Fieldbus system

Operation Manual

EX600-SMJ□

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 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 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.

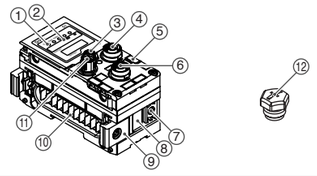
Maintenance

•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 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

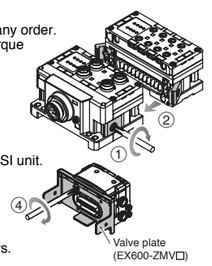
○Composing the unit as a manifold

(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.

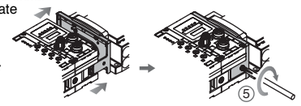
(2)Add more units.
Up to 10 units (including the SI unit) can be connected to one manifold.

(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.

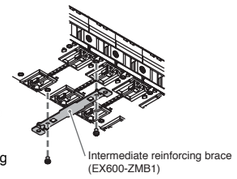


Mounting and Installation

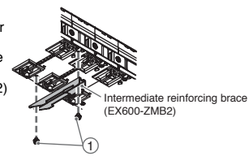
■Installation

•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.

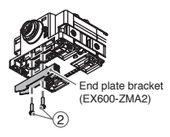
(2)Fix and tighten the end plates at one end of the unit. (M4)
Tightening torque: 0.7 to 0.8 Nm.
Fix the end plate at the valve side while referring to the operation manual of the corresponding valve manifold.



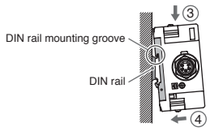
•DIN rail mounting
(Available for series other than SY series. Refer to the catalog for SY series.)
(1)When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB2) before mounting, using 2-M4x6 screws.
Tightening torque: 0.7 to 0.8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

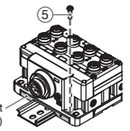


(3)Hook the DIN rail mounting groove to the DIN rail.



(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.

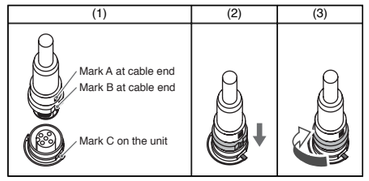


■Wiring

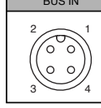
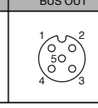
•Connect the M12 connector cable. M12 connector is applicable for SPEEDCON connector.
SPEEDCON connector wiring method is explained below.
(1)Align the mark B on the metal bracket of the cable side connector (plug/socket) with the mark A.

(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.

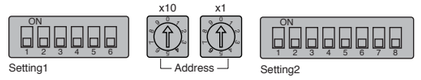
(3)When the mark B of the connector has been turned 180 degrees (1/2 turn), wiring is completed. Confirm that the connection is not loose. If turned too far, it will become hard to remove the connector.



•Connector pin assignment

Configuration		Pin number	Signal name
BUS IN	BUS OUT		
		1	SLD
		2	DB
		3	DG
		4	DA
		5	NC

Setting and Adjustment



•Operation mode switch: Sets the version of CC-Link and the number of occupied nodes.

Settings1			Operating mode	Content				
1	2	3		CC-Link version	Number of occupied nodes	Bit area input/output	Word area input/output size (RWr/RWr)	Extended cyclic (Ver2.00)
OFF	OFF	OFF	1	1.10	1	32/32	4 word/4 word	-
ON	OFF	OFF	2	1.10	2	64/64	8 word/8 word	-
OFF	ON	OFF	3	1.10	3	96/96	12 word/12 word	-
ON	ON	OFF	4	1.10	4	128/128	16 word/16 word	-
OFF	OFF	ON	5	2.00	1	64/64	16 word/16 word	4 times
ON	OFF	ON	6	2.00	1	128/128	32 word/32 word	8 times
OFF	ON	ON	7	2.00	2	384/384	64 word/64 word	8 times
ON	ON	ON	8	2.00	3	640/640	96 word/96 word	8 times

•Communication speed switch: Sets the communication speed of CC-Link.

Settings1			Content
4	5	6	
OFF	OFF	OFF	156 kbps (Default setting)
ON	OFF	OFF	625 kbps
OFF	ON	OFF	2.5 Mbps
ON	ON	OFF	5 Mbps
OFF	OFF	ON	10 Mbps

∗: "LERR" LED light to a switch setting other than the above.

•Node setting switch: Set the node of CC-Link. The settable range depends on the number of occupied nodes.

Address X10	Address X1	Node number
0	0	Err (Default setting)
0	1	1
:	:	:
6	4	64

Number of occupied nodes	Settable node number range
1	1 to 64
2	1 to 63
3	1 to 62
4	1 to 61

∗: If a node is set to 00 or a number over 65, the "LERR" LED will light up.

•V_SEL switch: Select the number of outputs (size) that SI unit occupies.

Settings2		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

•Switch for diagnosis: Allocates the diagnostic data to the input word area.

Settings2		Mode	Content	Diagnosis size set for the input
5	6			
OFF	OFF	0	Input data only (Default setting)	0 word
OFF	ON	1	Input data + System diagnosis	2 word
ON	OFF	2	Input data + System diagnosis + Unit diagnosis (up to 10 units)	3 word

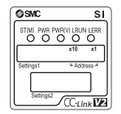
•HOLD/CLEAR switch: Sets the output status when the fieldbus has a communication error.

Settings2	Content
7	
OFF	Output is Off. (Default setting)
ON	Holds the output.

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.
LRUN	Displays the data link status.
LERR	Displays the error 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 diagnosed and 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	Either of the following conditions: •Connection error between units has occurred. •Configuration memory error has occurred.

•CC-Link status

LED display	Content
LRUN LERR ○ ○ Off	Communication is not established. Or, the power supply for control or input is Off.
LRUN LERR ● ○ Green LRUN LED is On	Communication is normal.
LRUN LERR ○ ● Red LERR LED is On	Communication error has occurred.
LRUN LERR ○ ☼ Red LERR LED is flashing	The node setting or communication speed setting has been changed during communication.

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

Troubleshooting

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

Commissioning

•Parameter Setting •I/O Map •Diagnostic
Refer to the SMC website (URL http://www.smcworld.com) to obtain more detailed information about these setting above.

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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