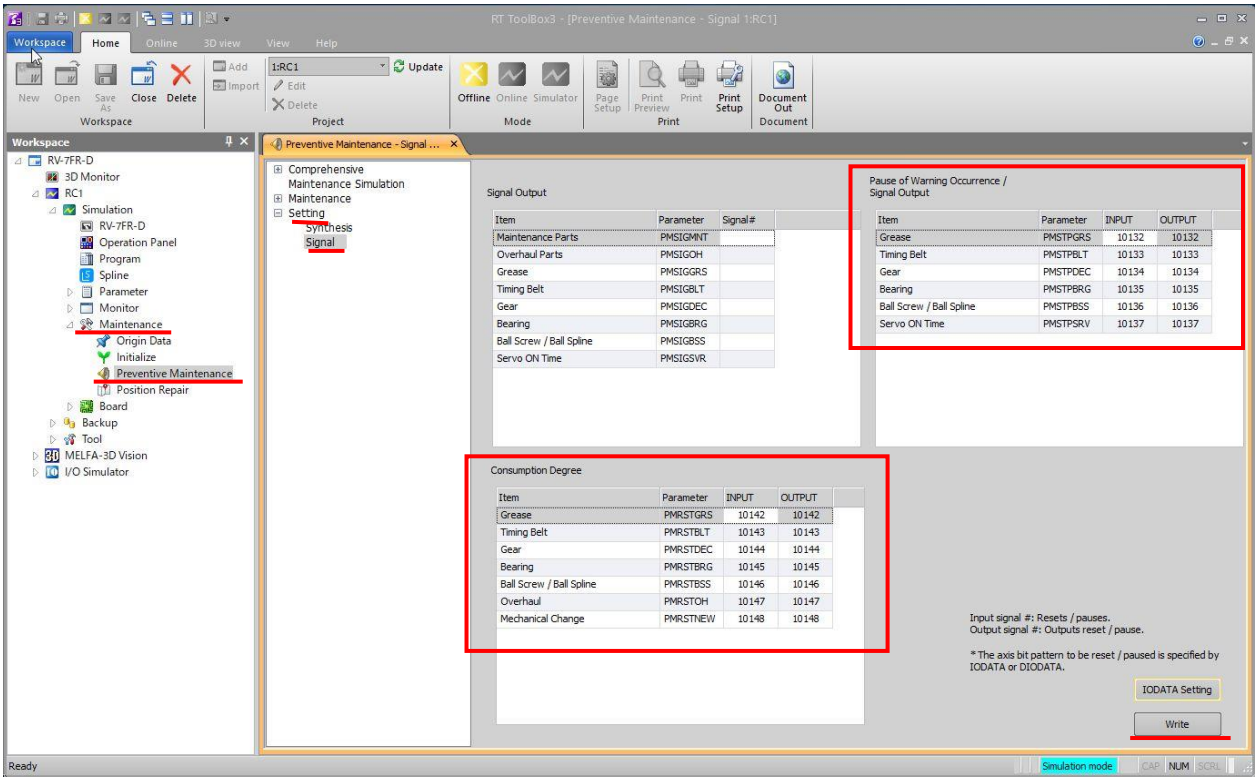


(3) [Preventive Maintenance Menu] screen appears.



4.2.8.1 Parameter Setting of Preventive Maintenance Input/Output Signals

Input/Output signals parameter setting about “Pause of Warrning Occurrence / Signal Output” and “Consumption Degree” is nessessary when you use “Warning Pause” and “Maintenance Reset”.



(1) Open [**Maintenance]** in the workspace and double-click on [**Preventive Maintenance**]
(2) [**Preventive Maintenance**] window opens
(3) Open [**Setting]** and click on [**Signal**]
(4) Enter Input/Output signals of “Pause of Warning Occurrence / Signal Output” and “Consumption Degree” according to the table.
(5) Click [**Write**] to write parameters
(6) [Are you sure you want to write the set content in the robot controller?] → click [**Yes(Y)**]
(7) [Writing of Parameters to the robot controller was completed.] → click [**OK**]

Pause of Warning Occurrence / Signal Output

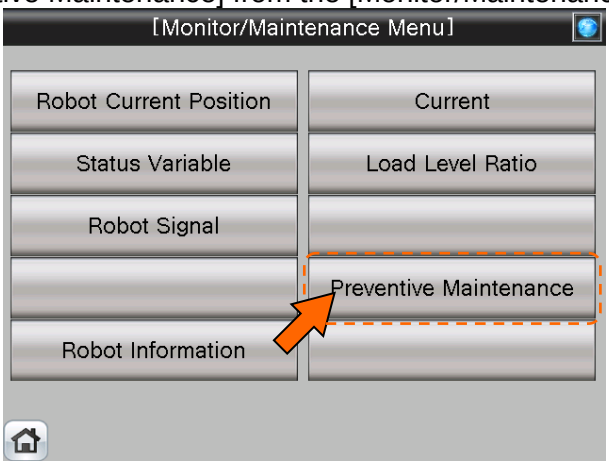
Item	Parameter	INPUT	OUTPUT
Grease	PMSTPGRS	10132	10132
Timing Belt	PMSTPBLT	10133	10133
Gear	PMSTPDEC	10134	10134
Bearing	PMSTPBRG	10135	10135
Ball Screw / Ball Spline	PMSTPBSS	10136	10136
Servo ON Time	PMSTPSRV	10137	10137

Consumption Degree

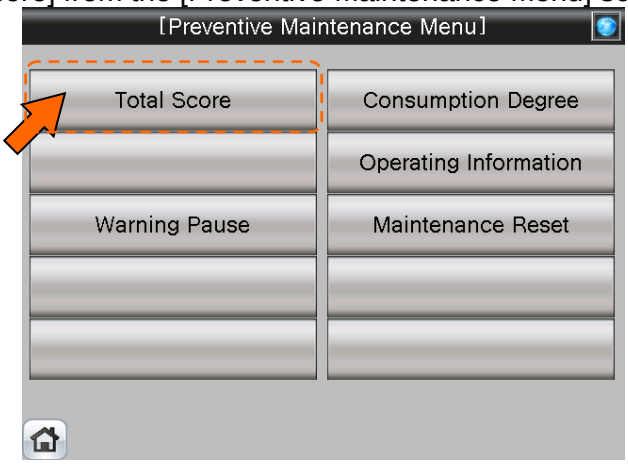
Item	Parameter	INPUT	OUTPUT
Grease	PMRSTGRS	10142	10142
Timing Belt	PMRSTBLT	10143	10143
Gear	PMRSTDEC	10144	10144
Bearing	PMRSTBRG	10145	10145
Ball Screw / Ball Spline	PMRSTBSS	10146	10146
Overhaul	PMRSTOH	10147	10147
Mechanical Change	PMRSTNEW	10148	10148

4.2.8.2 Total Score

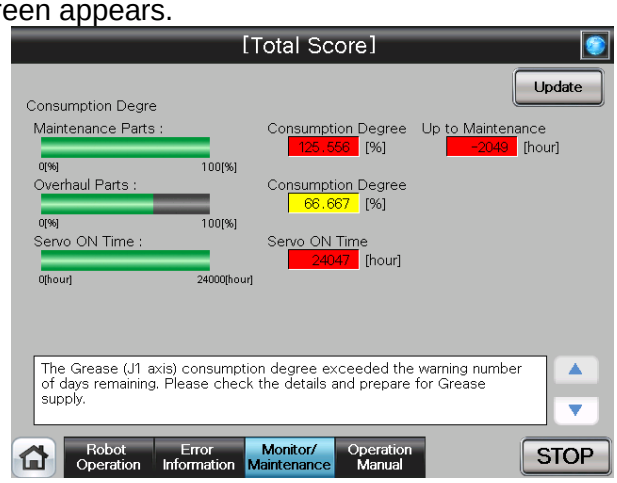
(1) Select [Preventive Maintenance] from the [Monitor/Maintenance Menu] screen.



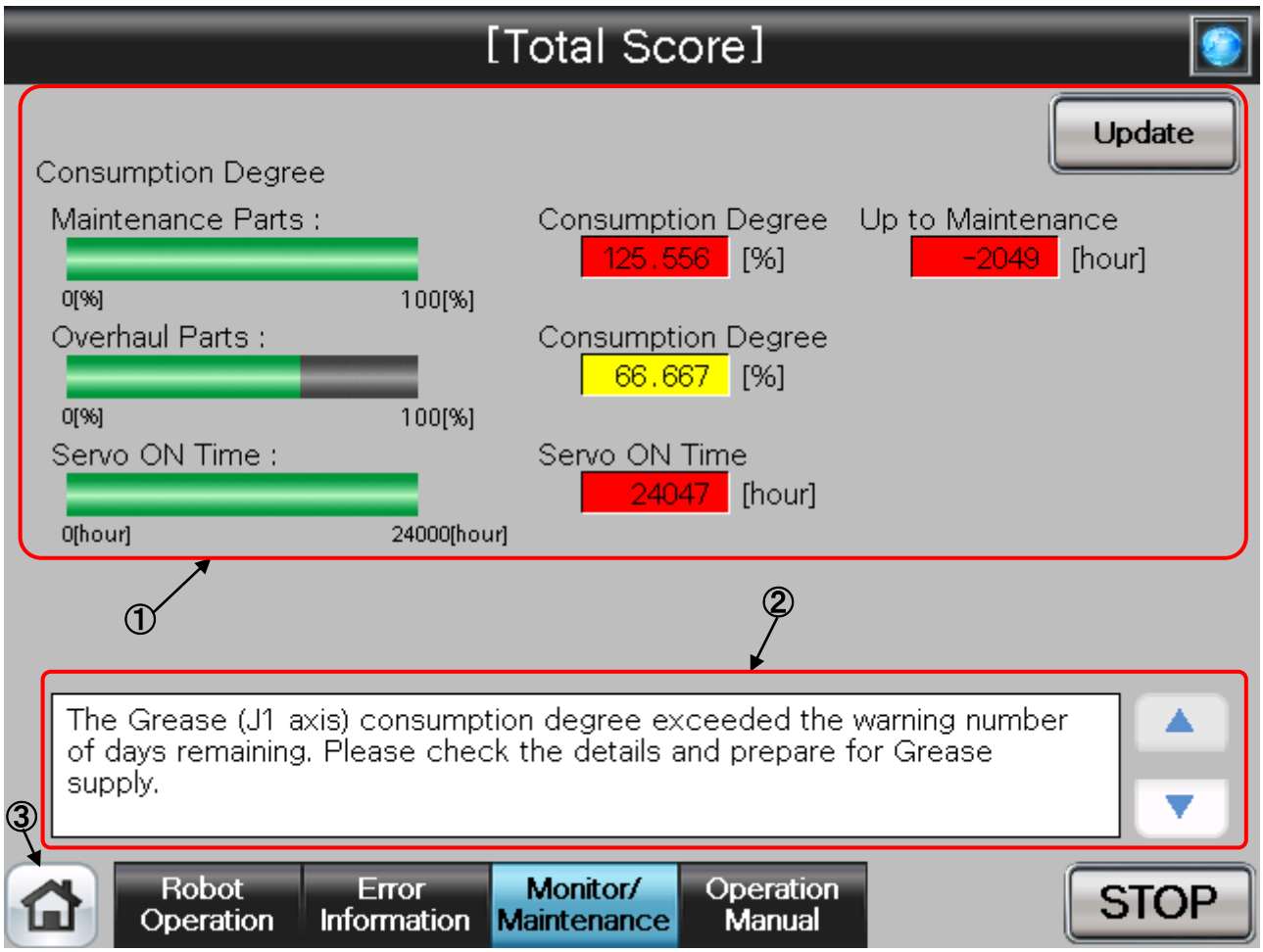
(2) Select [Total Score] from the [Preventive Maintenance Menu] screen.



(3) [Total Score] screen appears.



(4) This screen displays the total evaluation result of the consumption degree calculation function. For details of the operation buttons, see [Table 4-17: Details and Roles of “Total Score” Operation Buttons].



【Screen Specifications】

(1) Consumption Degree Calculation ･･･ The Consumption Degree area indicates the total score (Consumption Degree [%] and Up to Maintenance) of maintenance parts (grease, timing belt), and the total score (Consumption Degree [%]) of overhaul parts (Reduction gear, bearing, ball screw, ball spline), and the accumulated servo ON time since the previous overhaul time.

(2) Preventive maintenance message ･･･ When the consumption status of the target part exceeds the notification day you specified, the preventive maintenance message according to the status is displayed; check the message content and take measures.

(3) Common Buttons ･･･ Jump to each screen

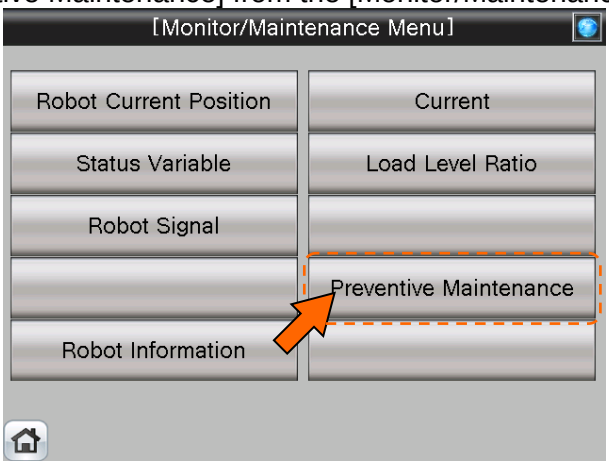
* **“STOP”** stop a running program (Servo remains ON)

Table 4-17: Details and Roles of "Total Score" Operation Buttons

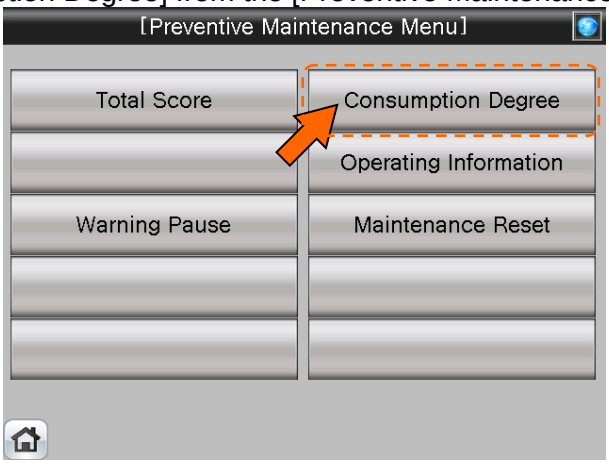
Classification	Name	Function Spec.		Note
Consumption Degree Calculation	Update	Update a display value.		—
		Red Light ON	Updating a display value	
		Light OFF	Update done	
Message Display	Preventive Maintenance Message	Preventive maintenance message is displayed.		—
		▲	Scroll a displayed message up. Button color is changed to gray when first message is displayed.	
		▼	Scroll a displayed message down. Button color is changed to gray when last message is displayed.	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.8.3 Consumption degree calculation function

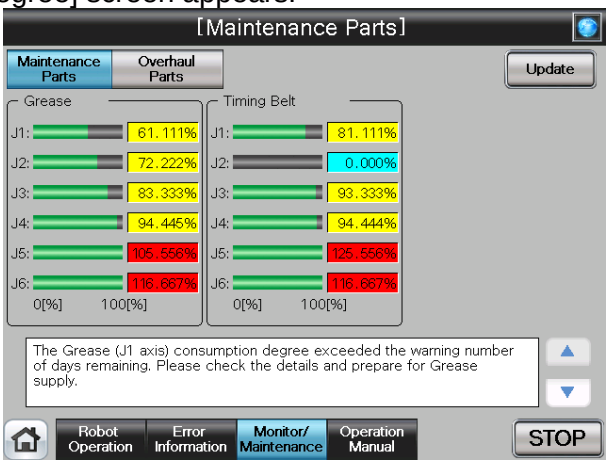
(1) Select [Preventive Maintenance] from the [Monitor/Maintenance Menu] screen.



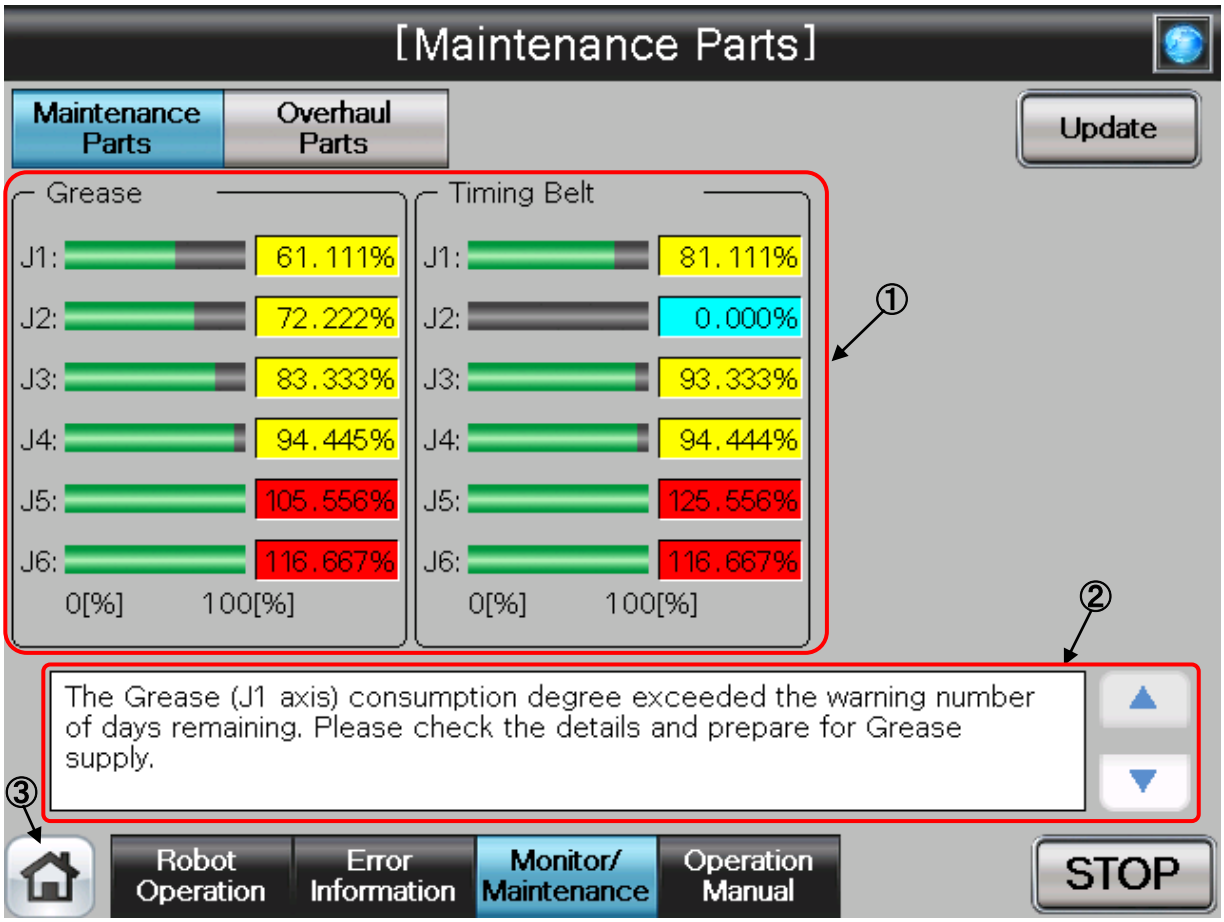
(2) Select [Consumption Degree] from the [Preventive Maintenance Menu] screen.

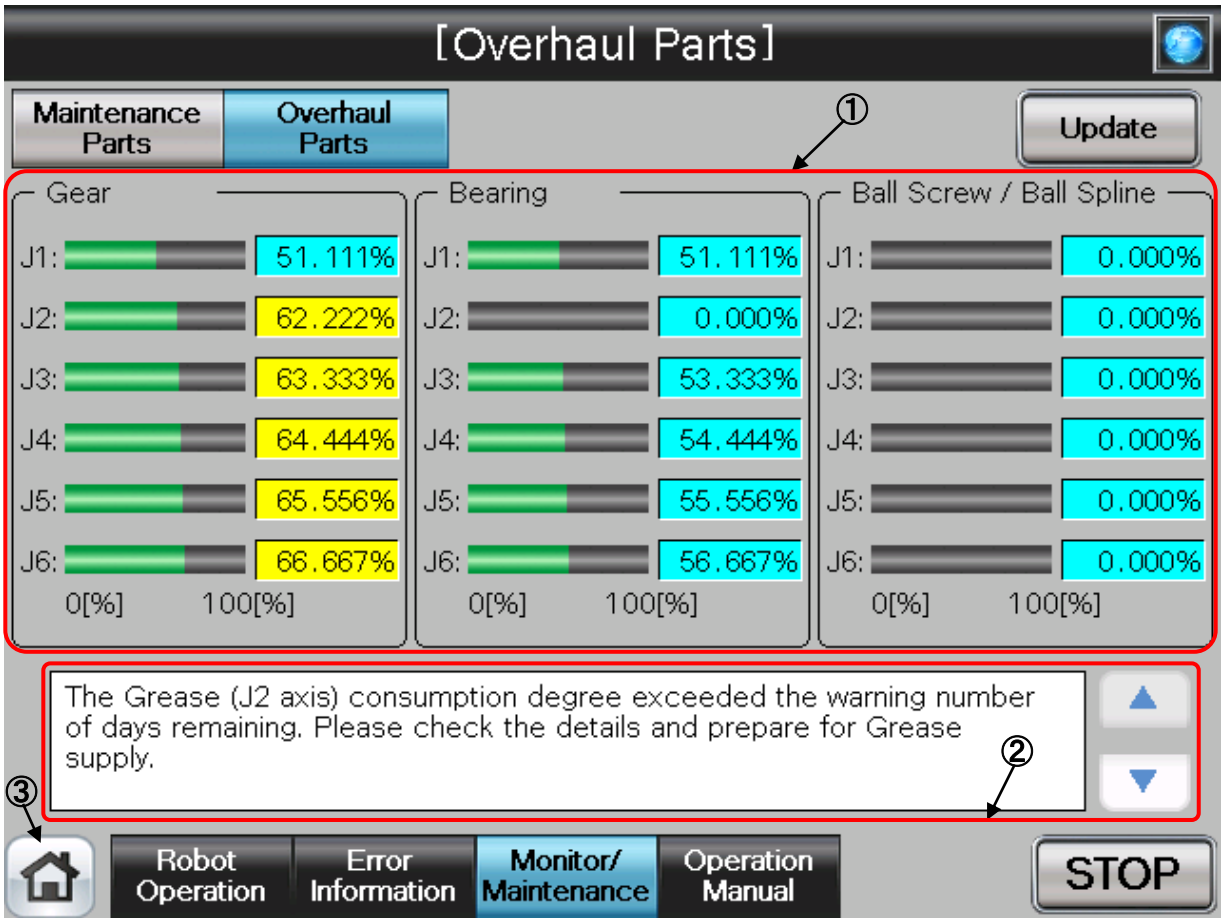


(3) [Consumption Degree] screen appears.



(4) When you select "Maintenance Parts" or "Overhaul Parts", the consumption degree of each part of the target axis and each joint axis is displayed. For details of the operation buttons, see [Table 4-18: Details and Roles of “Maintenance Parts/Overhaul Parts” Operation Buttons].





【Screen Specifications】

(1) Consumption Degree ･･･ This area of the screen indicates the consumption degree of each part of the target axis and each joint axis in a graph and numeric value [%].
Non target axes are displayed at [0%].

(2) Preventive maintenance message ･･･ This field displays preventive maintenance messages according to the part status. When the remaining time exceeds the notification day, an appropriate preventive maintenance message is displayed; check the message content and take measures.

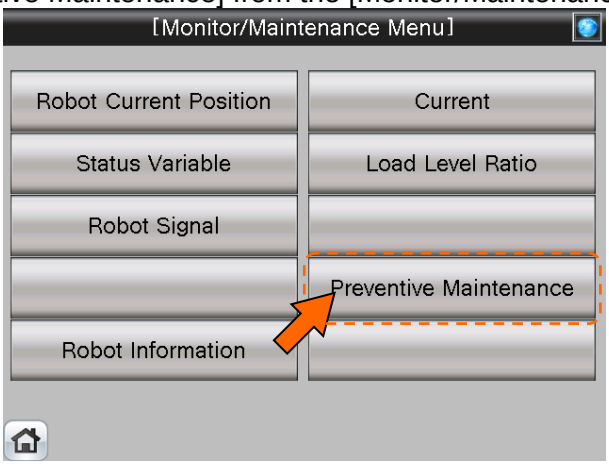
(3) Common Buttons ･･･ Jump to each screen
* **"STOP"** stop a running program (Servo remains ON)

Table 4-18: Details and Roles of "Maintenance Parts/Overhaul Parts" Operation Buttons

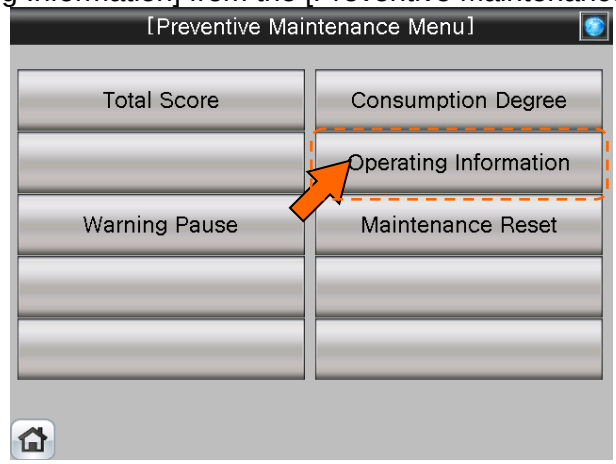
Classification	Name	Function Spec.		Note
Consumption Degree	Update	Update a display value.		—
		Red Light ON	Updating a display value	
		Light OFF	Update done	
Change Screen	Maintenance Patrs	Maintenance Parts screen is displayed.		—
	Ovehaul Parts	Overhaul Parts screen is displayed.		
Message Display	Preventive Maintenance Message	Preventive maintenance message is displayed.		—
		▲	Scroll a displayed message up. Button color is changed to gray when first message is displayed.	
		▼	Scroll a displayed message down. Button color is changed to gray when last message is displayed.	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.8.4 Operating Information

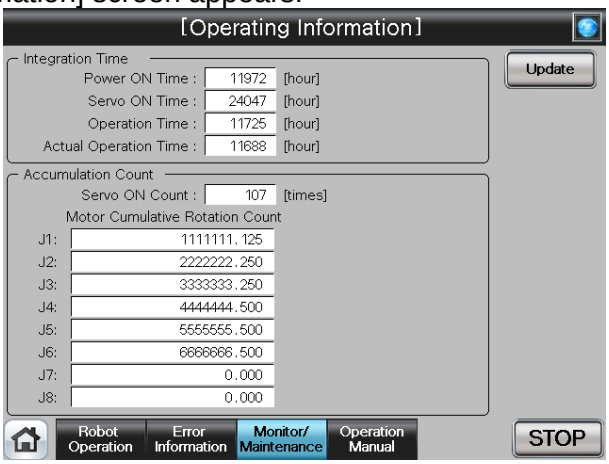
(1) Select [Preventive Maintenance] from the [Monitor/Maintenance Menu] screen.



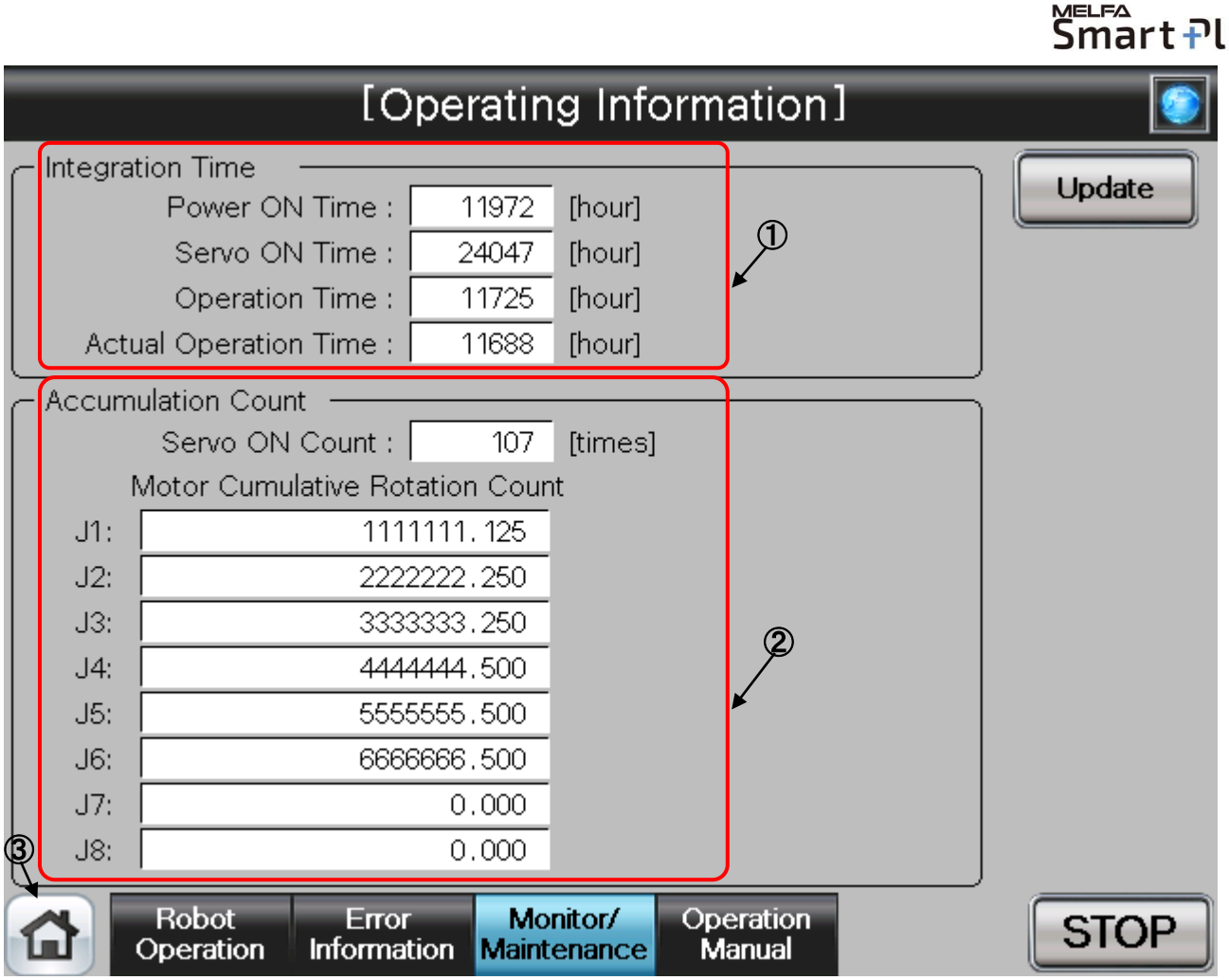
(2) Select [Operating Information] from the [Preventive Maintenance Menu] screen.



(3) [Operating Information] screen appears.



(4) The Operating Information screen is used to manage and display the integration time and accumulation count from the time when the previous overhaul was carried out. For details of the operation buttons, see [Table 4-19: Details and Roles of “Operating Information” Operation Buttons].



【Screen Specifications】

(1) Integration Time ･･･ The integration time that power on time, servo on time, operation time, actual operation time, are indicated.

(2) Accumulation Count ･･･ The accumulation count that servo on count, motor cumulative count, are indicated.

(3) Common Buttons ･･･ Jump to each screen

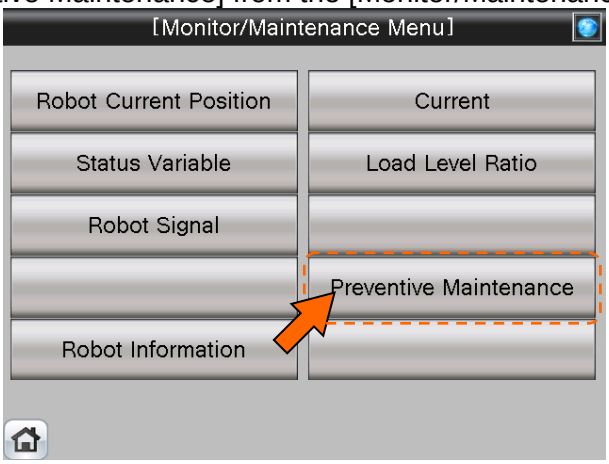
* **“STOP”** stop a running program (Servo remains ON)

Table 4-19: Details and Roles of "Operating Information" Operation Buttons

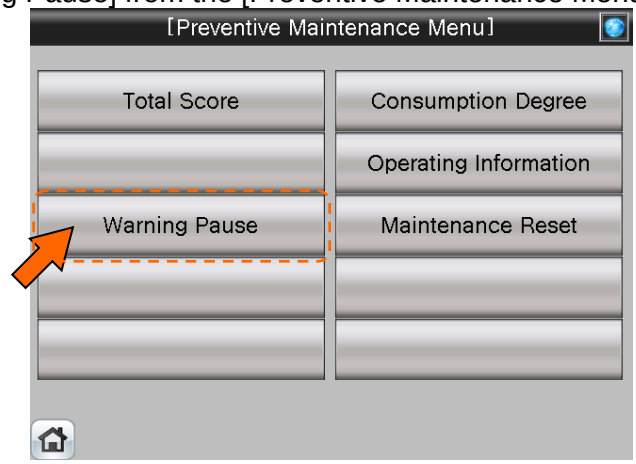
Classification	Name	Function Spec.		Note
Integration Time/ Accumulation Time	Update	Update a display value.		—
		Red Light ON	Updating a display value	
		Light OFF	Update done	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.8.5 Warning Pause

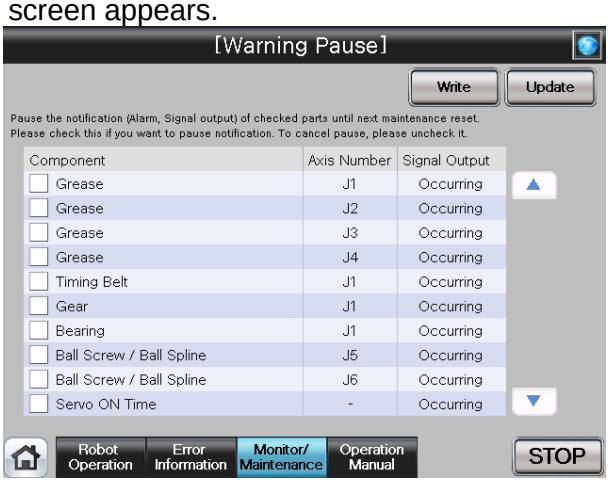
(1) Select [Preventive Maintenance] from the [Monitor/Maintenance Menu] screen.



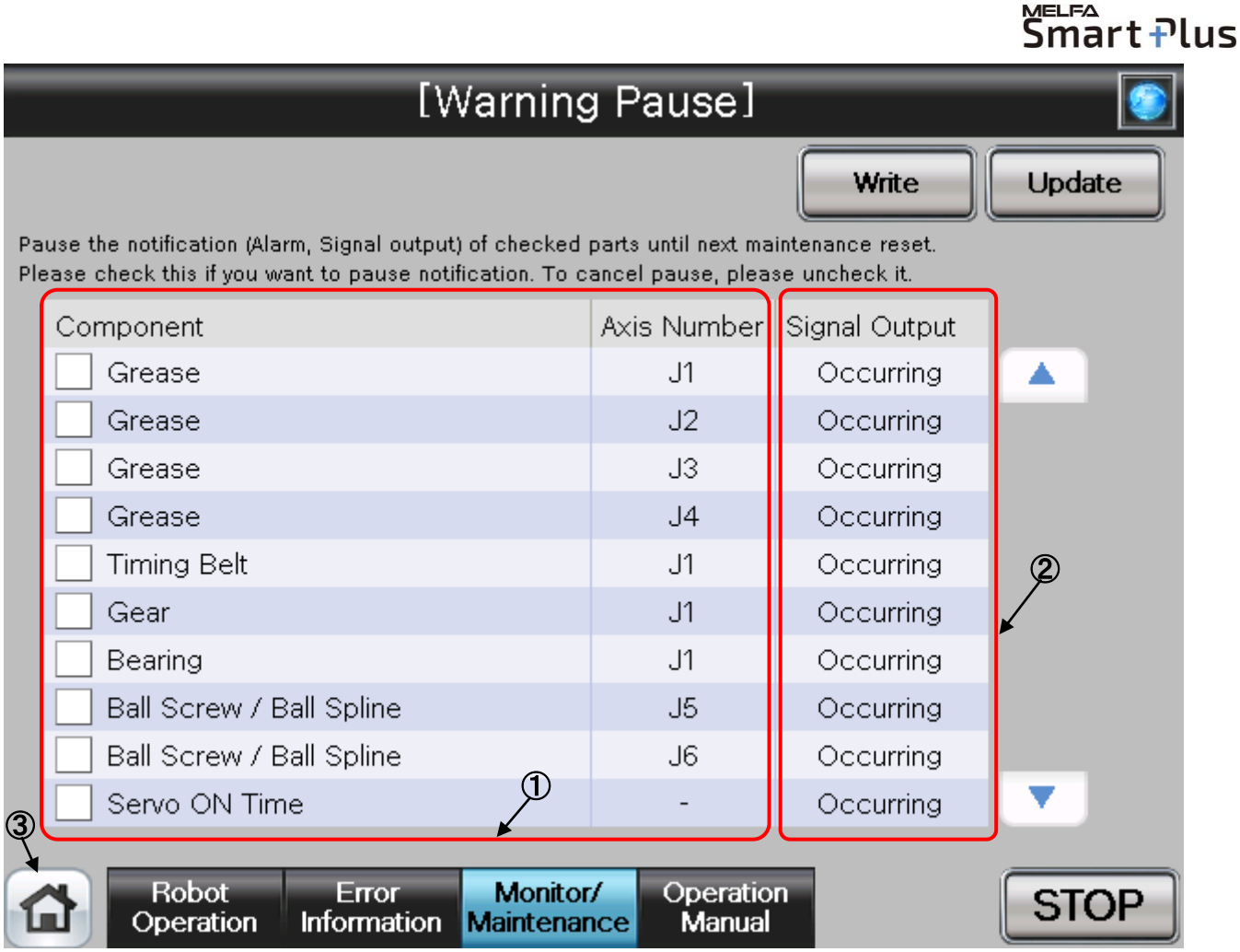
(2) Select [Warning Pause] from the [Preventive Maintenance Menu] screen.



(3) [Warning Pause] screen appears.



(4) Displays the list of warning and warning signals that are occurring or paused. If you desire to stop notification (alarm, dedicated output signal), you can temporarily disable at this stage.
For details of the operation buttons, see [Table 4-20: Details and Roles of “Warning Pause” Operation Buttons].



【Screen Specifications】

(1) Component/Axis Number ･･･ This area of the screen indicates the consumption degree of each part of the target axis and each joint axis in a graph and numeric value [%].

(2) Signal Output ･･･ Indicates either occurring or pause.
Select this check box to pause. Deselect this check box to cancel pause.

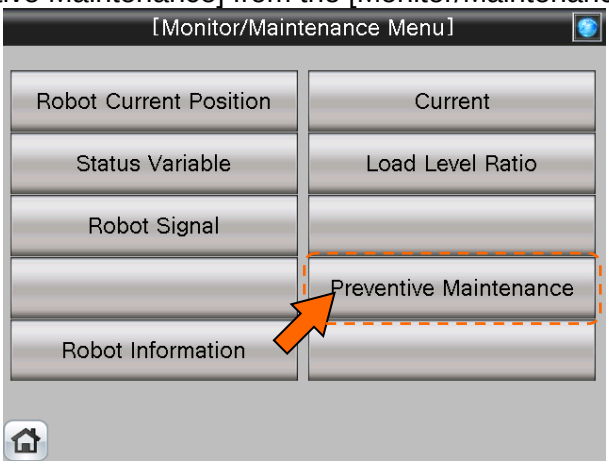
(3) Common Buttons ･･･ Jump to each screen
* **“STOP”** stop a running program (Servo remains ON)

Table 4-18: Details and Roles of "Warning Pause" Operation Buttons

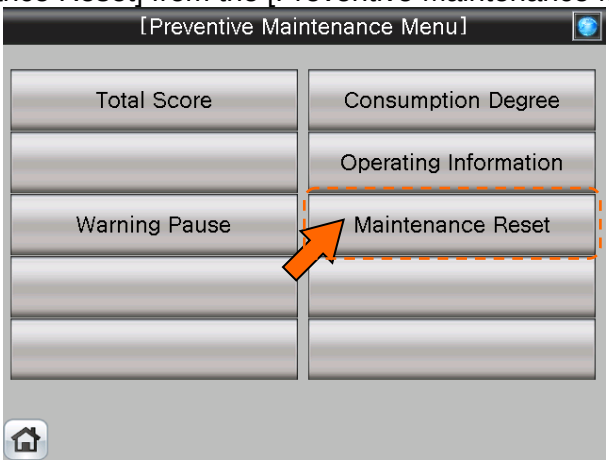
Classification	Name	Function Spec.		Note
Warning Pause	Update	Update a display value.		—
		Red Light ON	Updating a display value	
		Light OFF	Update done	
	Write	Writes the content of the selected item. You can temporarily disable notification related to consumption degree calculation until part replacement (reset of consumption degree).		—
	▲	Scroll displayed list up. Button color is changed to gray when first message is displayed or number of cautions is within 10.		—
	▼	Scroll displayed list down. Button color is changed to gray when last message is displayed or number of cautions is within 10.		—
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.8.6 Maintenance Reset

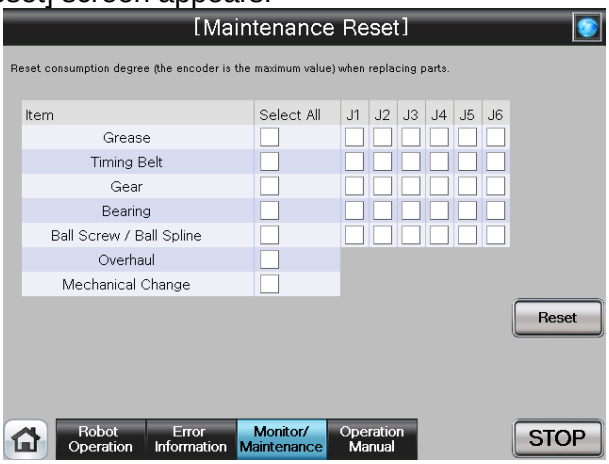
(1) Select [Preventive Maintenance] from the [Monitor/Maintenance Menu] screen.



(2) Select [Maintenance Reset] from the [Preventive Maintenance Menu] screen.



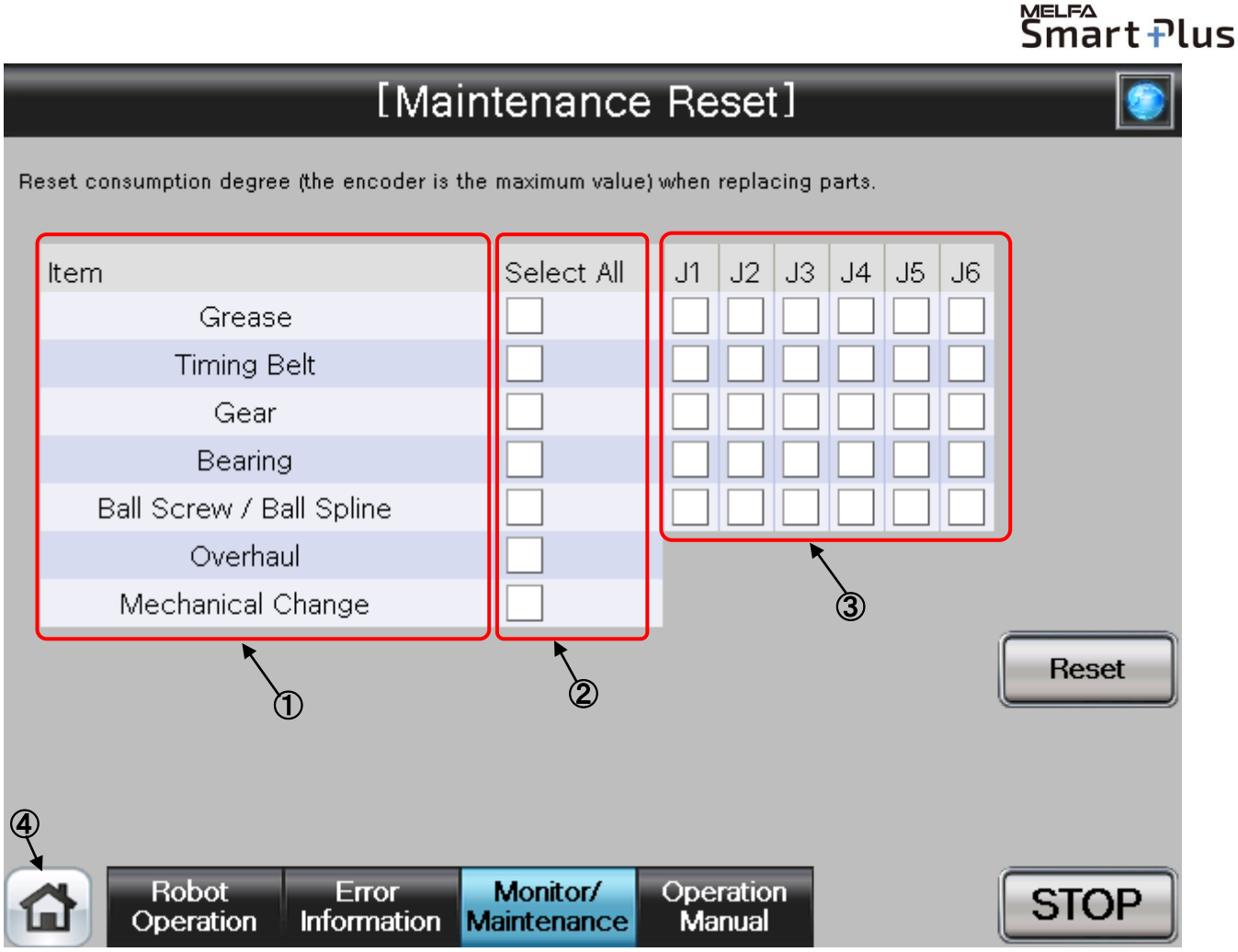
(3) [Maintenance Reset] screen appears.



(4) When part replacement, grease replenishing, or overhaul was performed, the information of the axes for which maintenance was performed accumulated in the controller needs to be reset.

On the Maintenance Reset screen, you can reset the information held by the controller such as the consumption degrees calculated by the consumption degree calculation function.

For details of the operation buttons, see [Table 4-21: Details and Roles of “Maintenance Reset” Operation Buttons].



【Screen Specifications】

(1) Item ・・・ Displays parts subject to reset..

(2) Select All ・・・ Selecting this check box selects all [J1] to [J6] check boxes on the right field.

(3) J1 to J6 ・・・ Depending on the robot type, non-target axes are ignored.

(4) Common Buttons ・・・ Jump to each screen

* **“STOP”** stop a running program (Servo remains ON)

Table 4-21: Details and Roles of "Maintenance Reset" Operation Buttons

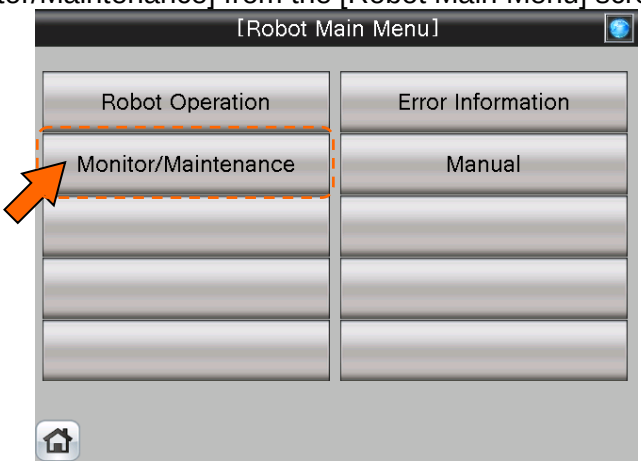
Classification	Name	Function Spec.		Note
Maintenance Reset	Reset	Resets the consumption degree of the items you have selected.		—
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.9 Predictive Maintenance

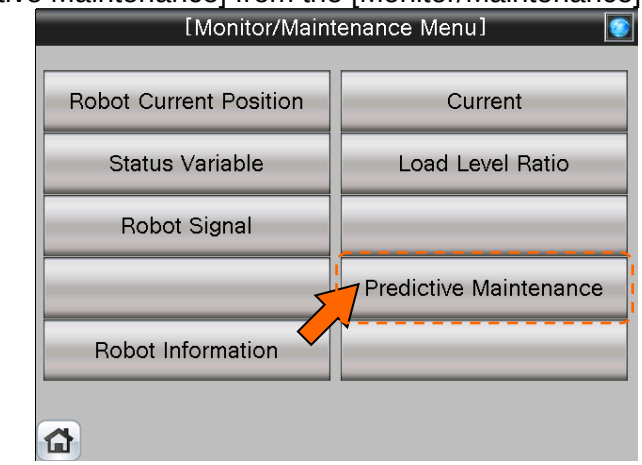
The MELFA Smart Plus option is nessessary when use the predictive maintenance function. Refer to "Predictive Maintenance Function Operation Manual (bfp-a3663)" for details of display contents.

Notice) It is necessary to restart the GOT when activate the 'Predictive Maintenance Function'.

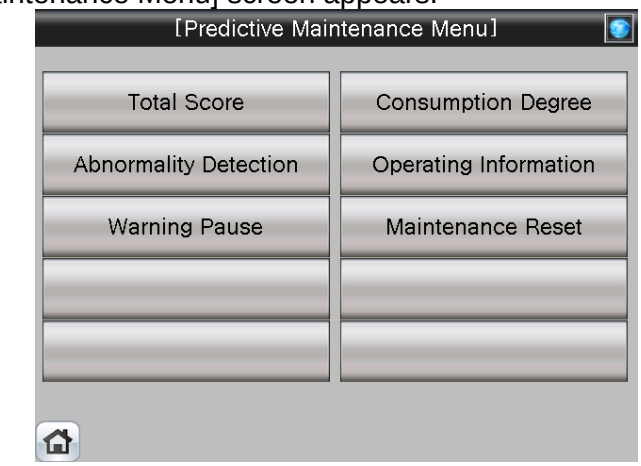
(1) Select [Monitor/Maintenance] from the [Robot Main Menu] screen.



(2) Select [Predictive Maintenance] from the [Monitor/Maintenance] screen.

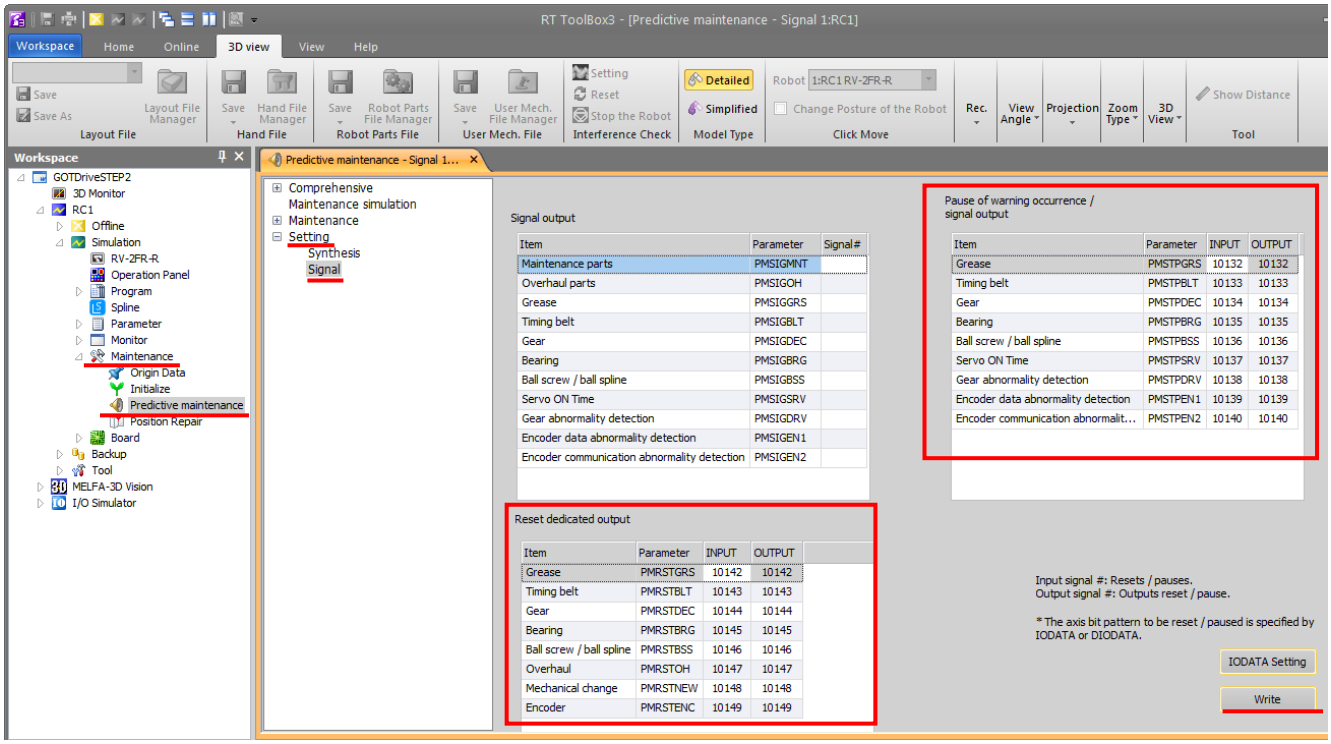


(3) [Predictive Maintenance Menu] screen appears.



4.2.9.1 Parameter Setting of Predictive Maintenance Input/Output Signals

Input/Output signals parameter setting about “Pause of Warrning Occurrence / Signal Output” and “Consumption Degree” is nessessary when you use “Warning Pause” and “Maintenance Reset”.



(1) Open [**Maintenance]** in the workspace and double-click on [**Predictive Maintenance**]
(2) [**Predictive Maintenance**] window opens
(3) Open [**Setting]** and click on [**Signal**]
(4) Enter Input/Output signals of “Pause of Warning Occurrence / Signal Output” and “Consumption Degree” according to the table.
(5) Click [**Write**] to write parameters
(6) [Are you sure you want to write the set content in the robot controller?] → click [**Yes(Y)**]
(7) [Writing of Parameters to the robot controller was completed.] → click [**OK**]

Pause of Warning Occurrence / Signal Output

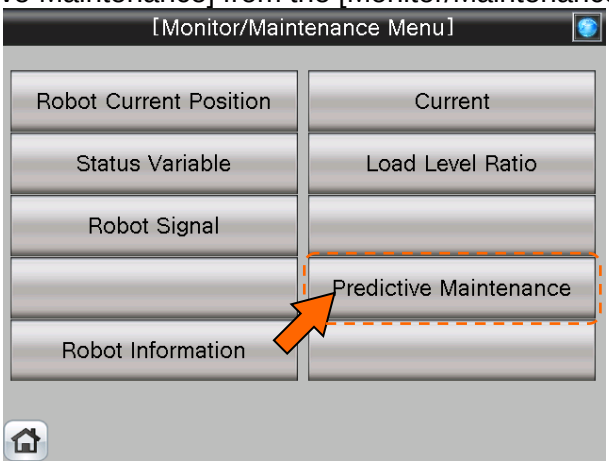
Item	Parameter	INPUT	OUTPUT
Grease	PMSTPGRS	10132	10132
Timing Belt	PMSTPBLT	10133	10133
Reduction Gear	PMSTPDEC	10134	10134
Bearing	PMSTPBRG	10135	10135
Ball Screw / Ball Spline	PMSTPBSS	10136	10136
Servo ON Time	PMSTPSRV	10137	10137
Reduction Gear Abnormality Detection	PMSTPDRV	10138	10138
Encoder Data Abnormality Detection	PMSTPEN1	10139	10139
Encoder Communication Abnormality Detection	PMSTPEN2	10140	10140

Consumption Degree

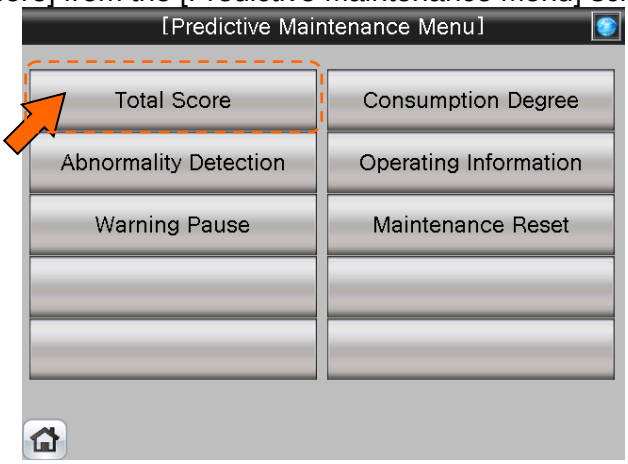
Item	Parameter	INPUT	OUTPUT
Grease	PMRSTGRS	10142	10142
Timing Belt	PMRSTBLT	10143	10143
Gear	PMRSTDEC	10144	10144
Bearing	PMRSTBRG	10145	10145
Ball Screw / Ball Spline	PMRSTBSS	10146	10146
Overhaul	PMRSTOH	10147	10147
Mechanical Change	PMRSTNEW	10148	10148
Encoder (Score of Abnormality Detection)	PMRSTENC	10149	10149

4.2.9.2 Total Score

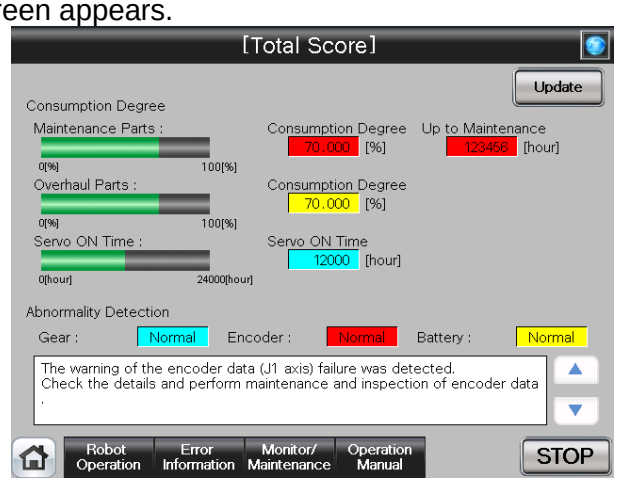
(1) Select [Predictive Maintenance] from the [Monitor/Maintenance Menu] screen.



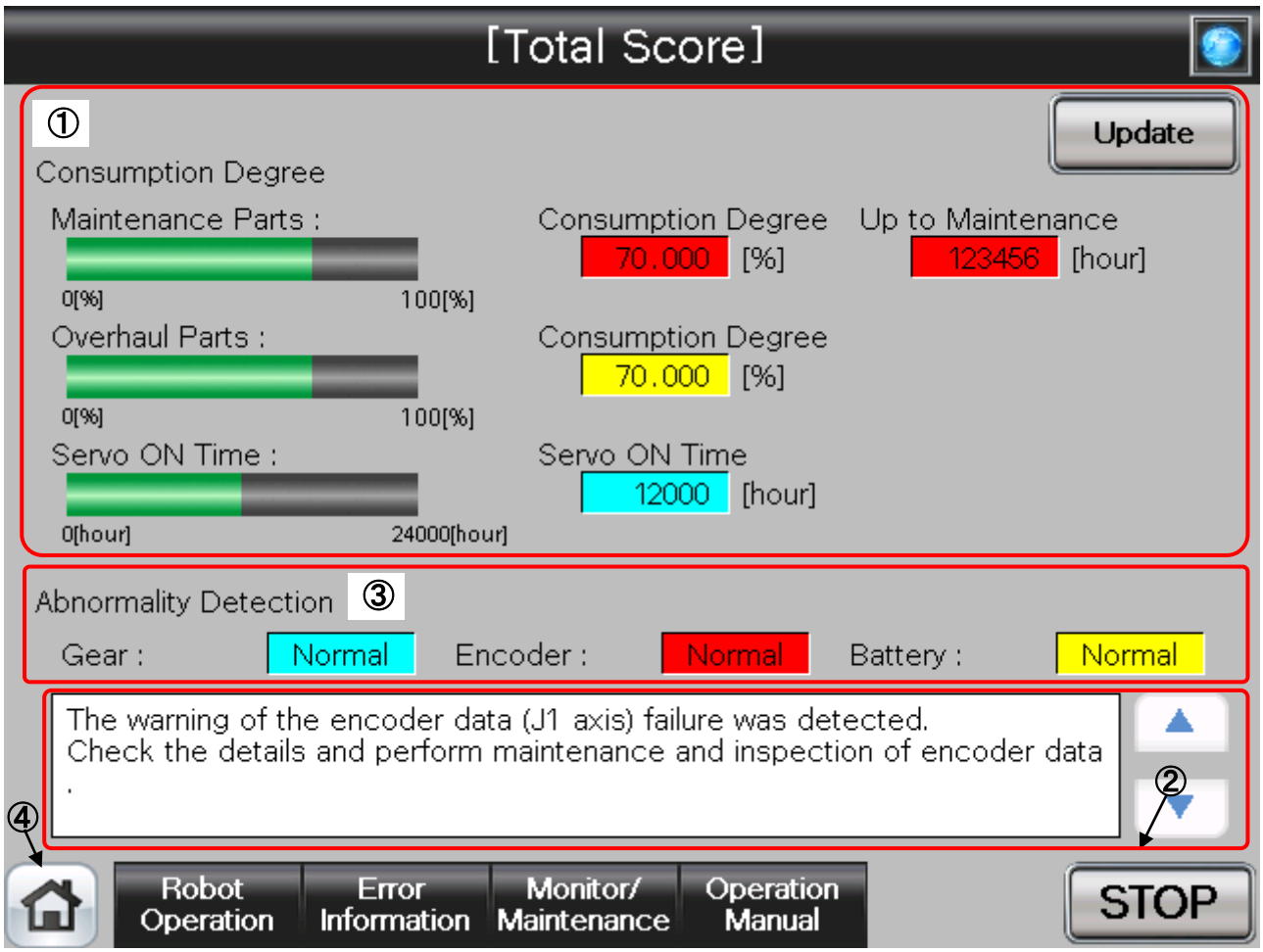
(2) Select [Total Score] from the [Predictive Maintenance Menu] screen.



(3) [Total Score] screen appears.



(4) This screen displays the total evaluation result of the consumption degree calculation function. For details of the operation buttons, see [Table 4-22: Details and Roles of “Total Score” Operation Buttons].



【Screen Specifications】

(1) Consumption Degree Calculation ･･･ The Consumption Degree area indicates the total score (Consumption Degree [%] and Up to Maintenance) of maintenance parts (grease, timing belt), and the total score (Consumption Degree [%]) of overhaul parts (Reduction gear, bearing, ball screw, ball spline), and the accumulated servo ON time since the previous overhaul time.

(2) Predictive maintenance message ･･･ When the consumption status of the target part exceeds the notification day you specified, the predictive maintenance message according to the status is displayed; check the message content and take measures.

(3) Abnormality Detection ･･･ This area of the screen indicates the score status obtained using the abnormality detection function.
The display also includes the status (normal, fault) of reduction gear, the status (normal, fault) of the encoder, and the status (normal, warning, fault) of the battery.

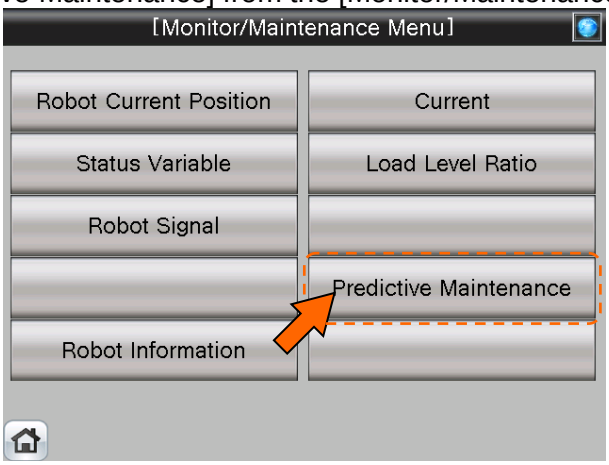
(4) Common Buttons ･･･ Jump to each screen
* **“STOP”** stop a running program (Servo remains ON)

Table 4-22: Details and Roles of "Total Score" Operation Buttons

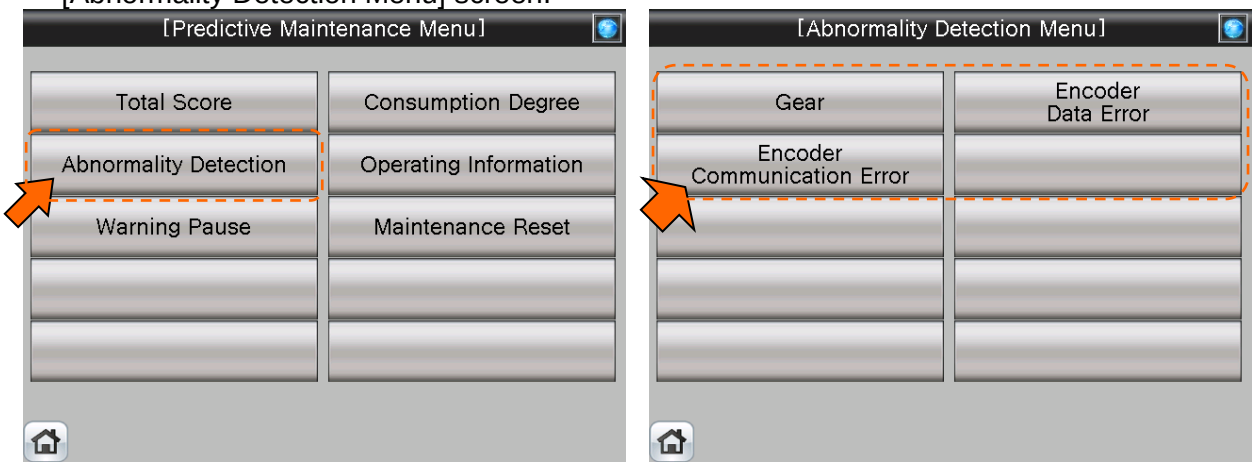
Classification	Name	Function Spec.		Note
Consumption Degree Calculation	Update	Update a display value.		—
		Red Light ON	Updating a display value	
		Light OFF	Update done	
Message Display	Predictive Maintenance Message	Predictive maintenance message is displayed.		—
		▲	Scroll a displayed message up. Button color is changed to gray when first message is displayed.	
		▼	Scroll a displayed message down. Button color is changed to gray when last message is displayed.	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.9.3 Consumption degree calculation function

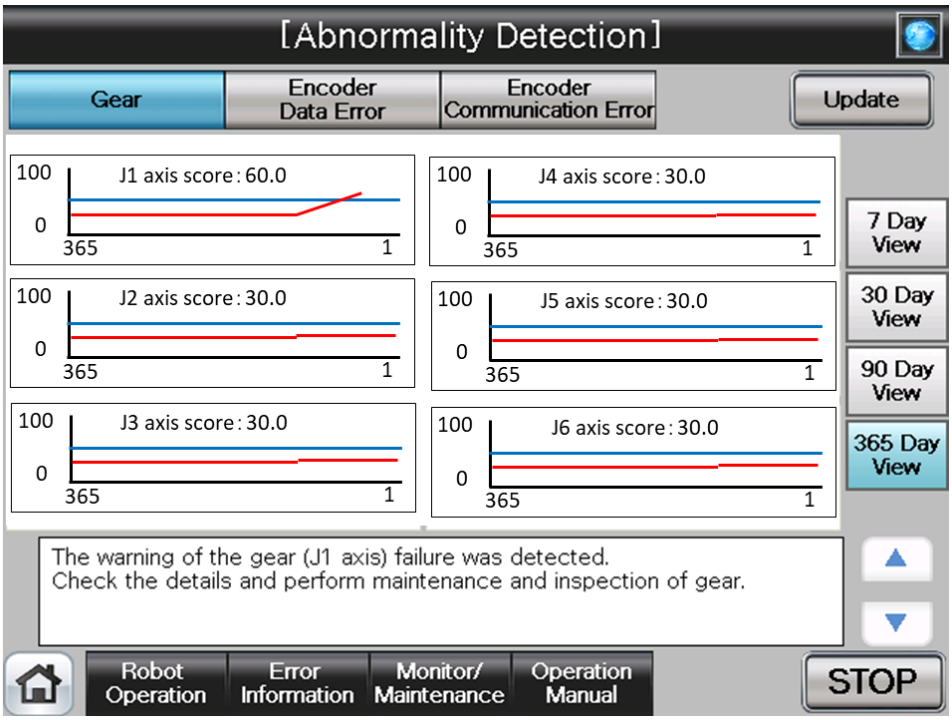
(1) Select [Predictive Maintenance] from the [Monitor/Maintenance Menu] screen.



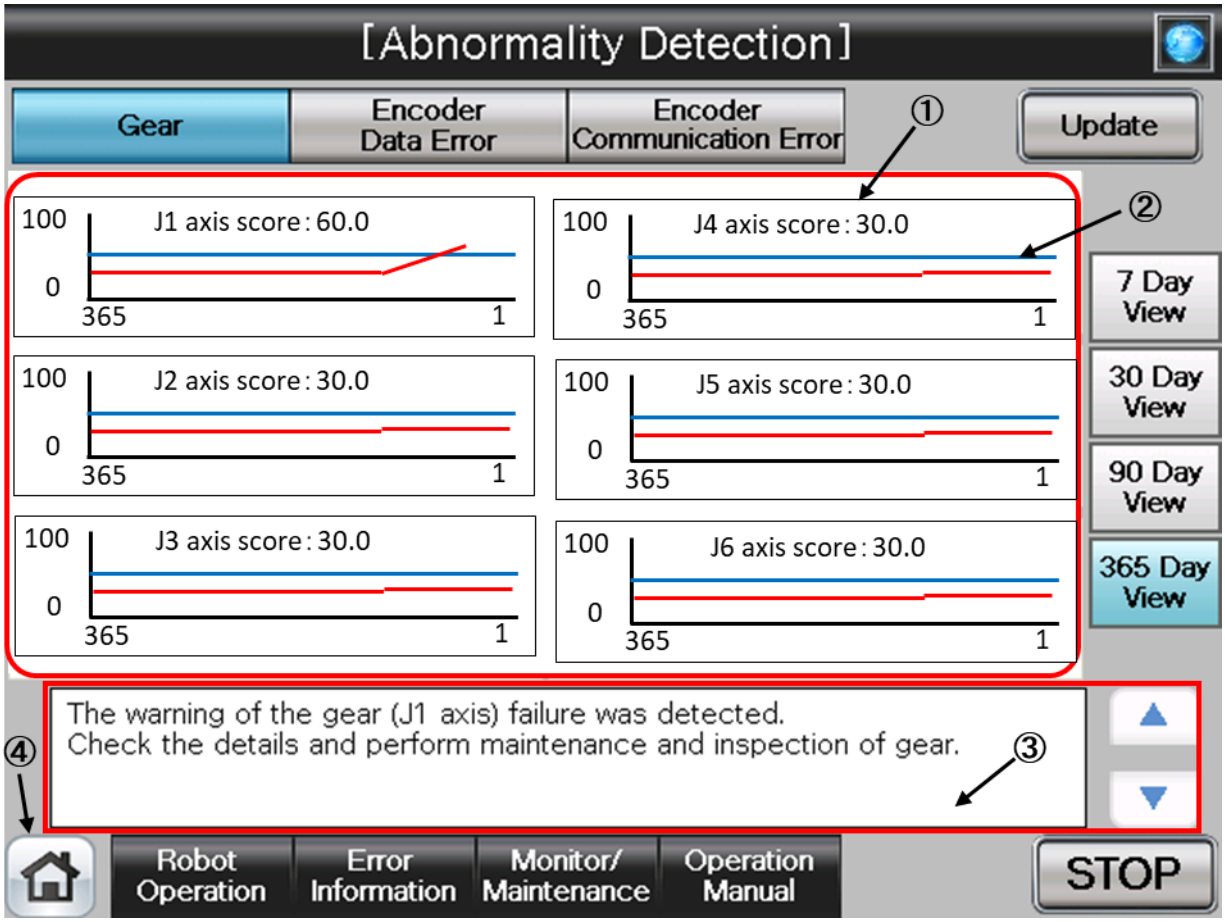
(2) When select [Abnormality Detection] from the [Predictive Maintenance Menu] screen, the [Abnormality Detection Menu] screen is displayed.
And select [Gear] or [Encoder Data Error] or [Encoder Communication Error] on the [Abnormality Detection Menu] screen.

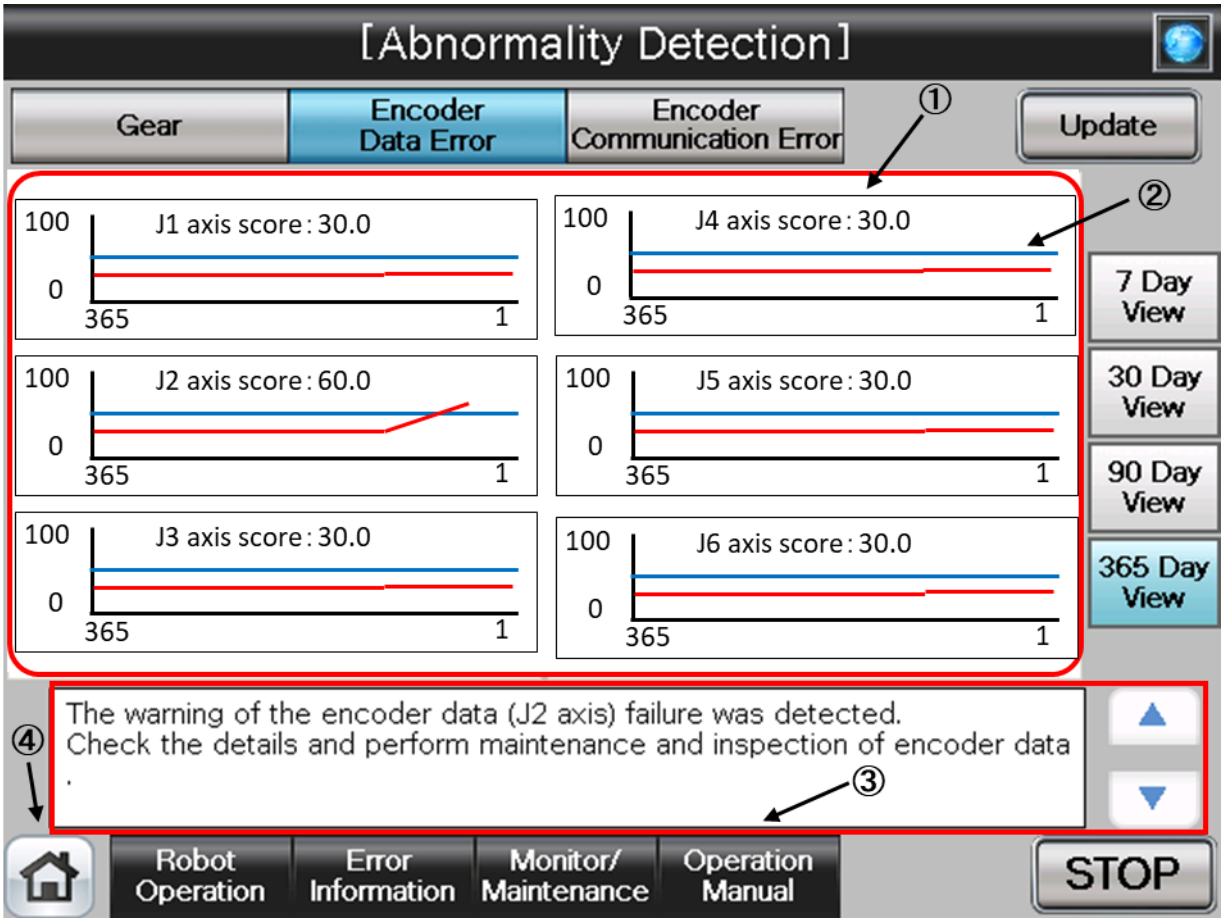


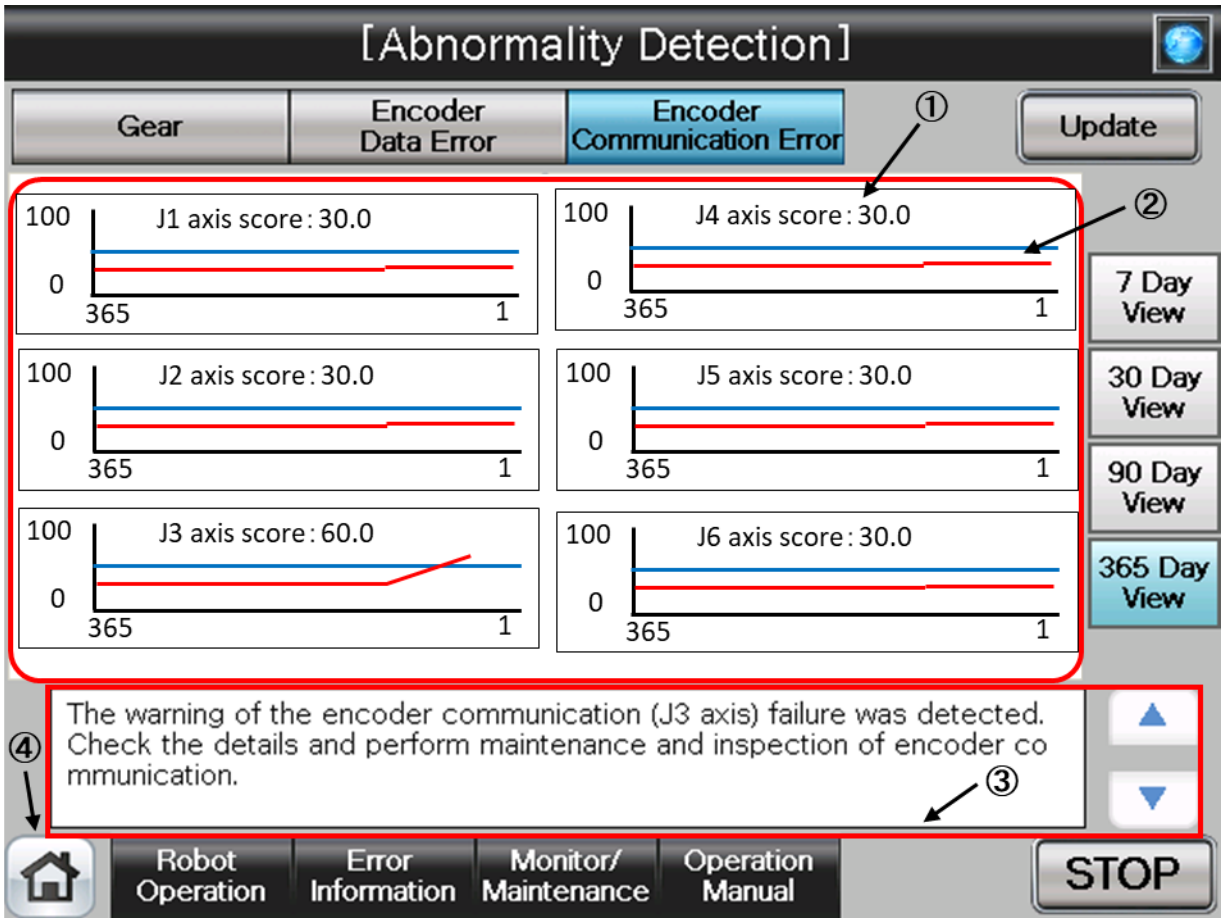
(3) [Abnormality Detection] screen appears.



(4) This function detects abnormalities or deterioration of robot reduction gearcomponents early.Before the robot exhibits behavior that is a sign of an abnormality, the function can detect reduction gearor encoder abnormalities. For details of the operation buttons, see [Table 4-23: Details and Roles of “Abnormality Detection” Operation Buttons]






[Abnormality Detection]
Gear
Encoder Data Error
Encoder Communication Error
①
Update
100
0
J1 axis score : 30.0
365
1
100
0
J4 axis score : 30.0
365
1
②
7 Day View
30 Day View
90 Day View
365 Day View
100
0
J2 axis score : 30.0
365
1
100
0
J5 axis score : 30.0
365
1
100
0
J3 axis score : 60.0
365
1
100
0
J6 axis score : 30.0
365
1
The warning of the encoder communication (J3 axis) failure was detected. Check the details and perform maintenance and inspection of encoder co mmunication.
③
④
Robot Operation
Error Information
Monitor/ Maintenance
Operation Manual
STOP

【Screen Specifications】

(1) Score ･･･ Indicates the scoreofeach joint axis. The value is the current value..

(2) Log data ･･･ Displays log data of the maximum value of scoreof each joint axis for the past 365 days.The indicated value is the maximum value of a day.

• You can specify the display period using the "Display Period" field of the end of right side of the screen. Non target axes are displayed at [0].

(3) Predictive maintenance message ･･･ This field displays predictive maintenancemessages according to the part status.

When an abnormality is detected, an appropriate predictive maintenancemessage is displayed; check the message content and take measures.

(4) Common Buttons ･･･ Jump to each screen

* **"STOP"** stop a running program (Servo remains ON)

Table 4-23: Details and Roles of "Abnormality Detection" Operation Buttons

Classification	Name	Function Spec.		Note
Consumption Degree	Update	Update a display value.		—
		Red Light ON	Updating a display value	
		Light OFF	Update done	
Display Period	7 Day View	You can specify the display period of log data displayed on the screen. 1 year (365 days) | 3 months (90 days) | 1 month (30 days) | 1 week (7 days)		—
	30 Day View			
	90 Day View			
	365 Day View			
Change Screen	Gear	Maintenance Parts screen is displayed.		—
	Encoder Data Error	Overhaul Parts screen is displayed.		
	Encoder Communication Error			
Message Display	Predictive Maintenance Message	Predictive maintenance message is displayed.		—
		▲	Scroll a displayed message up. Button color is changed to gray when first message is displayed.	
		▼	Scroll a displayed message down. Button color is changed to gray when last message is displayed.	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

4.2.9.4 Consumption degree calculation function

Please refer [4.2.8.3 Consumption degree calculation function].

4.2.9.5 Operating Information

Please refer [4.2.8.4 Operating Information].

4.2.9.6 Warning Pause

Please refer [4.2.8.5 Warning Pause].

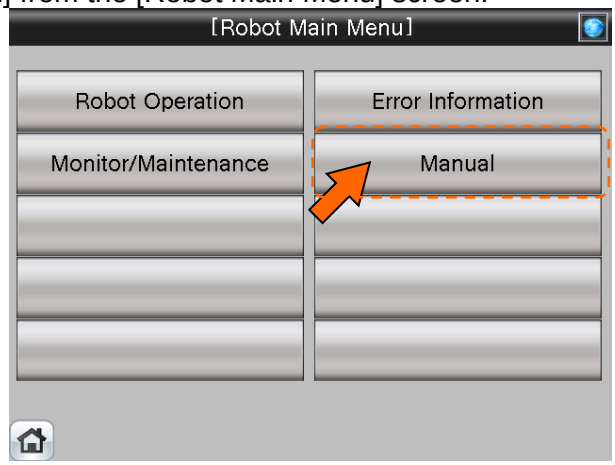
4.2.9.7 Maintenance Reset

Please refer [4.2.8.6 Maintenance Reset].

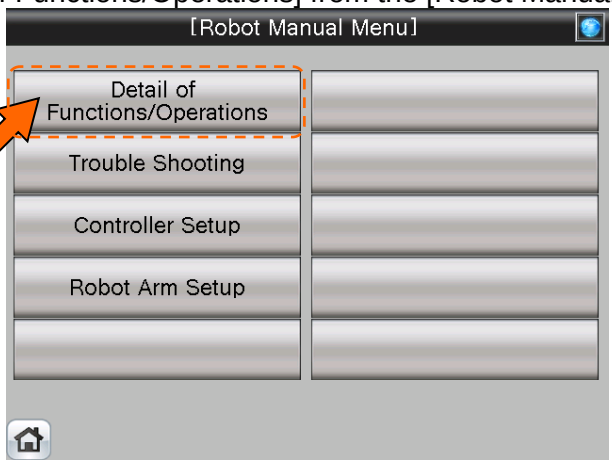
4.3 Manual Document Display Screen

4.3.1 Robot Manual

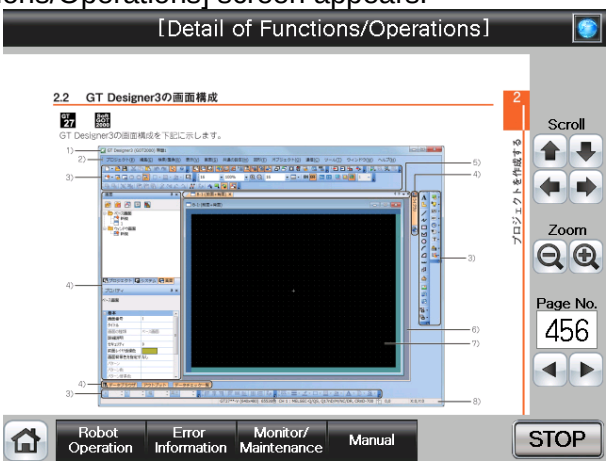
(1) Select [Manual] from the [Robot Main Menu] screen.



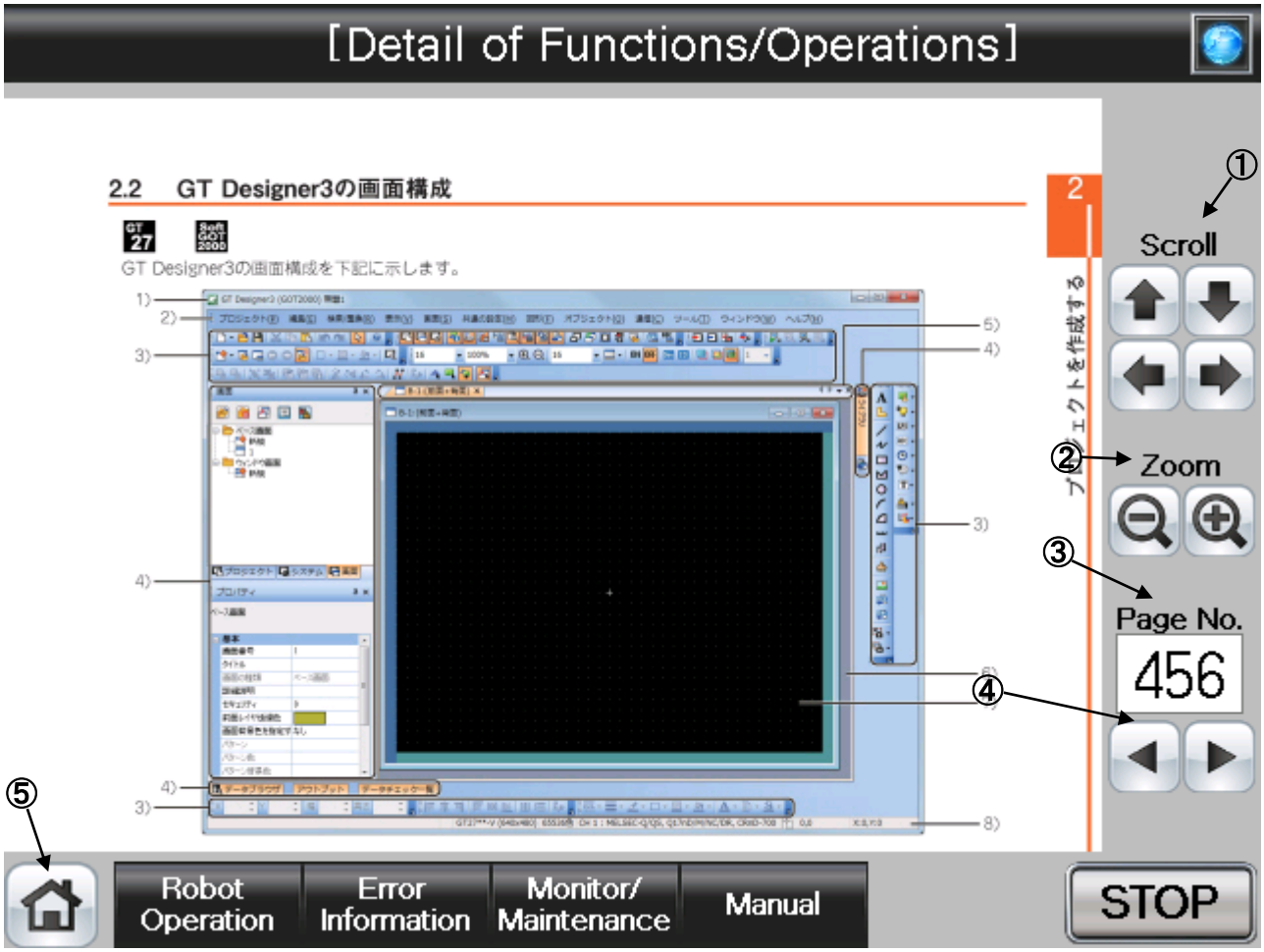
(2) Select [Details of Functions/Operations] from the [Robot Manual Menu] screen.



(3) [Details of Functions/Operations] screen appears.



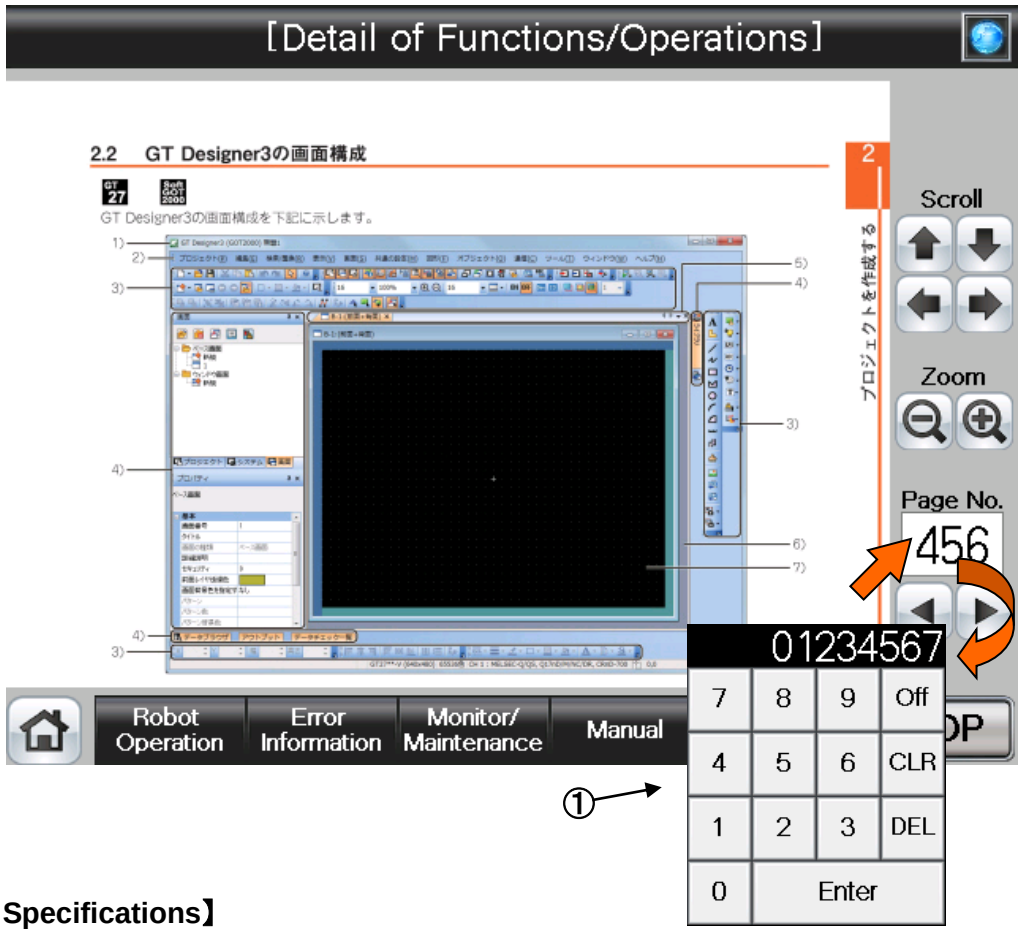
(4) See below for the [Details of Functions/Operations] screen. For details of operation buttons, see [Table4-3-1: Details and Roles of “Manual Monitor” Operation Buttons].



【Screen Specifications】
Screen to monitor the manual display.
(1) Scroll･･･Scrolls the page in the specified direction
(2) Zoom･･･Zooms in/out the page
(3) Page No. **(*1)**･･･Switches the pages
(4) ◄/► Buttons･･･Goes back to the previous page with “◄” and “►” to the next page.
(5) Common Buttons･･･Jump to each screen
* **“STOP”** stop a running program (Servo remains ON)

(*1) To enter the page No, press the numeric display. Number entry screen appears.

(5) See below for the number-entry screen.



【Screen Specifications】

Screen to enter the page No.

(1) Page No. Screen･･･Enters the task slot No. with the decimal input keys

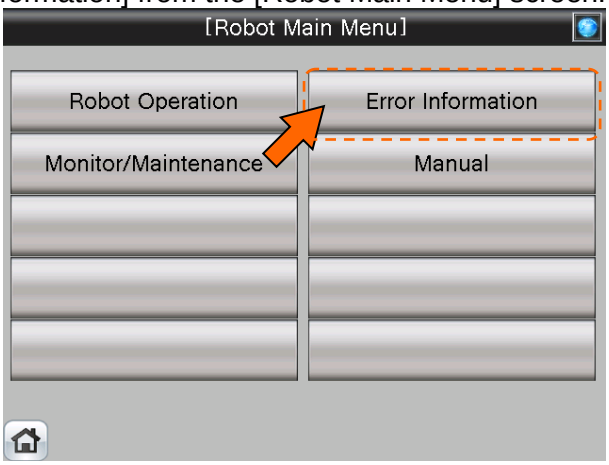
Table 4-3-1: Details and Roles of [Manual] Operation Buttons

Classification	Name	Function Spec.		Note
Display Operation	Scroll	Scrolls the page in the specified direction		—
		⇧	Scrolls up the display	
		⇩	Scrolls down the display	
		⇦	Scrolls the display to the left	
		⇨	Scrolls the display to the right	
	Zoom	Zooms in/out of the page		
		−	Zooms out the page	
		+	Zooms in the page	
	Page No.	Switches the pages to be displayed		
		Numeric	Displays the page of the entered No.	
		◄	Goes back to the previous page	
		►	Goes to a the next page	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

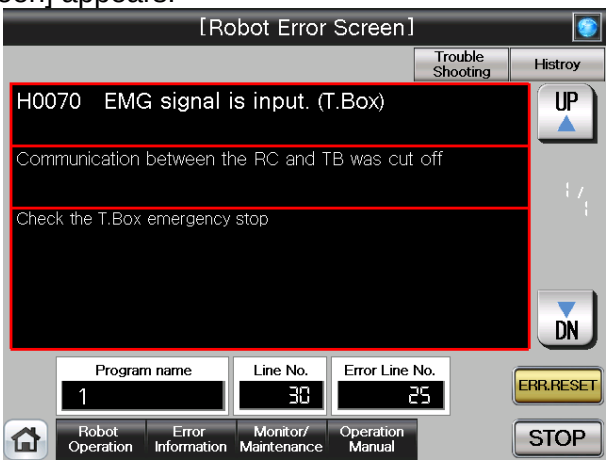
4.4 Error Information Screen

4.4.1 Check the Robot Error Information

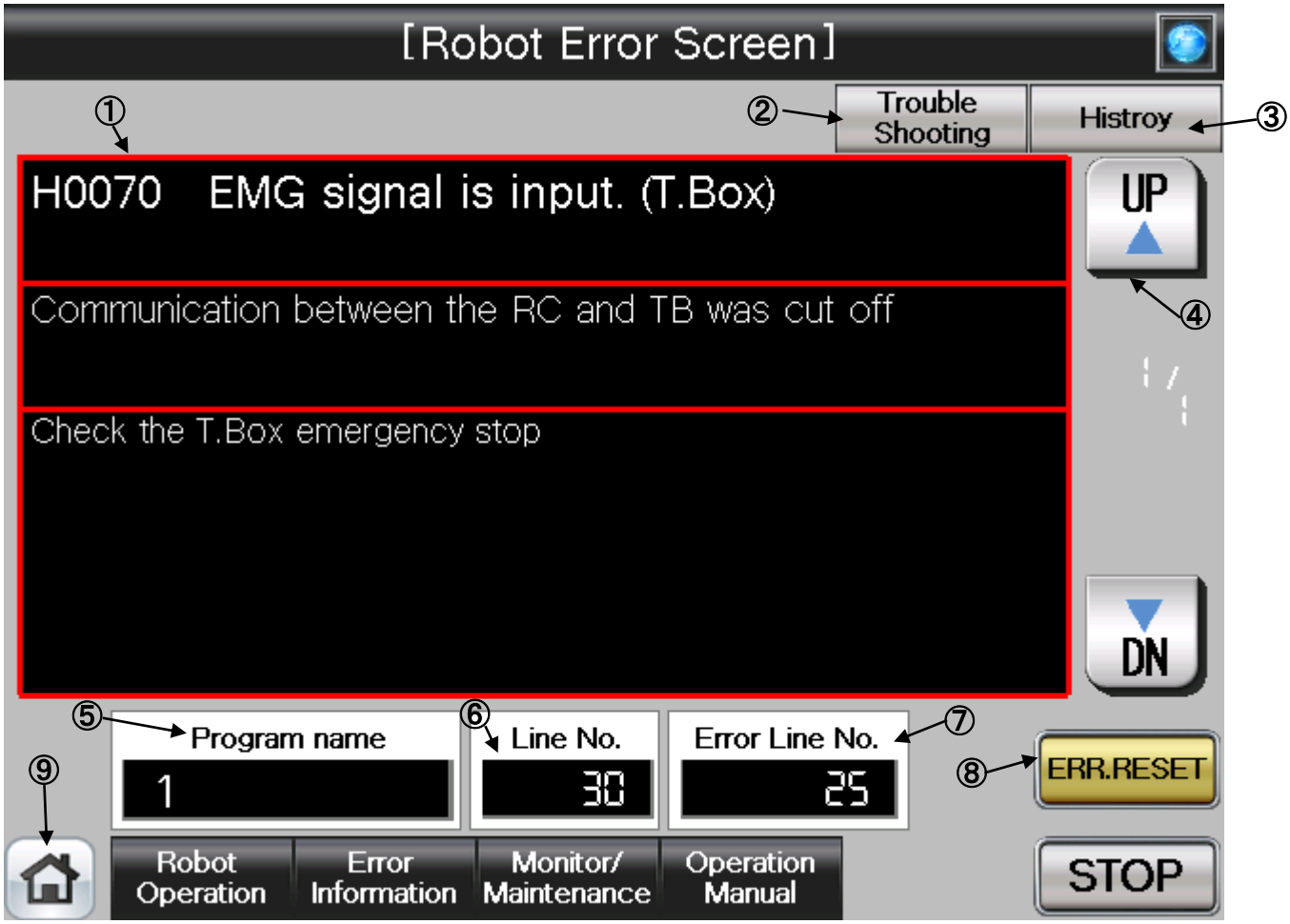
(1) Select [Error Information] from the [Robot Main Menu] screen.



(2) [Robot Error Screen] appears.



(3) See below for the [Robot Error Screen]. For details of the operation buttons, see [Table 4-4-1: Details and roles of “Robot Error Screen” Operation Buttons].



【Screen Specifications】

Screen to monitor the robot errors in chronological order

(1) Error Display･･･Displays the description of an ongoing error

* **Upper column:** error description
Middle column: cause
Lower column: restoration

(2) Troubleshooting･･･Jump to “**Troubleshooting**” in the [**Robot Manual Menu**]

(3) History･･･Jumps to the history screen

(4) ▲/▼ Buttons･･･Switches the error screens ▲ for the previous error and▼ for the next error

(5) Program Name･･･Displays the name of program with an error

(6) Line No.･･･Displays the line number of the program with an error

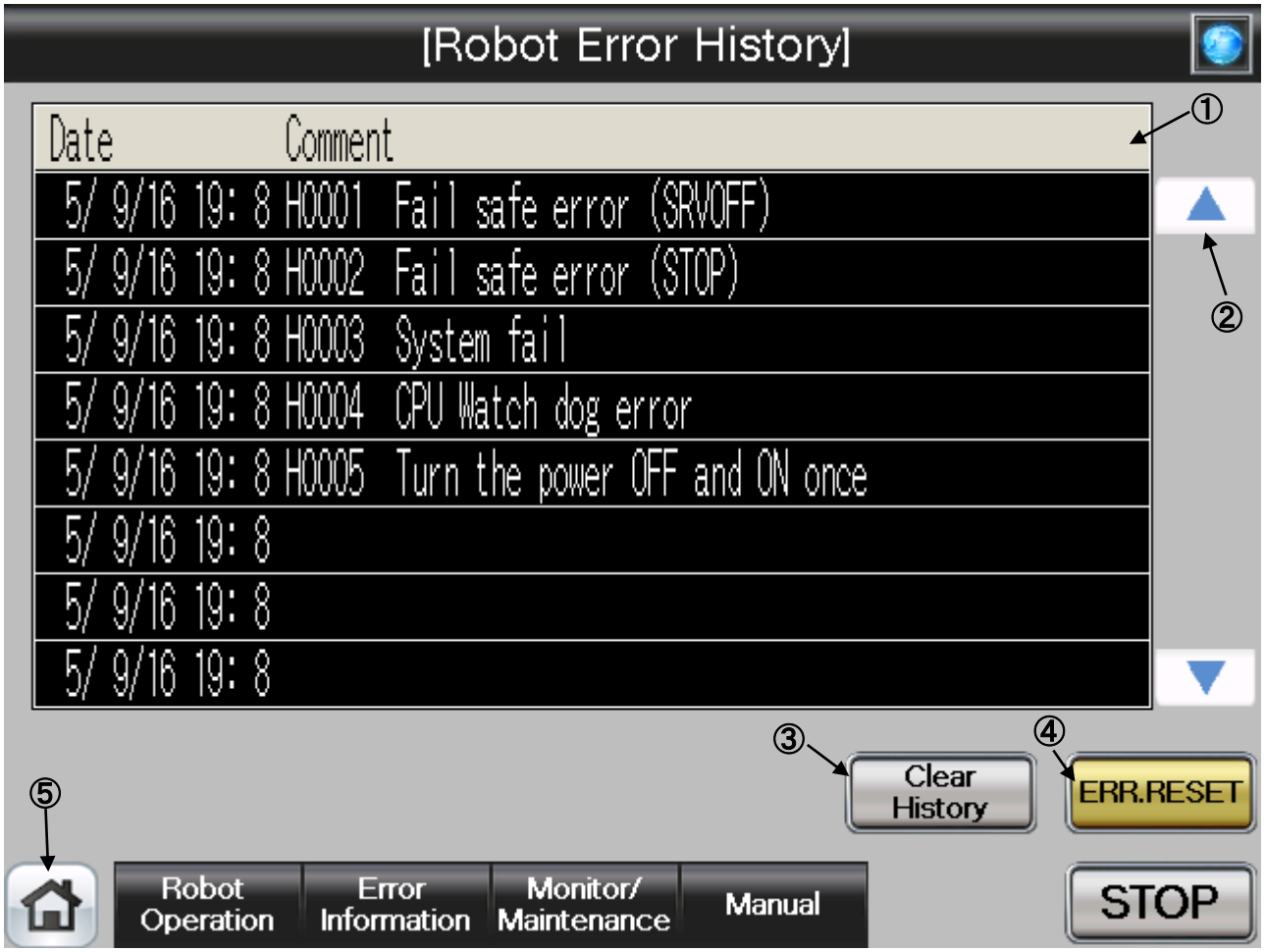
(7) Error Line No. ･･･Displays the number of ongoing error

(8) Error Reset Button･･･Resets the error with **ERR. RESET**

(9) Common Buttons･･･Jump to each screen

* **“STOP”** stop a running program (Servo remains ON)

(4) See below for the [Robot Error History] screen. For details of the operation buttons, see [Table 4-4-2: Details and Roles of “Robot Error History” Operation Buttons].



【Screen Specifications】

Screen to monitor the robot error history in chronological order

(1) Error History･･･Displays the errors in the past in chronological order

(2)▲/▼ Buttons･･･Scrolls the history ▲ for the previous history ▼ for the next history

(3) Clear History･･･Deletes all the error history (initialization)

(4) Error Reset Button･･･Resets the error with **ERR. RESET**

(5) Common Buttons･･･Jump to each screen

* **“STOP”** stop a running program (Servo remains ON)

Table 4-4-1: Details and roles of "Robot Error Screen" Operation Buttons

Classification	Name	Function Spec.		Note
Error Screen	Error Screen	Displays the details of the ongoing error		—
		Upper Column	Error description	
		Middle Column	Causes	
		Lower Column	Restoration	
	History	Jumps to the screen with the past error information in chronological order		
	UP△/DN▽	Switches the errors to display		
		UP▲	Displays the previous error	
		DN▼	Displays the next error	
	ERR.RST	Clears the displayed error and cancel the error		
		Blue Light ON	Error reset	
		Yellow Light ON	No error or error reset	
	Program Name	Displays the program name with an error		
	Line No.	Displays the line number of the program with an error		
	Error No.	Displays the No. of ongoing error		
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

Table 4-4-2: Details and roles of "Robot Error History" Operation Buttons

Classification	Name	Function Spec.		Note
Error History	Display of Error History	Displays of the error history		—
		Date of Error	Displays the date when the error occurs	
		Comment	Displays the error summary	
	History Clear	Clears the list of error history		
	UP△/DN▽	Scrolls the error history		
		▲	Displays the previous error history	
		▼	Displays the next error history	
	ERR.RST	Resets and cancel the error		
		Blue Light ON	Error reset	
		Yellow Light ON	No error or error reset	
Common Screen	Main Menu	Jumps to the main menu screen		—
	Robot Operation	Jumps to the robot operation sub menu		
	Error Information	Jumps to the robot failure display		
	Monitor/ Maintenance	Jumps to the monitor/maintenance sub menu		
	Manual	Jumps to the robot manual sub menu		
	STOP	Stops the running program (servo remains ON)		
		Red Light ON	Program stops	
		Light OFF	Program in running	

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