

LOCTITE®

EQUIPMENT OPERATION MANUAL



Cartesian 200, 300, 400 and 500 Series

Maintenance

“For Specific Maintenance Qualified Person(s) ONLY”

Thank you for purchasing a Loctite® Robot.

***Read this manual thoroughly in order to properly use this robot.**

Be sure to read “For Your Safety” before you use the robot. It will protect you from possible dangers during operation.

***After having read this manual, keep it in a handy place so that you or the operator can refer to it whenever necessary.**

FOR YOUR SAFETY

Safety Precautions



The precautions stated in this manual are provided for the customer to make the best use of this product safely, and to provide preventive measures against injury to the customer or damage to property.

Be sure to follow the instructions

Various symbols are used in this manual. Please read the following explanations to understand what each symbol stands for.











Symbols indicating the Degree of Damage or Danger

The following symbols indicate the degree of damage or danger which may be incurred if you neglect the safety notes.

	Warnings These "Warnings" indicate the possibility of death or serious injury.
	Cautions These "Cautions" indicate the possibility of accidental injury or damage to property.

Symbols indicating the type of Danger and Preventive Measures

The following symbols indicate the type of safety measure that should be taken.

	Indicates the type of safety measure that should be taken.
	Take care. (General caution)
	Indicates prohibition.
	Never do this. (general prohibition)
	Do not disassemble, modify or repair.
	Do not touch. (contact prohibition)
	Indicates necessity
	Be sure to follow instructions.
	Be sure to unplug power supply from wall outlet.
	Be sure to check grounding.

FOR YOUR SAFETY

Warnings



Be sure to check grounding.

Improper grounding can cause electric shock or fire.



Be sure to use within the voltage range indicated on the unit.

Failure to do so may cause electric shock or fire.



Plug the power cord into the wall outlet firmly.

Failure to do so can cause the input to heat up and may result in fire.
Make sure that the power plug is clean.



Be sure to unplug the power cord from the wall outlet when you examine or grease the machine.

Failure to do so may cause electric shock or fire.



Stop operation and unplug immediately whenever you sense any abnormalities, such as a pungent odor. Immediately contact the dealer from which you purchased the product.

Continued operation may result in electric shock, fire or malfunction.



Install the product in a place which can endure it's weight and conditions while running.

Be sure to leave a space greater than 30cm between the back of the robot (equipped with a cooling fan) and the wall. Installation in an insufficient or unstable place can cause the unit to fall, overturn, breakdown, or overheat.



Be sure to take protective measures such as installing an area sensor or enclosure to avoid injury.

Entering the robot's work range during operation could lead to injury.



Do not attempt to disassemble or modify the machine.

Disassembly or modification may cause electric shocks, fire or malfunction.

FOR YOUR SAFETY

Warnings



Use the machine indoors where no flammable or corrosive gas is present.
Emission and accumulation of such gasses could lead to fire.
IP Protection Rating is "IP30." ("IP40" for CE specification)



Be sure to unplug the power cord from the wall outlet if the robot will remain unused for long periods of time.
Gathered dust could lead to fire.



Be sure to use power in the proper voltage range.
Failure to do so may result in fire or malfunction.



Keep the unit and the power cables away from water and oil.
Failure to do so may result in electric shock or fire.



Turn off the unit before inserting and removing cables.
Failure to do so may result in electric shock, fire, or malfunction of the unit.
IP Protection Rating is "IP30." ("IP40" for CE specification)



Keep the emergency stop switch within reach of an operator while teaching and running the robot.
Failure to do so may lead to danger since the robot cannot be stopped immediately and safely.



Regularly check that the emergency stop switch works properly.
For models with I/O-S circuits, also check that they work properly.
Failure to do so may lead to danger since the robot cannot be stopped immediately and safely.

FOR YOUR SAFETY

Warnings



Be sure to check grounding.

Improper grounding may cause malfunction or defect.



Use the Benchtop Robot in an environment between 0 to 40 degrees centigrade with a humidity of 20 to 95 percent without condensation.

Failure to do so may result in malfunction.

IP Protection Rating is "IP30." ("IP40" for CE specification)



Use the machine in an environment where no electric noise is present.

Failure to do so may result in malfunction or defect.



Use the machine in an environment where it is not exposed to direct sunlight. Failure to do so may result in malfunction or defect.



Be sure to confirm that tools such as the electric screwdriver unit, etc. are properly connected.

Failure to do so may result in injury or defect.



Check the mounting screws regularly so that they are always firmly tightened.

Loose screws may cause injury or defect.



Be sure to check the wiring to the main unit.

Improper wiring may cause malfunction or defect.



Be sure to secure the movable parts of the robot before transportation.

Failure to do so may result in defect or injury.



Do not bump or jar the machine while it is being transported or installed.

This can cause defects.

PREFACE

The Loctite® Benchtop Robot CARTESIAN Series is a new low cost, high performance robot. We have succeeded in reducing price while maintaining functionality. Energy and space saving is made possible through the combined use of stepping motors and special micro step driving circuits.

The operation manual consists of the following volumes.

Setup	This volume explains how to set up the robot. You must read this volume before you operate the robot.
Maintenance	This volume explains how to maintain the robot.
Basic Instructions	This volume provides safety precautions, part names, and the basic knowledge necessary to operate the Benchtop Series. You must read this volume before you operate the robot.
Dispensing	This volume explains dispensing applications for the Benchtop Series robot.
Quick Start	This volume explains the actual operation of the Benchtop Series with simple running samples.
Teaching Pendant Operation	This volume explains how to operate the robot via the teaching pendant.
PC Operation	This volume explains how to operate the robot from a computer (LR C-Points.)
Features I	This volume explains point teaching.
Features II	This volume explains commands, variables, and functions.
Specifications	This volume provides comprehensive specifications, including mechanical or electrical requirements.

Please be sure to follow the instructions described in these volumes. Proper use of the robot will ensure continued functionality and high performance.

The contents described in this volume are based on the standard application. Menu items may vary depending on models.



BE SURE TO MAKE A PROPER GROUNDING WHEN YOU INSTALL THE ROBOT.



Be sure to save data whenever it is added or modified. **Otherwise, changes will not be saved if the power to the robot is cut off.**

CONTENTS

Maintenance

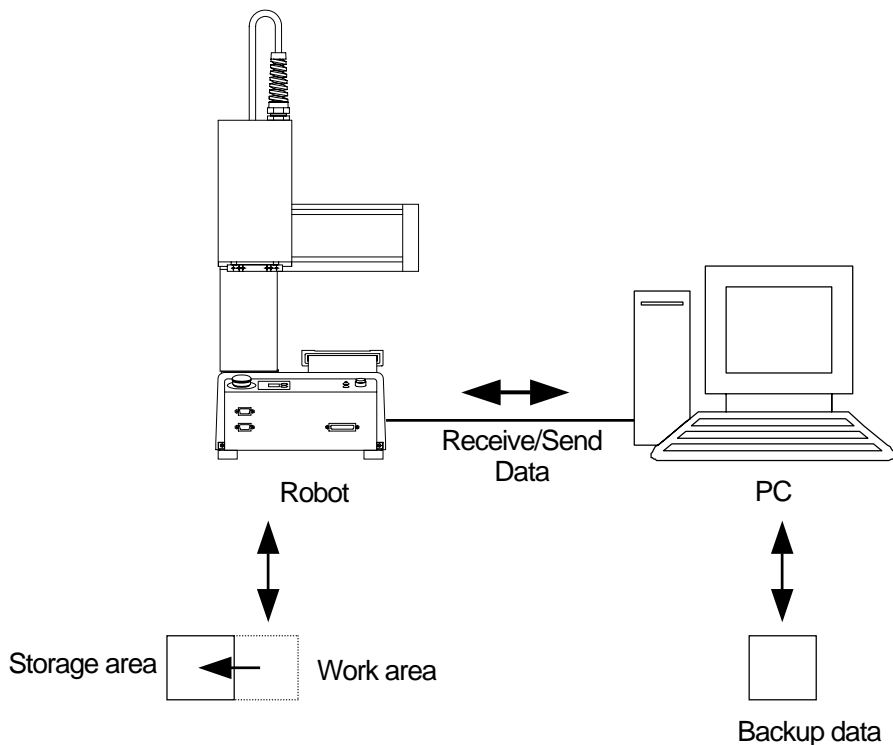
FOR YOUR SAFETY	i
PREFACE	v
CONTENTS	vi
C&T DATA BACKUP	1
WHEN ERRORS OCCUR	2
Self-Diagnosis	2
Failure Diagnosis	2
Key of Teaching Pendant	3
Teaching Pendant	3
Switch	4
LED Buzzer	5
State of Sensor	5
Z-phase of Motor Driver	5
XY Axis Motor	6
ZR Axis Motor	7
Position of Sensor	7
External I/O	8
Emergency	9
COM1 to 3 Communication	10
GREASE UP	11
Screws that must be removed for greasing (indicated by thick arrows)	11
Grease Up	14
MECHANICAL ADJUSTMENT	16
HOW TO INSTALL ROBOT SYSTEM SOFTWARE	19
ERROR TABLE	20

C&T DATA BACKUP

Back up data in case of accident.

To create the backup data, start up the PC software “LR C-Points Limited Edition” or “LR C-Points Full Version”. Retrieve data from the robot and save the received data in a file.

The teaching data in combination with the customizing data is sent and received between the robot and PC as a unit of data. This unit of data is called “C&T data.” You cannot send or receive one particular program only.



The robot has a data storage area and a work area. When you start up the robot, the C&T data in the storage area will be copied to the work area. The copied data is used for running and teaching. The data in the work area will be deleted when the power to the robot is turned OFF.

When retrieving data from the robot, it comes from the work area. After sending data from the PC to the robot, the sent data will be saved in the storage area automatically.

- If you are using “LR C-Points”, the robot system software can also be upgraded by selecting [Receive C&T Data] from the [Robot] pull-down menu.

WHEN ERRORS OCCUR

Self-Diagnosis

When an error occurs during operation or teaching, the error number and error message will be displayed on the LCD of the teaching pendant. When an error occurs during operation, the robot will stop running. Recover from the error according to the error message.

If the teaching pendant is not connected, turn OFF the power then connect the teaching pendant. After turning the power ON again, the error message will be displayed on the LCD of the teaching pendant.

For details of error contents and how to solve the problem, refer to the "ERROR TABLE."

Failure Diagnosis

If you are unsure whether the robot is functioning properly, execute "failure diagnosis" on each part.

The failure diagnosis menu contains the following items.

No	Item	No	Item
1	Key of Teaching Pendant	8	ZR Axis Motor
2	Teaching Pendant	9	Position of Sensor
3	Switch	10	External IO
4	LED Buzzer	11	Emergency
5	State of Sensor	12	COM1 Communication
6	Z-phase of Motor Driver	13	COM2 Communication
7	XY Axis Motor	14	COM3 Communication

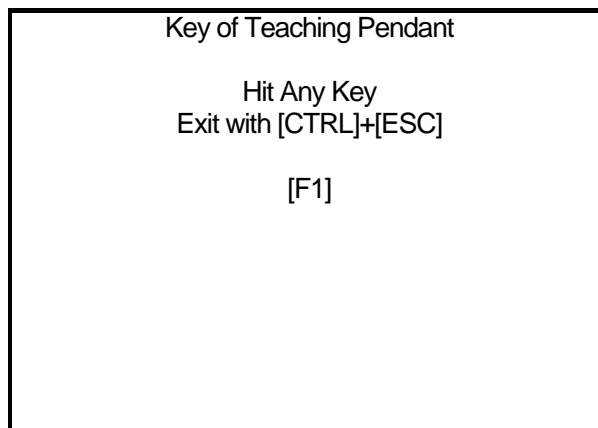
Press the **MODE** key and select [Administration] from the mode selection menu to start up the administration mode. Select [Diagnosis Mode] from the administration mode menu to enter the diagnosis mode.

Select the item you want to check from the diagnosis mode menu.

Key of Teaching Pendant

When you press a key, that character will appear on the teaching pendant LCD.

- To return to the Diagnosis Mode menu, press the **[CIRL]** + **[ESC]** keys.
To return to the Administration menu, press the **[SHIFT]** + **[ESC]** keys.



Teaching Pendant

This diagnosis menu is for the Enable Switch, Buzzer, LED and LCD. Select the item you want to check. Press the **[ESC]** key to go back to the diagnosis mode menu.

1. Enable Switch

When the Enable Switch is pressed, "ON" will be displayed. When it is released, "OFF" will be displayed.

2. Buzzer

When the **[ENTR]** key is pressed, "ON" will be displayed and a buzzer will sound. When the key is pressed again, the buzzer will stop. (Buzzer OFF)

Teaching Pendant	
Enable Switch	OFF
Buzzer	OFF
LED 1	ON
LED 2	OFF
LED 3	OFF
LED 4	OFF
LED 5	OFF
Back Light	ON
Screen	ON
Changing Display	
Brightness Adjustment	Standard

<Teaching Pendant Diagnosis Screen>

3. LED 1 to 5

Pressing the **[ENTR]** key will toggle between ON and OFF and the relevant LCD will switch ON and OFF.

- This is only an LED test for the teaching pendant. Please note that it has no effect on the robot. For example, it will not be switched to Teaching Mode even if [TEACH] LED is turned [ON.]

4. Back Light

When the **[ENTR]** key is pressed, the [Backlight] display will switch ON and OFF.

5. Screen

When the **[ENTR]** key is pressed, the [Screen] display will switch ON and OFF. When this item is OFF, the teaching pendant LCD display will be blank.

6. Changing Display

Each time the **ENTR** key is pressed, the display on the teaching pendant LCD will change in the following order:

“Checked pattern” “Highlighted checked pattern” “Blank” “White” “Teaching pendant diagnosis screen”

7. Brightness Adjustment

Each time the **ENTR** key is pressed, the display on the teaching pendant LCD will change in the following order:

[Standard] [Bright] [Dark] [Standard]

- The emergency stop switch is diagnosed under “Emergency.”

Switch

The diagnosis shows the current condition of the displayed item. Press the **ESC** key to return to the diagnosis mode menu.

Switch	
Start Switch	OFF
Increment Number	OFF
Decrement Number	OFF
Special Mode Switch	ON
Spare Switch	ON

1. Start Switch

While the start switch is pressed, “ON” is displayed.

2. Increment Number

While the increment number switch is pressed, “ON” is displayed.

3. Decrement Number

While the decrement number switch is pressed, “ON” is displayed.

4. Special Mode Switch

The current condition of the special mode switch will be displayed.

5. Spare Switch

The current condition of the spare switch will be displayed.

- The I/O-SYS Internal/External Power Selection Switch, I/O-1 Internal/External Power Selection Switch will not be displayed.

LED Buzzer

The LED is lighted, when it is ON, and the LED is not lighted, when it is OFF. If you turn [Number Display] ON, "88" will be displayed.

If you turn [Buzzer] ON, a buzzer will sound. And if you turn it OFF, it will stop sounding.

Press the key to return to the diagnosis mode menu.

LED Buzzer	
Number Display	ON
Green LED	ON
Red LED	ON
Buzzer	OFF

State of Sensor

Select [State of Sensor] from the Diagnosis Mode to move each axis manually.

Check whether the sensor is ON/OFF by moving each axis manually.

The State of Sensor is turned ON when the corresponding axis exceeds the initialized position in the negative direction.

Press the key to return to the diagnosis mode menu.

State of Sensor	
X Axis Sensor	ON
Y Axis Sensor	ON
Z Axis Sensor	OFF
R Axis Sensor	ON

Z-phase of Motor Driver

Diagnose the motor driver for each axis.

Press the key to execute mechanical initialization.

If you press a jog key (the key, etc.), the motor rotates 1 step.

1 step of the motor is 1/10000 of a motor spin and 1 motor spin which is a 50 mm shift of the X or Y axis, 25 mm of the Z axis and a rotation of 90 degrees of the R axis. (These values are references.)

Z-Phase of Motor Driver	
Z-Phase of X Motor	ON
Z-Phase of Y Motor	OFF
Z-Phase of Z Motor	ON
Z-Phase of R Motor	ON

INIT

Press the **ESC** key to return to the Diagnostic Mode menu.



Caution

Be careful of the movement of the robot in Teaching mode.

XY Axis Motor

Check the XY axis motor drive.

Number of Output Pulse, Rate of Output Pulse, and Hold and Half (ON/OFF) can be set.

The settings Number of Output Pulse and Rate of Output Pulse are common to the X and Y axes. The default values for Number of Output Pulse and Rate of Output Pulse are 10000 (corresponding to 1 rotation) and 1000, respectively.

Jog keys (the **X** key, etc.) are used to operate the motor drive. When you press a jog key, the motor rotates by the Number of Output Pulse.

Press the **F4** key to execute mechanical initialization. the X, Y, Z and R axes are all initialized by mechanical initialization.

Press the **ESC** key to return to the diagnostic mode menu.

XY Axis Motor	
Number of Output Pulse	10000
Rate of Output Pulse	1000
X Axis Hold	ON
X Axis Half	OFF
Y Axis Hold	ON
Y Axis Half	OFF
INIT	



Caution

Be careful of the movement of the robot in Teaching mode.

ZR Axis Motor

Check the ZR axes motor drive.

Number of Output Pulse, Rate of Output Pulse, and Hold and Half (ON/OFF) can be set.

The settings Number of Output Pulse and Rate of Output Pulse are common to the Z and R axes. The default values for Number of Output Pulse and Rate of Output Pulse are 10000 (corresponding to 1 rotation) and 1000, respectively.

Jog keys (the **[Z]** key, etc.) are used to operate

the motor drive. If you press a jog key, the motor rotates by the Number of Output Pulse.

Press the **[F4]** key to execute mechanical initialization. The X, Y, Z and R axes are all initialized by mechanical initialization.

Press the **[ESC]** key to return to the diagnostic mode menu.

ZR Axis Motor	
Number of Output Pulse	10000
Rate of Output Pulse	1000
Z Axis Hold	ON
Z Axis Half	OFF
R Axis Hold	ON
R Axis Half	OFF
INIT	



Caution

Be careful of the movement of the robot in Teaching mode.

Position of Sensor

First, follow the instructions on the LCD screen and press the **[F4]** Key. Execute mechanical initialization.

The differential amount of the zero phase after initializing will be displayed.

X Axis, Y Axis: Zero Phase of the Encoder

Z Axis, R Axis: Zero Phase of the Motor Driver

Sensor Adjustment	
X Axis Sensor	20 %
Y Axis Sensor	30 %
Z Axis Sensor	40 %
R Axis Sensor	20 %
CHANGE SENSOR	INIT

In this test, the differential amount between the sensor position and the zero phase of the motor driver or the encoder will be checked.

Press **F 0** CHANGE key to change % display to OK/Fault display.

Press **F 1** SENSOR key to change the screen display to the current sensor state display.

Press **F 4** INIT key to re-execute mechanical initialization and update the display.



Caution

Do not touch moving parts of the robot while it is running.

It is normal if the value is within the following range.

If it is out of range, move the shielding plate to adjust the difference.

X Axis: $\pm 25\%$

Y Axis: $\pm 25\%$

Z Axis: $\pm 25\%$

R Axis: $\pm 25\%$

To re-check, press the **F 4** key to execute mechanical initialization.

Press the **ESC** key to return to the mechanical adjustment mode menu.

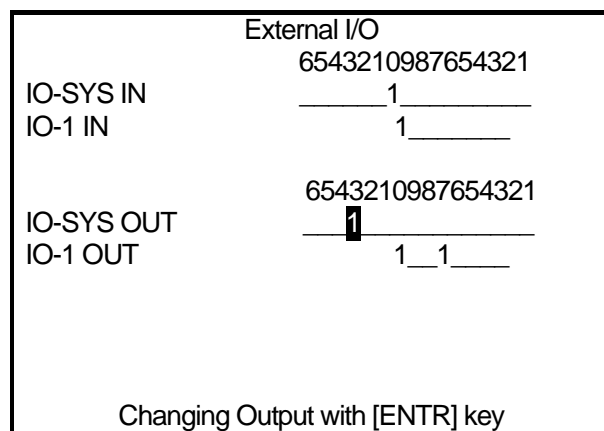
External I/O

In this diagnosis, how the I/O-SYS and I/O-1 have been entered is displayed on LCD.

Connect an external I/O test device (to check the input switch and the output) to the terminal of the external I/O and press the **ENTR** key to display the I/O-1 state. (ON: 1, OFF: 0)

If the entered state is output correctly, it is recognized as normal.

Press the **ESC** key to return to the diagnosis mode menu.



Emergency

In the emergency diagnosis, you can check the safety circuit including the emergency stop and the IO-S. There are 6 types of signals and they are roughly divided into 3 groups.

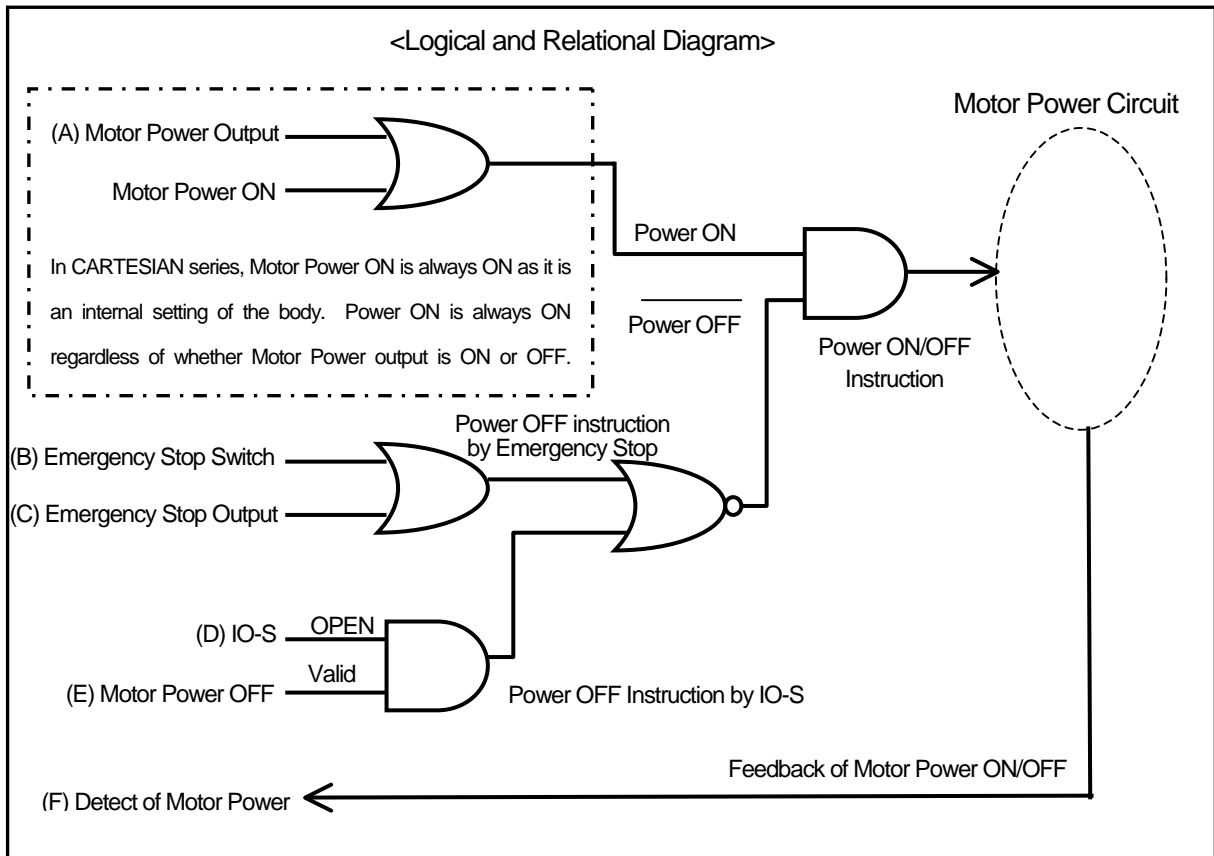
- (1) Motor Power ON Instruction
 - (A) Output of Motor Power ON

- (2) Motor Power OFF Instruction
 - (B) Emergency Stop Switch
 - (C) Output of Emergency Stop
 - (D) IO-S (OPEN/CLOSE)
 - (E) Motor Power OFF (Valid/Invalid)

- (3) Motor Power Feedback Signal
 - (F) Detect of Motor Power

Emergency	
Output of Motor Power ON	OFF
Output of Emergency	OFF
Motor Power OFF	Valid
IO-S	OFF
Emergency Switch	OFF
Detect of Motor Power	OFF

This is a logical and relational diagram for each signal.



You need to judge the diagnosis result dividing it into “Checking the input signal” and “Checking the emergency stop sequence.”

(1) Checking the input signal

Check the display to see whether signals for “(B) Emergency Stop Switch” and “(D) IO-S” are input normally.

<Emergency Stop Switch>		<IO-S>	
State	Display	State	Display
Pressed	ON	Shorted	CLOSE
Not pressed	OFF	Not shorted	OPEN

(2) Checking the emergency stop sequence

Check whether an emergency stop sequence works normally or not by confirming that the display of Detect of Motor Power for the input signal (A) to (E) is ON or OFF. The relation between the input signal (A) to (E) and Detect of Motor Power (F) is shown in the Logical and Relational Diagram.

Power ON signal stays ON regardless of whether Detect of Motor Power (A) is ON or OFF as shown in the diagram. Therefore, if it is normal, the Detect of Motor Power (F) ON/OFF display will not change even if the ON/OFF setting is changed.

COM1 to 3 Communication

Select “Set Output String.” The Output String entry screen will appear. Set output strings and then select “Execute Output String.” The output strings you have set will be output from the COM port.

Hidden characters (00H to 1FH, 7FH to FFH) will be displayed only HEX text. ASCII text will not be displayed (blank.)

COM1 Communication	
Baud Rate	9600
Set Output String	
Execute Output String	
30 31 32 33 41 42 43 61 62 63 0123ABCabc	
04 0D	d

Baud rate will be changed as follows:

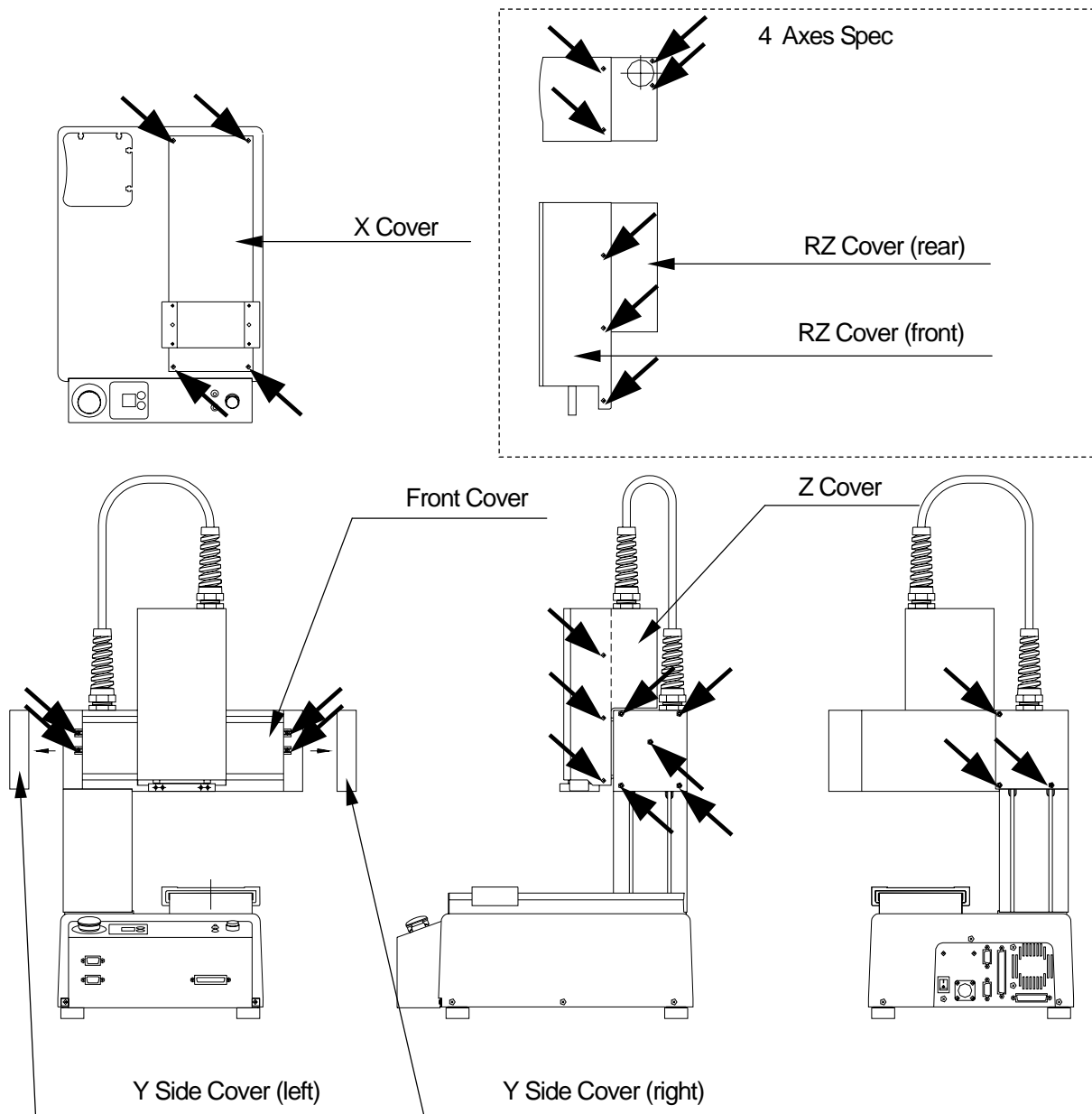
COM1	9600/19200/38400/57600/115200/230400/460800/921600
COM2	9600/19200/38400/57600/115200/230400/460800/921600
COM3	9600/19200

- If you change the baud rate on this screen, the value will be restored when you exit the failure diagnosis.

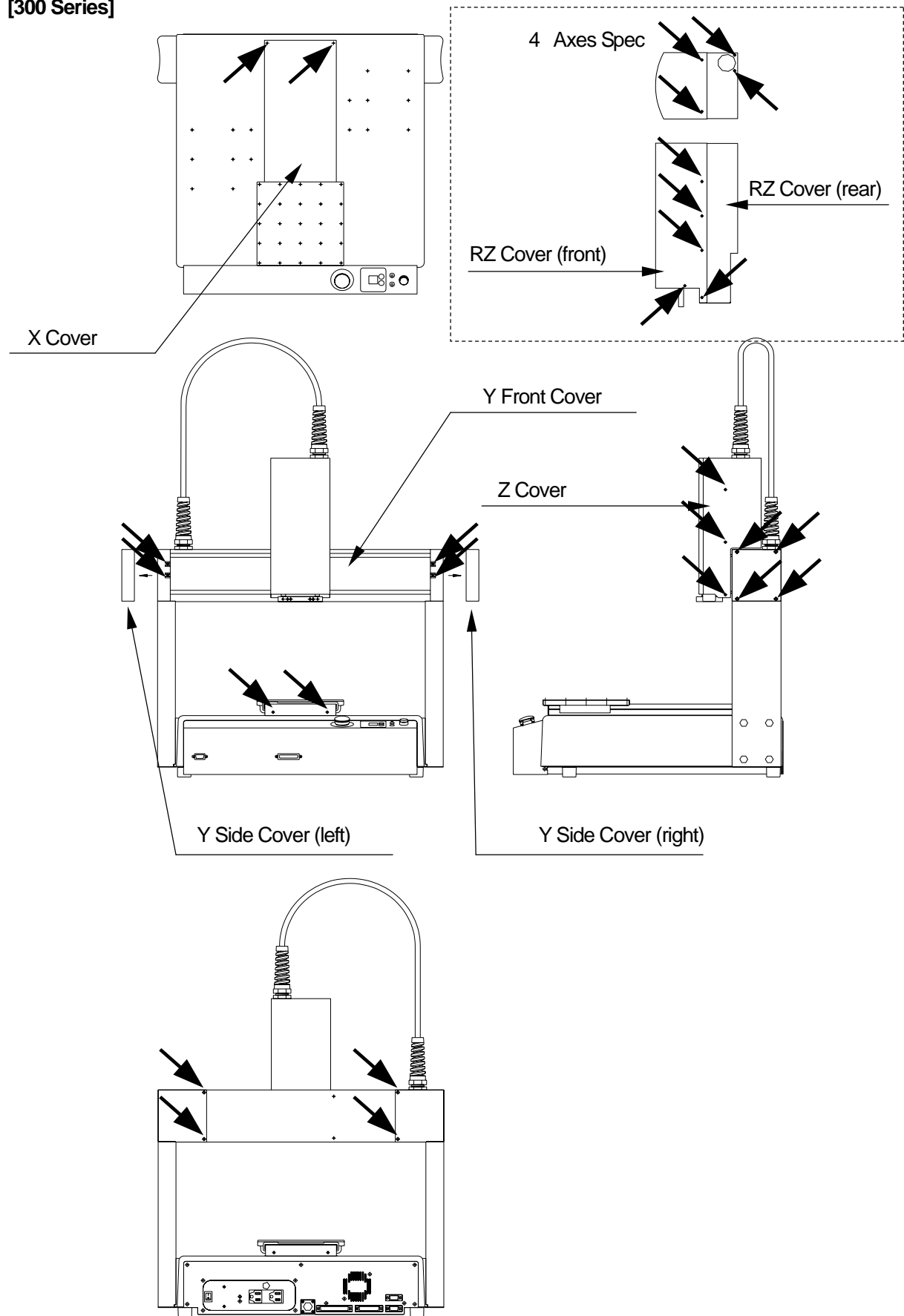
GREASE UP

Screws that must be removed for greasing (indicated by thick arrows)

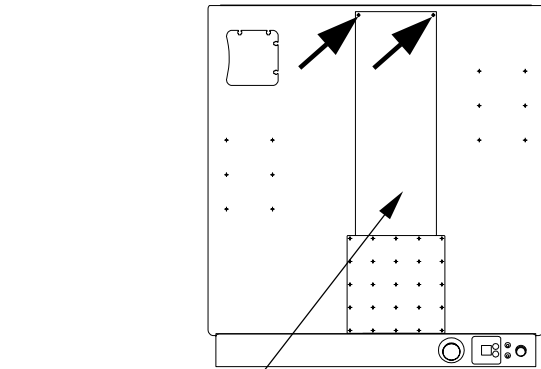
[200 Series]



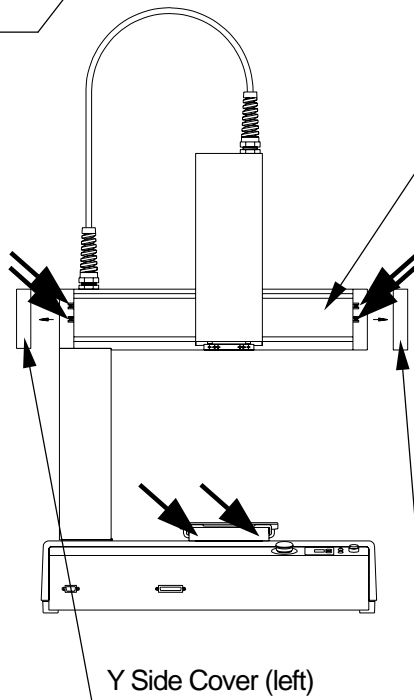
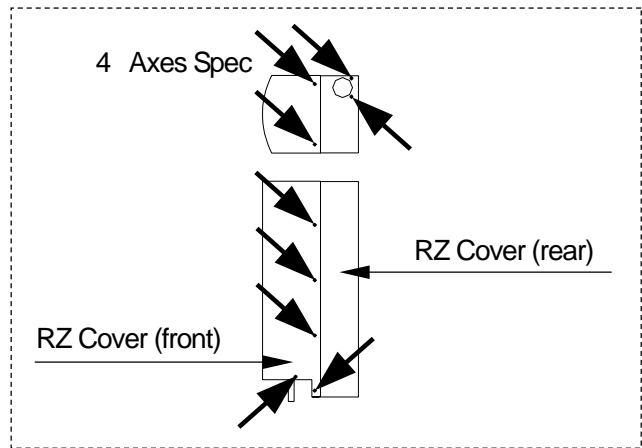
[300 Series]



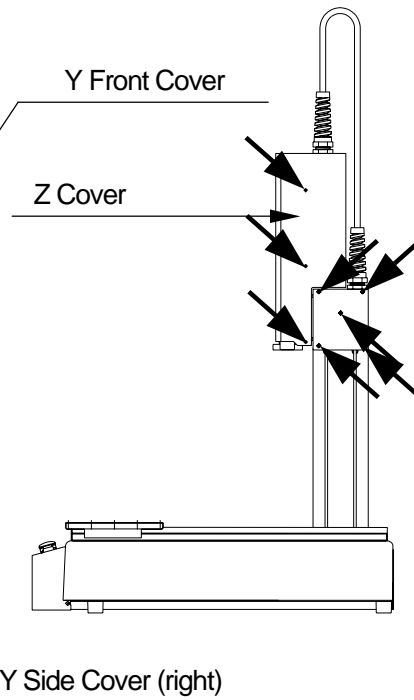
[400 & 500 Series]



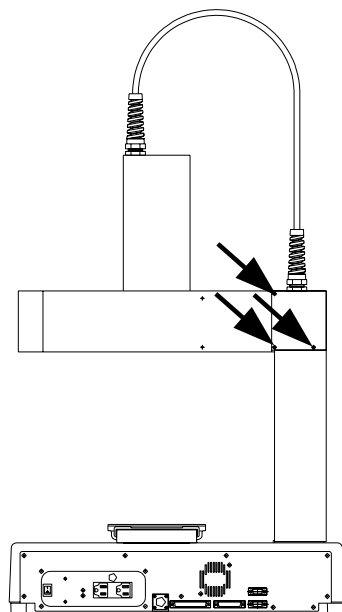
X Cover



Y Side Cover (left)



Y Side Cover (right)



Grease Up

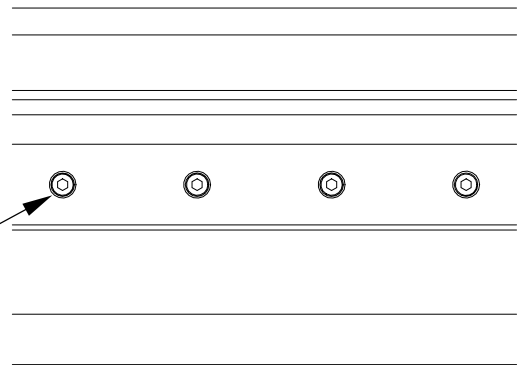


For smooth operation and long-term use of the robot, grease the robot regularly (approximately ever half year.)

LM guide for the X axis

- 1) Remove the 4 screws (indicated by arrows in the figures “Screws that must be removed for greasing” (page 20-22)) fastening the X cover to remove the X cover.
- 2) Grease both of the side faces of LM Guide rail.

LM Guide (rail)

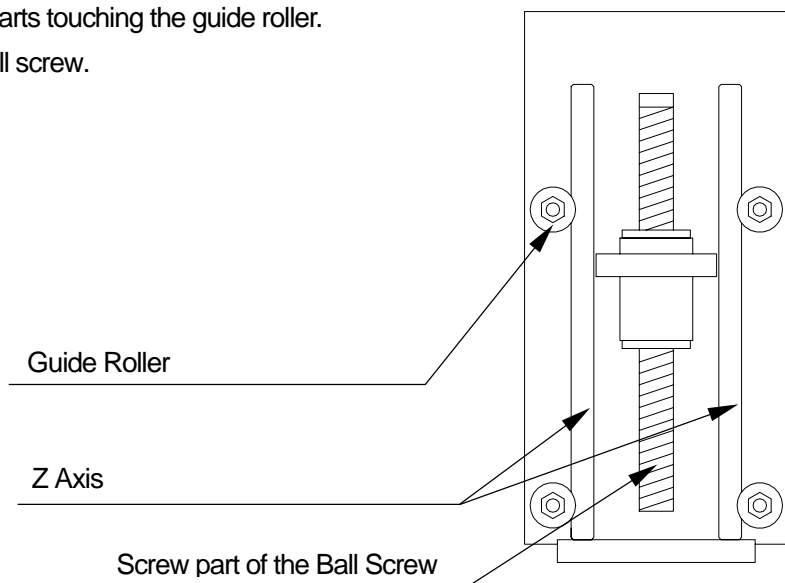


LM Guide of the Y axis

- 1) Remove the 13 screws (indicated by arrows in the figures “Screws that must be removed for greasing” (page 20-22)) fastening the Y side cover (right) and (left) to remove the Y side cover (right) and (left).
- 2) Remove the 4 screws (indicated by arrows in the figures “Screws that must be removed for greasing” (page 20-22)) fastening the Y front cover to remove the Y front cover.
- 3) Grease both of the side faces of LM Guide rail.

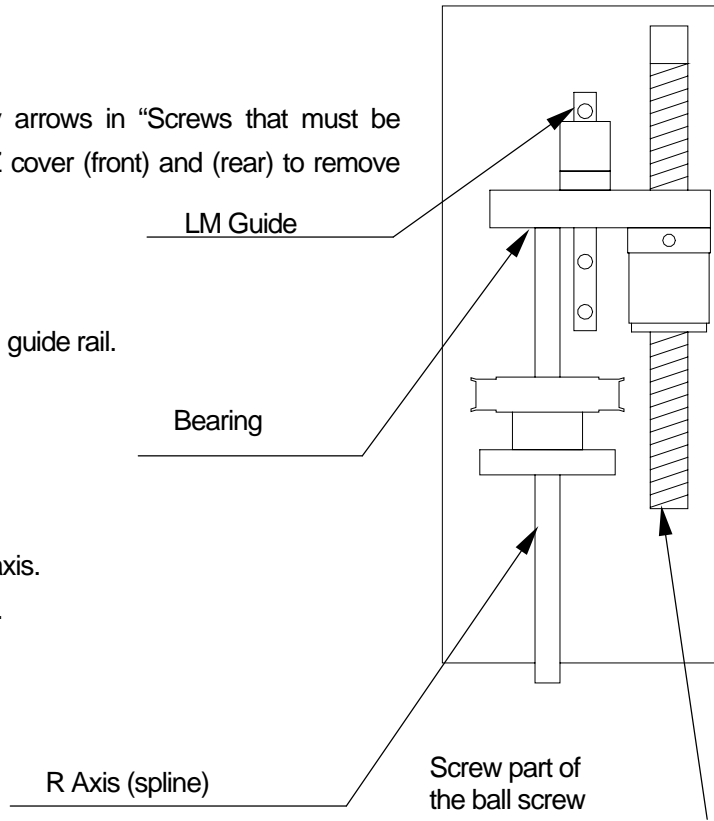
Z axis mechanism (3 axes spec)

- 1) Remove the 6 screws in the figures “Screws that must be removed for greasing” (page 20-22)) fastening the Z cover to remove the Z cover.
- 2) Grease the Z axes, especially parts touching the guide roller.
- 3) Grease the screw part of the ball screw.



Z axis mechanism (4 axes spec)

- 1) Remove the 8 screws (indicated by arrows in “Screws that must be removed for greasing”) fastening the Z cover (front) and (rear) to remove the Z cover (front) and (rear.)
- 2) Grease both of the side faces of the LM guide rail.
- 3) Grease the R axis (spline.)
- 4) Grease the bearing at the top of the R axis.
- 5) Grease the screw part of the ball screw.



Use recommended grease to prevent from malfunction of the robot.

Recommended grease: AFC Grease (THK Co., LTD)

MECHANICAL ADJUSTMENT

After you replace the motor or timing belt, be sure to execute sensor adjustment in mechanical adjustment mode. See the Service Manual for the details.



Caution

Do not touch moving parts of the robot while it is running.

Press **[MODE]** key and select [Administration] from the mode selection menu to start up the administration mode. Select [Mechanical Adjustment Mode] to enter the mechanical adjustment mode.

When you enter the mechanical adjustment mode, the Mechanical Adjustment Mode menu (right) will be displayed.

Select an item that you want to adjust.

Mechanical Adjustment Mode	
Sensor Adjustment	
Aging	

Sensor Adjustment

First, follow the instructions on the LCD screen and press **[F 4]** Key. Execute mechanical initialization.

The differential amount of the zero phase after initializing will be displayed.

X Axis, Y Axis: Zero Phase of the Encoder

Z Axis, R Axis: Zero Phase of the Motor Driver

Sensor Adjustment	
X Axis Sensor	20 %
Y Axis Sensor	30 %
Z Axis Sensor	40 %
R Axis Sensor	20 %
CHANGE SENSOR	INIT

In this test, the differential amount between the sensor position and the zero phase of the motor driver or the encoder will be checked.

Press **F 0** CHANGE key to change % display to OK/Fault display.

Press **F 1** SENSOR key to change the screen display to the current sensor state display.

Press **F 4** INIT key to re-execute the mechanical initialization and update the display.



Caution

Do not touch moving parts of the robot while it is running.

It is normal if the value is within the following range.

If it is out of the range, move the shielding plate to adjust the difference.

X Axis: $\pm 25\%$

Y Axis: $\pm 25\%$

Z Axis: $\pm 25\%$

R Axis: $\pm 25\%$

To re-check, press **F: 4** key to execute mechanical initialization.

Press **ESC** key to return to the mechanical adjustment mode menu.

Aging

When you select [Aging] from the mechanical adjustment mode menu, the screen to the right will be shown.

Press the start switch to start aging.

Aging	
Times	0
X error number	0
Y error number	0
Z error number	0

Press Start Switch



Caution

Do not touch moving parts of the robot while it is running.

For aging, repeat the following movements from 1 to 8 in order.

Speed: Maximum Speed

1. Mechanical Initialization
2. Lower the Z axis to half of the maximum moving range.
3. Raise the Z axis to the position of "Z=0."
4. Move the X and Y axes to the maximum moving range.
Rotate the R axis to the maximum moving range.
5. Lower the Z axis to the maximum moving range.
6. Raise the Z axis to the position of "Z=0."
7. Rotate the R axis to the negative maximum moving range.
8. Move the X and Y axes to the positions of "X=0" and "Y=0."
Rotate the R axis to the "R=0."

If a position error is detected, 1 count (screen display) is added to the error number of the axis where the error has been detected and mechanical initialization is executed. Then, continue the movements above.

If you press the start switch during aging, the robot will stop temporarily. If it is in the process of aging, the robot will stop after movement 8 is completed.

If you press the start switch again, the robot will re-start aging from movement 1. (Times will not be reset.)

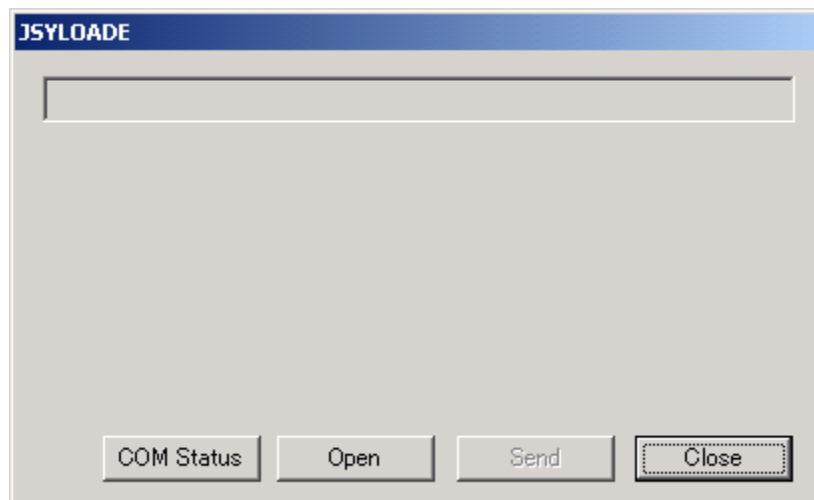
If you press **[ESC]** key during a temporary stop, it will terminate aging and return to the mechanical adjustment menu.

HOW TO INSTALL ROBOT SYSTEM SOFTWARE

This robot is controlled by built-in “Robot system software.” To upgrade the robot system software, follow the instructions below. (For this operation, the robot must be connected to a PC.)

“Robot system software” is included in the Operation Manual CD-ROM with the file name, **JRN_DAC_XXX.jsy**. (“XXX” indicates the version number.)

1. Turn OFF the robot, remove the cover on the left side body and then turn the **special mode switch** ON.
2. Turn ON the robot again, copy the “JSYLOADE” software included in Operation Manual CD-ROM to the local disk on the PC and start it up.
3. Select the communication port status of your PC which is connected to the robot and then click [OK.]
4. Select [Open] on the dialog box and specify the robot system software to be downloaded. Then click the **Send** button.



5. After data sending is complete, turn the robot OFF, then turn the special mode switch OFF and then reattach the cover.
- If you are using “LR-C points”, the robot system software can also be upgraded by selecting [Send Robot System Software] from the [Robot] pull-down menu.

ERROR TABLE

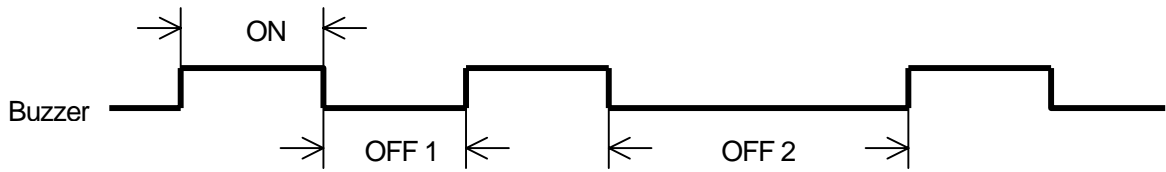
If an error occurs, the error number and error message will be displayed on the LCD screen of the teaching pendant.

When the teaching pendant is not connected, turn off the power briefly and connect the teaching pendant to the robot. After turning on the power again, the error number and error message will be displayed on the teaching pendant LCD.

System Error

The following errors will not be displayed on the LCD screen. The type of error can be identified by the number of times that the buzzer repeatedly sounds when the power source is turned on.

Buzzer	Description
1 Long Sound	Special mode program error. Detected by the boot program. Special mode program does not exist or has been corrupted. (Judged by the SUM check.) Replace Board A. Special mode program written by the emulator is required.
2 Long Sounds	System program error. Detected by the boot program. System program does not exist or has been corrupted.(Judged by the SUM check.) Switch to the special mode and then reinstall the system program again.
2 Short Sounds	Trap error. If an error is detected in the boot program, the buzzer will sound but the error number and message will not be displayed. Board A is damaged. Replace Board A. If the error is detected in the system program, the error number and message will be displayed.
Beeps for 2 seconds.	Flash ROM write error. Detected in the special mode program. Write PSD data. After the buzzer sounds, the special mode program will start up.
3 Short Sounds	Board check program, FROM error.
4 Short Sounds	Board check program, SRAM error.
5 Short Sounds	Board check program, SDRAM error.



	ON	OFF 1	OFF 2
Long	0.6 [sec]	0.6 [sec]	1.2 [sec]
Short	0.2 [sec]	0.2 [sec]	1.2 [sec]

e.g. 3 Short Sounds

ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	
0.2	0.2	0.2	0.2	0.2	1.2	0.2	0.2	0.2	0.2	0.2	1.2	0.2	[sec]

e.g. 1 Long Sound

ON	OFF	ON	OFF	ON	OFF	
0.6	1.2	0.6	1.2	0.6	1.2	[sec]

■ Logic Error

Error No.	Message	Error Handling
100	Logic Error XXXXXXXX	Turn the power OFF and ON again. If the error occurs repeatedly, contact your dealer with a detailed description of the error message "XXXXXX."

■ **Operation Error**

Error No.	Message	Error Handling
001	Program is Empty.	Enter the number of an existing program.
006	Point Type Error.	For example, a CP passing point following a PTP point will return a point type error. Check the point type and enter a proper point type.
007	Position is out of range.	In this case, "out of range" means a case in which the tool tip cannot move into the designated move area limit. This error occurs when either a point position or an intermediate path (as in a CP arc movement) falls out of the limit. Check and correct the teaching position coordinates. Also check and correct the move area limit and TCP (tool center point) settings in the tool data.
008	Error on Point Job.	Point job errors which are not classified as one of Errors 009 to 013 fall into this category. A condition command series does not include "ld" or "ldi" corresponding to "anb" or "orb." There are 10 or more "then"/"else"/"timeUp" nests in a single point job routine. A "then"/"else"/"endif" command does not have a corresponding "if" command. A "timeUp"/"endWait" command does not have a corresponding "waitCondTime" or "waitCond" command. Check the point job command and reenter it.
009	Then/else for if doesn't exist.	This error includes the following cases. When a "then"/"else" corresponding to an "if" is missing. When non-condition commands are entered between "if" and "then"/"else." Check the point job command and reenter it.
010	endif for if doesn't exist.	Check the point job command and reenter it.
011	endWait for waitCond doesn't exist.	Check the point job command and reenter it.
012	Label for Jump doesn't exist.	Check the point job command and reenter it.
013	Point for go doesn't exist.	This error occurs when the jump point number of "goPoint", "goRPoint" or "palletLoop" is larger than the largest point number in a program or when it will be a negative number. ("goRpoint" may cause a negative number.) Check the point job command and reenter it.
016	Error on Pallet Routine Data.	Check the designate pallet routine in the additional function and reenter it.
022	CP Speed Over.	Reduce the (CP) line speed.

Warranty

Henkel Corporation warrants, to the original Buyer for a period of one (1) year from date of delivery, that the Loctite® Equipment or System sold by it is free from defects in material and workmanship. Henkel will, at its option, replace or repair said defective parts. This warranty is subject to the following exceptions and limitations.

1. Purchaser Responsibilities – The Purchaser shall be responsible for:
 - Maintenance of the equipment as outlined in the Equipment Manual for the product.
 - Inventory of recommended maintenance parts established by Henkel;
 - Notification to Henkel within 6-8 hours of downtime.
 - Any cost of travel or transportation connected with warranty repair.
 - All cost associated with investigating or correcting any failure caused by the purchaser's misuse, neglect or unauthorized alteration or repair.
 - All costs attributed to accident or other factors beyond Henkel's control.
2. A thirty (30) day warranty will be extended on any items subject to normal wear, such as:
 - Pump Seals -Tubing -Wear Surfaces of Wiping Rollers
 - O-Rings -Hoses

Purchased items used in Loctite® dispensing equipment are covered under warranties of their respective manufacturers and are excluded from coverage under this warranty. Typical purchased items are:

- Solenoids -Electrical Relays -Refrigeration Units
- Timers -Fluid Power Cylinders -Electrical Motors

3. No warranty is extended to perishable items, such as:
 - Fuses -Dispensing Needles -Dispensing Nozzles
 - Light Bulbs -Lamps -Product Barrels

Henkel reserves the right to make changes in design and/or improvements to its equipment without obligation to include these changes in any equipment previously manufactured.

Henkel's warranty herein is in lieu of and excludes all other warranties of Henkel and its affiliated and related companies (hereinafter the "seller companies"), express, implied, statutory, or otherwise created under applicable law including, but not limited to, any warranty or merchantability and/or fitness for a particular purpose of use. In no event shall the seller and/or the seller companies be liable for any direct, indirect, special, incidental or consequential damages, including, but not limited to, loss of profits. In addition, this warranty shall not apply to any products, which have been subjected to abuse, misuse, improper installation, improper maintenance or operation, electrical failure or abnormal conditions; and to products, which have been tampered with, altered, modified, repaired or reworked by anyone not approved by seller. Buyer's sole and exclusive remedy under this warranty shall be limited to, at seller's discretion, the replacement or repair of any defective product or part thereof, or a refund of the purchase price paid by for the product in exchange for buyer's return of the product to seller, free and clear of any and all liens and encumbrances of any nature.

The specifications of the robot or the contents of this manual may be modified without prior notice to improve its quality.

No part of this manual may be reproduced in any form, including photocopying, reprinting, or translation to another language, without the prior written consent of LOCTITE®.

©2005, JSMC., Ltd., All rights reserved.