

LOCTITE[®]

EQUIPMENT OPERATION MANUAL



LOCTITE[®] SCARA-N ROBOT

S440N Series

<Features III>

Run Mode Parameter/Sequencer

Thank you for purchasing the Loctite® SCARA-N 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



Do not leave the unit plugged in (power cord and connectors) when it is not in use for long periods of time. Dust can cause fire.

Be sure to shut off the power supply before removing the power cord.



In robots with servomotors, change the battery periodically (approximately every three years) to prevent malfunction or breakdown.



Keep the emergency stop switch within reach of an operator while teaching and running the robot.

Failure to do so may cause danger since the robot cannot be stopped immediately and safely.



Regularly check that the I/O-S circuits and emergency stop switch work properly.

Failure to do so may cause danger since the robot cannot be stopped immediately and safely.



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

Loose screws may cause injury or defect.



Power the unit only with the rated voltage.

Excessive voltage can cause fire or malfunction of the unit.



Do not sprinkle water or oil on the unit, control box, or its cable.

Contact with water can cause electric shock, fire, or malfunction of the unit. IP Protection Rating is IP40.

FOR YOUR SAFETY

INSTALLATION

Warnings

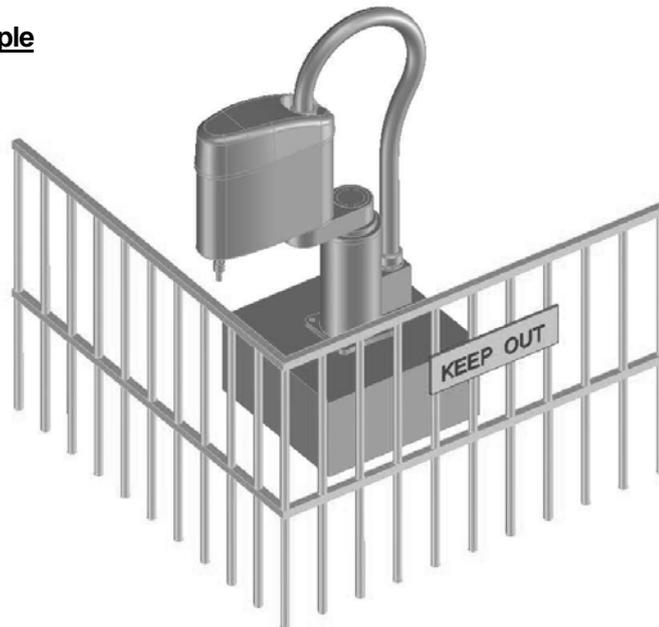


Always use a safety barrier.

A person entering the robot's restricted area may be injured.

At the entry/exit gate of the safety barrier, **install an interlock that triggers an emergency stop when the gate is opened.** Ensure there is no other way of entering the restricted area. Furthermore, **put up a “No Entry” or “No Operating” warning sign** in a clearly visible position.

Example



Install a safety barrier of adequate strength so as to protect the operator from moving tools and flying objects.

Always use protective wear (helmet, protective gloves, protective glasses, and protective footwear) when going inside the safety barrier.



Take adequate precautions against objects the robot is gripping flying or falling off **taking into account the object's size, weight, temperature and chemical composition.**

FOR YOUR SAFETY

Warnings



Confirm that the unit is properly grounded.

Power supply earth should be connected complying with Type D installation. (under 100 Ω of resistance.)

Insufficient grounding can cause electric shock, fire, or malfunction of the unit.



Plug the power cord into the wall outlet firmly.

Incomplete insertion into the wall outlet makes the plug hot and can cause fire.

Check that the plug is not covered with dust.

Be sure to shut off the power supply before connecting the power cord to the control box.



Place the unit on a suitable flat surface that can support its weight.

An insufficient or unstable area can cause the unit to fall, overturn, breakdown, or overheat.



If you are using the control box, be sure to leave a space greater than 30cm between the back of the control box with a cooling fan and the wall. If you are not using it, do not cover the inlet vent 18 mm from the floor on the back of the robot. Insufficient ventilation can cause overheating.



Do not attempt to disassemble or modify the machine.

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



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

Failure to do so may cause electric shock or fire.



Do not use the unit near inflammable or corrosive gas.

If leaked gas accumulates around the unit, it can cause fire.

IP Protection Rating is IP40.



Place the unit in a well-ventilated area for the health and safety of the operator.

FOR YOUR SAFETY

Warnings



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 "IP40."



Be sure to confirm that all the air tubes are connected correctly and firmly.



Use the 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 "IP40."



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

Failure to do so may result in 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.



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.



Be sure to check the wiring to the main unit.

Improper wiring may cause malfunction or defect.

FOR YOUR SAFETY

Warnings



Keep the emergency stop switch within reach of an operator while teaching and running the robot.

Failure to do so may cause danger since the robot cannot be stopped immediately and safely.



Be sure to shut off the power supply before plugging the power cord.



Be sure to remove the eye bolt after installing the robot so that it does not hit the arm.

Failure to do so may result in injury or breakdown of the unit.



Place the control box on a flat surface more than 80 cm above the floor so that it is easier to operate it.



Use the machine in an environment that is not dusty or damp.

Dust and dampness may cause failure or malfunction.

FOR YOUR SAFETY

WORKING ENVIRONMENT

Warnings



When you lubricate or inspect the unit, unplug the power cord from the control box.

Failure to do so may result in electric shock or injury.

Be sure to shut off the power supply before removing the power cord from the control box.



When going inside the safety barrier, **place a “Do Not Operate” sign** on the start switch.



During operation, always have the emergency stop switch within the operator’s reach.

For the operator’s safety, the emergency stop switch is necessary to make a quick and safe stop.



Install a safety barrier of adequate strength so as to protect operators from moving tools and flying objects.

Always use protective wear (helmet, gloves, glasses, and footwear) when going inside the safety barrier.



Be sure to confirm that all the air tubes are connected correctly and firmly.



Always watch out for robot’s movement, even in the teaching mode.

Special attention will protect the operator from injury.

FOR YOUR SAFETY

DURING OPERATION

Warnings



When operations are taking place within the safety barrier, **ensure no one enters the robot's restricted area.**



If you must go inside the safety barrier, be certain to **push the emergency stop switch** and **put a "Do Not Operate" sign** on the start switch.



When starting the robot, check that, **no one is within the safety barrier and no object will interfere with the robot operating.**



Under no circumstances should you go inside the safety barrier or place your hands or head inside the safety barrier while the robot is operating.



If anything unusual (e.g. a burning smell) occurs, stop operation and unplug the cable immediately. Contact your dealer or the office listed on the last page of this manual.

Continuous use without repair can cause electric shock, fire, or breakdown of the unit.



During teaching, tests, and actual operation, always have the Emergency stop switch within the operator's reach.

For the operator's safety, the emergency stop switch is necessary to make a quick and safe stop.

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 Desktop 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® SCARA-N Robot S440N Series features diverse applications, high speed, rigidity and precision, and can accommodate a wide variety of requirements.

The operation manual consists of the following volumes.

Setup	This volume explains how to set up the robot. * For people who receive safety and installation instructions regarding the robot.
Maintenance	This volume explains how to maintain the robot. * For people who receive safety and installation instructions regarding the robot.
Basic Instructions	This volume provides safety precautions, part names, and the basic knowledge necessary to operate the LR Series.
Quick Start	This volume explains the actual operation of the SCARA-N 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.
Features III	This volume explains features such as run mode parameters, sequencer program, etc.
External Control I (I/O-SYS)	This volume explains the I/O-SYS control.
External Control II (COM Communication)	This volume explains the COM communication control system.
Specifications	This volume provides comprehensive specifications, including mechanical or electrical requirements.

Note) The contents of this volume may be modified without prior notice to improve its quality. Therefore, it may not consistent with the specifications of the delivered series.

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 shut off the power supply before plugging the power cord.



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.**

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RUN MODE PARAMETER

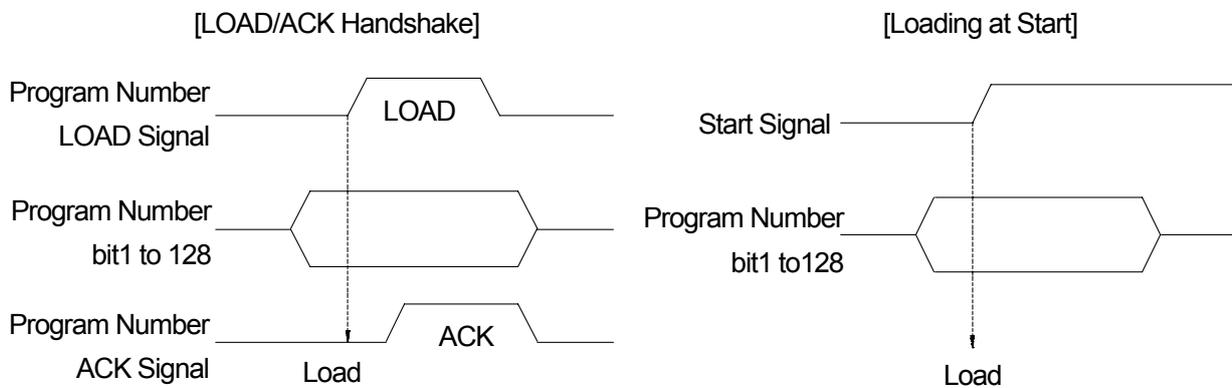
■ I/O Setting

There are four I/O settings, described as follows.

■ Program Number Changing Way

To change program numbers using the digit switch connected to the I/O terminal, you need to set [Loading at Start.]

Setting items	Contents
LOAD/ACK Handshake	Load the status of I/O Signal Program Number bit 1 to 128 when the "Program Number LOAD Signal" comes ON, output the "Program Number ACK Signal" and change program numbers.
Loading at Start	Load the status of I/O Signal Program Number bit 1 to 128 when receiving a start instruction and change program numbers.



- In the SCARA-N Series, the "Program Number bit 1 to 64" signal is loaded by default. If you are using the "Program Number bit 128" signal, you need to change the signal function. ("I/O-SYS Function Assignment")

■ Program Number Reading Code

You can select whether to read a signal equal to I/O Signal Program Number bit 1 to 128 in binary or in [BCD]. If you select [BCD], the Program Number bit 1 to 8 are assigned as the lower digit and the Program Number bit 16 to 128 as the upper digit.

Example) Program Number 91 (SCARA Series)

Binary: $\#sysIn11 + \#sysIn9 + \#sysIn8 + \#sysIn6 + \#sysIn5 \rightarrow 91$

BCD: $(\#sysIn12 + \#sysIn9 \rightarrow 9) \times 10 + (\#sysIn5 \rightarrow 1) \rightarrow 91$

(Binary Coded Decimal)

Example) Program Number 91 (Cartesian Series)

Binary: $\#sysIn10 + \#sysIn8 + \#sysIn7 + \#sysIn5 + \#sysIn4 \rightarrow 91$

BCD: $(\#sysIn11 + \#sysIn8 \rightarrow 9) \times 10 + (\#sysIn4 \rightarrow 1) \rightarrow 91$

(Binary Coded Decimal)

Example) Program Number 91 (SCARA-N Series)

Binary: $\#sysIn12 + \#sysIn10 + \#sysIn9 + \#sysIn7 + \#sysIn6 \rightarrow 91$

BCD: $(\#sysIn13 + \#sysIn10 \rightarrow 9) \times 10 + (\#sysIn6 \rightarrow 1) \rightarrow 91$

(Binary Coded Decimal)

- In the SCARA-N Series, if you specify a program number over 127 in the binary setting or a program number over 79 in the [BCD] setting using the I/O-SYS, you need to change the “Last Work” signal to “Program Number bit 7.” (I/O-SYS Function Assignment)

■ IO-SYS Function Assignment

If you want to use an I/O-SYS signal to which another function has already been assigned, you can change its function.

For example, “#sysIn1” has been assigned as “Start” signal by default. If you change its function to “Free”, you can use this signal for purposes other than to start running the robot. (In this case the signal can no longer be used to start running.)

■ IO-S Function Settings

If this is set to [Emergency Stop], the robot will stop immediately when the I/O-S signal comes ON.

If this is set to [Interlock], the robot will not stop immediately even if the I/O-S signal comes ON while it is stopping.

For example, when the door of the fence surrounding the robot is opened, the I/O-S will come ON and the robot will stop immediately. If the door is opened while the robot is stopping, it does not stop immediately. However, while the door is open, it is impossible to start running the robot.

■ **Job and Sequencer on Run Mode**

■ Job on Run Mode

Job on Run Mode is a setting included in the [Run Mode Parameter.]

Point job data specified by number is executed as follows.

Execution Timing	Item Name
When the power of the robot is turned ON in the Run mode.	Job on Power ON
When mechanical initialization has been executed after the power is turned ON on the SCARA-N series.	Job after Initialize
When the robot stops urgently during Run mode.	Job on Emergency Stop
When a Playback error occurs.	Job on Playback Error
When a system error occurs in Run mode.	Job on System Error
When switching from other modes to Run mode, or when the power of the robot is turned ON in Run mode*.	Job on Start of Run Mode
When a program starts running. Only if the cycle mode is set to [Continuous Playback] and a running instruction is given.	Job on Start of Cycle
When program running is complete. Only if the cycle mode is set to [Continuous Playback] and Last Work instruction is given.	Job on End of Cycle
When the robot stops while running program.	Job on Stopping
When the robot re-starts running after it stops while running a program.	Job on Starting
Executes repeatedly when the robot stops before and after program running.	Job while Stopping (Cycle Top)
Executes repeatedly when the robot stops in the cycle playback (during program running.)	Job while Stopping (In Cycle)

- If the power of the robot is turned ON in the Run mode, execute the [Job on Start of Run Mode] after the [Job on Power ON.]



Warning

If the “Call Program” or commands for the driving control are included in the contents of point jobs, please note that these commands are ignored.

- If a command which the robot cannot execute is set in Job on Power ON (run mode parameter), it is not possible to switch between modes on the Cartesian series. In this case, turn the power to the robot OFF, turn the spare switch inside the side cover of the robot ON and turn the power to the robot again to activate teaching mode.
- “O” is set as default, which means that point jobs are not executed.
- These operations are executed only in the Run mode.

■ Sequencer Program on Run Mode

Sequencer Program on Run Mode is a setting included in the [Run Mode Parameter.] Set sequencer program numbers to be executed in the Run mode.

During Run mode, a sequencer program specified by number is executed repeatedly.

■ Point Reset Settings

“Point Reset” is used to reset the point number counter. If you reset the point number counter, the point number returns to “1” and the robot will be at the cycle top (in the status before start of program running.)

Items	Contents
Reset at Power ON	Specifies whether to execute point reset when the power is turned ON. If this is set to “Invalid”, when the power is turned off due to error while running the robot can re-start running from the point where the power was turned OFF.
Reset at Emergency	Specifies whether to execute point reset on emergency stop. If this is set to “Invalid”, the robot can re-start running from the point where it stopped after emergency stop.
Reset at Going Home	Specifies whether to execute point reset when the robot shifts to work home.

■ **Other Settings (For the SCARA-N series only)**

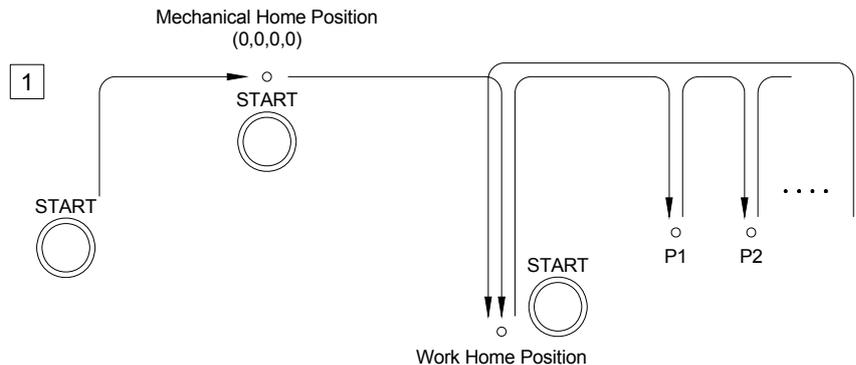
- The SCARA series is not equipped with the following five settings.

■ Initialize

The following three types of mechanical initialization can be used.

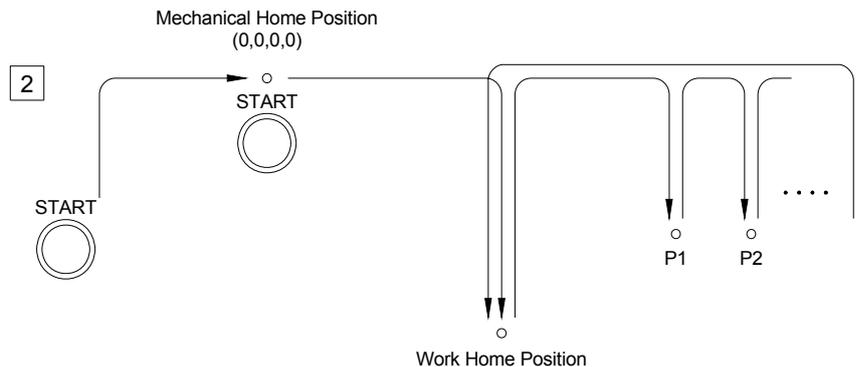
<Work Home on Start>

When the start switch is pressed after the first mechanical initialization is complete, each axis moves to the work home position of the selected program. The robot is ready for running.



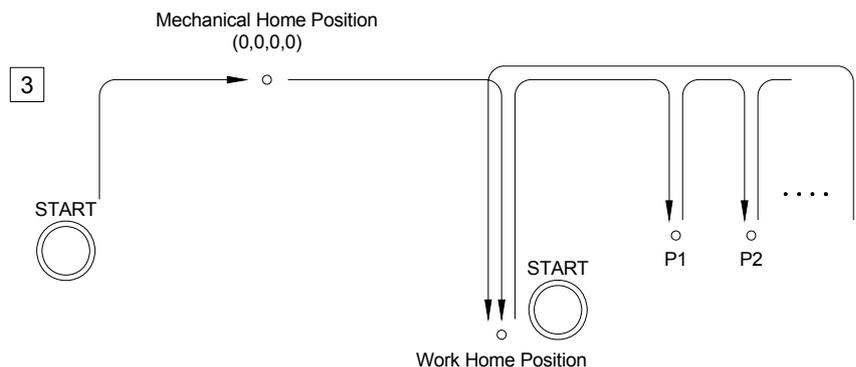
<Work Home after First Cycle>

After mechanical initialization, the robot is ready for running at the mechanical home position. (When the start switch is pressed, the first cycle operation will start from here.) The following operations start from the work home position.



<Work Home After Initialize>

After the first mechanical initialization, each axis moves to the work home position of the selected program. The robot is ready for running.



■ Initialize at Start

Select whether the [Initialize at Start] operation is executed (valid) or not executed (invalid) when a program starts.

- Valid for the Cartesian series only

- Position Error Check

Select whether the [Position Error Check] operation is executed (valid) or not executed (invalid) when running is completed.

- Valid for the Cartesian series only

- Order of Initialization

If this setting is set to default, the X and Y-axes simultaneously move in mechanical initialization.

If there is interference between the tool and workpiece, it is possible to delay the timing of mechanical initialization for each axis.

<Execution order of axis initialization>

- XY simultaneous initialization: Z → R → XY
- X-first initialization: Z → R → X → Y
- Y-first initialization: Z → R → Y → X

- Valid for the Cartesian series only

- Stop by Start Switch

If the start switch is pressed while running,

Valid: The operation will temporarily stop. If the start switch is pressed again, the operation will restart.

Invalid: The operation will not stop.

It is assumed that system flag 60 (#FstartSW) would be used to refer to the start switch, and that point job data which restarts a program that has been stopped when the start switch is pressed would be used. In this case, if [Stop by Start Switch] is set to [Valid], the operation will not restart unless the start is pressed twice.

SEQUENCER

A sequencer program is a set of commands for logical calculation to control the I/O signals. It can be executed in Run mode.

Sequencer programs Number 1 to 50 can be created in the Teaching mode and Number 51 to 100 in the Customizing mode. By using the Protect Mode setting, you can also restrict access to sequencer programs created in the Customizing mode.

Registering Sequencer Program

TP

<Operation procedure 1>

MENU [Sequencer Settings]

Sequencer number entry

<Operation procedure 2>

MENU [Run Mode Parameter]

[Job and Sequencer on Run Mode]

[Sequencer Program on Run Mode]

Press **F·4** while the program number you want to register teaching data to is displayed.

- For command entry and edit, see the procedure for point job data.

PC

[Data] → [Sequencer Settings]

You can enter up to 1000 steps (lines) in a sequencer program.

However, the more steps that are entered, the longer it will take to scan (interval between each step execution.)

10 msec (1 to 200 steps)

20 msec (201 to 400 steps)

30 msec (401 to 600 steps)

40 msec (601 to 800 steps)

50 msec (801 to 1000 steps)

Commands available for Sequencer

Category	Command	Parameter required	Content of command
Calculate	ld	Boolean Variable	ON Input
	ldi	Boolean Variable	OFF Input
	and	Boolean Variable	Serial ON Input
	ani	Boolean Variable	Serial OFF Input
	or	Boolean Variable	Parallel ON Input
	ori	Boolean Variable	Parallel OFF Input
Coil	out	Output Destination	Coil Drive
	set	Output Destination	Movement Holding Set
	reset	Output Destination	Movement Holding Reset
	pls	Output Destination	Output of the Leading Edge of Pulse
	plf	Output Destination	Output of the Trailing Edge of Pulse
Connection	anb	-	Parallel Connection of Serial Circuit Blocks
	orb	-	Serial Connection of Parallel Circuit Blocks
	mps	-	Storing data in process of calculation
	mrd	-	Reading out data in process of calculation
	mpp	-	Reading out and resetting data in process of calculation
Other	nop	-	No process

Expressions cannot be used for sequencer programs.

The following variables can be used as parameters. (Some variables may not be available for certain commands.)

Available Parameters
#mv (1 to 99)
#mkv (1 to 99)
#sysIn1 to 15 (#sysIn1 to 16 in the SCARA-N Series)
#genIn1 to 18 (#genIn1 to 8 in the SCARA-N Series)
#handIn1 to 4 (Invalid in the SCARA-N Series)
#sysOut1 to 14 (#sysOut1 to 16 in the SCARA-N Series)
#genOut1 to 22 (#genOut1 to 8 in the SCARA-N Series)
#handOut1 to 4 (Invalid in the SCARA-N Series)
#sysFlag (1 to 999)
#palletFlag (1 to 100)
#seqT (1 to 99)
#seqC (1 to 99)

Setting Sequencer

TP  **MENU** [Run Mode Parameter]
[Job and Sequencer on Run Mode]
[Sequencer Program on Run Mode]

PC  [Robot] → [Run Mode Parameter]

To execute a registered sequencer program, you need to set the number of the registered sequencer program in the [Sequencer Program on Run Mode.]

- If selecting Number “0”, the sequencer program will be invalid (not be executed.)
- Registered sequencer programs will run as soon as the robot switches in to Run mode.

Cumulative/ Non-Cumulative Timer of Sequencer

#seqT (1 to 50): 10ms-based Cumulative Timer: If it is OFF, the value is held.

#seqT (51 to 99): 10ms-based Non-Cumulative Timer: If it is OFF, the timer is reset.

Example)

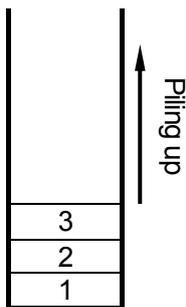
```
ld #genIn1
out #seqT(1),1000
ld #seqT(1)
out #genOut1
ldi #genIn1
reset #seqT(1)
```

- Sequencer programs cannot read the value of the timer. However, point job data can read it as a variable of #seqTCount (1 to 99.)

Referring to data in the process of being calculated

Sequencer programs can store and refer to data that is in the process of being calculated.

Category	Command	Name	Parameter required	Contents of Command
Connection Commands	mps	Memory Push	-	Store data in process of calculation
	mrd	Memory Read	-	Read out data in process of calculation
	mpp	Memory Pop	-	Read out and reset data in process of calculation



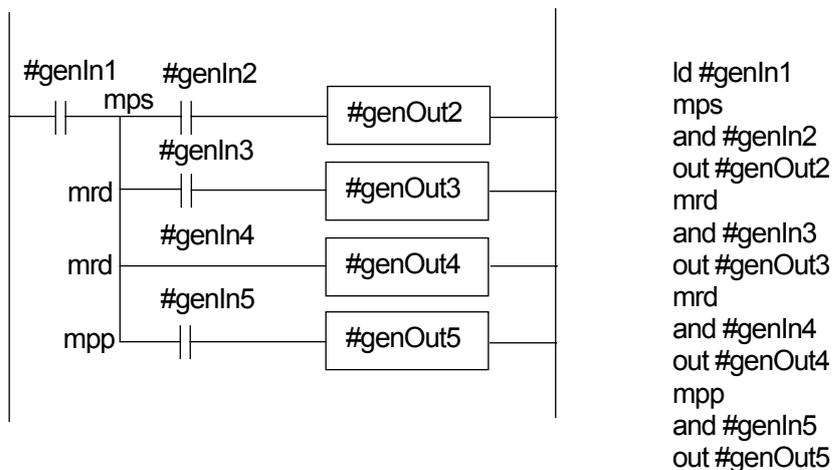
If the command “mps” is executed, data in process of calculation will be piled up in order of executed “mps.”

If the command “mrd” is executed, data at the top of the piled up data (3 in the example on the left) is read out.

If the command “mpp” is executed, data at the top of the piled up data (3 in the example on the left) is read out and reset.

Data in the process of being calculated can be stored in a pile of up to 11.

Example)

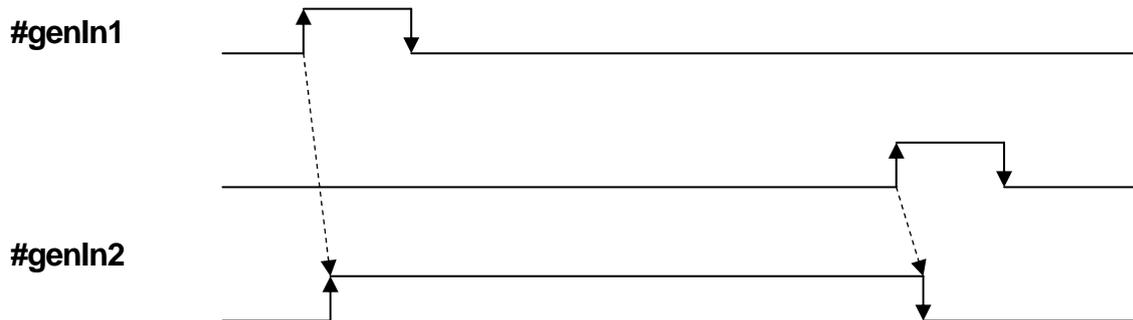


Sequencer Example 1: Self-Hold Circuit

The following explains how to make a sequence for a self-hold circuit with the external I/O-1.

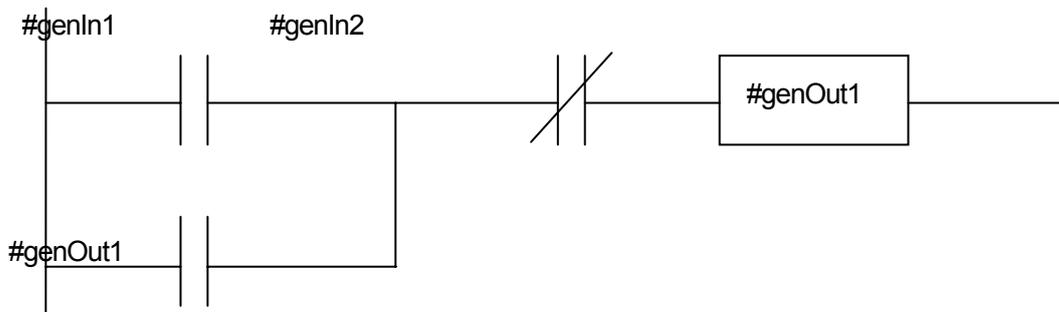
When “Input: #genIn1” comes ON, “Output: #genOut1” will turn on and stay on. When “Input: #genIn2” comes ON, “Output: #genOut1” will turn OFF.

The following timing chart shows this operation:



#genOut1

The same operation is shown in a relay ladder as follows:



The commands for this operation are shown below:

```
ld #genIn1
or #genOut1
ani #genIn2
out #genOut1
```

Sequencer Example 2: Alternating Pulse Output Circuit

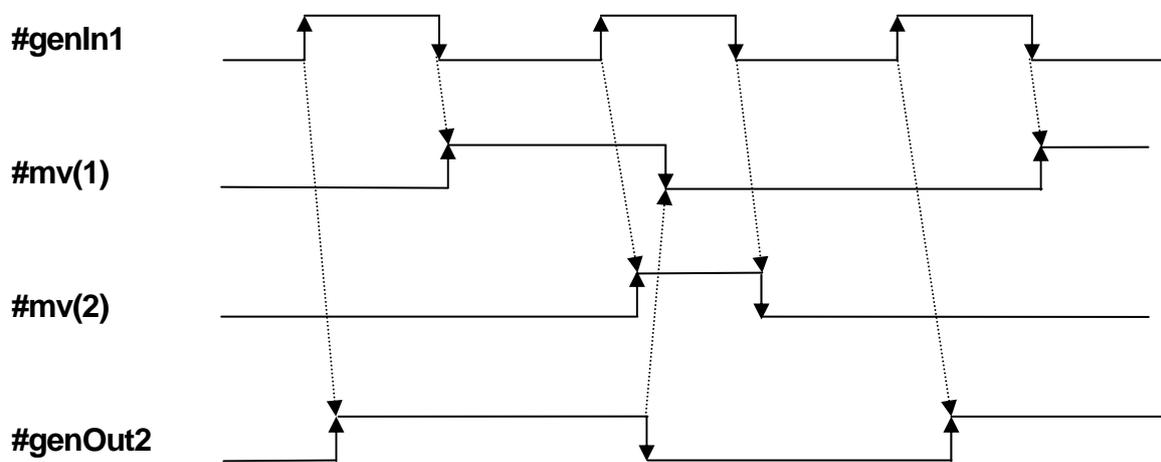
The following explains how to switch an output signal from ON to OFF or vice versa every time an input signal comes ON.

“Input: #genIn1” is used as an input signal and “Output: #genOut2” as an output signal in the following example.

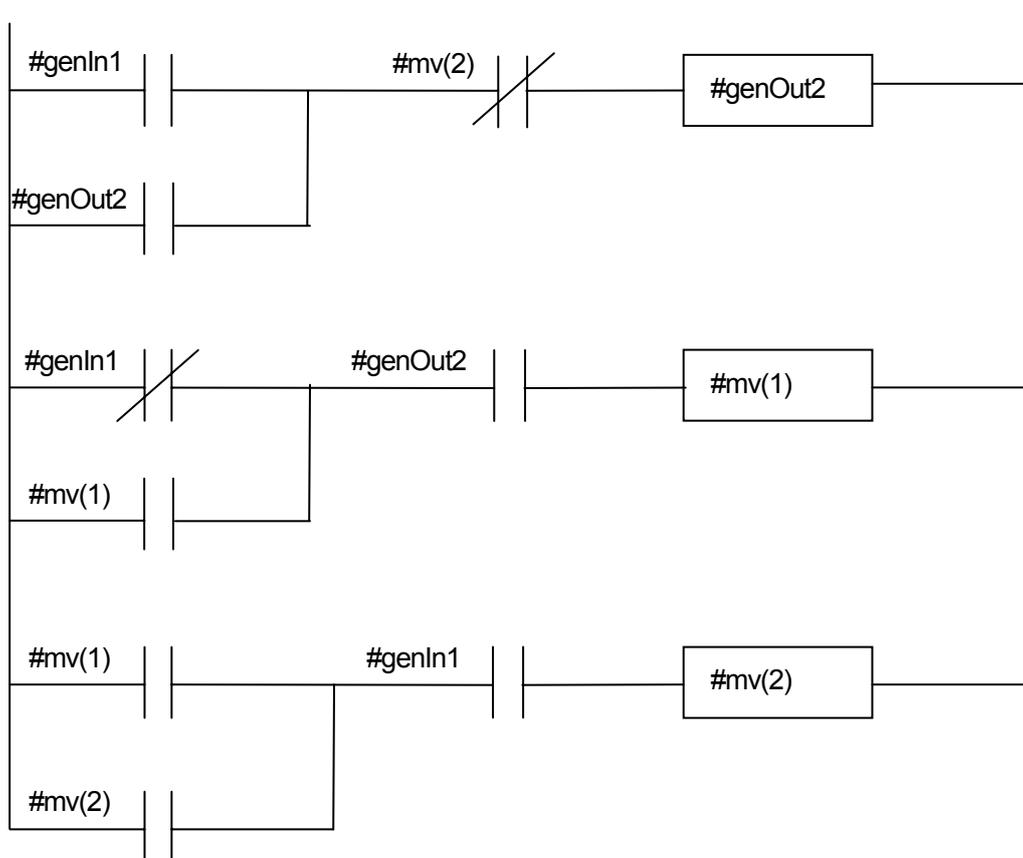
When “Input: #genIn1” comes ON, “Output: #genOut2” will turn ON the first, third, fifth and following odd-numbered times.

It will turn OFF at the second, fourth, sixth and following even-numbered times.

The following timing chart shows this operation:



The same operation is shown in a relay ladder as follows:



The commands for this operation are shown below:

```

ld #genIn1
or #genOut1
ani #mv(2)
out #genOut1
ldi #genIn1
or #mv(1)
and #genOut1
out #mv(1)
ld #mv(1)
or #mv(2)
and #genIn1
out #mv(2)

```

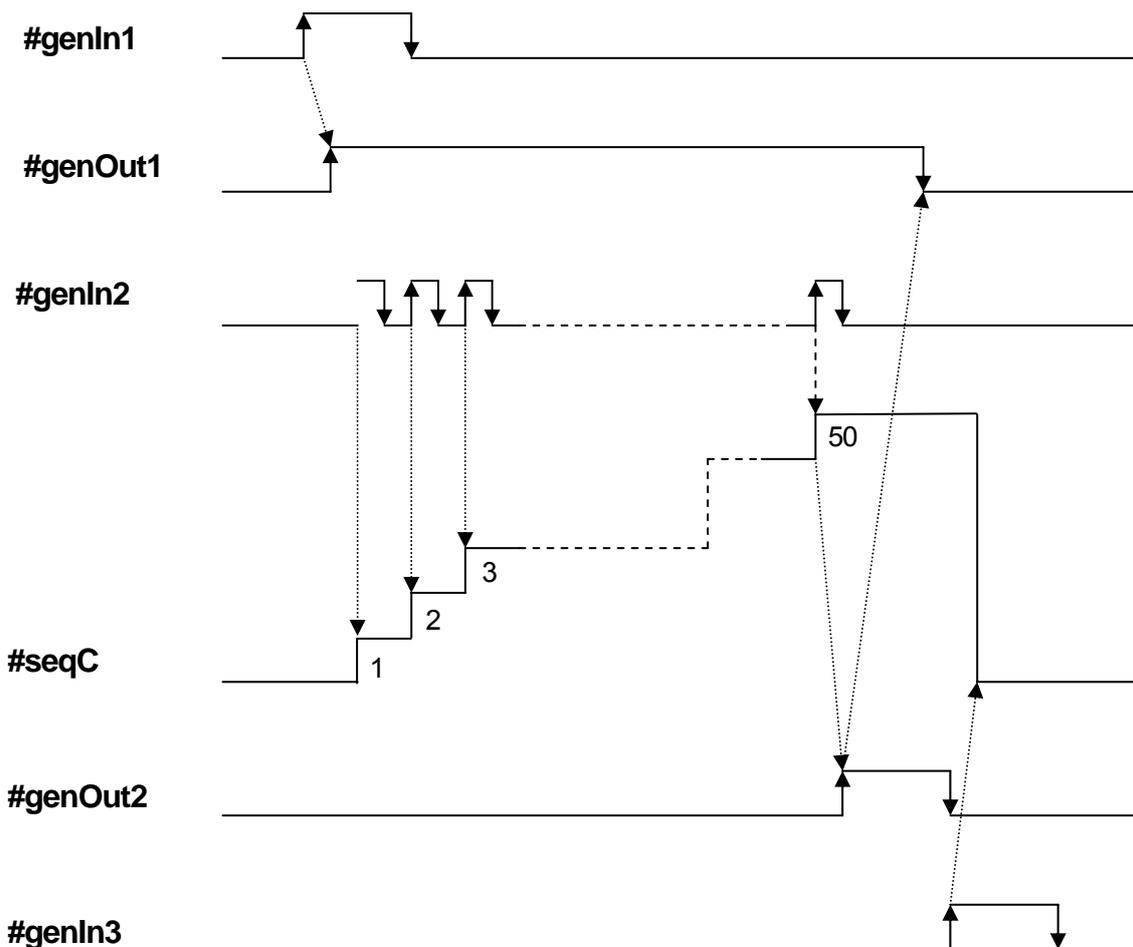
Sequencer Example 3: Counting the Parts Carried on the Conveyor Belt

The following explains how to count the parts carried on the conveyor belt with external I/O-1 operation. When the number reaches a specified amount, the conveyor is stopped.

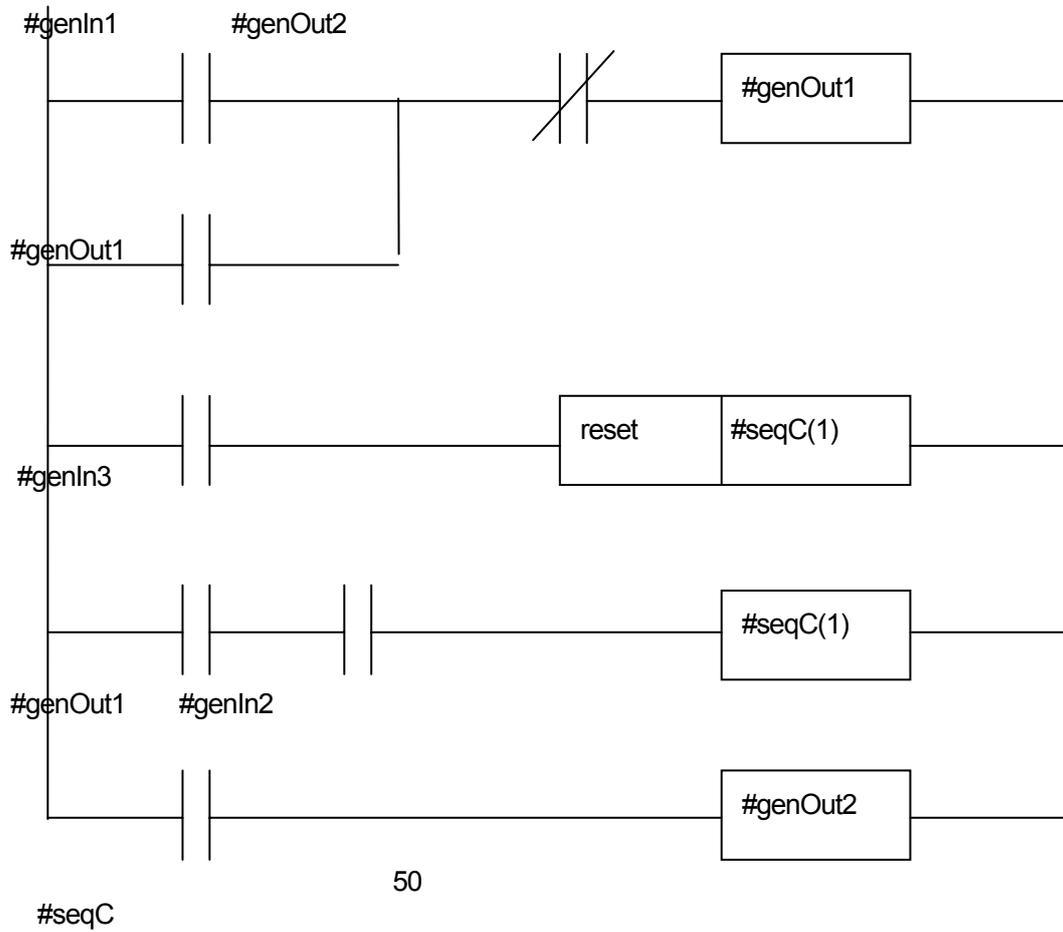
“Input: #genIn2” is used to count the parts being carried and “Input: #genIn3” to reset the “Counter: #seqC” in the following example.

“Input: #genIn1” is the signal to turn the conveyor ON. When this signal is turned ON, “Input: #genIn2” will detect the parts being carried and count them using “Counter: #seqC.” When it reaches 50, “Output: #genOut2” is turned ON to stop the conveyor.

The following timing chart shows this operation:



The same operation is shown in a relay ladder as follows:



The commands for this operation are shown below:

```

ld #genIn1
or #genOut1
ani #genOut2
out #genOut1
ld #genIn3
reset #seqC(1)
ld #genOut1
and #genIn2
out #seqC(1),50
ld #seqC(1)
out #genOut2
    
```

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.

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