

# **LOCTITE®**

## EQUIPMENT OPERATION MANUAL



# **LOCTITE® SCARA-N ROBOT**

## **S440N Series**

### **External Control I**

#### **(I/O-SYS)**

Thank you for purchasing this 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 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 of 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.

	<b>Warnings</b> These “Warnings” indicate the possibility of death or serious injury.
	<b>Cautions</b> These “Cautions” indicate the possibility of accidental injury or damage to property.

- **Symbols Indicating 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 cord from wall outlet.
	Be sure to check grounding.

## FOR YOUR SAFETY

### Warnings



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 shut off the power supply before removing the power cord.**



**Keep the emergency stop switch within reach of an operator while teaching or 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 breakdown.



**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 robot, operation box, or power cord.**

Contact with water or oil can cause electric shock, fire, or malfunction of the unit. IP Protection Rating is "IP20."

## FOR YOUR SAFETY

### ■ INSTALLATION ■

## Warnings

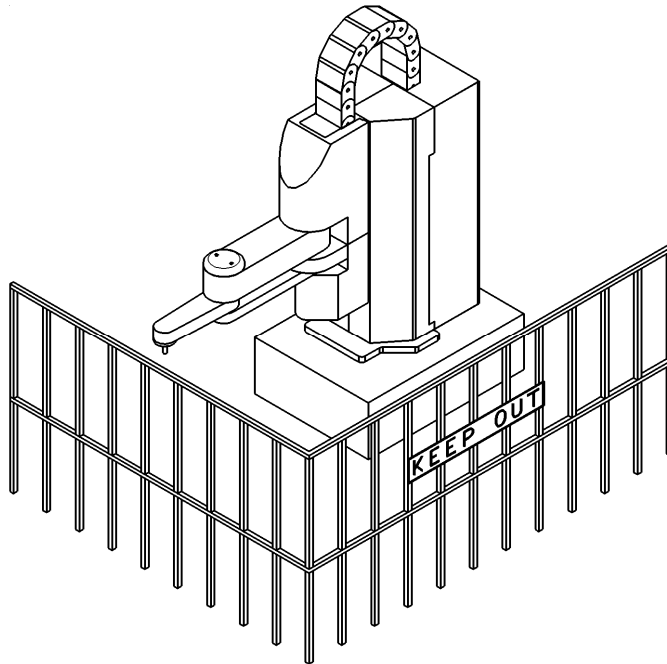


#### **Always use a safety barrier.**

A person entering the robot's maximum operating range may be injured.

**Install an interlock that triggers an emergency stop when the gate is opened at the entry gate of the safety barrier, using the I/O-S connector included in package.** 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 robot is properly grounded before use.**

Insufficient grounding can cause electric shock, fire, malfunction, or breakdown.



**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 robot.



**Install the robot in a place which can endure its weight and conditions while running.**

Placing the unit in an insufficient or unstable surface may cause the unit to fall, overturn, or breakdown. This could result in operator injury.



Do not block the air intake on the lower part of the back of the robot (18mm above the floor.) This may cause overheating or fire.



**Do not attempt to disassemble or modify the robot.**

This may lead to electric shocks or fire.



**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 where flammable or corrosive gas is present.**

Leaked gas accumulated around the unit can cause fire or explosion.



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



**Turn off the unit before inserting and removing cables.**

Failure to do so may result in electric shock, fire, or malfunction of the unit.

## FOR YOUR SAFETY

### Warnings



**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 humidity of 20 to 90 percent without condensation.**  
Failure to do so may result in malfunction. IP Protection Rating is "IP20."



**Use the robot in an environment where no electric noise is present.**  
Failure to do so may result in malfunction or breakdown.



**Be sure to secure the movable parts of the robot before transportation.**  
Failure to do so may result in injury or breakdown.



**Do not bump or jar the unit while it is being transported or installed.**  
This can cause breakdown.



**Use the robot in an environment where it is not exposed to direct sunlight.**  
Direct sunlight may cause malfunction or breakdown.



**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 breakdown.



**Be sure to check the wiring to the main unit.**  
Improper wiring may result in malfunction or breakdown.



**Keep the emergency stop switch within reach of an operator.**  
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 in the power cord.**

## FOR YOUR SAFETY



### Cautions



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



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

Dust and dampness may lead to breakdown or malfunction.  
IP Protection Rating is "IP20."



## FOR YOUR SAFETY

### ■ WORKING ENVIRONMENT ■

## Warnings



**When you lubricate or inspect the unit, unplug the power cord from the robot.**

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 robot.



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



**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.



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.**



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



**Always be aware of the robot's movement**, even in the teaching mode.

Careful 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 maximum operating range.**



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 or abnormal sound) occurs, stop operation and unplug the cable immediately. Contact the dealer from which you purchased the robot 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.



**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.

# PREFACE

The Loctite® SCARA-N Robot S440N Series is a new low cost, high performance robot. The combined use of pulse motors and special micro step driving circuits saves you energy and space.

There are several manuals pertaining to this robot.

Setup	This manual explains how to set up the robot. ● Be sure to read this manual.
Maintenance	This manual explains how to maintain the robot. ● Be sure to read this manual.
Basic Instructions	This manual provides safety precautions, part names, and the basic knowledge necessary to operate the robot.
Quick Start	This manual explains the actual operation of the robot with simple running samples.
Teaching Pendant Operation	This manual explains how to operate the robot via the teaching pendant.
PC Operation	This manual explains how to operate the robot from a computer (LR C-Points.)
Features I	This manual explains point teaching.
Features II	This manual explains commands, variables, and functions.
Features III	This manual explains features such as run mode parameters, sequencer program, etc.
External Control I (I/O-SYS)	This manual explains the I/O-SYS control.
External Control II (COM Communication)	This manual explains the COM communication control system (COM1 – COM3.)
Specifications	This manual provides comprehensive specifications, including mechanical or electrical requirements.

**Note: The product specifications in these manuals may differ from those of the robot you have received due to product improvement.**

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

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

“**For Your Safety**” is also provided so that the operator can make the best use of this robot safely. This book includes preventive measures that can be taken against injury to the operator or damage to property. Please be sure to read “For Your Safety” before using the robot.



Be sure to shut off the power supply before plugging in 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.**

# CONTENTS

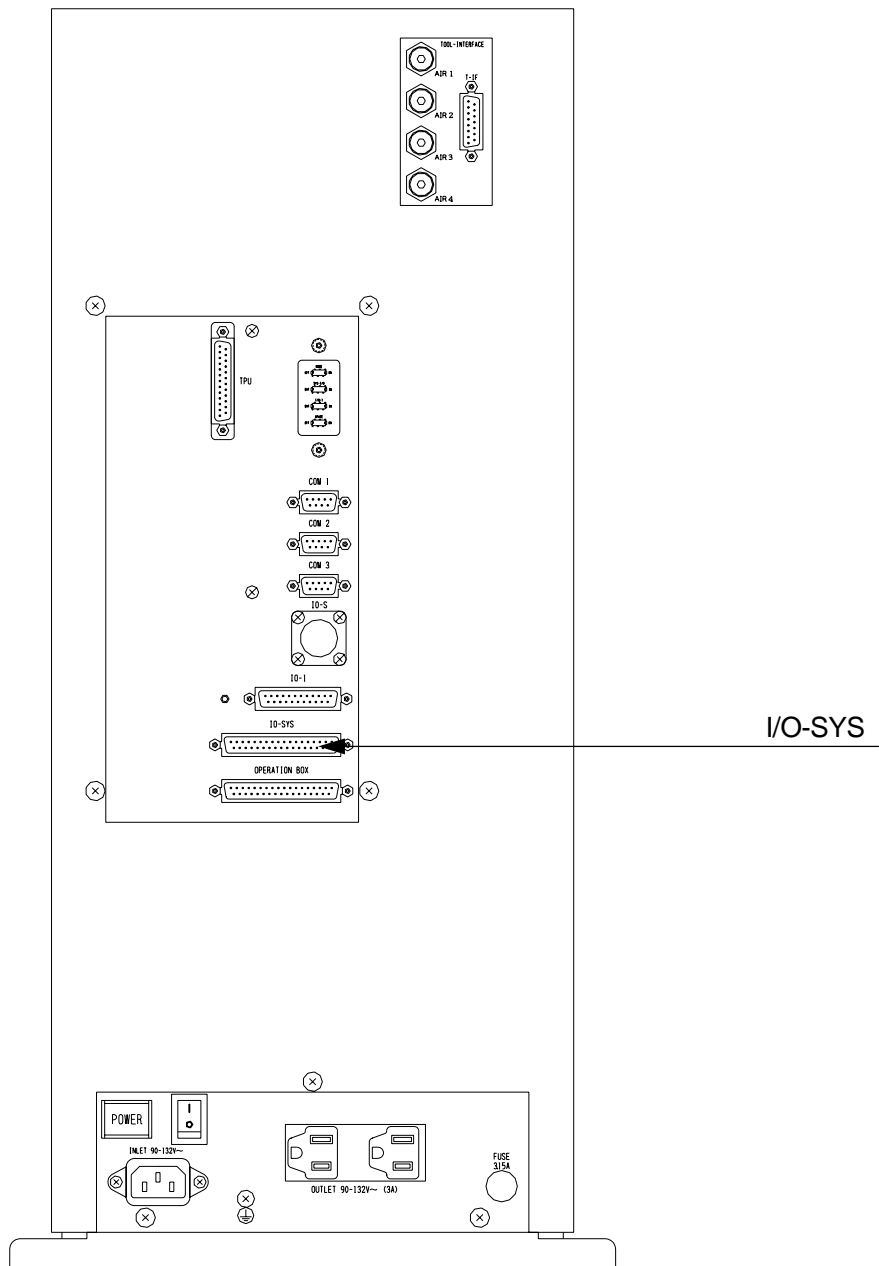
## External Control I (I/O-SYS)

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# I/O-SYS CONNECTOR

System functions are assigned to I/O-SYS.

## Rear of the Robot



# I/O-SYS FUNCTION ASSIGNMENTS

The following table shows the preset I/O-SYS function assignments.

		Name	Function	Cable Specifications		
				Pin No.	Color of Insulator	Spiral Mark
Input	Ext	#sysIn1	Start	1	Black	
	Ext	#sysIn2	Initialize	2	White	
	Ext	#sysIn3	Go Home	3	Red	
		#sysIn4	Reset	4	Green	
		#sysIn5	Program Number LOAD	5	Yellow	
		#sysIn6	Program Number bit0 $2^0=1$	6	Brown	
		#sysIn7	Program Number bit1 $2^1=2$	7	Blue	
		#sysIn8	Program Number bit2 $2^2=4$	8	Gray	
		#sysIn9	Program Number bit3 $2^3=8$	9	Orange	
		#sysIn10	Program Number bit4 $2^4=16$	10	Pink	
		#sysIn11	Program Number bit5 $2^5=32$	11	Light blue	
		#sysIn12	Program Number bit6 $2^6=64$	12	Purple	
		#sysIn13	Last Work/Program Number bit7	13	White	Black
		#sysIn14	Temporary Stop	14	White	Red
		#sysIn15	Free	15	White	Green
		#sysIn16	Free	16	White	Blue
Output	Ext	#sysOut1	Ext. Ready for Running	17	Black	White
		#sysOut2	Finish Initialize	18	Black	Red
		#sysOut3	Finish Work Home	19	Black	Green
		#sysOut4	Program Number ACK	20	Black	Blue
		#sysOut5	Program Number Error	21	Red	White
		#sysOut6	Running	22	Red	Black
		#sysOut7	Stopping	23	Red	Green
		#sysOut8	Error	24	Red	Blue
		#sysOut9	Emergency Stop	25	Green	White
		#sysOut10	Request MPON	26	Green	Black
		#sysOut11	Request Initialize	27	Green	Red
		#sysOut12	Request Work Home	28	Green	Blue
		#sysOut13	Free	29	Yellow	White
		#sysOut14	Free	30	Yellow	Black
		#sysOut15	Free	31	Yellow	Red
		#sysOut16	Free	32	Yellow	Green
Input		MPON	Motor Power ON	33	Yellow	Blue
Others		COM+	DC24V	34	Brown	White
		COM-	GND	35	Brown	Black
		COM-	GND	36	Brown	Red
		COM-	GND	37	Brown	Green

- Ext: Can only be activated in External Run mode.

# I/O-SYS INPUT/OUTPUT FUNCTION

## I/O-SYS Input/Output Function

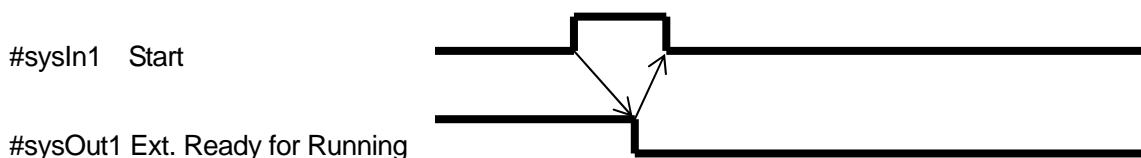
### INPUT

**Start (#sysIn1):** Turn ON this signal to start or restart a program in External Run mode. It is used to start mechanical initialization when turning the power ON and also to shift to the coordinates of the work home. It is valid when the “Ready for Start (#sysOut1)” is ON.

The “#sysIn1 Start” is used to execute mechanical initialization and to start/restart running programs when “a program is running in External Run mode” and “the I/O-S input turns ON”, in addition to any of the following conditions.

1. The robot is standing by for mechanical initialization when the power is turned ON.
2. The robot is standing by for mechanical initialization after making an emergency stop and after the emergency stop is released.
3. The robot is standing by for program execution at the work home.
4. The robot is standing by to restart after a temporary stop.
5. The robot is standing by to restart after stopping at a wait start point.
6. The robot is standing by to start because of a point job which is a waitStart command.

A “#sysIn1 Start” signal which has a pulse less than 20msec is regarded as invalid and will be rejected as noise. A signal with a pulse of 30msec is valid. However, it is recommended that you use a response signal (ACK signal) to indicate when the “sysOut1 Ext. Ready for Running” signal goes OFF. In the above standby cases, the “#sysOut1 Ext. Ready for Running” signal comes ON. If the “#sysIn1 Start” turns ON, the “#sysOut1 Ext. Ready for Running” will go OFF.



**Initialize (#sysIn2):** Turn this signal ON when you want to conduct mechanical initialization in External Run mode.

**Go Home (#sysIn3):** Turn this signal ON when you want to move the arm to the coordinates of the work home position in External Run mode.



- Reset (#sysIn4): Turn this signal ON when an “Operation Error” or “Emergency Stop Error” has occurred.  
When an operation error occurs, the error is fixed (sysOut8 OFF) and the program is terminated on the spot. In case of an emergency stop error, when emergency stop is released (sysOut9 OFF), a message “Press the Motor Power ON switch” will be displayed on the teaching pendant.
- Program Number LOAD: (#sysIn5) This signal is an instruction to read the program number. When it is turned ON, the “Program Number bit (#sysIn6 – #sysIn12)” is read.  
It is valid when [Changing Program Number] is set to [I/O-SYS] and [I/O-LOAD Function] is set to [LOAD/ACK Handshake] in the Administration mode.
- Program Number bit 0 to 6: (#sysIn6 – #sysIn12) Turn On these signals to specify program numbers.  
For example, if you want to specify the program number “67”,  

$$67 = 64 (\text{\#sysIn12}) + 2 (\text{\#sysIn7}) + 1 (\text{\#sysIn6}) =$$
Turn ON #sysIn12, #sysIn7, #sysIn6  
These signals are valid when [Changing Program Number] is set to [Valid] in the External I/O. When [I/O-LOAD Function] is set to [Loading at Start], use this signal to start the program after designating the program number.
- Last Work (#sysIn13): If [Cycle Mode] is set to [Continuous Playback], the robot will shift to Point 01 after running the last point and continue the cycle operation. To terminate the cycle, execute a point job that terminates the program or turns this signal ON.  
This signal is valid only after running the last point (before shifting.) You cannot use this signal to terminate a program while it is running.
- Program Number bit 7: (#sysIn13) The highest bit number for Program Number bit 0 to 6 (#sysIn6 – #sysIn12) signals. This signal enables you to specify more than “128” program numbers when it is ON.
- Temporary Stop (#sysIn14): Turn ON this signal to temporarily stop a program while it is running.  
You cannot stop a program running in CP drive but you can stop a program running in PTP drive. When this signal is ON, the start will be inhibited.

## OUTPUT

Ext. Ready for Running: (#sysOut1)	<p>The “#sysOut1 Ext. Ready for Start” turns ON when the program is running in External Run mode and the I/O-S input turns ON, in addition to any of the following conditions.</p> <ol style="list-style-type: none"><li>1. The robot is standing by for mechanical initialization when the power is turned ON.</li><li>2. The robot is standing by for mechanical initialization after it is stopped by the emergency stop and the emergency stop is released.</li><li>3. The robot is standing by at the work home for program execution to start.</li><li>4. The robot is standing by to restart after a temporary stop.</li><li>5. The robot is standing to restart after stopping at a wait start point.</li><li>6. The robot is standing by to start because of a point job which is a waitStart command.</li></ol> <p>If the “#sysOut6 Running” is OFF, the robot's status is either 1, 2 or 3. There is no way to distinguish between cases 4, 5 or 6 by signals.</p> <p>Whenever the “#sysOut1 Ext. Ready for Start” is ON, the “#sysOut7 Stopping” is always ON too. However, the opposite is not true. When the robot is stopping to wait for a signal, the “#sysOut7 Stopping” comes ON but the “#sysOut1 Ext. Ready for Start” does not come ON.</p>
Finish Initialize (#sysOut2):	<p>This signal comes ON when mechanical initialization is complete, and stays ON except for cases that mechanical initialization is required, such as emergency stop.</p>
Finish Work Home (#sysOut3):	<p>This signal is ON while the arm stays on a work home position in Run mode or External Run mode.</p>
Program Number ACK: (#sysOut4)	<p>This response signal corresponds to the “Program Number LOAD (#sysIn5)”</p> <p>When the “Program Number LOAD (#sysIn5)” is turned ON, this signal will come ON after the “Program Number bit (#sysIn6 – #sysIn12)” has been read. When the “Program Number LOAD (#sysIn3)” is turned OFF, this signal will also go OFF.</p>
Program Number Error: (#sysOut5)	<p>This signal comes ON when an unregistered program number is selected in the Run or External Run mode.</p>

- Running (#sysOut6): When a program starts running, this signal will come ON. When a program finishes running, it goes OFF.
- Robot Stopping (#sysOut7): When the robot is stopping, this signal comes ON and when the robot is moving, it goes OFF.  
When this signal is ON (the robot is stopping), the start will be inhibited if the "Soft Lock (#sysIn2)" signal is turned OFF. Even if you try to start the robot, it will not move.  
When this signal is OFF (the robot is running), the robot will stop immediately if the "Soft Lock (#sysIn2)" signal is turned OFF.
- Error (#sysOut8): When an error occurs, this signal will come ON.
- Emergency Stop (#sysOut9): When an "Emergency Stop Error" occurs (the emergency stop button is pressed), this signal comes ON. When this signal comes ON, the "Error (#sysOut8)" will come ON at the same time.
- Request MPON (#sysOut10): When the main power is turned ON or when emergency stop is released (sysOut9 OFF) after emergency stop error, a message "Press the Motor Power ON switch" will be displayed on the teaching pendant.
- Request Initialize (#sysOut11): When turning the motor power ON after turning the main power ON or releasing emergency stop, this signal comes ON.  
A message "Press Initialize Switch" in run mode or external run mode or "Press F.3 key with Enable-Switch" in Teaching mode will be displayed on the teaching pendant LCD.
- Request Work Home : (#sysOut12) : When turning the motor power ON after turning the main power ON or releasing emergency stop, this signal comes ON after mechanical initialization is complete.  
However, if [Initialize] is set to [Work Home After Initialize] or [Work Home on Start], this signal will not come ON when turning the main power ON.

## **OTHERS**

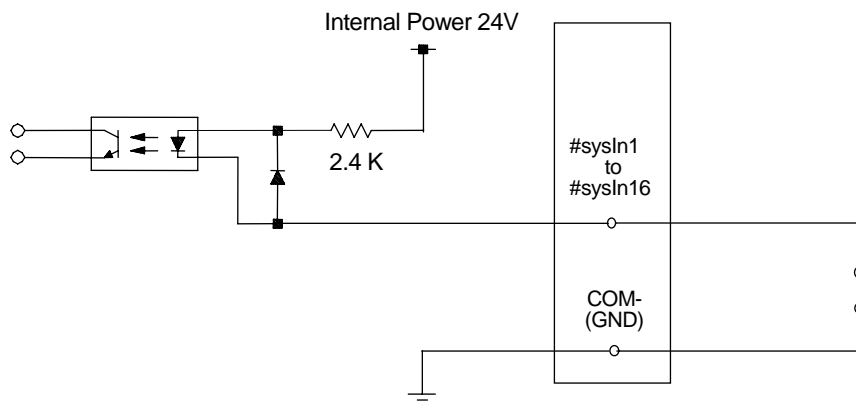
- COM+ (DC24V): If I/O-SYS is set to [External], connect the COM+ pin to the plus pole of the external power supply (DC24V.)  
If I/O-SYS is set to [Internal], DC24V (+) will be output.
- COM- (GND): If I/O-SYS is set to [External], connect the COM- pin to the ground of the external power supply.  
If I/O-SYS is set to [Internal], use the pin as a common ground.

## I/O-SYS Input Signal (Sink Input)

Input signals are active when the photo coupler is ON.

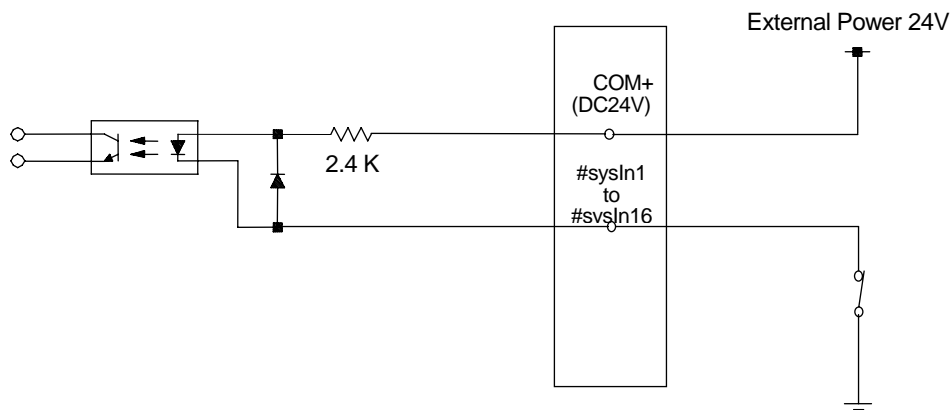
### Internal Power Supply

When an internal power supply is used, the input pin and the COM- pin should be shorted as shown below.



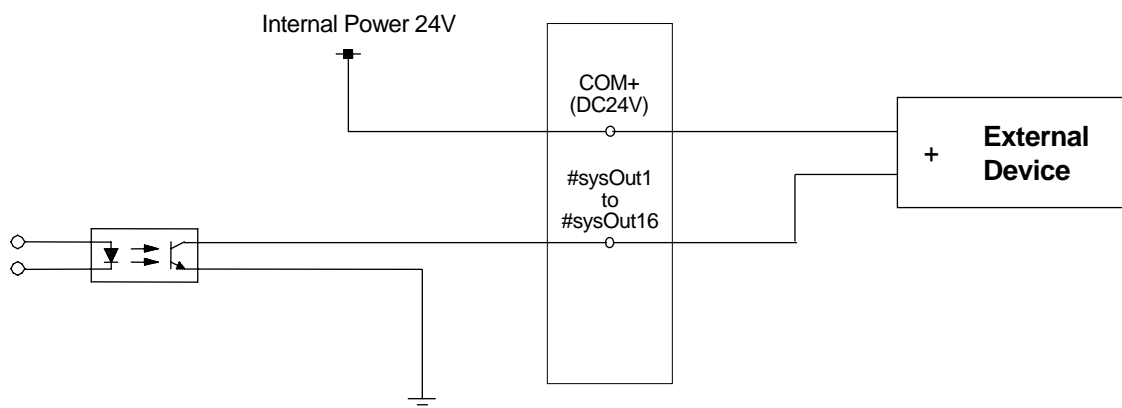
### External Power Supply

When an external power supply is used, input pins and external power ground should be ON as shown below.

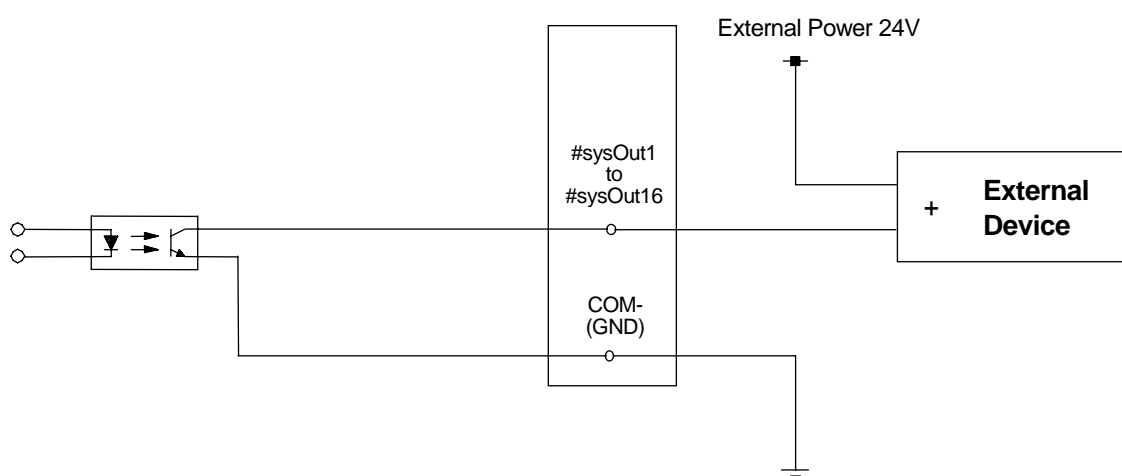


## I/O-SYS Output Signal (Sink Output)

### Internal Power Supply



### External Power Supply



## I/O-SYS Output Capacity (Sink Output)

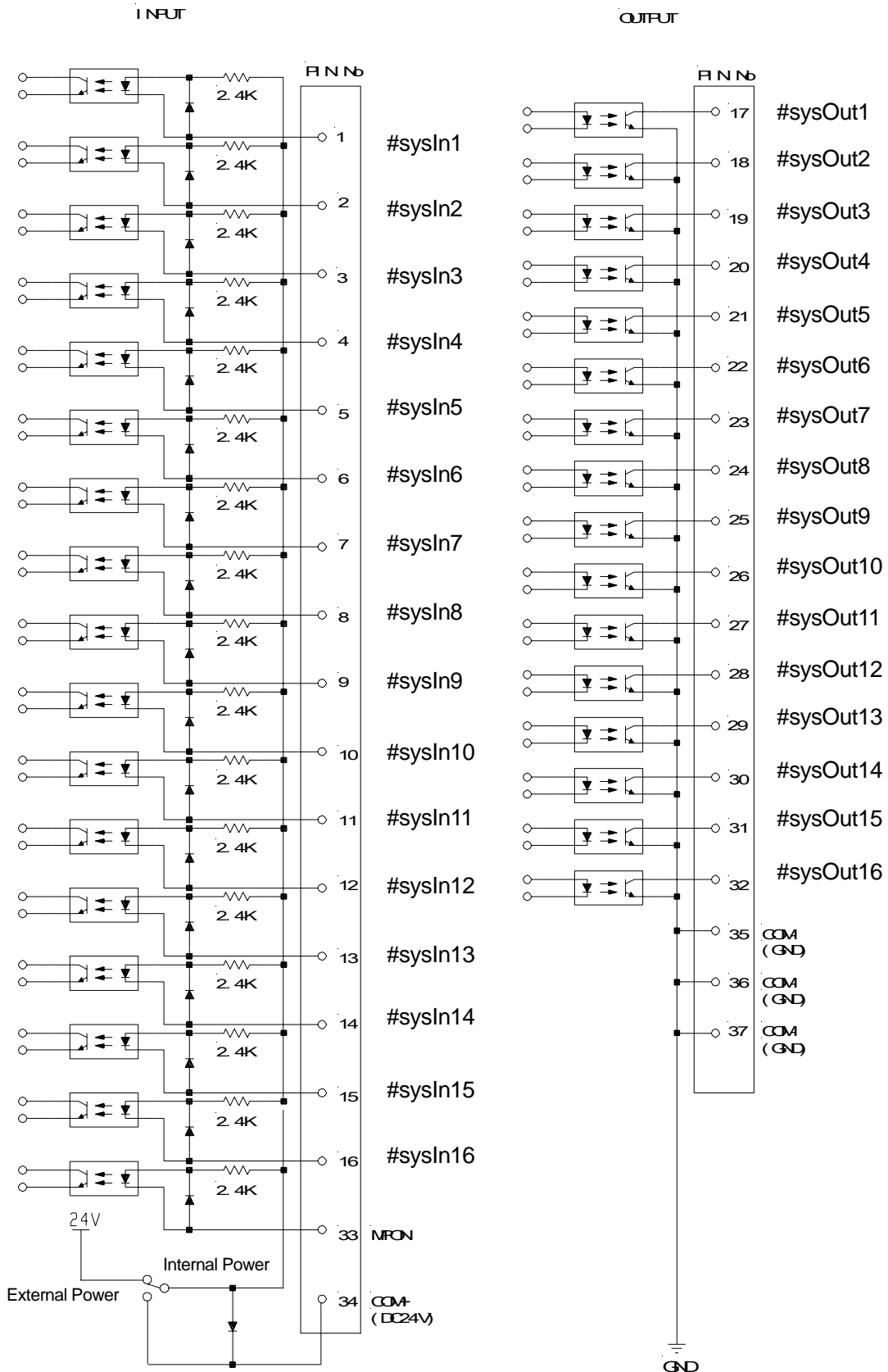
For both the internal power supply and external power supply, use rated voltage not more than the following.

- 100mA for 1 pin (DC24V)

For the internal power supply, use rated voltage not more than the following.

- DC24V, 2A (Total of I/O-SYS and I/O-1)

# I/O-SYS Circuit Diagram (Sink Input/Output)

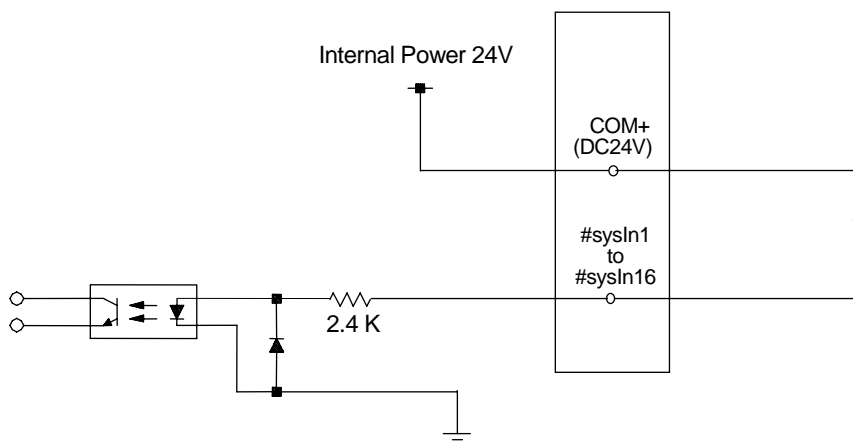


## I/O-SYS Input Signal (Source Input)

Input signals are active when the photo coupler is ON.

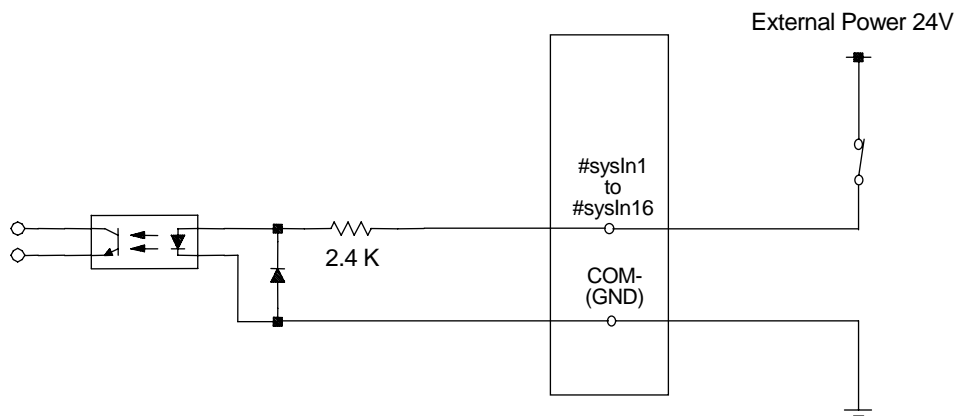
### Internal Power Supply

When an internal power supply is used, the input pin and the COM+ pin should be ON as shown below.



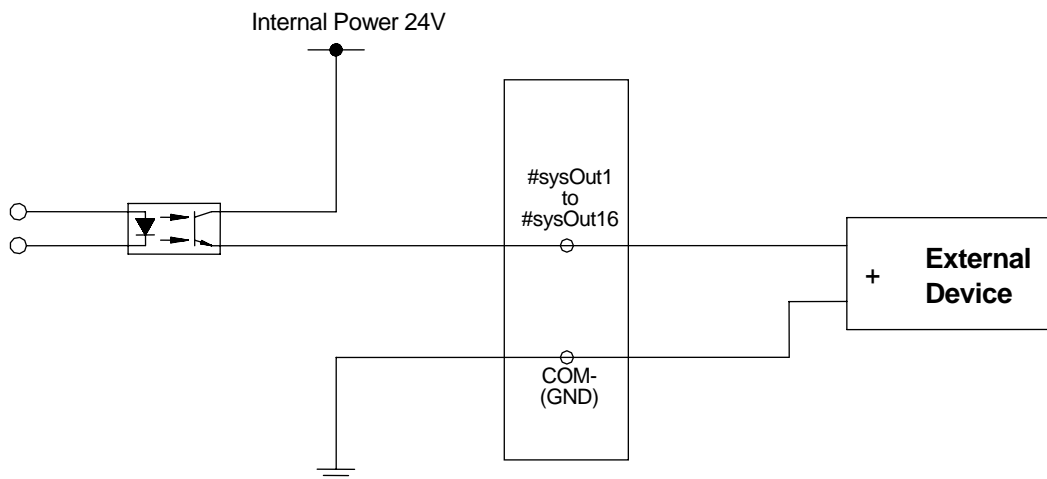
### External Power Supply

When an external power supply is used, the input pin and external power should be ON as shown below.

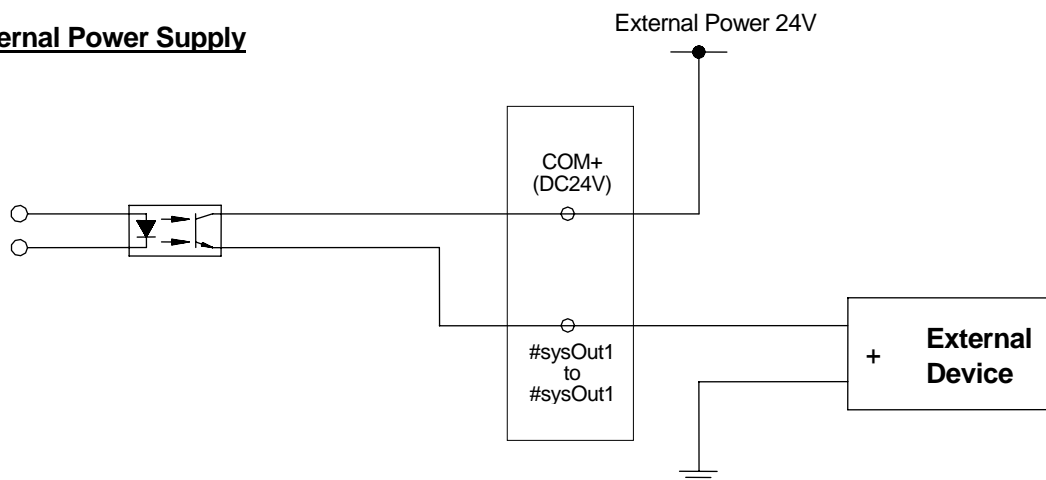


## I/O-SYS Output Signal (Source Output)

### Internal Power Supply



### External Power Supply



## I/O-SYS Output Capacity (Source Output)

For both the internal power supply and external power supply, use rated voltage not more than the following.

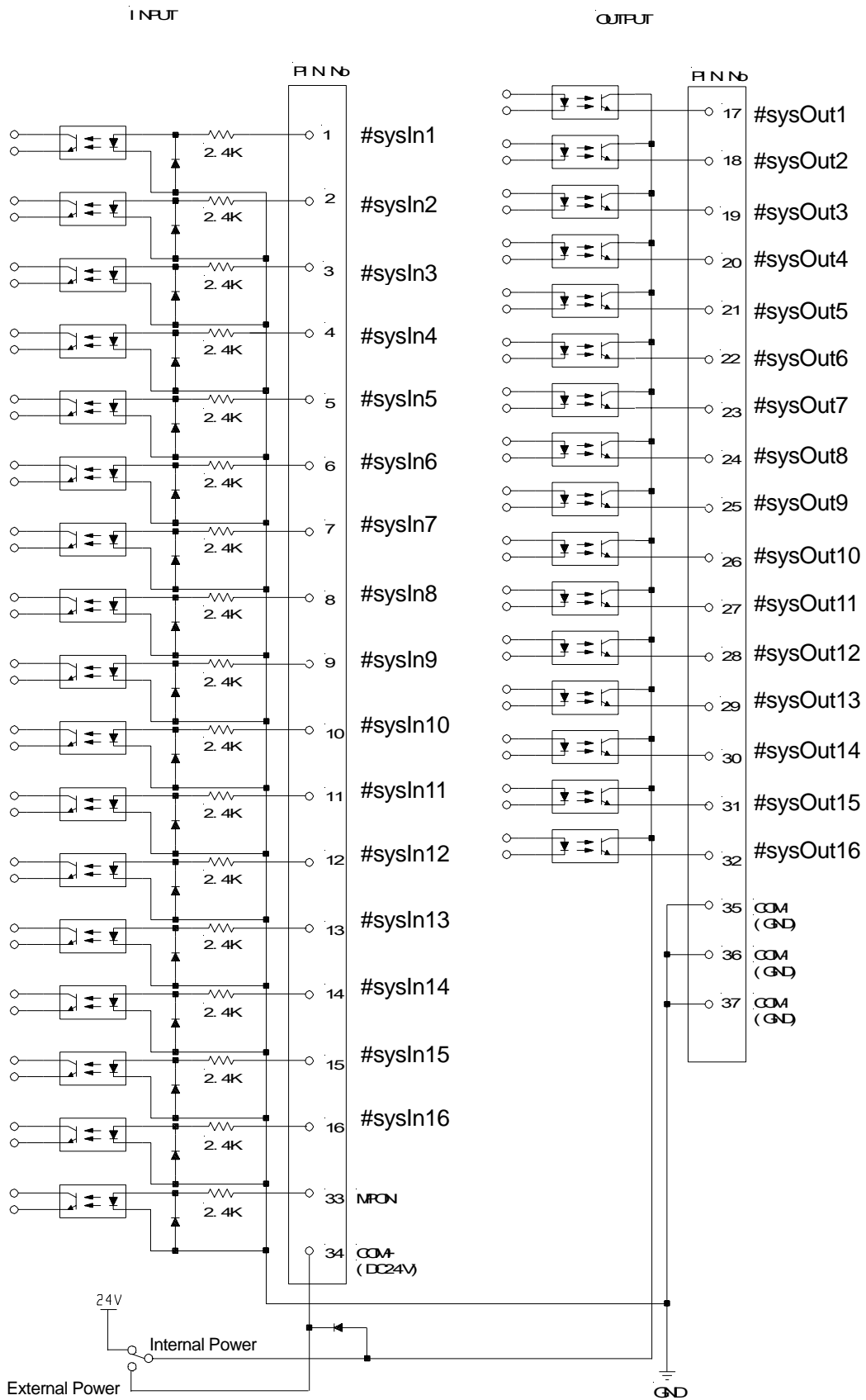
- 100mA for 1 pin (DC24V)

For the internal power supply, use rated voltage not more than the following.

- DC24V, 2A (Total of I/O-SYS and I/O-1)



# I/O-SYS Circuit Diagram(Source Input/Output)



# TIMING CHART

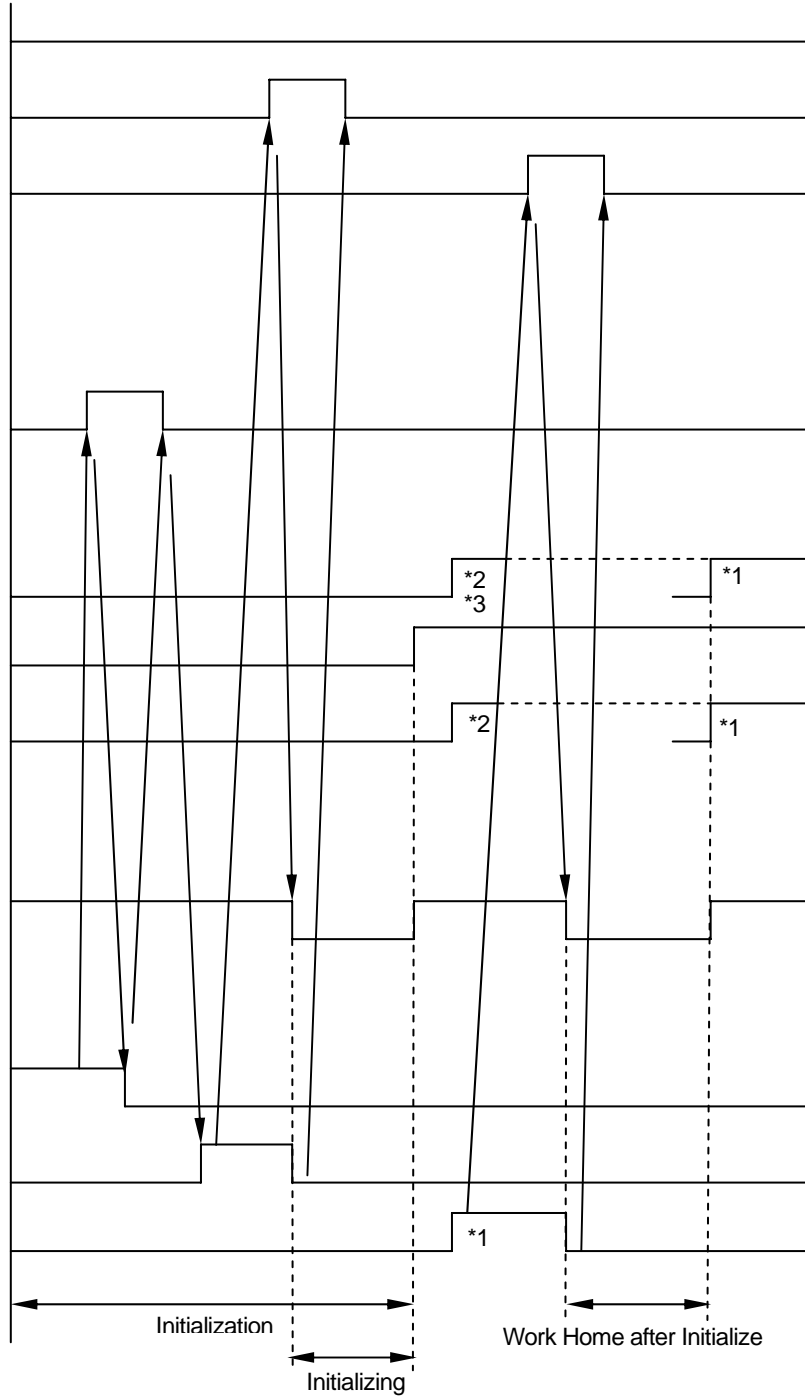
## 1. Start IN

sysIn1 (Start)  
 sysIn2 (Initialize)  
 sysIn3 (Go Home)  
 sysIn4 (Reset)  
 sysIn5 (Program No. LOAD)  
 sysIn6 – sysIn12 (Program No.)

MPON (Motor Power ON)

## OUT

sysOut1 (Ext. Ready for Start)  
 sysOut2 (Finish Initialize)  
 sysOut3 (Finish Work Home)  
 sysOut4 (Program No. ACK)  
 sysOut5 (Program No. Error)  
 sysOut6 (Running)  
 sysOut7 (Stopping)  
 sysOut8 (Error)  
 sysOut9 (Emergency Stop)  
 sysOut10 (Request MPON)  
 sysOut11 (Request Initialize)  
 sysOut12 (Request Work Home)



- \*1: [Work Home on Start] is set in [Initialize] under [Run Mode Parameter.]
- \*2: [Work Home After Initialize] is set in [Initialize] under [Run Mode Parameter.]
- \*3: [Work Home after First Cycle] is set in [Initialize] under [Run Mode Parameter.]

## 2. Program Switching

[LOAD/ACK Handshake] is set in [I/O LOAD Function] under [Run Mode Parameter.]

### IN

sysIn1 (Start)

sysIn5 (Program No. LOAD)

sysIn6 – sysIn12 (Program No.)

### OUT

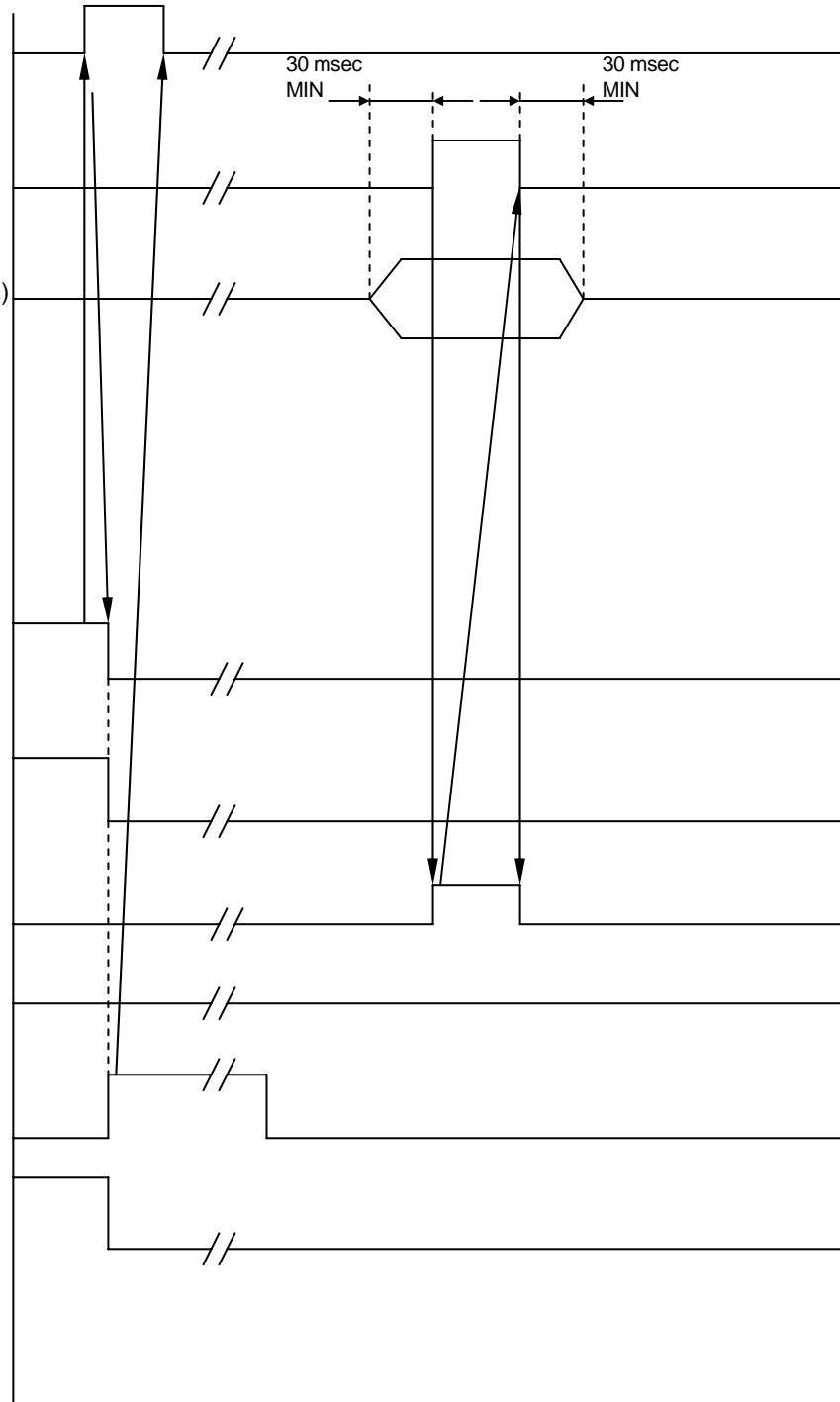
sysOut1 (Ext. Ready for Start)

sysOut3 (Finish Work Home)

sysOut4  
(Program No. ACK)

sysOut5  
(Program No. Error)

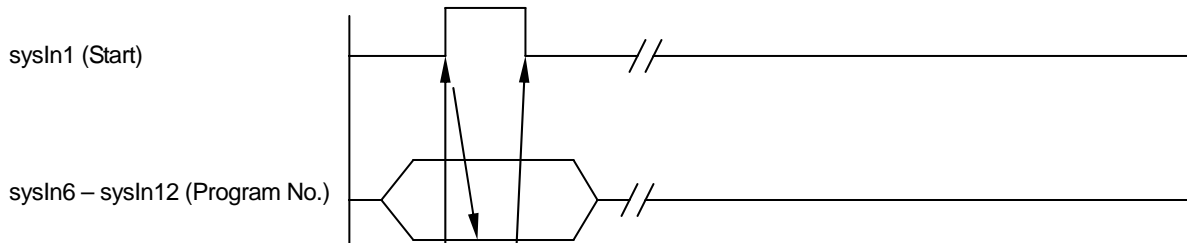
sysOut6 (Running)  
sysOut7 (Stopping)



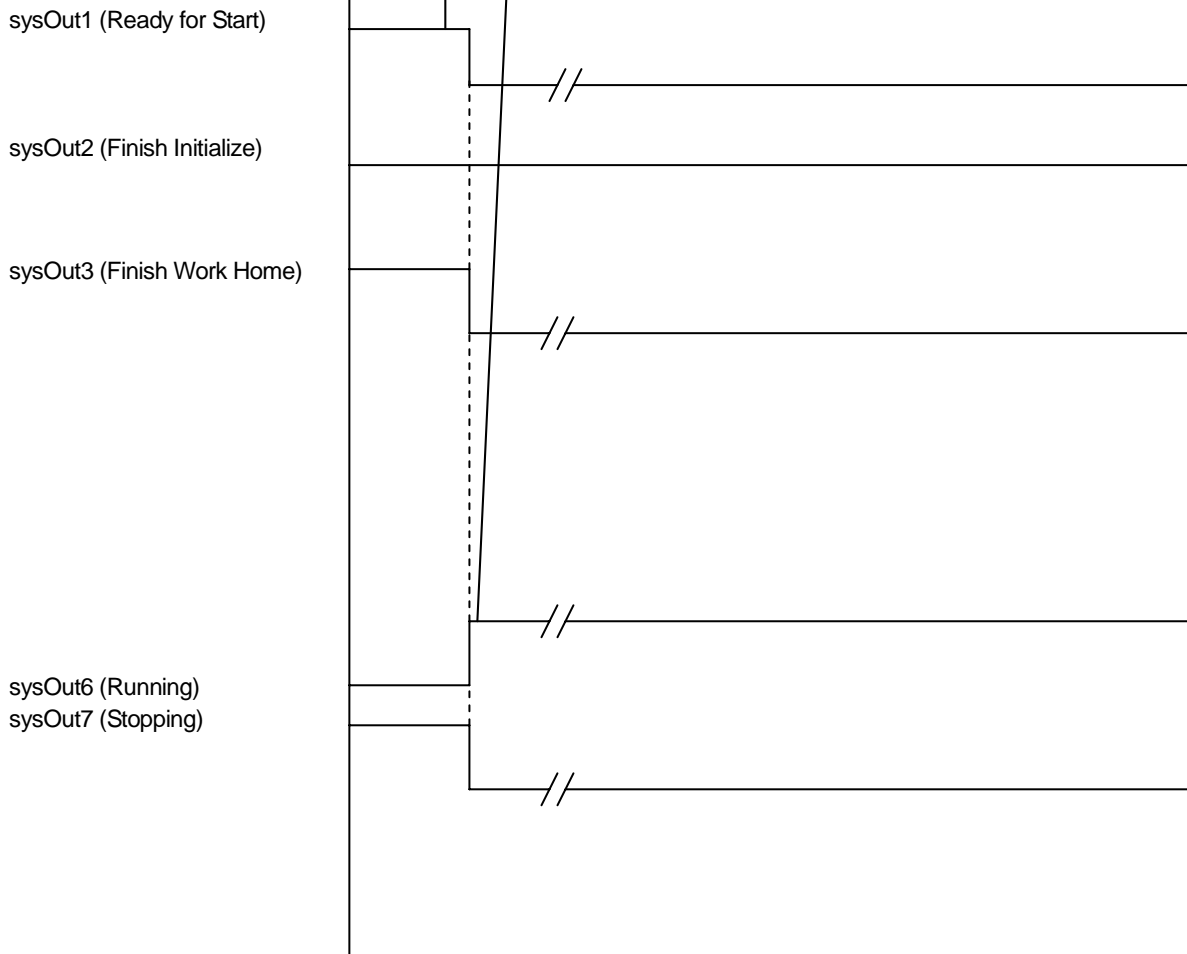
### 3. Program Switching

[Loading at Start] is set in [I/O LOAD Function] under [Run Mode Parameter.]

#### IN



#### OUT



#### 4. Emergency Stop (including emergency stop by an I/O-S [Interlock] signal.)

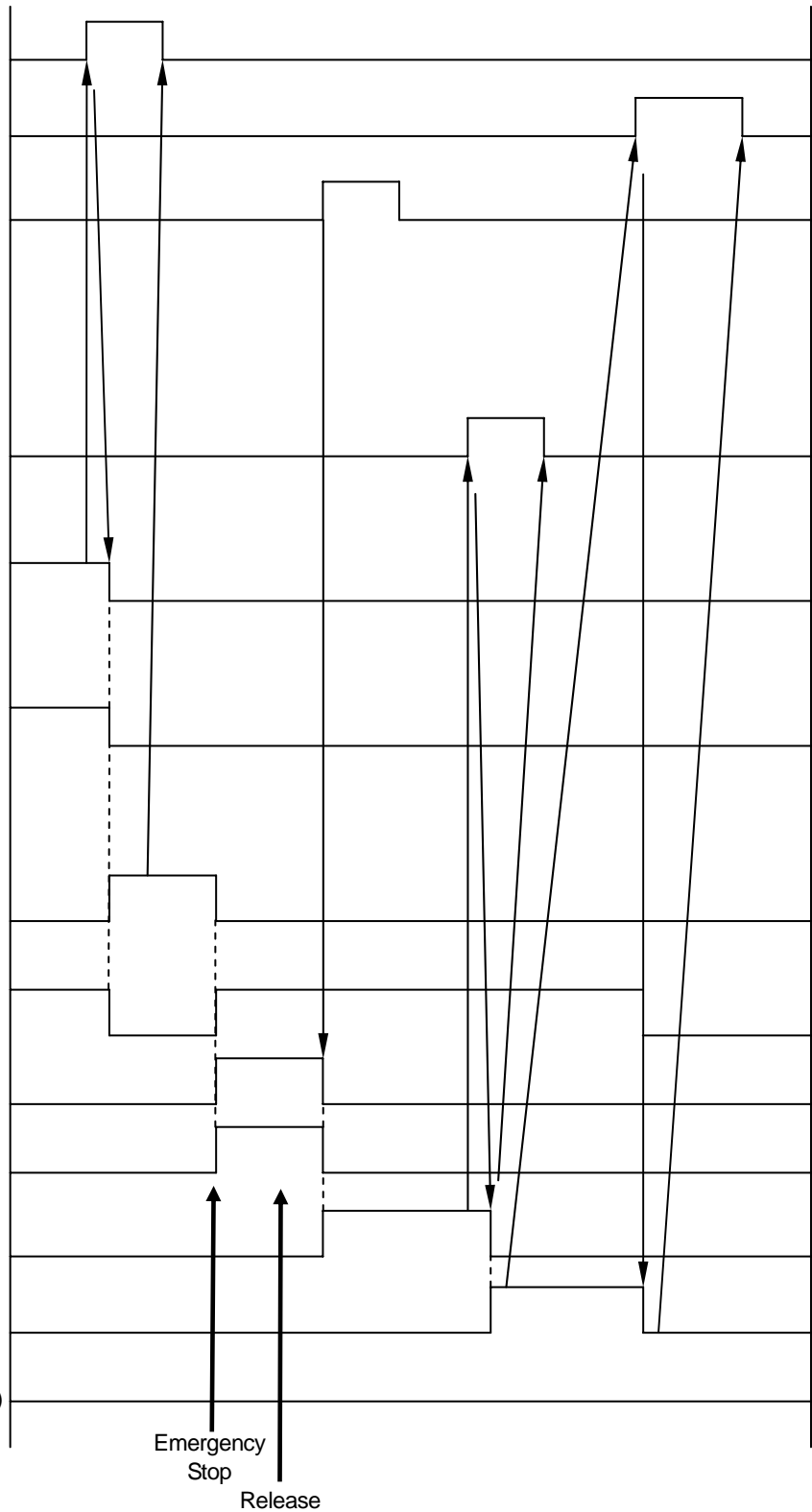
### IN

- sysIn1 (Start)
- sysIn2 (Initialize)
- sysIn3 (Go Home)
- sysIn4 (Reset)
- sysIn5 (Program No. LOAD)
- sysIn6 – sysIn12 (Program No.)

MPON  
(Motor Power ON)

### OUT

- sysOut1 (Ready for Start)
- sysOut2 (Finish Initialize)
- sysOut3 (Finish Work Home)
- sysOut4 (Program No. ACK)
- sysOut5 (Program No. Error)
- sysOut6 (Running)
- sysOut7 (Stopping)
- sysOut8 (Error)
- sysOut9 (Emergency Stop)
- sysOut10 (Request MPON)
- sysOut11 (Request Initialize)
- sysOut12 (Request Work Home)



## 5. Temporary Stop

### IN

sysIn1 (Start)

sysIn3 (Go Home)  
 sysIn5 (Program No. LOAD)  
 sysIn6 – sysIn12 (Program No.)  
 sysIn13 (Last Work)

Temporary Stop Separation Point

sysIn14 (Temporary Stop)

### OUT

sysOut1 (Ext. Ready for Start)

sysOut2 (Finish Initialize)

sysOut3 (Finish Work Home)

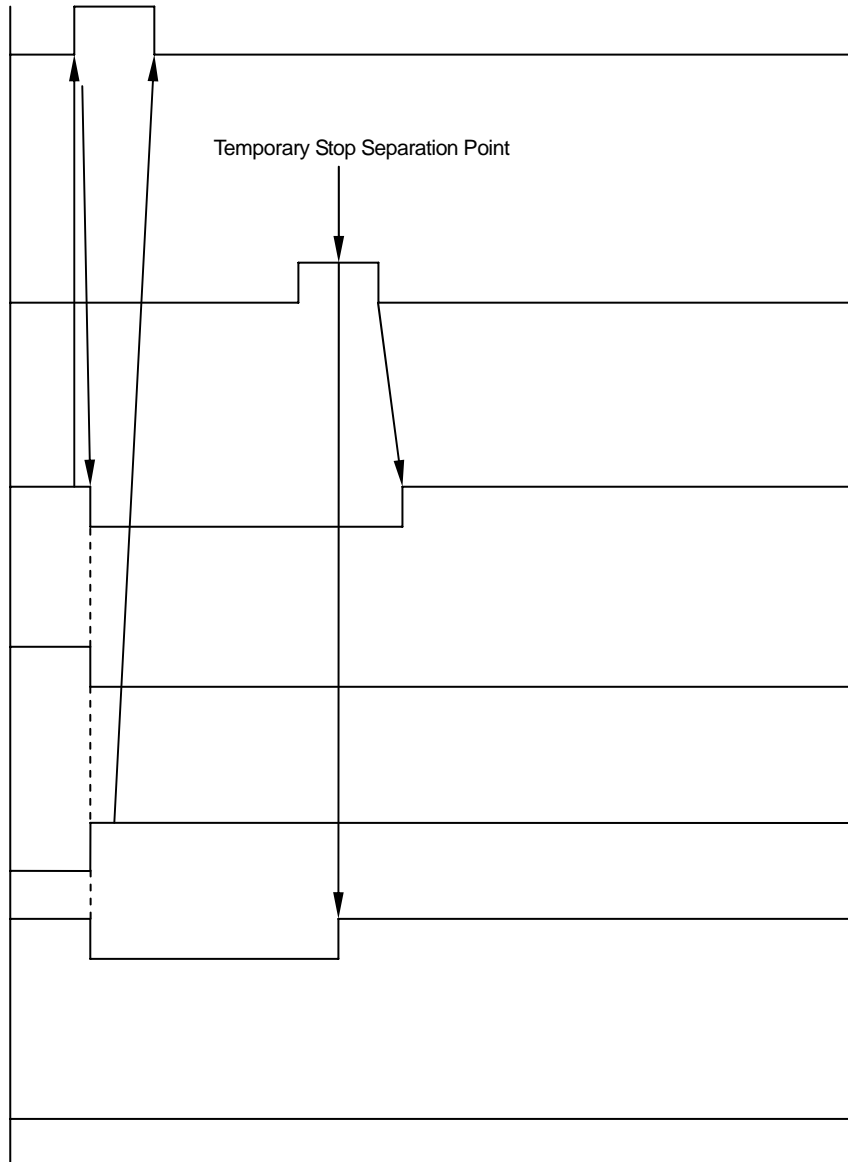
sysOut4 (Program No. ACK)

sysOut5 (Program No. Error)

sysOut6 (Running)

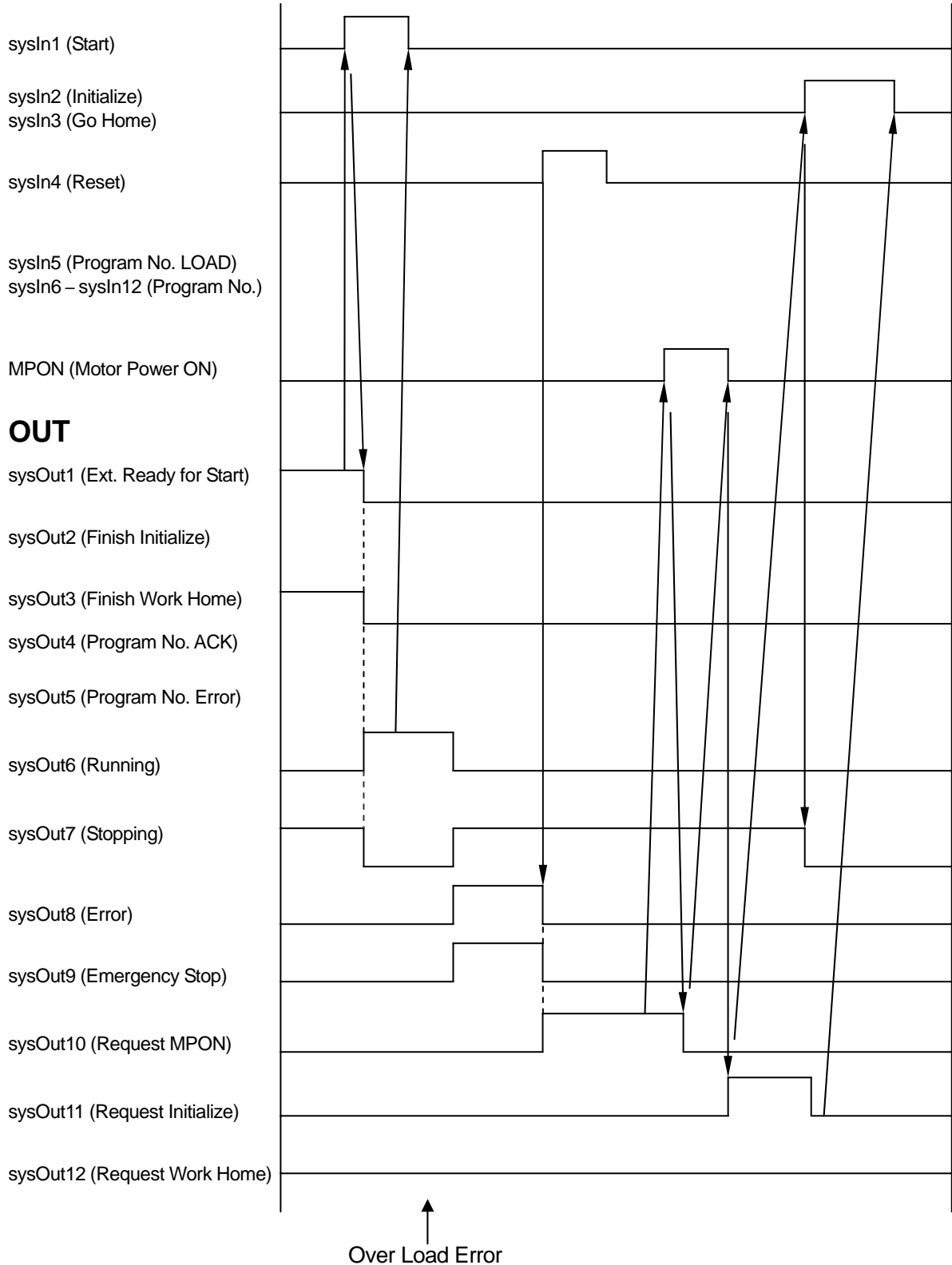
sysOut7 (Stopping)

sysOut12  
 (Request Work Home)



## 6. Over Load Error

### IN



## 7. Program Number Error

No program corresponding to the registered program number is available when the main power is turned on.

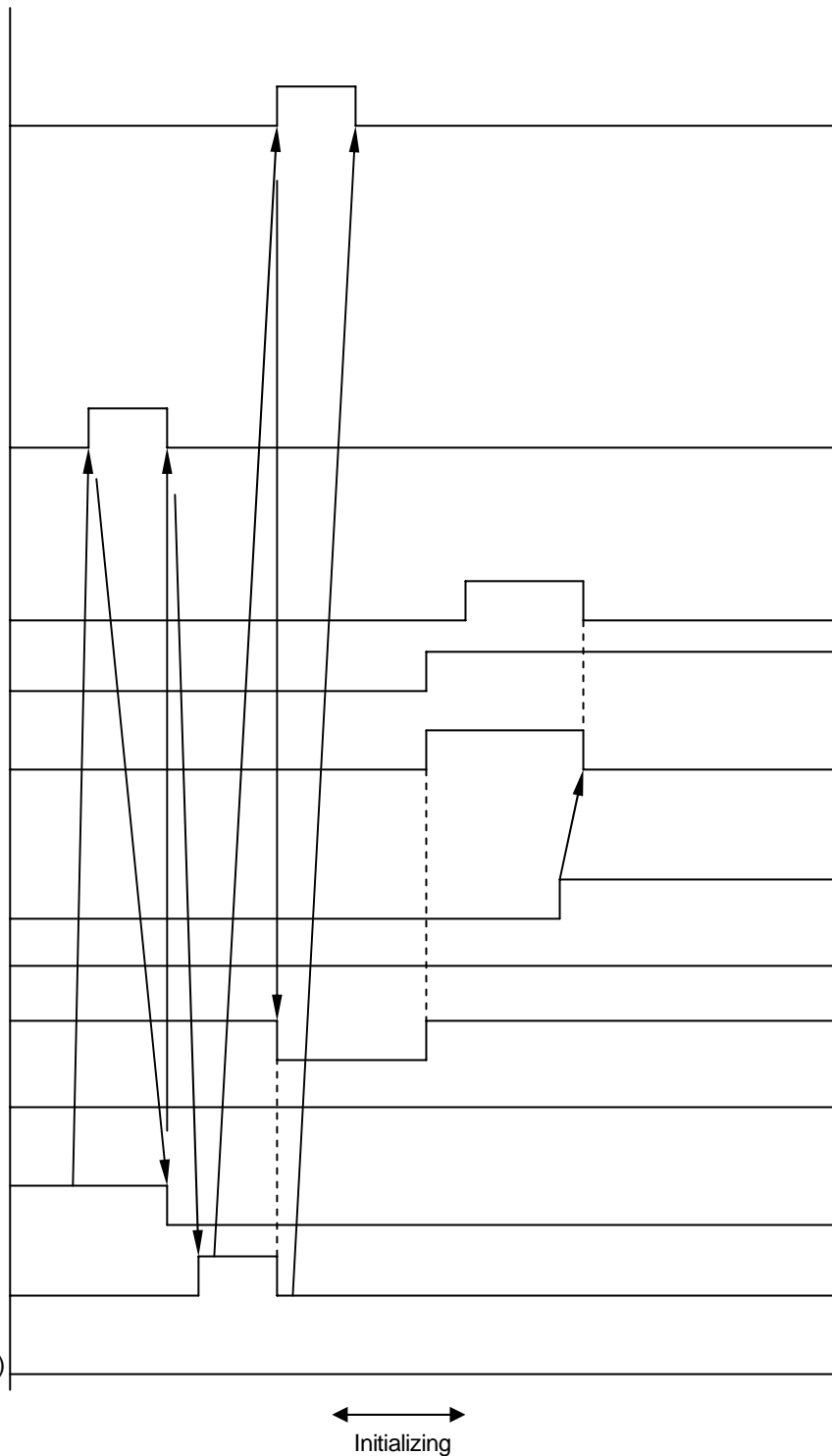
### IN

sysIn1 (Start)  
 sysIn2 (Initialize)  
 sysIn3 (Go Home)  
 sysIn4 (Reset)  
 sysIn5 (Program No. LOAD)  
 sysIn6 – sysIn12 (Program No.)

MPON  
 (Motor Power ON)

### OUT

sysOut1 (Ext. Ready for Start)  
 sysOut2 (Finish Initialize)  
 sysOut3 (Finish Work Home)  
 sysOut4 (Program No. ACK)  
 sysOut5 (Program No. Error)  
 sysOut6 (Running)  
 sysOut7 (Stopping)  
 sysOut8 (Error)  
 sysOut9 (Emergency Stop)  
 sysOut10 (Request MPON)  
 sysOut11 (Request Initialize)  
 sysOut12 (Request Work Home)





# 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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