Fieldbus system

Befor Use

EX600-SPR1A/EX600-SPR2A

Thank you for purchasing an SMC EX600 Series Fieldbus system.
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 more detailed information about operating this product, please refer to the SMC website (URL https://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

- The 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 the 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

■When handling, assembling or replacing the units:
•Avoid touching any sharp metal parts of the connectors for connecting units.
•When assembling units, take care not to get any fingers caught between units.
Injury can result.
•When disassembling units, take care to avoid excessive force.
The connection parts of the unit are firmly joined with seals and injury can result.

■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 noise resistance of the Fieldbus system.
Individual grounding should be provided close to the product with a short cable.

■NOTE

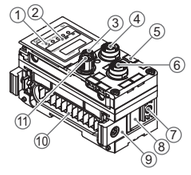
- The direct current power supply to combine should be UL1310 Class 2 power supply when conformity to UL is necessary.

Maintenance

•Maintenance should be performed according to the Safety Instructions.
•Perform regular maintenance and inspections.
There is a risk of unexpected malfunction.
•Do not use solvents such as benzene, thinner etc. to clean 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.

Refer to the SMC website (URL https://www.smcworld.com) for more information about maintenance.

Names and Functions of Product



No.	Description	Function
1	Status display LED	Displays the status of the unit.
2	Display cover	Open for the setting of switch.
3	Display cover tightening screw	Loosen to open the display cover.
4	Connector (BUS OUT)	Connects the cable for fieldbus outputs.
5	Marker groove	Groove to mount a marker.
6	Connector (PCI)	Connects the cable of the handheld terminal.
7	Valve plate mounting screw hole	Fixes the valve plate.
8	Valve plate mounting groove	Groove to insert the valve plate into.
9	Joint bracket	Bracket for joining to adjacent units.
10	Unit connector (plug)	Transmits signals and power supplies to adjacent units.
11	Connector (BUS IN)	Connects the cable for fieldbus inputs.
12	Seal cap (2 pcs.)	Mounted on to unused connectors (BUS OUT and PCI).

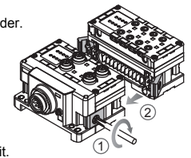
Assembly

○Composing the unit as a manifold

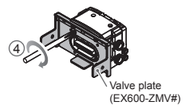
(1)Connect the unit to the end plate.
The Digital unit, Analog unit can be connected in any order.
Tighten the bracket of the joint using tightening torque 1.5 to 1.6 N•m.

(2)Add more units.
Up to 10 units (including the SI unit) can be connected to one manifold.

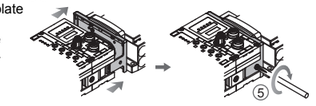
(3)Connecting the SI unit.
After connecting the necessary units, connect the SI unit.
Connecting method is the same as above (1), (2).



(4)Mounting the valve plate.
Mount the valve plate (EX600-ZMV#) to the valve manifold using the valve set screws. (M3 x 8)
Apply 0.6 to 0.7 N•m tightening torque to the screws.



(5)Connect the SI unit and the valve manifold.
Insert the valve plate to the valve plate set groove on the side of SI unit.
Then, tighten it with the valve plate set screws (M4 x 6) to fix the plate.
Tightening torque for set screws 0.7 to 0.8 N•m.

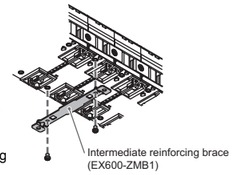


Mounting and Installation

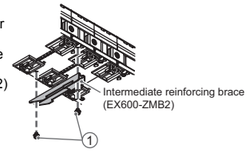
■Installation

•Direct mounting
(1)When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB1) before mounting using 2-M4 x 5 screws.
Tightening torque: 0.7 to 0.8 N•m.

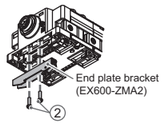
(2)Fix and tighten the end plates at one end of the unit. (M4)
Tightening torque: 0.7 to 0.8 N•m.
Fix the end plate at the valve side while referring to the operation manual of the corresponding valve manifold.



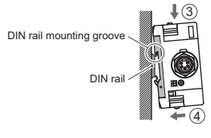
•DIN rail mounting
(Available for series other than SY series. Refer to the catalog for SY series.)
(1)When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB2) before mounting, using 2-M4 x 6 screws.
Tightening torque: 0.7 to 0.8 N•m.



(2)Mount the end plate bracket (EX600-ZMA2) to the end plate at the opposite end to the valves, using 2-M4 x 14 screws.
Tightening torque: 0.7 to 0.8 N•m.

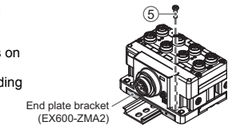


(3)Hook the DIN rail mounting groove to the DIN rail.



(4)Press the manifold using its side hooked to the DIN rail as a fulcrum until the manifold is locked.

(5)Fix the manifold by tightening the DIN rail fixing screws of the EX600-ZMA2. (M4 x 20)
Tightening torque: 0.7 to 0.8 N•m.
The tightening torque at the valve side depends on the valve type.
Refer to the operation manual of the corresponding valve manifold.

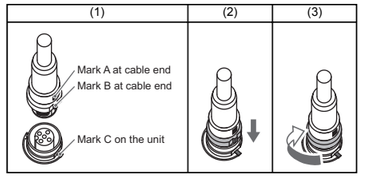


■Wiring

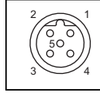
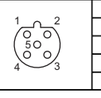
•Connect the M12 connector cable. M12 connector is applicable for SPEEDCON connector.
SPEEDCON connector wiring method is explained below.
(1)Align the mark B on the metal bracket of the cable side connector (plug/socket) with the mark A.

(2)Align the mark C on the unit and insert the connector into the unit vertically.
If they are not aligned, the connector cannot be joined properly.

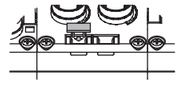
(3)When the mark B of the connector has been turned 180 degrees, wiring is completed. Confirm that the connection is not loose. If turned too far, it will become hard to remove the connector.



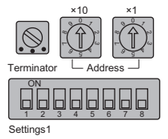
•Connector pin assignment

Configuration		Pin number	Signal name
BUS IN	BUS OUT		
		1	NC
		2	RXD/TXD-N
		3	NC
		4	RXD/TXD-P
		5	Shield

•Mounting the marker
Signal name of the input or output devices and unit address can be written to the marker, and it can be installed to each unit.
Mount the marker (EX600-ZT1) into the marker groove as required.



Setting and Adjustment



•Address setting switch: Set the PROFIBUS DP node address.

Settings1	Address		Node Address
8	X10	X1	
OFF	0	0	0 (default setting)
	0	1	1
	:	:	:
	9	9	99
ON	0	0	100
	:	:	:
	2	5	125

•V_SEL switch: A function to select the number of occupied valve outputs.
The number of outputs (size) occupied by the SI unit is selected.

Settings1		Content	SI unit output data size
1	2		
OFF	OFF	Number of occupied valve 32 outputs	4 byte (default setting)
OFF	ON	Number of occupied valve 24 outputs	3 byte
ON	OFF	Number of occupied valve 16 outputs	2 byte
ON	ON	Number of occupied valve 8 outputs	1 byte

•HOLD/CLEAR switch: Sets the output status when the fieldbus has a communication error or is in idling state.

Settings1	Content
4	
OFF	Clears the output. (default setting)
ON	Holds the output.

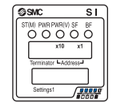
•Terminator switch: Sets the terminal resistor of the PROFIBUS DP communication line.

Setting of the terminal resistor		
		
Terminal resistor ON	Terminal resistor OFF (default setting)	Terminal resistor OFF

Refer to the product catalogue or SMC website (URL https://www.smcworld.com) to obtain more detailed information about setting and adjustment.

LED Display

The status display LED displays the power supply and communication status.



Display	Content
ST(M)	Displays the diagnosis status of the unit.
PWR	Displays the status of the power supply voltage for control and inputs.
PWR(V)	Displays the status of the power supply voltage for outputs.
SF	Displays system fault.
BF	Displays bus fault.

•ST(M)-LED

LED display	Content
OFF	The power supply for control and input is OFF.
Green LED is ON	The unit is in normal operation.
Green LED is flashing	Detected diagnostic error of I/O unit.
Red LED is flashing	Detected either of the diagnostic errors below (When diagnostics is activated) •The valve ON/OFF counter has exceeded the set value. •The valve is short circuited or disconnected.
Red/green LED is flashing alternately	Detected a communication error between SI unit and I/O unit.
Red LED is ON	SI unit has failed.

•PWR-LED

LED display	Content
Green LED is ON	The power supply voltage level for control and input is normal.
Red LED is ON	The power supply voltage level for control and input is abnormal. (When diagnostics is activated)

•PWR(V)-LED

LED display	Content
OFF	Power supply voltage for output is OFF or the voltage level is abnormal. (When diagnostics is not activated)
Green LED is ON	The power supply voltage level for output is normal.
Red LED is ON	Power supply voltage for output is OFF or the voltage level is abnormal. (When diagnostics is activated)

•SF-LED or BF-LED

LED display	Content
OFF	Either of the following conditions: •Communication with the master is established and normal. •The power supply for control and input is OFF.
Red SF LED is ON	The communication with the master has been established, but a diagnosis error has occurred.
Red BF LED is ON	Either of the following conditions: •The cable between the master and SI unit is not connected. •SI unit is not receiving the master data correctly. •The master or the SI unit has broken.
Red BF and SF LEDs are both ON	The address of the SI unit is set to 0, or to 126 or over.
Red SF LED is ON and red BF LED is flashing	The configuration data of the master and device are not consistent.
Red BF LED is flashing	One second flashing cycle: SI unit is recognizing the communication speed but the master address setting is wrong. Two seconds flashing cycle: The power source of PLC is OFF or the cable has a broken wire.

Troubleshooting

Refer to the LED Display. Refer to the SMC website (URL https://www.smcworld.com) for more information about troubleshooting.

Specifications

Model		EX600-SPR1A	EX600-SPR2A
Communication	Fieldbus	PROFIBUS DP (DP-V0)	
	Device type	PROFIBUS DP	
	Communication speed	9.6/19.2/45.45/93.75/187.5/500 kbps 1.5/3/6/12 Mbps	
	Configuration file	GSD (SMCB1411.gsd)	
	Occupied area (Number of inputs/outputs)	(512 inputs/512 outputs) max.	
Power supply (control and input)		24 VDC Class 2, 2 A	
Terminal resistor		Internally implemented (For type A cable)	
Internal current consumption (The power supply for control and input)		80 mA or less	
Valve output	Polarity of output	Source/PNP (Negative common)	Sink/NPN (Positive common)
	Output channel	32 outputs (8/16/24/32 outputs selectable)	
	Connected load	Solenoid valve with circuit of protection of surge voltage of 24 VDC 1.5 W (SMC)	
	Power supply (output)	24 VDC Class 2, 2 A	
	Output for com. error	HOLD/CLEAR/Force ON	
	Protective function	Short circuit protection	
Environment	Enclosure	IP67 (with manifold assembled)	
	Operating temperature range	−10 to 50 ℃	
	Storage temperature range	−20 to 60 ℃	
	Operating humidity range	35 to 85%RH (no condensation)	
	Withstand voltage	500 VAC for 1 minute between external terminals and FE	
	Insulation resistance	500 VDC, 10 MΩ or more between external terminals and FE	
Standard		CE marking (EMC directive, RoHS directive), UL(CSA)	
Weight		300 g	

Refer to the product catalogue or SMC website (URL https://www.smcworld.com) to obtain more detailed information about product specifications.

Outline with Dimensions

Refer to the product catalogue or SMC website (URL https://www.smcworld.com) for more information about outline dimensions.

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