

Fieldbus system

Operation Manual

EX600-SPN1 / EX600-SPN2

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.

Danger:

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

Warning:

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

Caution:

CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate 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.

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

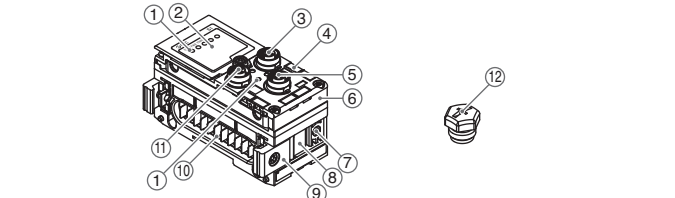
- The direct current power supply to combine should be UL1310 Class 2 power supply when conformity to UL is necessary.
- The output rating is tested as a DC output for General use.

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.

Summary of Product parts



No.	Description	Function
1	Status display LED	Displays the status of the unit.
2	Display cover	The display cover should not be opened.
3	Connector (BUS OUT)	Connector for fieldbus outputs.
4	Marker groove	Groove for an identification marker.
5	Connector (PCI)	Connector for Handheld Terminal.
6	MAC address label	Displays the 12 digit MAC address which is different for each SI unit.
7	Valve plate mounting hole	Holes for fixing the valve plate.
8	Valve plate mounting groove	Groove for mounting the valve plate.
9	Joint bracket	Bracket for joining to adjacent units.
10	Unit connector (Plug)	Connector for signals and power supplies to adjacent units.
11	Connector (BUS IN)	Connector for fieldbus inputs.
12	Seal cap (2 pcs.)	Fitted to unused connectors. (BUS OUT and PCI)

Assembly

Assembling the unit as a manifold

- Connect a unit to the end plate.
Digital and Analogue I/O units can be connected in any order.
Tighten the joint brackets to a torque of 1.5 to 1.6 N•m.
- Add more I/O units.
Up to 10 units (including the SI unit) can be connected to one manifold.
- Connecting the SI unit.
After connecting the required I/O units, connect the SI unit.
The method is as above in (1), (2).
- 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.

- Connect the SI unit to the valve manifold.
Insert the valve plate into the valve plate mounting groove on the side of the SI unit.
Fix using the valve plate screws (M4 x 6) supplied, to a torque of 0.7 to 0.8 N•m.

Mounting and Installation

Installation

- Direct mounting
 - 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.
 - Mount and tighten the end plate 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
(Not available for SY series valves. Refer to the SY catalogue.)
 - 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.
 - 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.

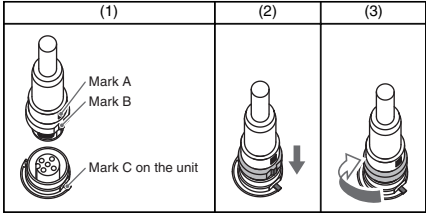
- Hook the DIN rail mounting groove on to the DIN rail.

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

- 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.
The M12 SPEEDCON connector connection method is explained below.
 - Align mark B on the metal bracket of the cable connector (plug/socket) with mark A.
 - Align with mark C on the unit and insert the connector vertically.
If they are not aligned, the connector cannot be connected correctly.
 - When mark B has been turned 180 degrees (1/2 turn), wiring is complete. Confirm that the connection is not loose. If turned too far, it will become difficult to remove the connector.



Connector pin assignment

Configuration		Pin number	Signal name
BUS IN	BUS OUT		
1	1	1	TD+
2	2	2	RD+
3	3	3	TD-
4	4	4	RD-

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

Setting and Adjustment

- This product has no switches for setting, therefore the display cover should not be opened.
- Parameter Setting
 - Hardware Configuration
 - I/O Map
 - Diagnostic

Refer to the SMC website (URL <https://www.smcworld.com>) for more information about these settings.

Specifications

Power supply	Control and input	24 VDC Class 2, 2 A
	Output	24 VDC Class 2, 2 A
Output rating	24 VDC, 1.0 W or less, DC General per output	
Operating temperature range	-10 to 50 °C (Max. surrounding air temperature rating: 50 °C)	
Storage temperature range	-20 to 60 °C	
Pollution degree	For use in Pollution Degree 3 Environment (UL508)	
Vibration resistance	10 to 57 Hz: constant amplitude 0.75 mm p-p 57 to 150 Hz: constant acceleration 49 m/s² for 2 hours each in direction X, Y and Z respectively (De-energized)	
Impact resistance	147 m/s² 3 times each in directions of X, Y and Z respectively (De-energized)	

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

Dimensions

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

LED Display

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

Display	Content
ST(M)	Displays the diagnostic status of the unit.
PWR	Displays the status of the power supply voltage for control and input.
PWR(V)	Displays the status of the power supply voltage for outputs.
SF	Displays the system status.
BF	Displays the communication status.

	Content
L/A IN	Displays the communication status of the BUS IN side.
L/A OUT	Displays the communication status of the BUS OUT side.

SI unit common status

LED display	Content
ST(M) PWR PWR(V) OFF.	The power supply for control and input is OFF.
ST(M) PWR PWR(V) Green LEDs are ON.	The unit is in normal operation.
ST(M) PWR PWR(V) Red ST(M) LED is ON.	An internal memory error has occurred in the SI unit.
ST(M) PWR PWR(V) Red PWR LED is ON.	The power supply voltage for control and input is abnormal.
ST(M) PWR PWR(V) Red PWR(V) LED is ON.	The power supply voltage for outputs is abnormal.
ST(M) PWR PWR(V) Green ST(M) LED is flashing.	A unit other than the SI unit has been detected.
ST(M) PWR PWR(V) Red ST(M) LED is flashing.	Either of the following conditions: •The valve ON/OFF counter has exceeded the set value. •The valve is short circuited or disconnected.
ST(M) PWR PWR(V) Red/Green ST(M) LED is flashing alternately.	Connection error between units has occurred.

PROFINET status

LED display	Content
SF BF OFF.	The communication with the master has been established normally, or the power supply for control and input is OFF.
SF BF Red SF LED is ON.	The communication with the master has been established, but a diagnosis error has occurred.
SF BF Red BF LED is flashing.	The configuration data of the master and EX600 are not consistent.
SF BF Red BF LED is ON.	Either of the following conditions: •The power supply for the master is OFF. •The cable between the master and SI unit is not connected. •The master or the SI unit has broken. •The configuration data of the master and the device name of the SI unit are not consistent.
SF BF Green SF LED is flashing.	Node flashing test command received.
(L/A IN) ON (Green)	BUS IN side : No Link, No Activity
(Green)	BUS IN side : Link, Activity
(L/A OUT) OFF (Green)	BUS OUT side: No Link, No Activity
(Green)	BUS OUT side: Link, Activity

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

Troubleshooting

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