

Before Use

Fieldbus device

EX250-SAS3/EX250-SAS5
EX250-SAS7/EX250-SAS9

Thank you for purchasing an SMC EX250-SAS3/EX250-SAS5/EX250-SAS7/EX250-SAS9 Fieldbus device.
Please read this manual carefully before operating the product and make sure you understand its capabilities and limitations. Please keep this manual handy for future reference.



To obtain the operation manual about this product and control unit, please refer to the SMC website (URL <http://www.smcworld.com>) or contact SMC directly.

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) and other safety regulations.

⚠

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.

⚠

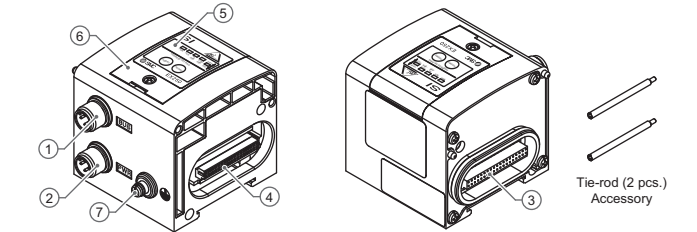
Danger:

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

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.

Summary of Product elements



No.	Element	Description
1	Communication connector	Connect with AS-Interface communication line.
2	Power supply connector for output equipment *1	Supplies power to the solenoid valve and Output block.
3	Input block connector	Connects the Input block.
4	Output block connector	Connects the solenoid valve, Output block and etc.
5	Display window	LED display shows the SI unit status.
6	Switch protective cover	Sets the address and baud rate etc. with the switch inside.
7	Grounding terminal (FE) *1	Used for grounding.

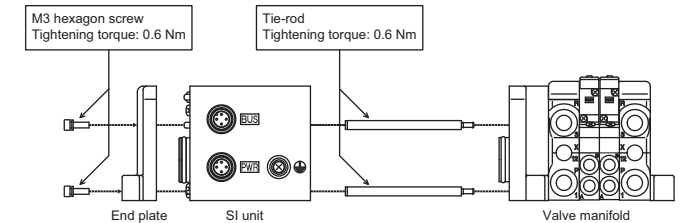
*1: Available only for EX250-SAS3/EX250-SAS5.

Mounting and Installation

Installation

The SI unit does not have mounting holes, so it cannot be installed alone. Make sure to connect the valve manifold.
Refer to the valve catalogue for valve manifold dimensions.

Assembly and disassembly of the SI unit



Exchange of SI unit

- Remove screws from End Plate and release connection of each unit.
- Replace old SI unit with new one. (Tie-rod does not need to be removed.)
- Connect Input Block and End Plate and tighten removed screws by specified tightening torque. (0.6 Nm)

Assembly and disconnection of unit

- Remove screws from End Plate.
- Mount attached tie-rod.
- Connect additional Input Block.
- Connect End Plate and tighten removed screws by specified tightening torque. (0.6 Nm)

Caution for maintenance

- (1) Be sure to turn-off all power supplies.
- (2) Be sure that there is no foreign object in any of units.
- (3) Be sure that gasket is lined properly.
- (4) Be sure that tightening torque is according to specification.

If these items are not kept, it may lead to the breakage of substrate or intrusion of liquid or dust into the units.

Connecting cables

Select the appropriate cables to mate with the connectors mounted on the SI unit.

EX250-SAS3/EX250-SAS5

Communication connector

M12 4-pin plug

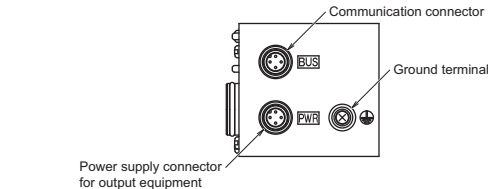
No.	Description	Function
1	AS-i +	AS-Interface line (+)
2	(0 V)	Power supply for output equipment (-)
3	AS-i -	AS-Interface line (-)
4	(24 V)	Power supply for output equipment (+)

Power supply connector for output equipment

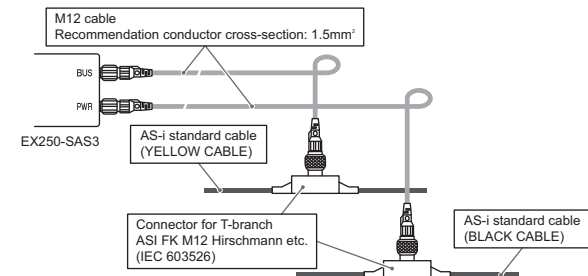
M12 4-pin plug

No.	Description	Function
1	24 V	Power supply for output equipment (+)
2	N.C.	Unused
3	0 V	Power supply for output equipment (-)
4	N.C.	Unused

*: Connected inside the SI unit.



Connection example



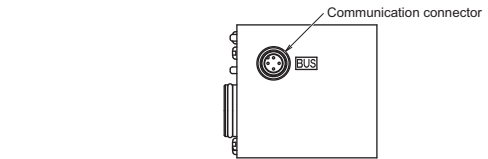
The M12 cable, AS-i standard cable and connector for T-branch are not supplied by SMC. Contact each manufacturer for the catalogue details etc.
Wire the cable for AS-Interface line so that the total voltage drop is 3 V or less.

EX250-SAS7/EX250-SAS9

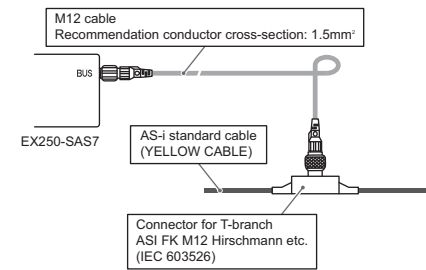
Communication connector

M12 4-pin plug

No.	Description	Function
1	AS-i +	AS-Interface line (+)
2	(0 V)	RESERVE
3	AS-i -	AS-Interface line (-)
4	(24 V)	RESERVE



Connection example



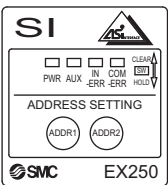
The M12 cable, AS-i standard cable and connector for T-branch are not supplied by SMC. Contact each manufacturer for the catalogue details etc.
Wire the cable for AS-Interface line so that the total voltage drop is 3 V or less.

Setting

- Address setting
- HOLD/CLEAR setting
- Over Current Protection setting SW
- Address setting procedure via the AS-i line

To set this function, refer to SMC website (URL <http://www.smcworld.com>) for more detailed information or contact us.

LED Indication



LED	LED condition	Description	
		EX250-SAS3/EX250-SAS5	EX250-SAS7/EX250-SAS9
PWR	Green LED is ON	Indicates that the power supply for AS-Interface line is turned ON.	
AUX	Green LED is ON	Indicates that the power supply for output equipment is turned ON.	- (LED is OFF at normal condition)
IN-ERR	Red LED is ON	Indicates that an input power supply over current is detected. *1 (LED is OFF at normal condition)	
COM-ERR	Red LED is ON	Indicates a communication error. (LED is OFF at normal condition)	
	Red LED is flashing	Indicates peripheral equipment error. *1 (Over current of input power, blown fuse)	

*1: EX250-SAS3/EX250-SAS5: Input block
EX250-SAS7/EX250-SAS9: Input block, Output block, Solenoid valve

Troubleshooting

Technical documentation giving detailed troubleshooting information can be found on the SMC website (URL <http://www.smcworld.com>).

Specifications

Connected load: 24 VDC Solenoid valve with surge voltage suppressor of 1.5 W or less (manufactured by SMC)
Current consumption of power supply for SI unit operation: 0.1 A max.
Operating ambient temp.: +5 to +45 °C
Storage ambient temp.: -20 to +60 °C
*1: Input terminal are not isolated from Power source.
*2: Do not connect outside Power source to Input and Output terminals.

Technical documentation giving detailed specification information can be found on the SMC website (URL <http://www.smcworld.com>).

Outline Dimensions

Technical documentation giving detailed outline dimensions information can be found on the SMC website (URL <http://www.smcworld.com>).

NOTE

- When conformity to UL is necessary the SI unit must be used with a UL1310 Class 2 power supply.
- The product is a UL approved product only if it has a mark on the body.

SMC Corporation

URL <http://www.smcworld.com>

Akihabara UDX 15F, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN
Phone: +81 3-5207-8249 Fax: +81 3-5298-5362

Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
© 2012-2017 SMC Corporation All Rights Reserved. EX-8-OMP0021-A



Operation Manual

PRODUCT NAME

SI unit for AS-Interface

MODEL / Series / Product Number

EX250-SAS#

SMC Corporation




Table of Contents

Safety Instructions	2
Product Outline	8
Model Indication and How to Order	9
Summary of Product elements	9
Mounting and Installation	10
Installation	10
Wiring	11
Setting	14
Indication	16
Connection between SI unit output and the solenoid valve	17
Data bit	18
Maintenance	19
Troubleshooting	20
Specifications	26
Specifications	26
Dimensions	28

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 catalogue 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 catalogue.
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 catalogue 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.

■ Safety Instructions


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 operation.Otherwise 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 maintenance.Otherwise 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 Fieldbus system.
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 necessary the SI unit must be used with a UL1310 Class2 power supply.
 - The SI unit is a UL approved product only if they have a  mark on the body.
 - 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.
It may also result in non-conformity to safety standards.

•Product handling

*Installation

- Do not drop, hit or apply excessive shock to the fieldbus system.
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.
IP67 protection cannot be guaranteed if the screws are not tightened to the specified torque.
- 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 fieldbus system and/or I/O device can result, causing malfunction.
- Do not route wires and cables together with power or high voltage cables.
Otherwise the fieldbus system and/or I/O device 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 fieldbus system and/or I/O device 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 fieldbus system is incorporated into equipment.
Otherwise noise can cause malfunction.

*Environment

- Select the proper type of protection according to the environment of operation.
IP67 protection is achieved when the following conditions are met.
 - (1)The units are connected properly with fieldbus cable with M12 connector and power cable with M12 (M8) connector.
 - (2)Suitable mounting of each unit and manifold valve.
If using in an environment that is exposed to water splashes, please take measures such as using a cover.
If the product is to be used in an environment containing oils or chemicals such as coolant or cleaning solvent, even for a short time, it may be adversely affected (damage, malfunction etc.).
- Do not use the product in an environment where corrosive gases or fluids could be splashed.
Otherwise damage to the product and 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 fieldbus system, this may cause deterioration or breakage of the internal circuit of the fieldbus system. Avoid sources of surge generation and crossed lines.
- When a surge-generating load such as a relay or solenoid is driven directly, use an fieldbus system with a built-in surge absorbing element.
Direct drive of a load generating surge voltage can damage the fieldbus system.
- The product is CE marked, but not immune to lightning strikes. Take measures against lightning strikes in the system.
- Prevent foreign matter such as remnant of wires from entering the fieldbus system 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

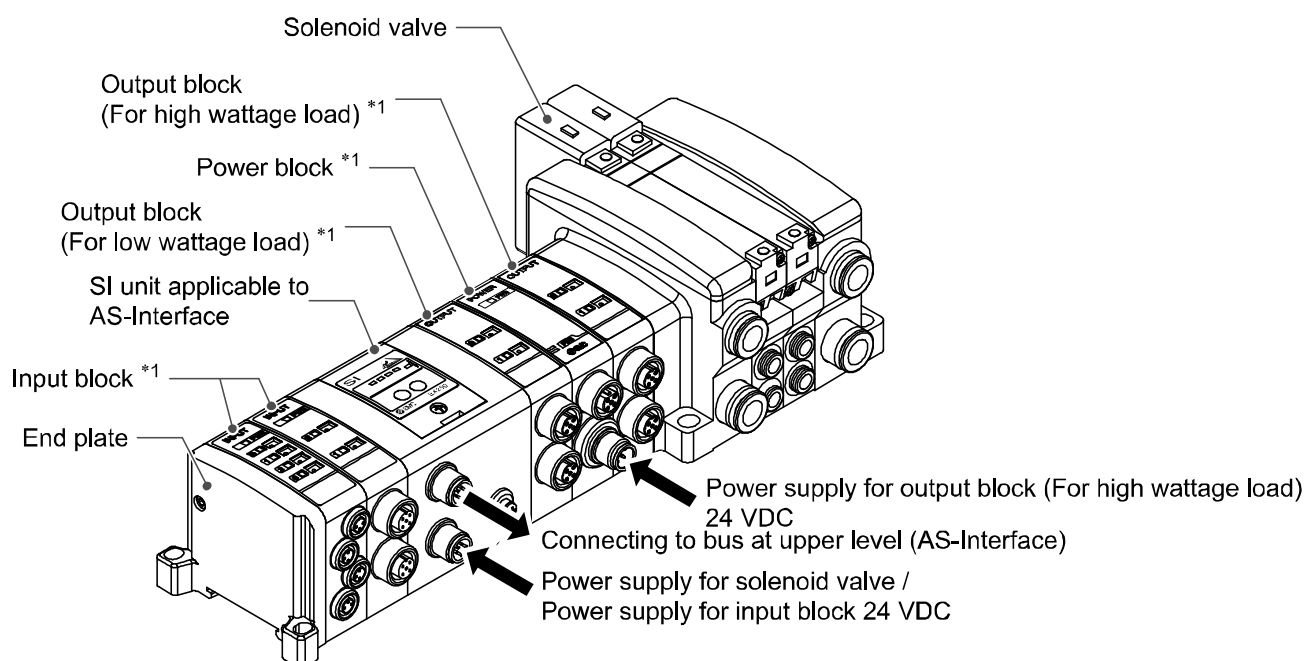
- Set the switches by using a sharp-pointed screwdriver etc.
It may damage set switches.
- Perform settings suitable for the operating conditions.
Incorrect setting can cause operation failure.
For details of each setting, refer to page 14 of this manual.
- Please refer to the PLC manufacturer's manual 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 each unit.
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.

Product Outline

System configuration



This system connects input/output devices to AS-Interface with reduced wiring. AS-Interface communicates with the input/output devices via the SI unit.

Input blocks, EX9 series output blocks and valve manifolds can be connected.

*1: Refer to the operation manual EX250-IE1 / -IE2 / -IE3 for the input block specifications, and EX9-OET1 / -OET2 / -OEP1 / -OEP2 / -PE1 for the output block and power block specifications.

Model Indication and How to Order

EX250-S AS 3

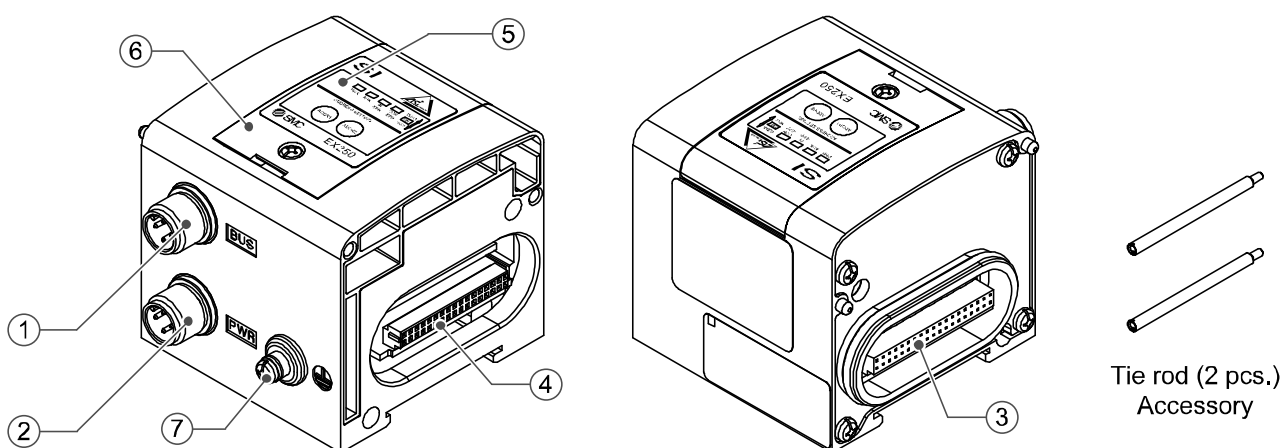
- Input / output and power supply

3	PNP (negative common) / source, 8 inputs / 8 outputs, 2 power supply systems
5	PNP (negative common) / source, 4 inputs / 4 outputs, 2 power supply systems
7	PNP (negative common) / source, 8 inputs / 8 outputs, 1 power supply system
9	PNP (negative common) / source, 4 inputs / 4 outputs, 1 power supply system

- Communication protocol

AS	AS-Interface
----	--------------

Summary of Product elements



No.	Element	Description
1	Communication connector	Sends or receives the communication signals via AS-Interface line. *2
2	Power supply connector for output equipment *1	Supplies power to the solenoid valve, output block, etc. *2
3	Input block connector	Connects the input block.
4	Output block connector	Connects the solenoid valve or output block, etc.
5	Display window	Displays the status of the SI unit with LEDs. *3
6	Switch cover	Sets the address, etc. with the switch inside. *3
7	Grounding terminal (FE) *1	Used for grounding.

*1: Available only for EX250-SAS3/-SAS5.

*2: Refer to "Wiring" in the SI unit section on page 11 of this operation manual.

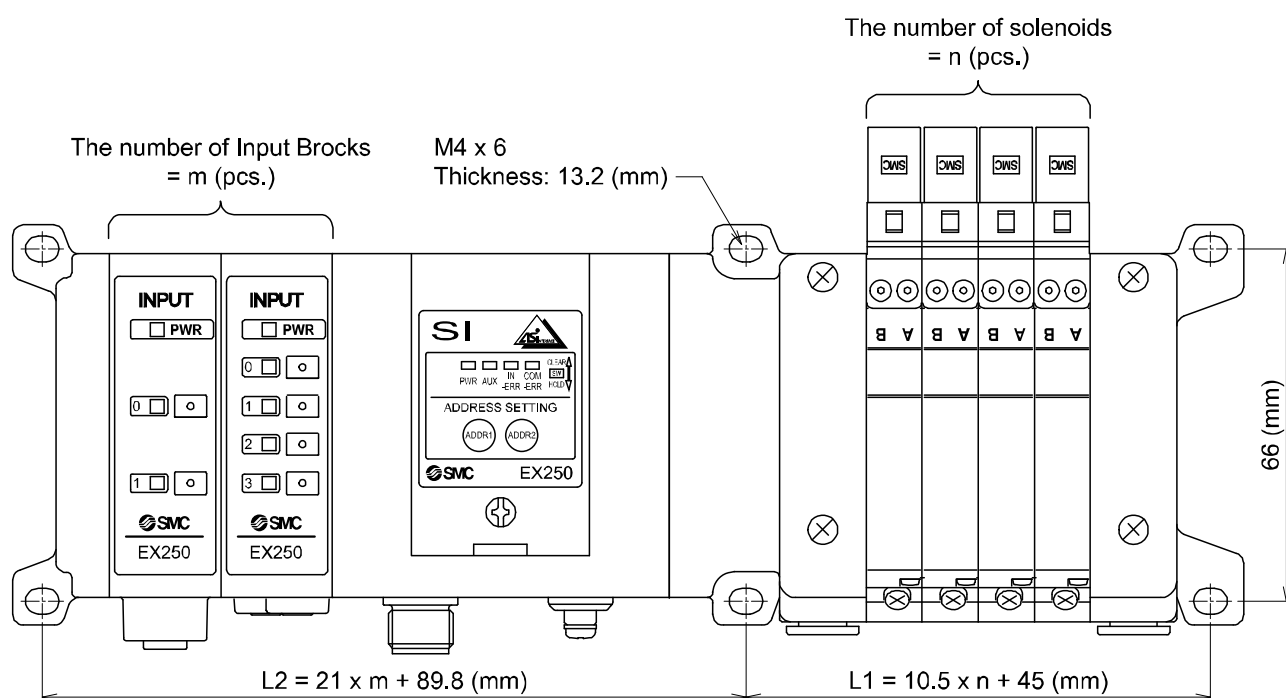
*3: Refer to "Indication" in the SI unit section on page 16 of this operation manual.

Mounting and Installation

■ Installation

The SI unit does not have mounting holes, so it cannot be installed alone. Make sure to connect the solenoid valve. When an input block is not required, connect the end plate directly to the SI unit.

○ Installation example



Dimensions when VQC2000 series solenoid valve manifold is connected are shown in the table below for reference.

Refer to the specific catalogue for the dimensions when other solenoid valve manifolds are connected.

L \ N_m	0	1	2	3	4	5	6	7	8
L1	45	55.5	66	76.5	87	97.5	108	118.5	129
L2	89.8	110.8	131.8	152.8	173.8	194.8	215.8	236.8	257.8

(mm)

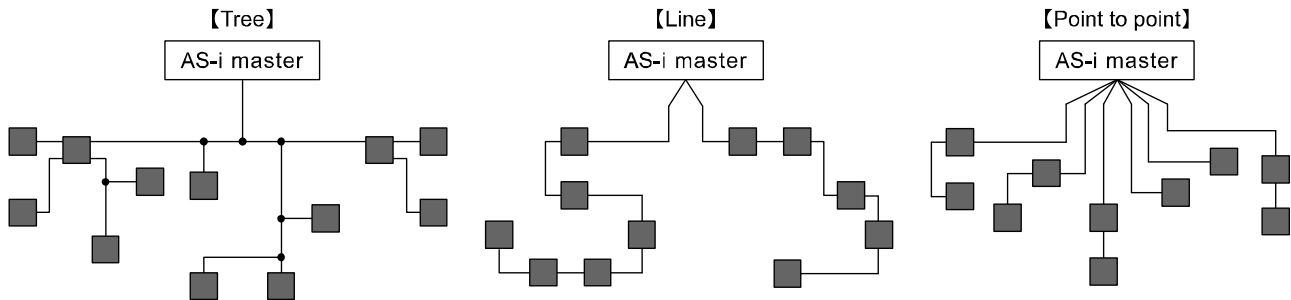
Wiring (for power supply, communication, input and output) and piping are carried out on one side only. On this side, make a space for wiring and piping.

■Wiring

○The topology of an AS-i network

The topology of an AS-i network can be connected as a tree, a line or point to point. The maximum total length of the cable must be 100 m.

It is possible to extend the total length of the cable up to 300 m by using a repeater.



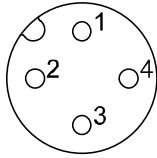
■ : AS-i slave

• Terminating resistors are not required.

○Wiring

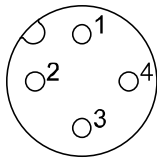
•EX250-SAS3/-SAS5

Communication connector: M12 4-pin, plug



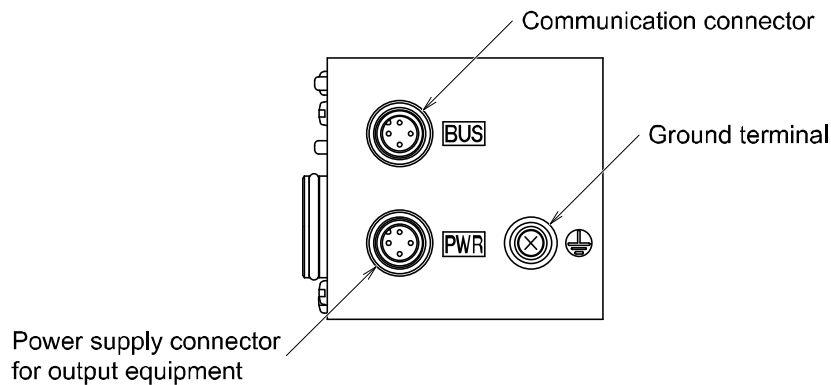
No.	Description	Function
1	AS-i +	AS-Interface line (+)
2	(0 V)	(Power supply for output equipment (-))
3	AS-i -	AS-Interface line (-)
4	(24 V)	(Power supply for output equipment (+))

Power supply connector for output equipment: M12 4-pin, plug

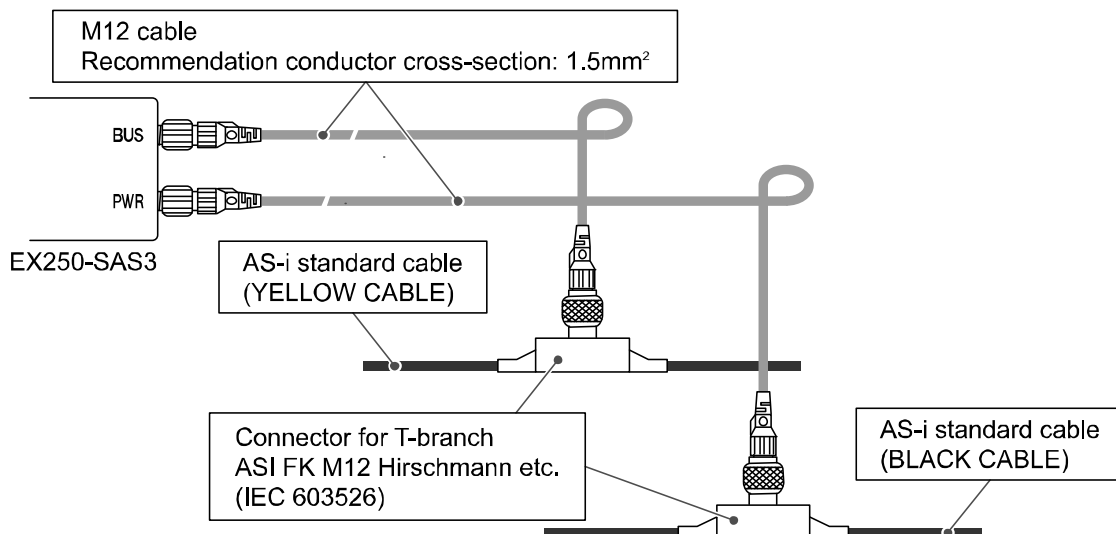


No.	Description	Function
1	24 V	Power supply for output equipment (+)
2	N.C.	Unused
3	0 V	Power supply for output equipment (-)
4	N.C.	Unused

※: Connected inside the SI unit.



•Connection example

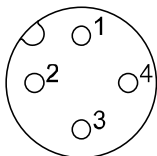


The M12 cable, AS-i standard cable and connector for T-branch are not supplied by SMC. Contact each manufacturer for the catalogue details etc.

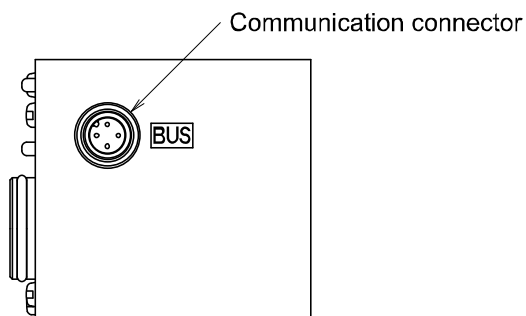
Wire the cable for AS-Interface line so that the total voltage drop is 3 V or less.

•EX250-SAS7/-SAS9

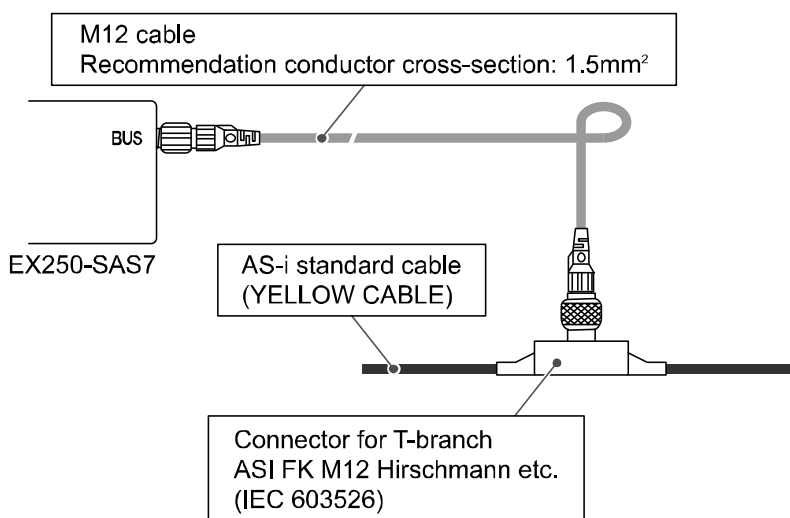
Communication connector: M12 4-pin, plug



No.	Description	Function
1	AS-i +	AS-Interface line (+)
2	RESERVE	RESERVE
3	AS-i -	AS-Interface line (-)
4	RESERVE	RESERVE



•Connection example



The M12 cable, AS-i standard cable and connector for T-branch are not supplied by SMC.
Contact each manufacturer for the catalogue details etc.
Wire the cable for AS-Interface line so that the total voltage drop is 3 V or less.

Setting

◦Address setting

The AS-I cable line should be disconnected from the SI unit while setting the address. Open the cover and set the address using an AS-Interface address programming device and DC power jack cable etc. (PEPPERL + FUCHS: VAZ-PK-V1-Cinch, SIEMENS: 3RK1901-3HA00 etc.) The Address assignment range is 1 to 31.

The address can be set regardless of connecting order, but it is not possible to set address overlap. The address at shipment from the factory is 0. Set different address for ADDR1 and ADDR2 as EX250-SAS3/-SAS7 occupy 2 slaves respectively.

*: If the address is to be set by the AS-I cable line via a master unit, in EX250-SAS3/-SAS7, it is possible to set the slaves one by one using the DC power jack for address setting inserted, to disconnect from the AS-I cable line the slave which is not subject to address setting at the moment (ADDR1 or ADDR2) (See page 15 for details). LED's turned on during address setting is not unusual.

•EX250-SAS3/-SAS7

ADDR1: Address setting for IN0 to 3 / OUT0 to 3

ADDR2: Address setting for IN4 to 17 / OUT4 to 7

◦HOLD/CLEAR setting

Set whether to maintain the SI unit output condition (HOLD) or to turn off the outputs (CLEAR) when a communication error is generated.

*: This switch at shipment from the Factory is set to CLEAR.

◦Over Current Protection setting SW

•Over Current Protection setting SW-ON (OCP-ON)

When the over current load is connected with an input/output block ^{*1} (input block, output block, solenoid valve), and the unit supply current value (specification value) is exceeded, the SI unit IN-ERR LED will turn ON, and the COM-ERR LED will flash. The power supply to each block ^{*1} will be disconnected.

•Over Current Protection setting SW-OFF (OCP-OFF)

When the over current load is connected with an input/output block □ (input block, output block, solenoid valve), and the unit supply current value (specification value) is exceeded, the SI unit IN-ERR LED will turn ON, and the COM-ERR LED will flash.

The power supply to the input/output block ^{*1} does not change.

*: This switch at shipment from the Factory is OCP-ON.

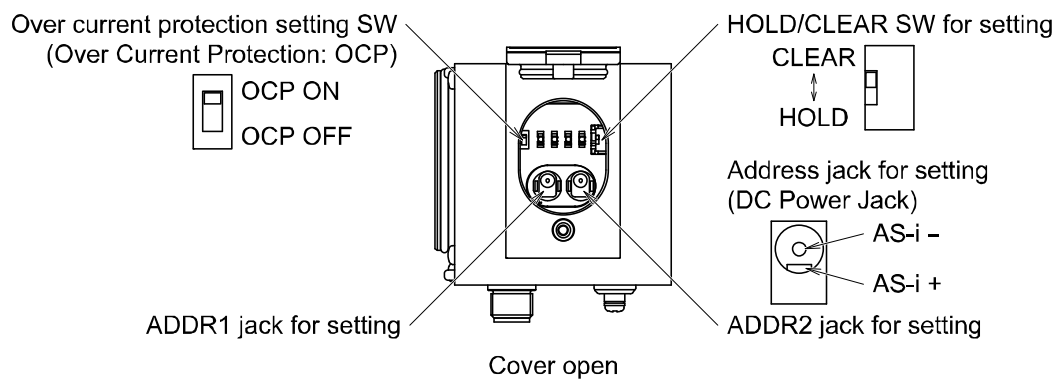
*1: Input block only for EX250-SAS3/-SAS5.

⚠Note

Using the SI unit with the setting OCP-OFF does not conform to the AS-I specification.

Therefore, please use the SI unit with OCP-ON.

Turn off the power supply and remove the cause immediately when over current load is connected with the input block, and the peripheral fault error occurs by over current detection. Using the SI unit with the peripheral fault error will cause unit damage.



○Address setting procedure via the AS-i line

The following is the procedure for address setting of the master unit via the AS-i line with EX250-SAS3/-SAS7 (8 inputs / 8 outputs, and address connector – 2 pcs.).

For setting the unit which occupies two slaves (EX250-SAS3/-SAS7), plug the cable jack into the address which is not to be set (ADDR2 when ADDR1 is set) to disconnect the address from the AS-i line.

<Address setting of ADDR1> *1

1. Plug the cable jack into the connector for setting ADDR2. (to disconnect ADDR2 from the line)
2. Connect the AS-i line to the SI unit communication connector to apply the AS-i power supply.
3. Set the ADDR1 address from the master unit.
4. Turn off the AS-i power supply. *2

<Address setting of ADDR2> *1

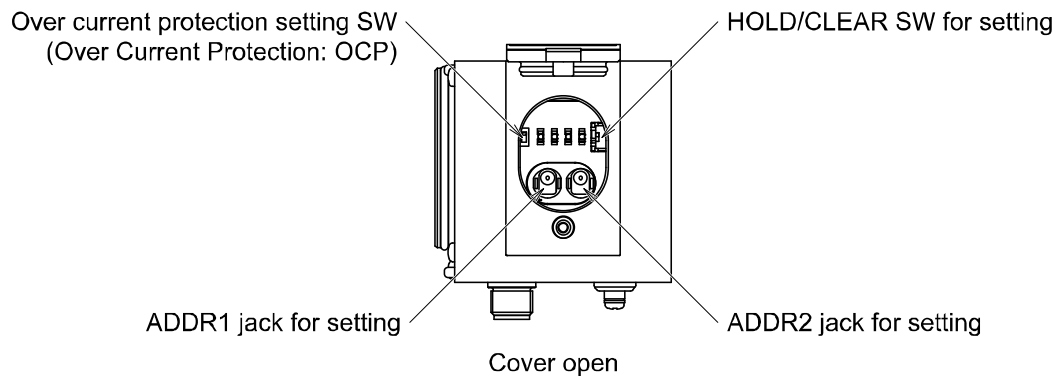
5. Pull out the cable jack which is plugged into the connector for setting ADDR2, and plug it into ADDR1. (to disconnect ADDR1 from the line)
6. Apply the AS-i power supply.
7. Set the address of ADDR2 from the master unit.
8. Turn off the AS-i power supply. *1
9. Pull out the cable jack from the connector for setting ADDR1.

Address setting completed. After setting, wire any other AS-i units.

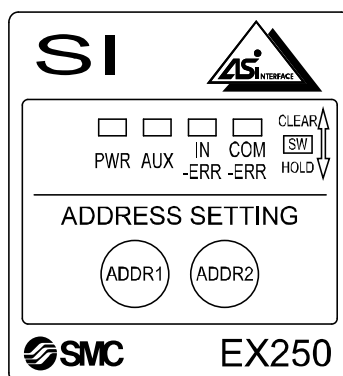
*1: Procedure above is an example for setting the address in order of ADDR1 -> ADDR2. It is not a problem to set the address in order of ADDR2->ADDR1.

*2: Turn off the AS-i power supply when connecting/disconnecting the cable jack.

*3: SMC does not provide the cable jack.



Indication



LED	LED condition	Description	
		EX250-SAS3/-SAS5	EX250-SAS7/-SAS9
PWR	Green LED is ON	Indicates that the power supply for AS-Interface line is turned ON.	
AUX	Green LED is ON	Indicates that the power supply for output equipment is turned ON.	- (LED is OFF at normal condition)
IN-ERR	Red LED is ON	Indicates that an input power supply over current is detected. *1 (LED is OFF at normal condition)	
COM-ERR	Red LED is ON	Indicates a communication error. (LED is OFF at normal condition)	
	Red LED is flashing	Indicates peripheral equipment error. *1 (Over current of input power, blown fuse)	

*1: EX250-SAS3/-SAS5: Input block

EX250-SAS7/-SAS9: Input block, Output block, Solenoid valve

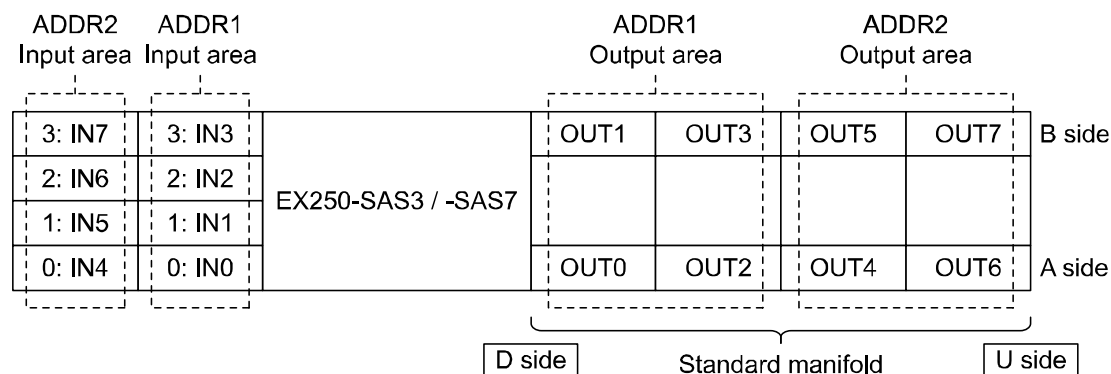
Connection between SI unit output and the solenoid valve

○Standard wiring

The outputs of the SI unit are assigned from the D side solenoid valve in the order 0, 1, 2 ... etc.
Refer to each solenoid valve's catalogue for details.

•Standard Address Mode

(EX250-SAS3/-SAS7, EX250-IE3, Manifold standard wiring, Double solenoid wiring)



○Special wiring

Mixed wiring of single and double wiring inside the manifold is available. The wiring type is specified by description of single or double solenoid valve mounted on the manifold.

In order to specify mixed wiring, completion of manifold type solenoid valve specifications sheet is required.

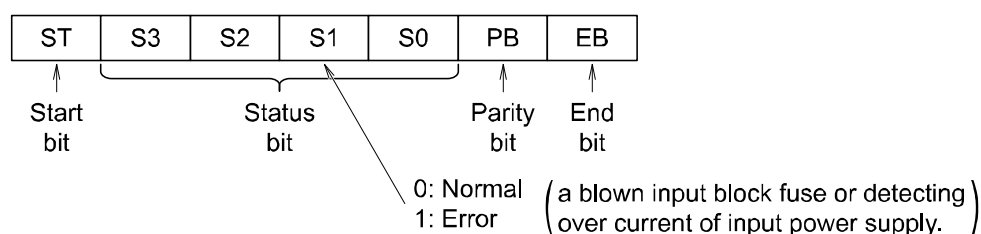
Data bit

•SI unit input/output data bit

Address	Data bit	EX250-SAS3/-SAS7	EX250-SAS5/-SAS9
ADDR1	D0	IN0 / OUT0	IN0 / OUT0
	D1	IN1 / OUT1	IN1 / OUT1
	D2	IN2 / OUT2	IN2 / OUT2
	D3	IN3 / OUT3	IN3 / OUT3
ADDR2	D0	IN4 / OUT4	-
	D1	IN5 / OUT5	
	D2	IN6 / OUT6	
	D3	IN7 / OUT7	

•Status register

It is possible to check the peripheral fault error (a blown input block fuse or detecting over current of input power supply) by monitoring the status bit S1, which complies with the AS-i Version 2.1.



It is possible to confirm the peripheral fault error only by status register on the ADDR1 side for EX250-SAS3/-SAS7 which occupy 2 slaves.

⚠ Note

Turn off the power supply and remove the cause immediately when over current load is connected with the input block, and the peripheral fault error occurs by over current detection. Using with the peripheral fault error can cause unit damage.

Maintenance

Addition of input block

- Remove the screws from the end plate to remove the plate.
- Mount the additional tie rods (supplied with the input block).
- Connect additional input block.
- Re-mount the end plate that was removed, and tighten the screws to the specified tightening torque. (0.6 Nm)

Replacing the SI unit

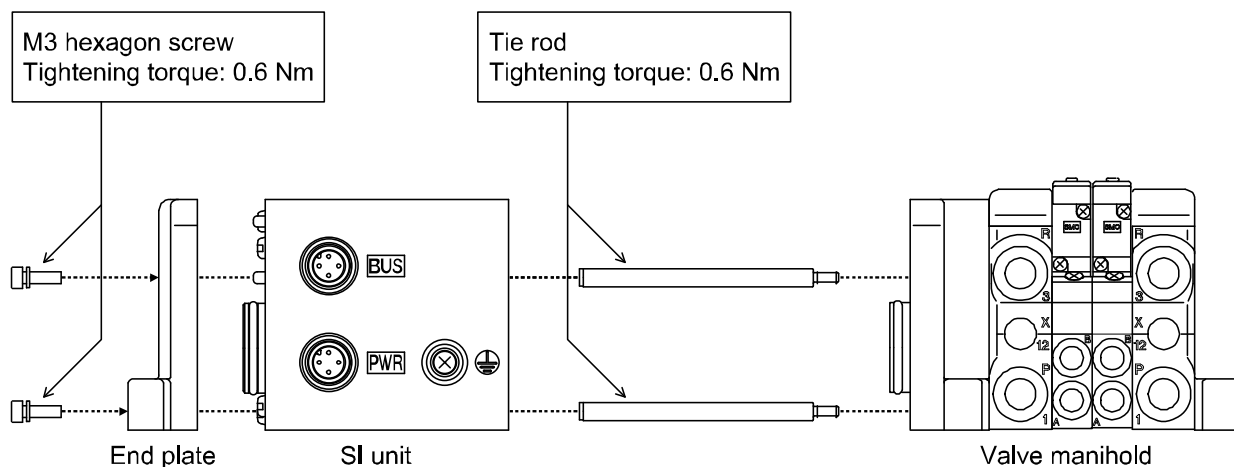
- Remove the screws from the end plate and release the connection with the valve unit.
- Replace the SI unit. (There is no need to remove the tie rod.)
- Re-mount the input block and end plate that was removed, and tighten the screws to the specified tightening torque. (0.6 Nm)

Precautions for maintenance

- (1) Turn off the power supply completely.
- (2) Check that there is no foreign matter inside the unit.
- (3) Check that there is no damage and no foreign matter on the gasket.
- (4) Tighten the screws to the specified torque.

If the unit is not assembled correctly, this may cause product failure due to foreign matter such as liquid and dust which may get into the unit.

Assembly and disassembly of the SI unit

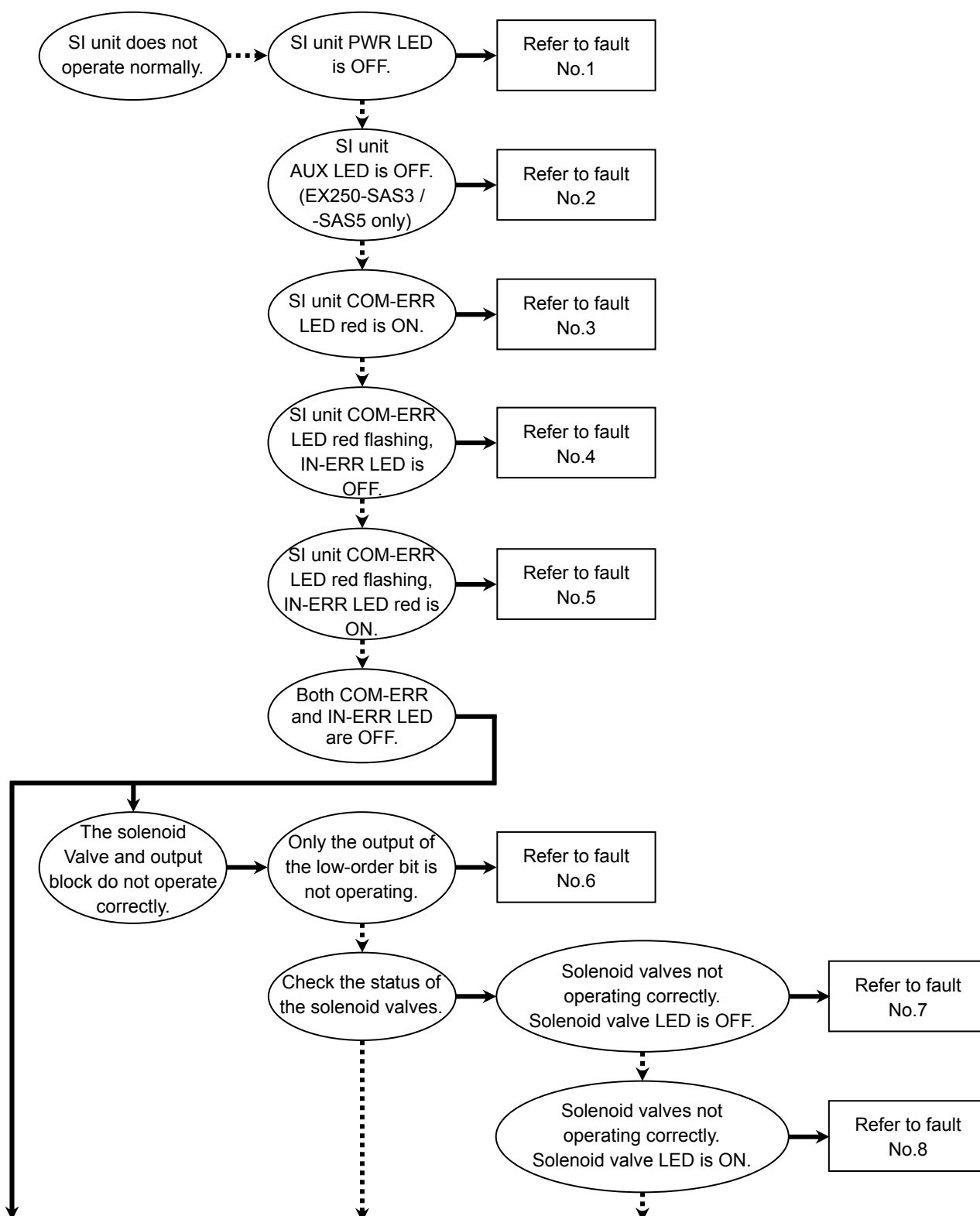


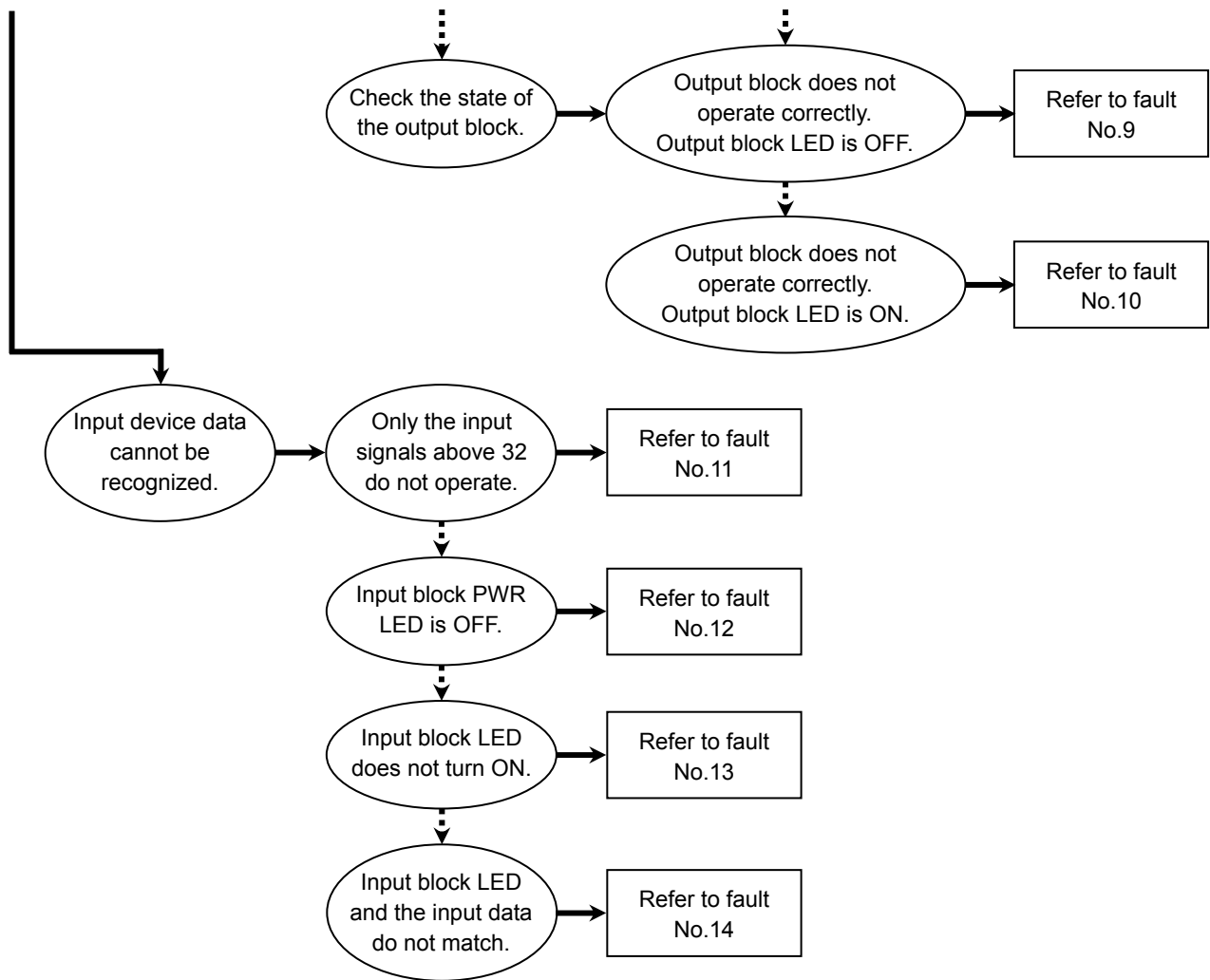
Troubleshooting

Troubleshooting flow chart

When any failure occurs with the SI unit, the following chart can be used to identify the cause of the failure.

→ Yes
 ...→ No





Troubleshooting

Fault No.1

Problem	Possible cause	Investigation method	Countermeasures
SI unit PWR LED is OFF.	AS-i line power supply wiring failure	Check the AS-i cable connections and check for broken wires.	Correct the AS-i cable connection. (Replace the cable if it is broken.)
	AS-i line power supply failure	Check the supply voltage of the AS-i power supply.	Correct the wiring of the AS-i cable. Supply 26.5 to 31.6 VDC to AS-i. Power supply for AS-i is used.

Fault No.2

Problem	Possible cause	Investigation method	Countermeasures
SI unit AUX LED is OFF (EX250-SAS3 /-SAS5 only)	Wiring of the solenoid valve power supply is defective	Check the power supply cable connections and check for broken wires.	Correct the power cable connection. (Replace the cable if it is broken.)
	Solenoid valve power supply failure	Check proper supply voltage of solenoid valve power supply.	Correct the power cable wiring layout. Supply 24 VDC +10% / -5% to the solenoid valve power supply.

Fault No.3

Problem	Possible cause	Investigation method	Countermeasures
SI unit COM-ERR LED red is ON.	Communication error	Check that the recommended cable for AS-i has been used.	Correct the wiring.
		Check that there is no equipment or high voltage cables which generates noise around the communication and power supply cables.	Separate the communication and power supply cables away from noise sources.
		Check the AS-i cable connections and check for broken wires. Confirm that repeated bending stress or pulling force is not applied to the cable.	Correct the AS-i cable connection.

Fault No.4

Problem	Possible cause	Investigation method	Countermeasures
SI unit COM-ERR LED red is flashing, IN-ERR LED is OFF.	Input block fuse blown / broken	Check for a blown or broken fuse in the input block.	Remove the cause of the broken fuse (e.g. short-circuit) and replace the fuse.

Fault No.5

Problem	Possible cause	Investigation method	Countermeasures
SI unit COM-ERR LED red is flashing, IN-ERR LED red is ON.	Over current to the power supply of input/output block detected	<ul style="list-style-type: none"> •EX250-SAS3/-SAS5 Check the supply current to the input block •EX250-SAS7/-SAS9 Check the supply current to the input block, output block, solenoid valve. 	Correct the supply current to within the specification range. (See page 27)

Fault No.6

Problem	Possible cause	Investigation method	Countermeasures
Only the output of the low-order bit is not operating.	No. of solenoids has exceeded the allowable number	<p>Check that the number of solenoids has not exceeded the allowable number. The allowable number depends on the SI unit model.</p> <p>EX250-SAS3/-SAS7: 8 points EX250-SAS5/-SAS9: 4 points</p>	Change the number of outputs to within the specification.

Fault No.7

Problem	Possible cause	Investigation method	Countermeasures
Solenoid valves do not operate correctly, solenoid valve LED is OFF.	Defective connection between the SI unit and solenoid valve manifold	Check the screws which connect the SI unit and the solenoid valve are not loose.	Tighten the screws while holding the SI unit and the solenoid valve manifold so that there is no gap between them. The screws should be tightened with the specified tightening torque. (0.6 Nm)
	Polarity of the solenoid valve and the SI unit output are not compatible	Check that the solenoid valve polarity specification and output polarity of the SI unit are compatible.	Use a solenoid valve compatible with the output polarity of the SI unit.
	Solenoid valve fault	Refer to the troubleshooting of the solenoid valve.	Replace the GW unit and check the operation.

Fault No.8

Problem	Possible cause	Investigation method	Countermeasures
Solenoid valves do not operate correctly, solenoid valve LED is ON.	Solenoid valve fault	Refer to the troubleshooting of the solenoid valve.	Replace the GW unit and check the operation.

Fault No.9

Problem	Possible cause	Investigation method	Countermeasures
Output block does not operate correctly, output block LED is OFF	Defective connection between the SI unit and output block	Check that the screws which connect the SI unit and output block are not loose.	Confirm grounding to improve the anti-noise performance of the SI unit.
	Polarity of the output block and SI unit output are not compatible	Check that the output block polarity specification and output polarity of the SI unit are compatible.	Use an output block polarity compatible with the output polarity of the SI unit.
	(When EX9-OEP1 is used) Defective connection of the power block	Check if a power block is used, and check that the position of the power block is correct.	Install the power block on the SI unit side of the output block (EX9-OEP1). (Refer to the operation manual of EX9 series general purpose output block)
	Failure of SI unit, power block or output block	Check that the power block and output block are operating correctly. Replace the power block or output block and check the operation.	Replace the GW unit and check the operation.

Fault No.10

Problem	Possible cause	Investigation method	Countermeasures
Output block does not operate correctly, output block LED is ON	Defective connection between the output block and load device	Check the connection and wiring (pin layout) between the load device and the output block. Check for broken wires.	Tighten the cable connection. (Replace the cable if it is broken.)
			Rectify the wire layout of the cable for output entry.
	Output block fault	Check that the output block is operating correctly. Replace the output block and check the operation.	Replace the GW unit and check the operation.

Fault No.11

Problem	Possible cause	Investigation method	Countermeasures
The inputs that are beyond the maximum point number do not operate.	Inadequate total number of inputs from the Input block connected with the SI unit.	Check that the number of inputs has not exceeded the allowable number. The allowable number depends on the SI unit model. EX250-SAS3/-SAS7: 8 points EX250-SAS5/-SAS9: 4 points	Change the number of inputs to within the specification.

Fault No.12

Problem	Possible cause	Investigation method	Countermeasures
Input block PWR LED is OFF	Defective connection between the SI unit and input block	Check that the screws which connect the SI unit and input block are not loose.	Tighten the screws while holding the SI unit and the input block so that there is no gap between them. The screws should be tightened with the specified tightening torque. (0.6 Nm)
	Liquid such as water has entered the product	Confirm that all unused connectors of the input block have a waterproof cap fitted.	If liquid has entered the product, replace the input block.
	Input block fault	Check that the input block is operating correctly.	Replace the input block.

Fault No.13

Problem	Possible cause	Investigation method	Countermeasures
Input block LED does not turn ON	Defective connection between the SI unit and input block	Check that the screws which connect the SI unit and input block are not loose.	Tighten the screws while holding the SI unit and the input block so that there is no gap between them. The screws should be tightened with the specified tightening torque. (0.6 Nm)
	Polarity of the input block and input device are not compatible	Check that the polarity of the input block and the input device are compatible.	Use an input device compatible with the polarity of the input block.
	Defective connection between the input block and input device	Check the input device connection and wiring (pin layout) and check for broken wires.	Tighten the cable connection. (Replace the cable if it is broken.)
			Rectify the wiring of the input device cable.
	Input block fault	Check that the input block is operating correctly.	Replace the input block and check the operation.

Fault No.14

Problem	Possible cause	Investigation method	Countermeasures
Input block LED and the input data do not match	Defective connection between the SI unit and input block	Check that the screws which connect the SI unit and input block are not loose.	Tighten the screws while holding the SI unit and the input block so that there is no gap between them. The screws should be tightened with the specified tightening torque. (0.6 Nm)
	Fault of the SI unit or input block	Check that the SI unit and input block are operating correctly. Replace the SI unit or input block and check the operation.	Replace the SI unit or input block and check the operation.

Specifications

■ Specifications

General specification

Item	Specifications
Ambient temperature	5 to 45 °C
Ambient humidity	35 to 85%RH (no condensation)
Storage temperature	-20 to +60 °C
Withstand voltage	500 VAC, 1 minute, Between whole external and FG
Insulation resistance	500 VDC, 10 MΩ or more, Between whole external and FG
Operating atmosphere	No corrosive gas or dust
Pollution degree	Pollution degree 3
Enclosure	IP67
Standard	CE marking, UL (CSA)
Weight	250 g or less

Communication specification

Item	Specifications	
	EX250-SAS3/-SAS7	EX250-SAS5/-SAS9
Applicable system	AS-Interface (AS-i)	
Address Mode	Standard Address Mode	
Number of occupied slave	2	1
Max. number of connected slaves	31	
Address assignment range	1 to 31	
IO Code (HEX)	7, 7	7
ID Code (HEX)	F, F	F
ID Code1 (HEX)	Set within 0 to F optionally	
ID Code2 (HEX)	E, E	E
D0	IN0, IN4 / OUT0, OUT4	IN0 / OUT0
D1	IN1, IN5 / OUT1, OUT5	IN1 / OUT1
D2	IN2, IN6 / OUT2, OUT6	IN2 / OUT2
D3	IN3, IN7 / OUT3, OUT7	IN3 / OUT3

Electrical specifications

Item		Specifications			
		EX250-SAS3	EX250-SAS5	EX250-SAS7	EX250-SAS9
Power supply voltage	For communication	Supplied by AS-Interface circuit. 26.5 to 31.6 VDC * ¹			
	For output	24 VDC +10%/-5%, PELV * ²		-	
Internal current consumption (Unit) * ³		100 mA or less	65 mA or less	100 mA or less	65 mA or less
Input specification	Number of inputs	8 inputs	4 inputs	8 inputs	4 inputs
	Input type	TTL			
	Connection block	Input block: EX250-IE1 to 3 * ⁴			
	Supply voltage	24 VDC			
	Supply current	240 mA or less * ⁵	120 mA or less * ⁵	240 mA or less * ⁶	120 mA or less * ⁶
Output specification	Number of outputs	8 outputs	4 outputs	8 outputs	4 outputs
	Output type	PNP (negative common) / source			
	Load	Solenoid valve with surge voltage suppressor of 24 VDC and 1.5 W or less (manufactured by SMC)			
	Supply current	24 VDC			
	Residual voltage	0.3 V or less			
	Supply current	500 mA or less * ⁷	250 mA or less * ⁷	240 mA or less * ⁶	120 mA or less * ⁶

*1: The power supply for the communication must use the special power supply made for AS-i.

Refer to each maker's manual etc. for details.

*2: The power supply for the output equipment must use the one which suits PELV (Protection Extra Low Voltage) demanded of IEC364-4-41.

*3: Current consumption inside SI unit.

*4: Refer to the input block operation manual for details.

*5: Power for input equipment is supplied from communication power.

*6: The AS-Interface circuit provides current to the internal parts of the SI unit and all connected equipment.

Since there is a limit on the possible supply current to all connected equipment, select the equipment connected to the input/output device to stay within the possible supply current.

Example: When EX250-SAS9 is used

Valve: VQC110NY - 5 (low - wattage type of 0.5 W) x 4 pcs.

$$0.5 \text{ [W]} \div 24 \text{ [V]} \times 4 \text{ [pcs.]} = 84 \text{ [mA]} \text{ (4 outputs simultaneously ON)}$$

The maximum possible supply current of EX250-SAS9 is 120 mA. Therefore, the possible supply current to the sensor is

$$120 \text{ [mA]} - 84 \text{ [mA]} = 36 \text{ [mA]}$$

Use of low - wattage type valves by minimizing the maximum number of simultaneous output, and low current consumption sensors (2 - wire sensor, etc.) is recommended.

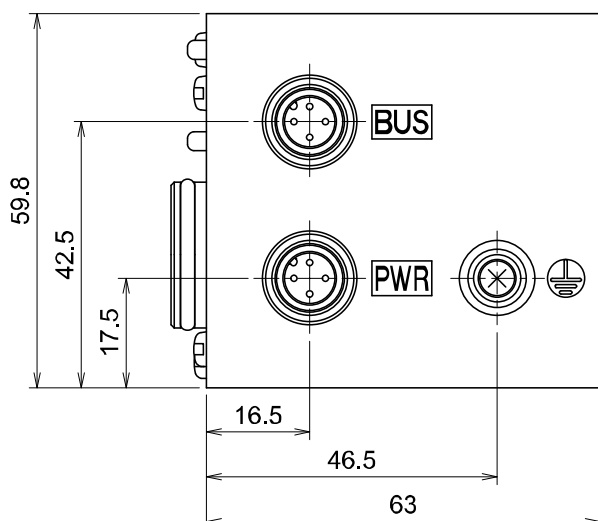
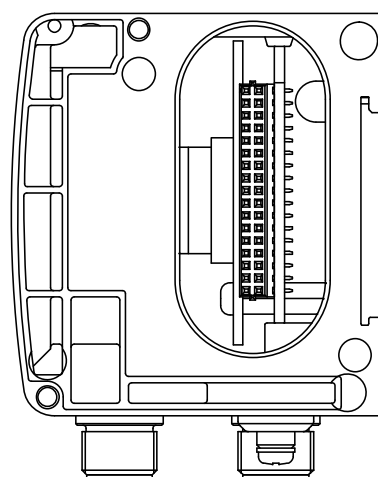
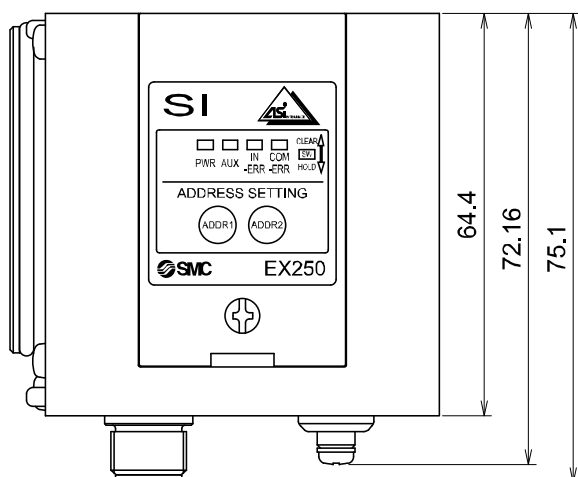
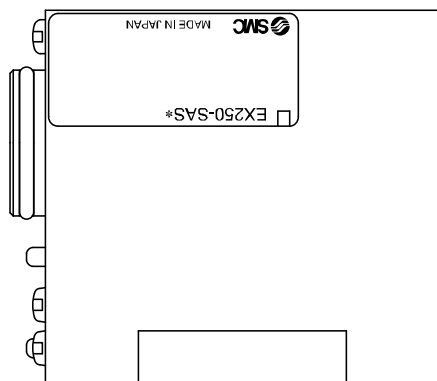
*7: Power for output equipment is supplied from output equipment power.

Applicable valve series

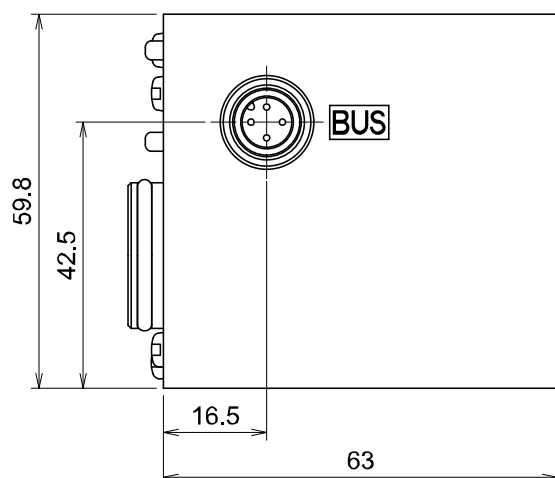
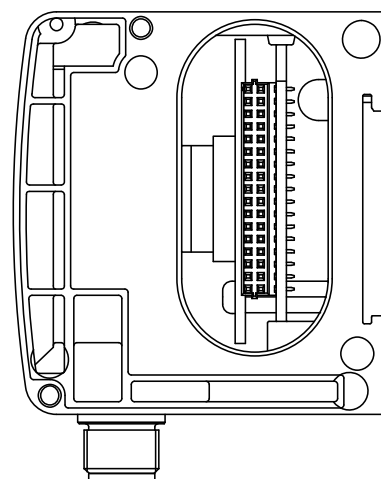
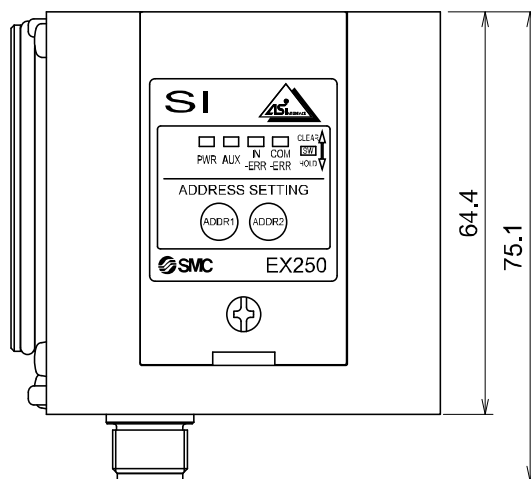
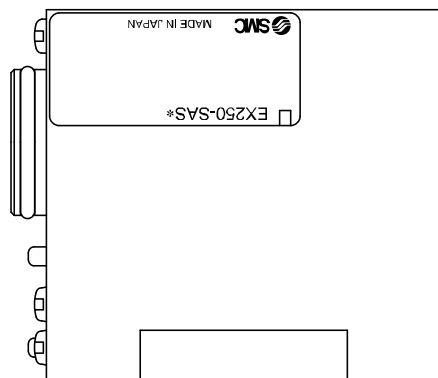
Main series	Applicable series
SY series	SY3000, SY5000, SY7000
VQC series	VQC1000, VQC2000, VQC4000
SV series	SV1000, SV2000, SV3000 (Tie rod base manifold)
S0700 series	S0700

■Dimensions

○EX250-SAS3/-SAS5



○EX250-SAS7/-SAS9



Revision history
A: Limited warranty and Disclaimer are added.

SMC Corporation

4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021 JAPAN

Tel: +81 3 5207 8249 Fax: +81 3 5298 5362

URL <http://www.smcworld.com>

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

© 2012-2013 SMC Corporation All Rights Reserved



No.EX※※-OMP0025-A