# Fieldbus system

# Operation Manual

***EX600-SPR□A***

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 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), Japan Industrial Standards (JIS) 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 maintenace 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 the unit or assembling/replacing units:**
•Do not touch the sharp metal parts of the connector or plug for connecting units.
•Take care not to hit your hand when disassembling the unit.
The connecting portions of the unit are firmly joined with seals.
•When joining units, take care not to get fingers caught between units.
An 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 safety and 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 Class2 power supply when conformity to UL is necessary.

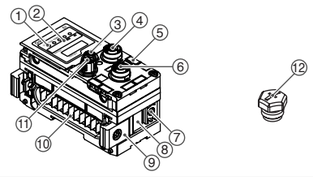
## Maintenance

•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 product catalogue or SMC website (URL http://www.smcworld.com) to obtain more detailed information about maintenance.

## Names and Functions of Product

○**Names of individual parts**




| 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

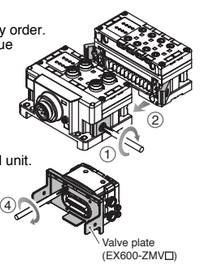
○**Composing the unit as a manifold**

(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 Nm.

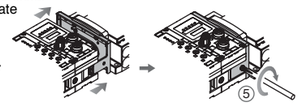
(2)Add more units.
Up to 10 units (including the SI unit) can be connected to one manifold.

(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. (M3x8)
Apply 0.6 to 0.7 Nm tightening torque to the screws.



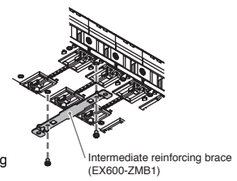

(5)Connect the SI unit and the valve manifold.
Insert the valve plate to the valve plate set groove on the side of SI unit.
Then, tighten it with the valve plate set screws (M4x6) to fix the plate.
Tightening torque for set screws 0.7 to 0.8 Nm.




## Mounting and Installation

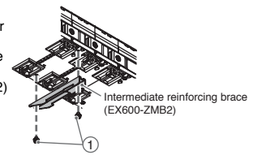
### ■Installation

•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-M4x5 screws.
Tightening torque: 0.7 to 0.8 Nm.

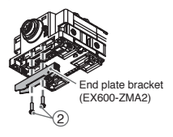



(2)Fix and tighten the end plates at one end of the unit. (M4)
Tightening torque: 0.7 to 0.8 Nm.
Fix the end plate at the valve side while referring to the operation manual of the corresponding valve manifold.

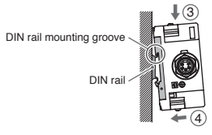
•DIN rail mounting
(Available for series other than SY series. Refer to the catalog for SY series.)
(1)When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB2) before mounting, using 2-M4x6 screws.
Tightening torque: 0.7 to 0.8 Nm.




(2)Mount the end plate bracket (EX600-ZMA2) to the end plate at the opposite end to the valves, using 2-M4x14 screws.
Tightening torque: 0.7 to 0.8 Nm.

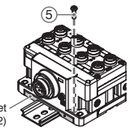



(3)Hook the DIN rail mounting groove to the DIN rail.




(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. (M4x20)
Tightening torque: 0.7 to 0.8 Nm.
The tightening torque at the valve side depends on the valve type.
Refer to the operation manual of the corresponding valve manifold.

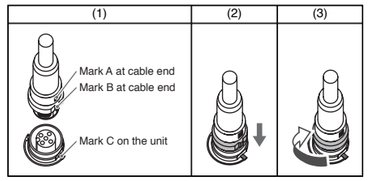



### ■Wiring

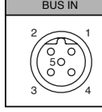
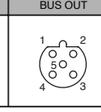
•Connect the M12 connector cable. M12 connector is applicable for SPEEDCON connector.
SPEEDCON connector wiring method is explained below.
(1)Align the mark B on the metal bracket of the cable side connector (plug/socket) with the mark A.

(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 (1/2 turn), wiring is completed. Confirm that the connection is not loose. If turned too far, it will become hard to remove the connector.

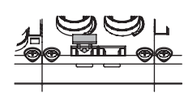



•Connector pin assignment

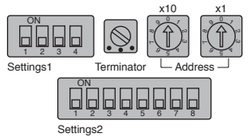
| Configuration | | Pin number | Signal name |
|---|---|---|---|
| BUS IN | BUS OUT | | |
|  |  | 1 | NC |
| | | 2 | RXD/TXD-N |
| | | 3 | NC |
| | | 4 | RXD/TXD-P |
| | | 5 | Shield |



•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.

| Settings2 | 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.

| Settings2 | Content |
|---|---|
| 4 | |
| OFF | Clears the output. (default setting) |
| ON | Holds the output. |

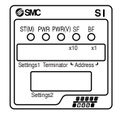
•Terminator switch: Sets the terminal resistor of the PROFIBUS DP communication line.

| 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 http://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. |

•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 | A component failure inside 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 output is abnormal. |
| ST(M) PWR PWR(V) ◔ ○ ○ Green ST(M) LED is flashing | A unit other than the SI unit has been diagnosed and detected. |
| ST(M) PWR PWR(V) ✳ ○ ○ Red ST(M) LED is flashing | Either of the following conditions:<br>•The set input diagnostic on/off counter has exceeded the set value.<br>•The valve is short circuited or disconnected. |
| ST(M) PWR PWR(V) ✳ ○ ○ Red/green ST(M) LED is flashing alternately | Connection error between units occurred. |

•PROFIBUS DP status

| LED display | Content |
|---|---|
| SF BF ○ ○ Off | The communication with the master has been established properly, or the power supply for control and inputs 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 On | Either of the following conditions:<br>•The cable between the master and SI unit is not connected.<br>•The SI unit cannot recognize the communication speed.<br>•The maser or the SI unit has broken. |
| SF BF ● ● Red BF and SF LEDs are both On | The address of the SI unit is set to 0, or to 126 or over. |
| SF BF ● ✳ Red SF LED is On and red BF LED is flashing | The configuration data of the master and device are not consistent. |
| SF BF ○ ✳ Red BF LED is flashing | The SI unit has recognized the communication speed, but the address setting of the master is incorrect. |

## Troubleshooting

Refer to the LED Display. Refer to the product catalog or SMC website (URL http://www.smcworld.com) to obtain more detailed information about troubleshooting.

## Specification

| | | |
|---|---|---|
| Power supply | Control and input | 24 VDC Class2, 2 A |
| | Output | 24 VDC Class2, 2 A |
| Connected load | | Solenoid valve with lamp and circuit of protection of surge voltage of 24 VDC 1.5 W (SMC) |
| 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 2 Environment (UL508) |
| Vibration resistance | | 10 to 57 Hz: constant amplitude 0.75 mm p-p<br>57 to 150 Hz: constant acceleration 49 m/s²<br>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 http://www.smcworld.com) to obtain more detailed information about product specifications.

## Commissioning

•Parameter Setting
•Hardware Configuration (GSD file)
•I/O Map
Refer to the product catalog or SMC website (URL http://www.smcworld.com) to obtain more detailed information about these setting above.

## Diagnostic

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

## Outline with Dimensions

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

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