



Operation Manual

PRODUCT NAME

SI unit

MODEL / Series / Product Number

EX140-SSL#

SMC Corporation




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• Safety instructions •

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution", "Warning" or "Danger". They are all important notes for safety and must be followed in addition to International standards (ISO/IEC) *1) and other safety regulations.

- *1) ISO 4414: Pneumatic fluid power -- General rules relating to systems.
- ISO 4413: Hydraulic fluid power -- General rules relating to systems.
- IEC 60204-1: Safety of machinery -- Electrical equipment of machines. (Part 1: General requirements)
- ISO 10218-1992: Manipulating industrial robots -Safety.
- etc.

 Caution :	CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
 Warning :	WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
 Danger :	DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".

Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first. *2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*2) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Operator

- ◆ This operation manual is intended for those who have knowledge of machinery using pneumatic equipment, and have sufficient knowledge of assembly, operation and maintenance of such equipment. Only those persons are allowed to perform assembly, operation and maintenance.
- ◆ Read and understand this operation manual carefully before assembling, operating or providing maintenance to the product.

■ Precautions

Warning

- Do not disassemble, modify (including changing the printed circuit board) or repair.
An injury or failure can result.
- Do not operate the product outside of the specifications.
Do not use for flammable or harmful fluids.
Fire, malfunction, or damage to the product can result.
Verify the specifications before use.
- Do not operate in an atmosphere containing flammable or explosive gases.
Fire or an explosion can result.
This product is not designed to be explosion proof.
- If using the product in an interlocking circuit:
 - Provide a double interlocking system, for example a mechanical system.
 - Check the product regularly for proper operationOtherwise malfunction can result, causing an accident.
- The following instructions must be followed during maintenance:
 - Turn off the power supply
 - Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenanceOtherwise an injury can result.

Caution

- After maintenance is complete, perform appropriate functional inspections.
Stop operation if the equipment does not function properly.
Safety cannot be assured in the case of unexpected malfunction.
- Provide grounding to assure the safety and noise resistance of the product.
Individual grounding should be provided close to the product with a short cable.

■NOTE

- Follow the instructions given below when designing, selecting and handling the product.
- The instructions on design and selection (installation, wiring, environment, adjustment, operation, maintenance, etc.) described below must also be followed.
- *Product specifications
 - When conformity to UL is required, the SI unit should be used with a UL1310 Class 2 power supply.
 - Use the specified voltage.
Otherwise failure or malfunction can result.
 - Reserve a space for maintenance.
Allow sufficient space for maintenance when designing the system.
 - Do not remove any nameplates or labels.
This can lead to incorrect maintenance, or misreading of the operation manual, which could cause damage or malfunction to the product.
- Precautions on handling
 - *Installation
 - Do not drop, hit or apply excessive shock to the product.
Otherwise damage to the product can result, causing malfunction.
 - Tighten to the specified tightening torque.
If the tightening torque is exceeded the mounting screws may be broken.
 - Never mount a product in a location that will be used as a foothold.
The product may be damaged if excessive force is applied by stepping or climbing onto it.
 - *Wiring
 - Avoid repeatedly bending or stretching the cables, or placing heavy load on them.
Repetitive bending stress or tensile stress can cause breakage of the cable.
 - Wire correctly.
Incorrect wiring can break the product.
 - Do not perform wiring while the power is on.
Otherwise damage to the product can result, causing malfunction.
 - Do not route wires and cables together with power or high voltage cables.
Otherwise the product can malfunction due to interference of noise and surge voltage from power and high voltage cables to the signal line.
Route the wires (piping) of the product separately from power or high voltage cables.
 - Confirm proper insulation of wiring.
Poor insulation (interference from another circuit, poor insulation between terminals, etc.) can lead to excess voltage or current being applied to the product, causing damage.
 - Take appropriate measures against noise, such as using a noise filter, when the product is incorporated into equipment.
Otherwise noise can cause malfunction.

*Environment

- Do not use the product in area that is exposed to corrosive gases, chemicals, sea water, water or steam.
Otherwise failure or malfunction can result.
- Do not use in an area where surges are generated.
If there is equipment which generates a large amount of surge (solenoid type lifter, high frequency induction furnace, motor, etc.) close to the product, this may cause deterioration or breakage of the internal circuit of the product. Avoid sources of surge generation and crossed lines.
- Prevent foreign matter such as remnant of wires from entering the product to avoid failure and malfunction.
- Mount the product in a place that is not exposed to vibration or impact.
Otherwise failure or malfunction can result.
- Do not use the product in an environment that is exposed to temperature cycle.
Heat cycles other than ordinary changes in temperature can adversely affect the inside of the product.
- Do not expose the product to direct sunlight.
If using in a location directly exposed to sunlight, shade the product from the sunlight.
Otherwise failure or malfunction can result.
- Keep within the specified ambient temperature range.
Otherwise malfunction can result.
- Do not operate close to a heat source, or in a location exposed to radiant heat.
Otherwise malfunction can result.

*Adjustment and Operation

- Set the switches by using a sharp-pointed screwdriver etc.
It may damage set switches.
- Perform settings suitable for the operating conditions.
Incorrect setting can cause operation failure.
- Please refer to the PLC manufacturer's manual etc. for details of programming and addresses.
For the PLC protocol and programming refer to the relevant manufacturer's documentation.

*Maintenance

- Turn off the power supply, stop the supplied air, exhaust the residual pressure and verify the release of air before performing maintenance.
There is a risk of unexpected malfunction.
- Perform regular maintenance and inspections.
There is a risk of unexpected malfunction.
- After maintenance is complete, perform appropriate functional inspections.
Stop operation if the equipment does not function properly.
Otherwise safety is not assured due to an unexpected malfunction or incorrect operation.
- Do not use solvents such as benzene, thinner etc. to clean the product.
They could damage the surface of the body and erase the markings on the body.
Use a soft cloth to remove stains.
For heavy stains, use a cloth soaked with diluted neutral detergent and fully squeezed, then wipe up the stains again with a dry cloth.

1. Outline

●S-LINK System

- (1) S-LINK system is a wire-saving system developed by Panasonic Industrial Devices SUNX Co., Ltd.
- (2) 128 points of I/O can be transmitted up to 200m using two signal wires.
- (3) T-shaped multi-drop wiring is available.
- (4) Programmable controller of any manufacturer can be used by connecting S-LINK PC I/O connector to I/O card of programmable controller.
- (5) Signal transmission is highly reliable due to loop wiring, address displaying function of disconnected unit, and double signal checking.
- (6) Delay of transmission is 3.9mS when 32 points are in use and 10.7mS when 128 points are in use.

●Manifold Solenoid Valve for S-LINK

- (1) It is a manifold solenoid valve equipped Serial Transmission Unit (SI unit) connectable to S-LINK system.
- (2) SI unit functions as output unit of S-LINK system.
- (3) Functions of S-LINK system such as error address detection are available.
- (4) Two different types of SI unit for S-LINK are available depending on mounting methods and number of output points.
 - EXI40-SSL1 ··· 16 point outputs
 - EXI40-SSL2 ··· 8 point outputs

2. Applicable solenoid valve

- SQ 1000/2000
- SZ3000

3. Specifications

●General specification

Item	Specification
Operating temperature range	Operating (When max. 8 points are ON): 0 to 55°C, Operating (When all points are ON): 0 to 50°C, Storage: -20 to +65°C (No freezing or condensation)
Operating humidity range	10 to 90%RH (No condensation)
Withstand voltage	1500VAC for 1 minute, between external terminals and ground
Insulation resistance	500VDC 2MΩ or more, between external terminals and ground
Environment	No corrosive gas and no dust in included

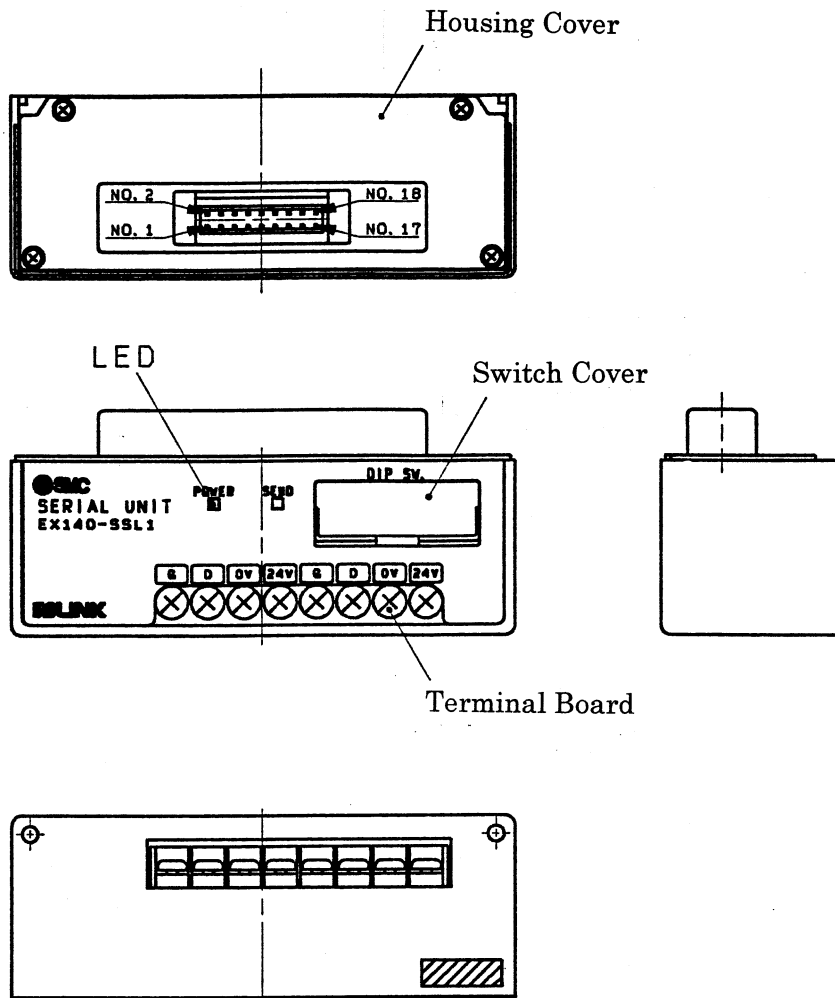
●Communication specification

Item	Specification
Applicable system	S-LINK system (Superior interchangeability for sensor Link system)
Transmission	Two-way time-division multiplex transmission
Synchronization	Bit synchronization, Frame synchronization
Transmission Procedure	S-LINK protocol
Transmission Lag	Max. 10.7ms (Transmission speed: 28.5kbps)
Wiring	T-shape multi-drop wiring/Crossover wiring
Transmission Distance	Max. 200m

●SI unit

Item	Specification	
Model	EX140-SSL1	EX140-SSL2
No. of Output Point	16 points	8 points
Output type	Sink/NPN (Positive common)	
Connected Load	24VDC 2.1W (SMC) solenoid valve with circuit protection of surge voltage	
Residual Voltage	1V or less	
Power Supply Voltage	24VDC -5% to +10%	
Power Consumption	0.1A or less (Unit inside)	
Enclosure	IP20	
Weight	130g or less	

4. Descriptions & Functions



■ LED Indication

LED Name	Function
POWER	LED lights when power is supplied.
SEND	LED blinks for proper transmission. LED blinks slowly for transmission failure.

■ Terminal Block

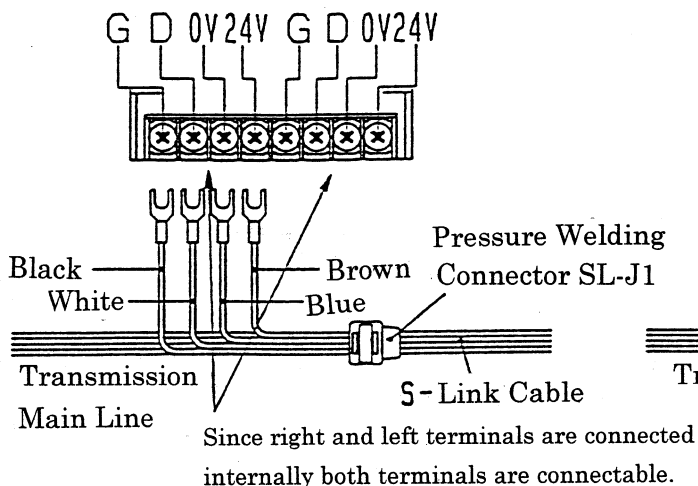
Terminal Name	Where to Connect
24V	24VDC Power Supply Line
0V	
D	Transmission Line D
G	Transmission Line G

5. Wiring method

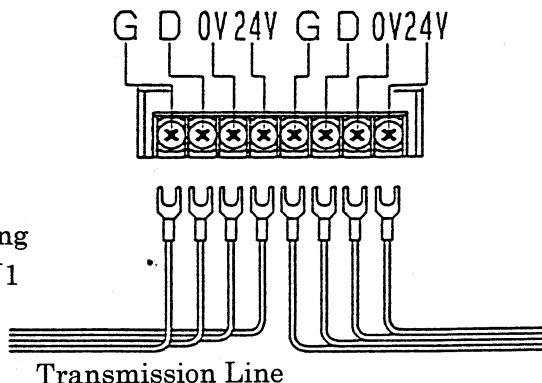
5-1. Wiring Configuration

For wiring, transmission lines (D, G) and power supply lines (24 V, 0 V) should be connected severally to the corresponding terminals. There are two types to connect SI unit to S-LINK transmission line, T-shaped multidrop wiring and crossover wiring. Each wiring method is shown below.

a) T-shaped Multidrop Wiring



b) Crossover Wiring

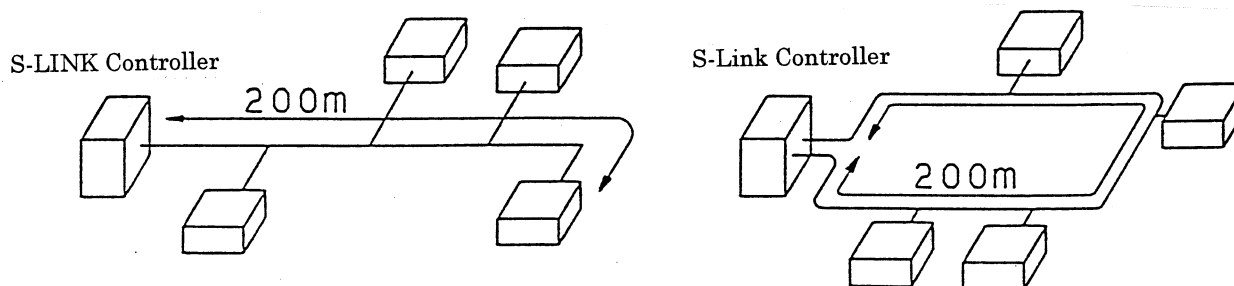


In the examples shown above, special flat cable for S-LINK, SL-ROM*00, is used.

* For connecting S-LINK system equipment to sensor link system, crossover wiring is recommended. If T-shaped multidrop wiring is done in sensor link system, disconnection in branch lines cannot be detected. Please keep branch lines as short as possible.

* Transmission Distance

- 1) Wiring length from S-LINK controller to the farthest unit is 200 m or less
- 2) For loop wiring, loop wiring length is 200 m or less
- 3) Total wiring length of trunk and branch lines is 400 m or less.



* Other than above factors, transmission distance is also restricted by the number of devices connected and voltage drop in power supply lines.

Please refer to the S-LINK Instruction Manual prepared by Panasonic Industrial Devices SUNX Co. for details.

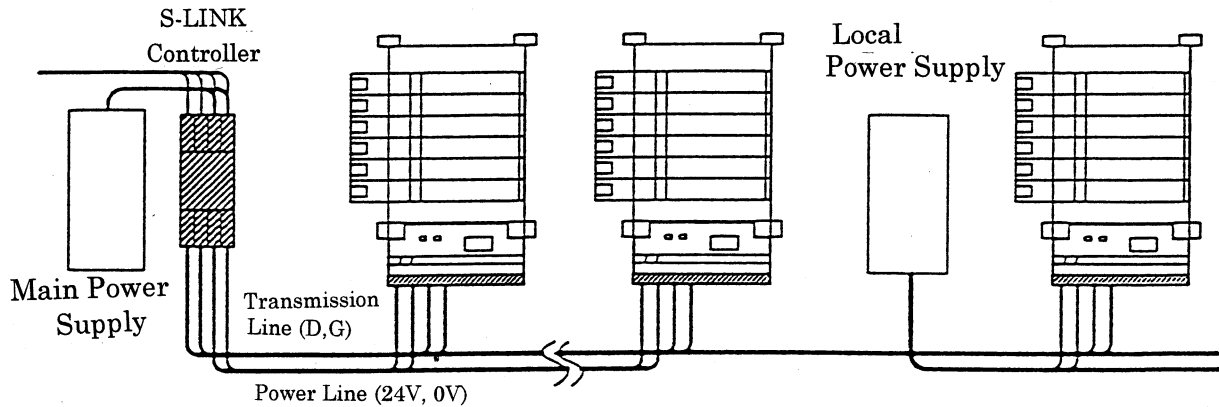
Connectable Number of Units

Connectable number of units is defined according to decrease of output capacity due to FAN-IN, FAN-OUT and cable length of S-LINK devices. Refer to the S-LINK Instruction Manual prepared by Panasonic Industrial Devices SUNX Co., Ltd. for its calculation.

5-2. Power Supply

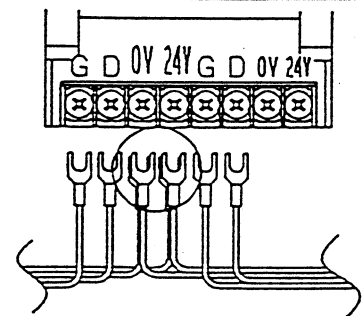
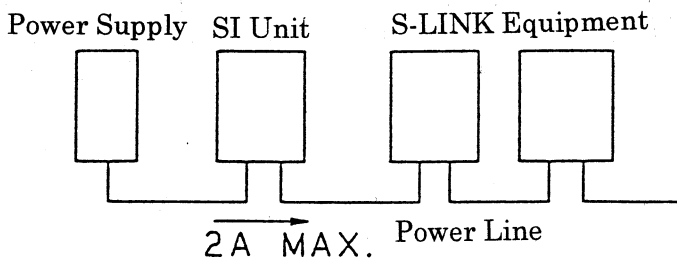
Please supply power of $24\text{VDC}^{+10\%}_{-5\%}$. Power supply methods of S-LINK system are the centralized power supply and the local power supply. With the centralized power supply, electric power is delivered to all S-LINK I/O equipment from the power source connected to S-LINK controller. In this case, load is restricted according to voltage drop in power lines (relating to cross section of cables and wiring length), allowable current for cables and capacity of the main power supply.

If load capacity is large, provide the local power supply as well as the main power supply to avoid concentration of power.



* For crossover wiring, power supply current delivered to other equipment through SI unit should be 2A or less. If more than 2A of current is applied, please use T-shaped multidrop wiring or gather power supply terminals in one for wiring.

*When more than 2A of power supply current is applied by crossover wiring.



* Current consumption of SI manifold solenoid valve should be approximately 1A with VQ valves (1.5W type) and 4A with SX/SY valves when 16 points are turned on.

⚠ Caution at wiring

- Keep the voltage among power supply terminals of SI unit at 22.8 V (- 5% of supply voltage) or higher even when the maximum load is applied.
- Be sure to ground FG of power supply (switching power supply). In addition, separate wiring for power supply such as an inverter motor from that for S-LINK.
- The applicable screwdriver is a Phillips head screwdriver with end size of #2 and diameter of $\phi 6$ or less. The screws should be tightened securely with a tightening torque of 0.5 to 0.6 Nm.

6. DIP Switch Setting

6-1. Address Setting

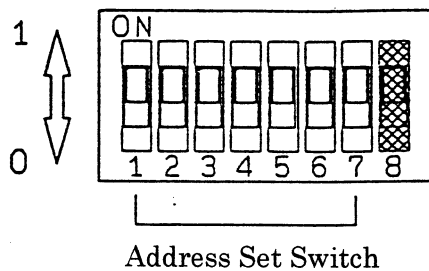
S-LINK I/O device sets addresses to correspond to I/O card of PLC.

For SI unit, addresses are assigned by DIP switches. Addresses from 0 to 127 can be set by binary codes.

For each solenoid valve, the address of the unit is assigned to begin with, and then the address of solenoid valve with output No.0 is assigned and the rest follows it.

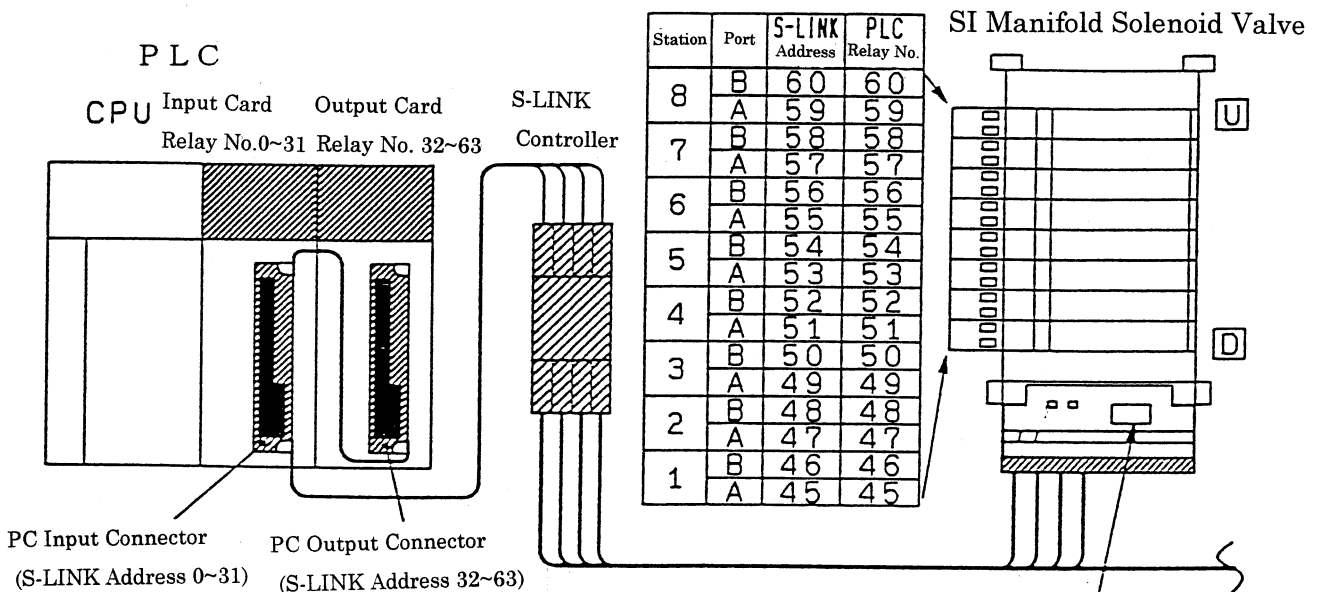
*Power of SI Unit should be turned off for setting DIP switch.

Relationship Between Address Set Value & Set Switch



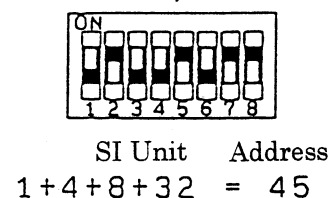
Switch No.	1	2	3	4	5	6	7
Weight of bit	1	2	4	8	16	32	64
Address set value	0	0	0	0	0	0	0
	1	1	0	0	0	0	0
	2	0	1	0	0	0	0
	⋮						
	127	1	1	1	1	1	1

Example of Address Setting



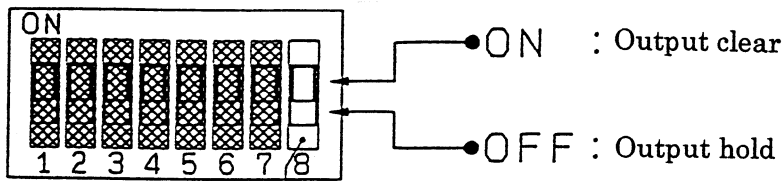
When the address of SI unit is set to 45, a solenoid valve with output No. 0 is set to address 45 and one with output No.1 is set to address 46. (Refer to Chapter 4 for Assignment of output No. to solenoid valves.)

With the formation above, relay numbers of PLC Corresponding to SI manifold solenoid valve (Double, 8 stations, 16 points) are 45 to 60.

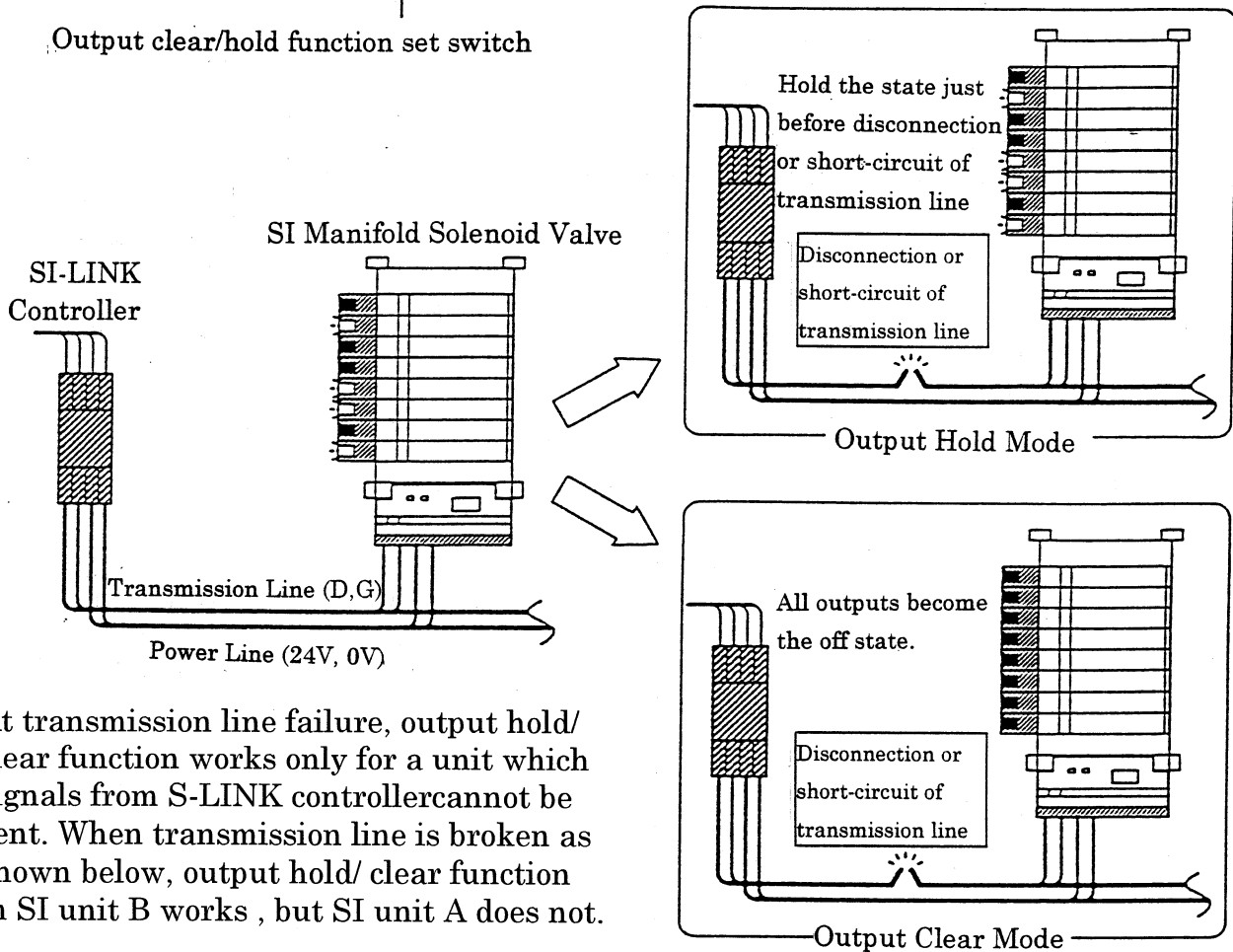


6-2. Output Hold Setting

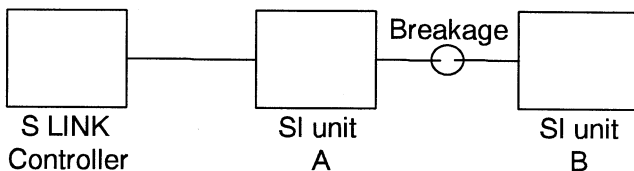
It can be selected if output of SI unit is held as the state just before transmission line failure (output hold) or completely cleared off (output clear) when transmission line (D,G) is disconnected or short-circuited. Use DIP switch No.8 for this setting.



Output clear/hold function set switch



At transmission line failure, output hold/clear function works only for a unit which signals from S-LINK controller cannot be sent. When transmission line is broken as shown below, output hold/clear function in SI unit B works, but SI unit A does not.

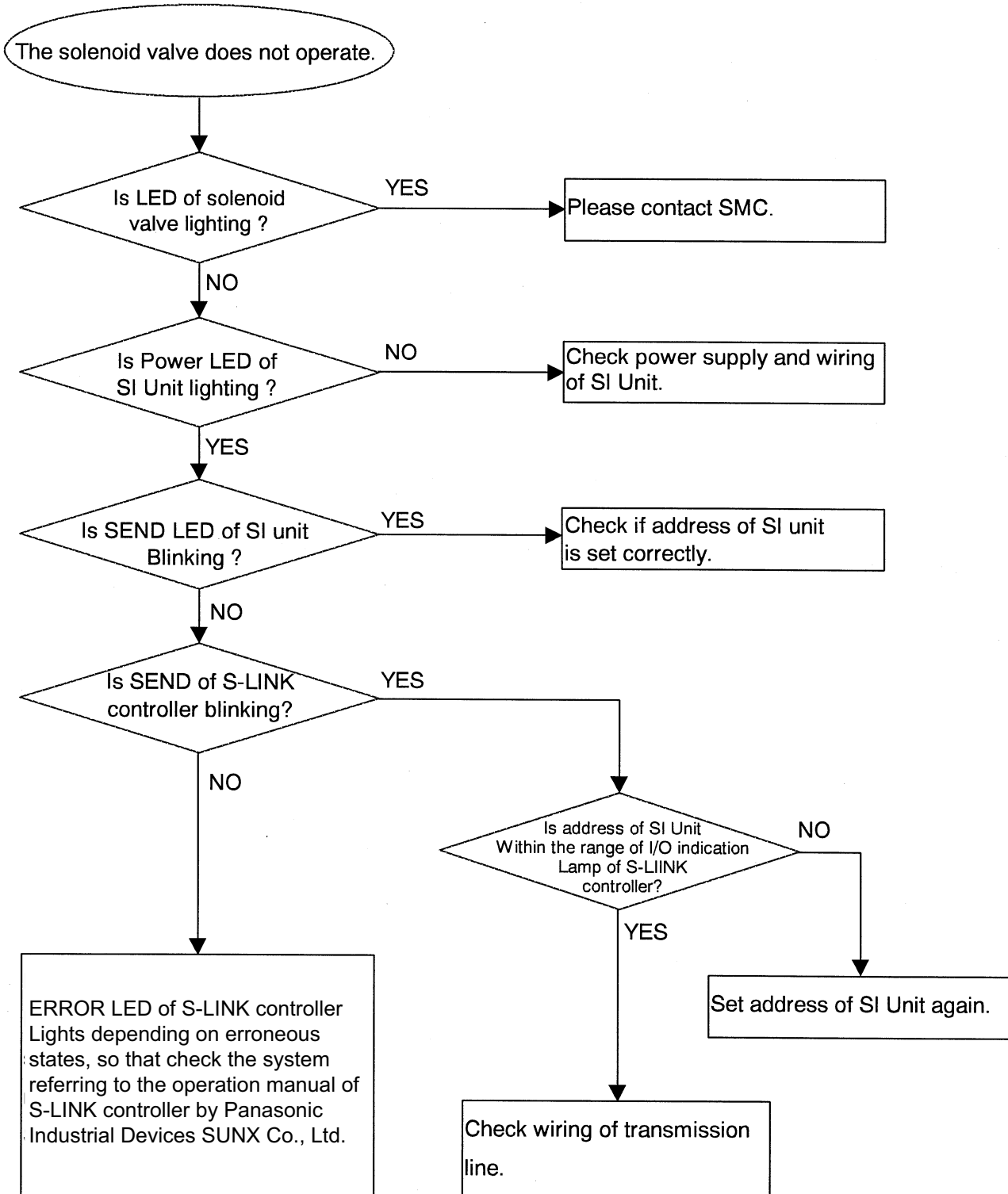


Caution at wiring

If transmission line is reset without turning off the power after output hold / clear function has worked, output may be wrong. Be sure to turn off the power before reset.

7. Troubleshooting

The following flow shows how to cope with inappropriate operation of SI Unit.
Refer to the Instruction Manual prepared by Panasonic Industrial Devices SUNX Co., Ltd. when the whole system needs troubleshooting.



Revision history
B: Contents revised in several places.

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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