# Fieldbus system

# Befor Use

***EX600-SDN1A/EX600-SDN2A***

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 Class2 power supply when conformity to UL is necessary.

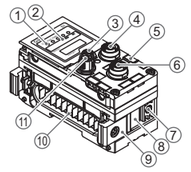
## Maintenance

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

## Names and Functions of Product

**○Names of individual parts**



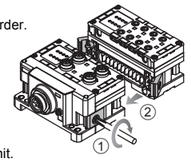


| No. | Description | Function |
|---|---|---|
| 1 | Status display LED | Displays the status of the unit. |
| 2 | Display cover | Open for the setting of switch. |
| 3 | Display cover tightening screw | Loosen to open the display cover. |
| 4 | Connector (BUS OUT) | Connects the cable for fieldbus outputs. |
| 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**

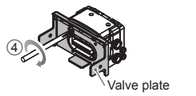
(1) Connect the unit to the end plate.
The Digital unit, Analog unit can be connected in any order.
Tighten the bracket of the joint using tightening torque 1.5 to 1.6 N•m.



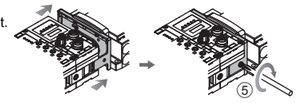

(2) Add more units.
Up to 10 units (including the SI unit) can be connected to one manifold.

(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.



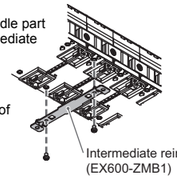

(5) Connect the SI unit and the valve manifold.
Insert the valve plate to the valve plate set groove on the side of SI unit.
Then, tighten it with the valve plate set screws (M4 x 6) to fix the plate.
Tightening torque for set screws 0.7 to 0.8 N•m.




## Mounting and Installation

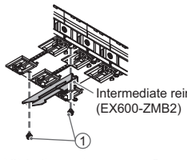
### ■Installation

•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.

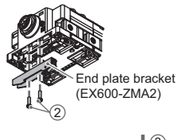



(2) Fix and tighten the end plates at one end of the unit. (M4)
Tightening torque: 0.7 to 0.8 N•m.
Fix the end plate at the valve side while referring to the operation manual of the corresponding valve manifold.

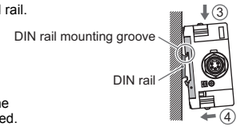
•DIN rail mounting
(Available for series other than SY series. Refer to the catalog for SY series.)
(1) When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB2) before mounting, using 2-M4 x 6 screws.
Tightening torque: 0.7 to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

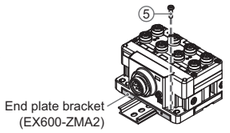



(3) Hook the DIN rail mounting groove to the DIN rail.




(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.

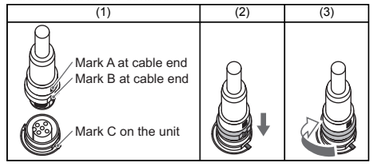



### ■Wiring

•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 (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.

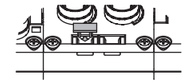



•Connector pin assignment

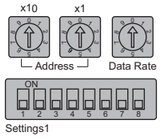
| Configuration | | Pin number | Signal name |
|---|---|---|---|
| BUS IN | BUS OUT | | |
|  |  | 1 | DRAIN |
| | | 2 | V+ |
| | | 3 | V– |
| | | 4 | CAN_H |
| | | 5 | CAN_L |



•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

| Address X10 | Address X1 | Node Address |
|---|---|---|
| 0 | 0 | 0 (Default setting) |
| 0 | 1 | 1 |
| : | : | : |
| 6 | 3 | 63 |
| 6 | 4 | PGM |
| : | : | |
| 9 | 9 | |

•Data Rate setting switch

| Data Rate | Communication speed |
|---|---|
| 0 | 125 kbps (Default setting) |
| 1 | 250 kbps |
| 2 | 500 kbps |
| 3 | PGM |
| : | |
| 9 | |

•Diagnostics switch: Allocates the diagnostic data to the input data.

| Settings1 | | Mode | Content | Diagnostic size set for the input |
|---|---|---|---|---|
| 1 | 2 | | | |
| OFF | OFF | 0 | Input data only (Default setting) | 0 byte |
| OFF | ON | 1 | Input data + System diagnosis | 4 byte |
| ON | OFF | 2 | Input data + System diagnosis + Unit diagnosis (Up to 10 units) | 6 byte |

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

| Settings1 | Content |
|---|---|
| 3 | |
| OFF | Output is Off. (Default setting) |
| ON | Holds the output. |

•HW/SW switch: Select the selection method of the Fieldbus address and Data Rate.

| Settings1 | Content |
|---|---|
| 4 | |
| OFF | Address and Data Rate are set by the SI unit switch. (Hardware) (Default setting) |
| ON | Address and Data Rate are set via the PLC. (Software) * |

*: In order to set software via PLC, set the address or Data Rate switch to PGM.

•V_SEL switch: The number of outputs (size) occupied by the SI unit is selected.

| Settings1 | | Content | SI unit output data size |
|---|---|---|---|
| 5 | 6 | | |
| 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 |

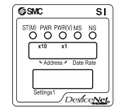
•QuickConnect™ switch: Sets whether QuickConnect™ for DeviceNet® is enabled.

| Settings1 | QuickConnect™ | Content |
|---|---|---|
| 7 | | |
| OFF | Invalid (Default setting) | QuickConnect™ depends on Software. |
| ON | Valid | QuickConnect™ is enable irrespective of the configuration by Software. |

Refer to the 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 input. |
| PWR(V) | Displays the status of the power supply voltage for outputs. |
| MS | Displays the module status. |
| NS | Displays the network status. |

•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 detected. |
| ST(M) PWR PWR(V) ☀ ○ ○ Red ST(M) LED is flashing. | Either of the following conditions:<br>•The valve 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 has occurred. |

•DeviceNet® status

| LED display | Content |
|---|---|
| MS NS ○ ○ OFF. | The power supply for control and input is OFF. |
| MS NS ● ○ Green MS LED is ON and NS LED is OFF. | •Double checking the node address.<br>•Communication error. |
| MS NS ● ● Green MS and NS LEDs are both ON. | Communication is normal. |
| MS NS ● ☀ Green MS LED is ON and Green NS LED is flashing. | Connection is not established. |
| MS NS ● ○ Red MS LED is ON. | A component failure inside the SI unit. |
| MS NS ● ● Green MS LED is ON and Red NS LED is ON. | Fatal communication error. |
| MS NS ● ☀ Green MS LED is ON and Red NS LED is flashing. | Minor communication error. |
| MS NS → MS NS ☀ ○ ☀ ○ Red/Green MS LED is flashing alternately. Then, Red/Green NS LED is flashing alternately. | Flashes when performing self diagnosis test when the power supply starts. |

## Troubleshooting

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

## Specifications

| | Model | EX600-SDN1A | EX600-SDN2A |
|---|---|---|---|
| Communication | Fieldbus | DeviceNet®, Volume1 (Edition2.1), Volume3 (Edition1.1) | |
| | Device type | 12 (Communication Adapter) | |
| | Slave type | Group 2 Only Server | |
| | Communication speed | 125/250/500 kbps | |
| | Configuration file | EDS file | |
| | Occupied area (Number of inputs/outputs) | (512 inputs/512 outputs) max. | |
| | Corresponding message | Duplicate MAC ID Check Message<br>Group 2 Only Unconnected Explicit Message<br>Explicit Message (Group 2)<br>Poll I/O Message (Predefined M/S Connection set) | |
| Power supply for DeviceNet® | | 11 to 25 VDC | |
| Internal current consumption (The power supply for control and input) | | 55 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 | 24 VDC 1.5 W (SMC), Solenoid valve with LED and circuit protection | |
| | Power supply | 24 VDC, 2 A | |
| | Output for communication error | HOLD/CLEAR/Force ON | |
| | Protective function | Short circuit protection | |
| Environment | Enclosure | IP67 (With manifold assembled)*1 | |
| | Operating temperature range | –10 to 50 °C | |
| | Storage temperature range | –20 to 60 °C | |
| | 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/UKCA marked, UL(CSA) | |
| Weight | | 300 g | |

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

## Outline with Dimensions

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

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