

Fieldbus system Operation Manual



EX600-DX/EX600-DY/EX600-DM

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.

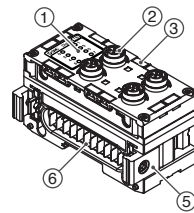
Operator

- 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.

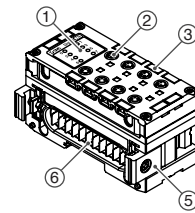
Names and Functions of Product

Names of individual parts

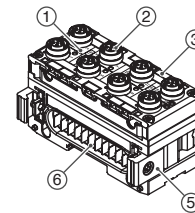
•Digital input unit
•EX600-DX□□B



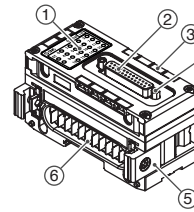
•EX600-DX□□□



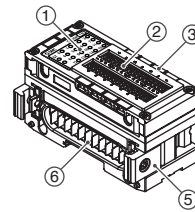
•EX600-DX□□□



•EX600-DX□□E

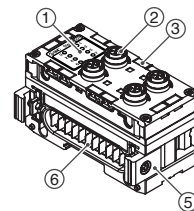


•EX600-DX□□F

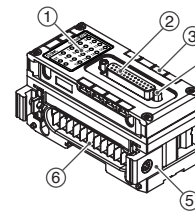


•Digital output unit

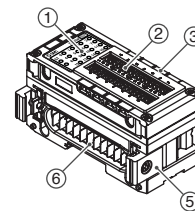
•EX600-DY□□B



•EX600-DY□□E

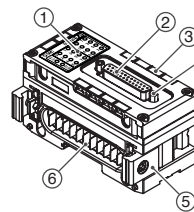


•EX600-DY□□F

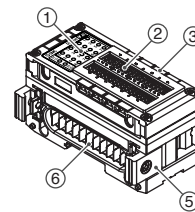


•Digital I/O unit

•EX600-DM□□E



•EX600-DM□□F



No.	Description	Function
1	Status display LED	Displays the status of the unit.
2	Connector	Connector for input or output devices with cable, D-sub connector or spring type terminal block.
3	Marker groove	Groove to mount a marker.
4	Lock screw	Fixes D-sub connector. (No.4-40 UNC)
5	Joint bracket	Bracket for joining to adjacent units.
6	Unit connector (plug)	Transmits signals and power supplies to adjacent units.

Assembly

Composing the unit as a manifold

- 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.
- Add more units. Up to 10 units (including the SI unit) can be connected to one manifold.
- Connecting the SI unit. After connecting the necessary units, connect the SI unit. Connecting method is the same as above (1), (2).
- 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.
- 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

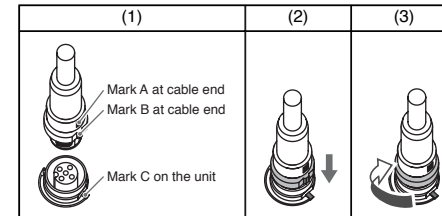
- Direct mounting**
 - When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB1) before mounting using 2-M4x5 screws. Tightening torque: 0.7 to 0.8 Nm.
 - Fix and tighten the end plates at one end of the unit. (M4) Tightening torque: 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.)

 - 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.
 - 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.
 - Hook the DIN rail mounting groove 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. (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 or M8 connector cable. M12 connector is applicable for SPEEDCON connector. SPEEDCON connector wiring method is explained below.
 - Align the mark B on the metal bracket of the cable side connector (plug/socket) with the mark A.
 - 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.
 - 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.



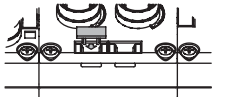
- D-sub socket connection method is explained below.**
 - Align the D-sub socket connector of the unit and the plug connector of the cable.

- Insert the plug connector of the cable into the D-sub socket connector of the unit vertically. If the connector is pushed forcibly, the pin will bend and the connector cannot be joined.
- Fix the connector by tightening two No.4-40 UNC screws in the lock screw parts located at both ends of the connector of the unit. The tightening torque should be within 0.6 Nm.

•Spring type terminal connection method is explained below.

- Insert a flat blade screwdriver inclined to the left into the right hole of the two holes as shown in the figure below.
- Incline the screwdriver to the right as indicated by the arrow. When the screwdriver is pushed downwards until it stops, the cable inlet will open.
- Insert the cable.
- The spring will capture the cable when the flat blade screwdriver is pulled out. This completes the connection.

•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.



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.

Connector pin assignment

•Digital input unit

Configuration	Pin number	Signal name
EX600-DX□□B/EX600-DX□□□	1	24 V (control and input)
	2	Input 2
	3	0 V (control and input)
	4	Input 1
	5	FE

Configuration	Pin number	Signal name	Pin number	Signal name
EX600-DX□□E	1	Input 0	14	Input 1
	2	Input 2	15	Input 3
	3	Input 4	16	Input 5
	4	Input 6	17	Input 7
	5	Input 8	18	Input 9
	6	Input 10	19	Input 11
	7	Input 12	20	Input 13
	8	Input 14	21	Input 15
	9	NC	22	24 V (control and input)
	10	24 V (control and input)	23	24 V (control and input)
	11	0 V (control and input)	24	0 V (control and input)
	12	0 V (control and input)	25	FE
	13	FE	-	-

Configuration	Group	Pin number	Signal name	Group	Pin number	Signal name
EX600-DX□□F	0	1	24 V (control and input) X0	4	1	24 V (control and input) X4
		2	Input 0		2	Input 8
		3	Input 1		3	Input 9
		4	0 V (control and input) X0		4	0 V (control and input) X4
	1	1	24 V (control and input) X1	5	1	24 V (control and input) X5
		2	Input 2		2	Input 10
		3	Input 3		3	Input 11
		4	0 V (control and input) X1		4	0 V (control and input) X5
	2	1	24 V (control and input) X2	6	1	24 V (control and input) X6
		2	Input 4		2	Input 12
		3	Input 5		3	Input 13
		4	0 V (control and input) X2		4	0 V (control and input) X6
	3	1	24 V (control and input) X3	7	1	24 V (control and input) X7
		2	Input 6		2	Input 14
		3	Input 7		3	Input 15
		4	0 V (control and input) X3		4	0 V (control and input) X7

•Digital output unit

Configuration EX600-DYCB	Pin number	Signal name	
		EX600-DYPB	EX600-DYNB
	1	NC	24 V (output)
	2	Output 2	Output 2
	3	0 V (output)	NC
	4	Output 1	Output 1
	5	FE	FE

Configuration EX600-DYDE	Pin number	Signal name		Pin number	Signal name	
		EX600-DYPE	EX600-DYNE		EX600-DYPE	EX600-DYNE
	1	Output 0		14	Output 1	
	2	Output 2		15	Output 3	
	3	Output 4		16	Output 5	
	4	Output 6		17	Output 7	
	5	Output 8		18	Output 9	
	6	Output 10		19	Output 11	
	7	Output 12		20	Output 13	
	8	Output 14		21	Output 15	
	9	NC		22	NC	
	10	NC		23	NC	
	11	NC		24	NC	
	12	NC		25	0 V (output)	24 V (output)
	13	0 V (output)	24 V (output)	-	-	-

Configuration EX600-DYDF	Group	Pin number	Signal name		Group	Pin number	Signal name	
			EX600-DYDF	EX600-DYDF			EX600-DYDF	EX600-DYDF
	0	1	0 V (output)	24 V (output)	4	1	0 V (output)	24 V (output)
		2	Output 0			2	Output 8	
		3	0 V (output)	24 V (output)		3	0 V (output)	24 V (output)
		4	Output 1			4	Output 9	
	1	1	0 V (output)	24 V (output)	5	2	Output 10	
		2	Output 2			3	0 V (output)	24 V (output)
		3	0 V (output)	24 V (output)		4	Output 11	
		4	Output 3			1	0 V (output)	24 V (output)
	2	2	Output 4		6	2	Output 12	
		3	0 V (output)	24 V (output)		3	0 V (output)	24 V (output)
		4	Output 5			4	Output 13	
		1	0 V (output)	24 V (output)		1	0 V (output)	24 V (output)
	3	2	Output 6		7	2	Output 14	
		3	0 V (output)	24 V (output)		3	0 V (output)	24 V (output)
		4	Output 7			4	Output 15	

•Digital I/O unit

Configuration EX600-DMCE	Pin number	Signal name		Pin number	Signal name	
		EX600-DMPE	EX600-DMNE		EX600-DMPE	EX600-DMNE
	1	Input 0		14	Output 0	
	2	Input 1		15	Output 1	
	3	Input 2		16	Output 2	
	4	Input 3		17	Output 3	
	5	Input 4		18	Output 4	
	6	Input 5		19	Output 5	
	7	Input 6		20	Output 6	
	8	Input 7		21	Output 7	
	9	24 V (control and input)		22	0 V (output)	24 V (output)
	10	24 V (control and input)		23	0 V (output)	24 V (output)
	11	0 V (control and input)		24	0 V (output)	24 V (output)
	12	0 V (control and input)		25	FE	
	13	FE		-	-	-

Configuration EX600-DMCF	Group	Pin number	Signal name		Group	Pin number	Signal name	
			EX600-DMPF	EX600-DMNF			EX600-DMPF	EX600-DMNF
	0	1	24 V (control and input) X0		4	1	0 V (output)	24 V (output)
		2	Input 0			2	Output 0	
		3	Input 1			3	0 V (output)	24 V (output)
		4	0 V (control and input) X0			4	Output 1	
	1	1	24 V (control and input) X1		5	1	0 V (output)	24 V (output)
		2	Input 2			2	Output 2	
		3	Input 3			3	0 V (output)	24 V (output)
		4	0 V (control and input) X1			4	Output 3	
	2	1	24 V (control and input) X2		6	1	0 V (output)	24 V (output)
		2	Input 4			2	Output 4	
		3	Input 5			3	0 V (output)	24 V (output)
		4	0 V (control and input) X2			4	Output 5	
	3	1	24 V (control and input) X3		7	1	0 V (output)	24 V (output)
		2	Input 6			2	Output 6	
		3	Input 7			3	0 V (output)	24 V (output)
		4	0 V (control and input) X3			4	Output 7	

LED Display

The status display LED shows the following unit state.

•Digital input unit

ST: Status display LED

Model	Display	Content
EX600-DYCB EX600-DYCB EX600-DYCB	Off	The power supply for control and input, or the input device, is Off.
	Green LED is On	The input device is On.
	Red LED is On	The power supply of input device has a short circuit.
	Red LED is flashing	•The input device On/Off count has exceeded the set value. •The input device is open circuit. (Only for EX600-DXC1)
EX600-DXCE EX600-DXCF	Off	The power supply for control and input is Off.
	Green LED is On	The product is operating normally.
	Red LED is On	The power supply of input device has a short circuit.
	Red LED is flashing	The input device On/Off count has exceeded the set value.
	0 to 15 LEDs are Off	The input device is Off.
0 to 15 green LEDs are On	The input device is On.	

•Digital output unit

ST: Status display LED

Model	Display	Content
EX600-DYEB	Off	The power supply for control and input, or the output device, is Off.
	Green LED is On	The output device is On.
	Red LED is On	The output device has a short circuit.
	Red LED is flashing	•The output device On/Off count has exceeded the set value. •The output device is open circuit.
EX600-DYEE EX600-DYEF	ST LED is Off	The power supply for control and input is Off.
	Green ST LED is On	The product is operating normally.
	Red ST LED is On	The output device has a short circuit.
	Red ST LED is flashing	•The output device On/Off count has exceeded the set value. •The output device is open circuit.
	0 to 15 LEDs are Off	The output device is Off.
0 to 15 green LEDs are On	The output device is On.	

•Digital I/O unit

ST: Status display LED

Model	Display	Content
EX600-DMEE EX600-DMEF	ST LED is Off	The power supply for control and input is Off.
	Green ST LED is On	The product is operating normally.
	Red ST(I) LED is On	The power supply of input device has a short circuit.
	Red ST(O) LED is On	The output device has a short circuit.
	Red ST(I) LED is flashing	The input device On/Off count has exceeded the set value.
	Red ST(O) LED is flashing	•The output device On/Off count has exceeded the set value. •The output device is open circuit.
	0 to 7 LEDs are Off	The input device or the output device are Off.
	Input (left) *0 to 7* green LEDs are On	The input device is On.
	Output (right) *0 to 7* green LEDs are On	The output device is On.

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

Model	DXCB/DXCC/DXCD	DXCE/DXCF	DYCB/DYCE/DYCF
		DMCE/DMCF	
Power supply	Control and input	24 VDC Class2, 2 A	
	Output	24 VDC Class2, 2 A	
Rated input current	9 mA or less	5 mA or less	-
Max. load current	-		500 mA or less/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 2 Environment (UL508)		
Vibration resistance	10 to 57 Hz: constant amplitude 0.75 mm p-p 57 to 150 Hz: constant acceleration 49 m/s ² for 2 hours each in direction X, Y and Z respectively (De-energized)		
Impact resistance	147 m/s ² 3 times each in directions of X, Y and Z respectively (De-energized)		

*1: Input terminals are not isolated from Power source.
*2: Do not connect outside Power source to Input and Output terminals.

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.

SMC Corporation URL <http://www.smcworld.com>

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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