SMC

ORIGINAL INSTRUCTIONS

Instruction Manual
Wireless System
EtherNet/IP™ compatible
Series EX600-WEN# / EX600-WSV#

The intended use of this product is to provide a connection from the EtherNet/IP™ communication protocol to a pneumatic valve manifold or I/O system via wireless communication.

1 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) [1], and other safety regulations.
[1] ISO 4414: Pneumatic fluid power - General rules relating to systems.
ISO 4413: Hydraulic fluid power - General rules relating to systems.
IEC 60204-1: Safety of machinery - Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots -Safety. etc.
- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

⚠ 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.

⚠ Warning

- **Always ensure compliance with relevant safety laws and standards.**
All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

2 Specifications

2.1 Base specifications (EX600-WEN#)

Models			EX600-WEN1	EX600-WEN2
Communication	Communication protocol		EtherNet/IP™	
	Conformance version		Composit 12	
	Transmission medium (cable)		Standard Ethernet cable (CAT5 or higher, 100BASE-TX)	
	Transmission speed		10 Mbps / 100 Mbps	
	Transmission method		Full duplex / Half duplex	
	Configuration file		EDS file [1]	
	IP address setting range		Manual / BOOTP, DHCP	
	Device information		Vendor ID: 7 (SMC Corporation) Device type: 12, Product code: 186	
	Quick Connect™ function		Applicable	
	DLR function		Applicable	
	Web server function		Applicable	
Electrical	Control and input (US1)	Power supply voltage	24 VDC ±10%	
		Current consumption	150 mA or less	
	Output (US2)	Power supply voltage	24 VDC ±10%	
		Max. current	4 A	

2 Specifications (continued)

		System input size	Max. 1280 points together with the registered remote
Input / Output	Number of inputs		
		Input size	Max. 128 points (increase or decrease by 16 points)
	Number of outputs	System output size	Max. 1280 points together with the registered remote
		Output size	Max. 128 points (increase or decrease by 16 points)
	Analogue input / output	AD refresh time	10 ms or less (input connected to the base) 0.1/0.2/0.5/1/2/5/10/30/60 s (input connected to remote)
		DA refresh time	10 ms or less (the output connected to the base) 0.1/0.2/0.5/1/2/5/10/30/60 s (output connected to remote)
	Valve output	Output type	Source / PNP (-COM) — Sink / NPN (+COM)
		Number of outputs	Max. 32 points (0/8/16/24/32 points)
		Connected load	Solenoid valve with surge voltage suppressor of 24 VDC and 1.5W or less (manufactured by SMC)
		Output condition at communication error	Clear / Hold / Software control
		Protection	Built-in short circuit prevention
	Number of connected Remotes		Maximum 127 pcs. (0/15/31/63/127 pcs.)
	Number of connected EX600 I/O units		Maximum 9 x EX600 I/O units (I/O = 128. I/O above 128 cannot be recognized)
Wireless communication	Protocol		SMC original protocol (SMC encryption)
	Radio wave type (spread)		Frequency Hopping Spread Spectrum (FHSS)
	Frequency		2.4 GHz (2403 to 2481 MHz)
	Frequency channel		79 ch (Bandwidth: 1.0 MHz)
	Communication speed		250 kbps
	Communication distance		Within 10 m (depending on the operating environment)
	Radio Law certificates		Japanese radio law, RE [2], FCC
NFC [3]	Communication standard		ISO/IEC14443B (Type-B)
	Frequency		13.56 MHz
	Communication speed		20 to 100 kHz (I2C)
	Communication distance		Up to 1 cm
Environmental	Enclosure rating		IP67 (with manifold assembled)
	Ambient operating temperature		-10 to +50ºC
	Ambient storage temperature		-20 to +60ºC
	Ambient humidity		35 to 85% RH (no condensation)
	Withstand voltage		500 VAC-1 minute between external terminals and metallic parts
	Insulation resistance		10 MΩ or more (500 VDC between external terminals and metallic parts)
	Vibration resistance (excluding valve manifold)		EN61131-2: 5 ≤ f < 8.4 Hz 3.5 mm 8.4 ≤ f < 150 Hz 9.8 m/s²
	Impact resistance (excluding valve manifold)		EN61131-2: 147 m/s², 11 ms
Weight			300 g

[1]: The EDS configuration file can be downloaded from the SMC website: (URL: https://www.smcworld.com)

[2]: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, U.K., Turkey. (as of March 2018).

[3]: The NFC communication RFID tag of the 13.56 MHz passive type.

2 Specifications (continued)

2.2 Remote specifications (EX600-WSV#)

| Models			EX600-WSV1	EX600-WSV2
Electrical	Control and input (US1)	Power supply voltage	24 VDC ±10%	
		Current consumption	70 mA or less	
	Output (US2)	Power supply voltage	24 VDC ±10%	
		Max. current	4 A	
Input / Output	Number of inputs	Input size	Max. 128 points (increase or decrease by 16 points)	
	Number of outputs	Output size	Max. 128 points (increase or decrease by 16 points)	
	AD / DA refresh time		0.1/0.2/0.5/1/2/5/10/30/60 s [1]	
	Number of connected EX600 I/O units		Maximum 9 x EX600 I/O units (I/O = 128. I/O above 128 cannot be recognized)	
	Valve output	Output type	Source / PNP (-COM) — Sink / NPN (+COM)
		Number of outputs	Max. 32 points (0/8/16/24/32 points)	
		Connected load	Solenoid valve with surge voltage suppressor of 24 VDC and 1.5W or less (manufactured by SMC)	
Wireless communication	Protocol		SMC original protocol (SMC encryption)	
	Radio wave type (spread)		Frequency Hopping Spread Spectrum (FHSS)	
	Frequency		2.4 GHz (2403 to 2481 MHz)	
	Frequency channel		79 ch (Bandwidth: 1.0 MHz)	
	Communication speed		250 kbps	
	Communication distance		Within 10 m (depending on the operating environment)	
	Radio Law certificates		Japanese radio law, RE [2], FCC	
NFC [3]	Communication standard		ISO/IEC14443B (Type-B)	
	Frequency		13.56 MHz	
	Communication speed		20 to 100 kHz (I2C)	
	Communication distance		Up to 1 cm	
Environmental	Enclosure rating		IP67 (with manifold assembled)	
	Ambient operating temperature		-10 to +50ºC	
	Ambient storage temperature		-20 to +60ºC	
	Ambient humidity		35 to 85% RH (no condensation)	
	Withstand voltage		500 VAC-1 minute between external terminals and metallic parts	
	Insulation resistance		10 MΩ or more (500 VDC between external terminals and metallic parts)	
	Vibration resistance (excluding valve manifold)		EN61131-2: 5 ≤ f < 8.4 Hz 3.5 mm 8.4 ≤ f < 150 Hz 9.8 m/s²	
	Impact resistance (excluding valve manifold)		EN61131-2: 147 m/s², 11 ms	
Weight			280 g	

[1]: Varies depending on the wireless communication status and the surrounding environment.

[2]: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, U.K., Turkey. (as of March 2018).

[3]: The NFC communication RFID tag of the 13.56 MHz passive type.

3 Name and Function of parts

- **Base module (EX600-WEN#)**
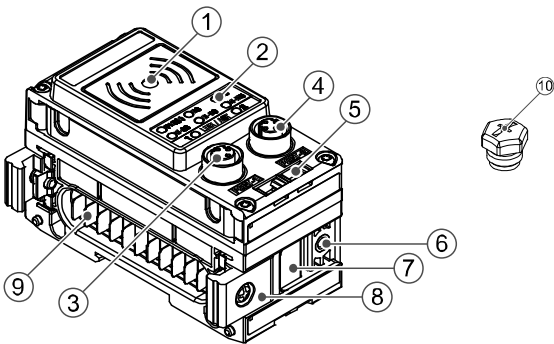
No.	Item	Description
1	NFC antenna area	This area is for close contact with the NFC reader/writer. "O" marks the centre of the NFC antenna.
2	Status indication LED	LED display to indicate the unit status.
3	Connector (PORT-1)	Fieldbus input / output connection.
4	Connector (PORT-2)	Fieldbus input / output connection.
5	Marker groove	Marker (EX600-ZT1) can be mounted.
6	Valve plate mounting	Screw hole for mounting the valve plate.
7	Valve plate mounting groove	Groove to insert the valve plate.
8	Joint bracket	Bracket for mounting adjacent units.
9	Unit connector (plug)	Connector to transfer signals and power to the next unit.
10	Seal cap (1 pc.)	To be mounted on unused connectors (PORT 1 or 2).

- **Remote module (EX600-WSV#)**
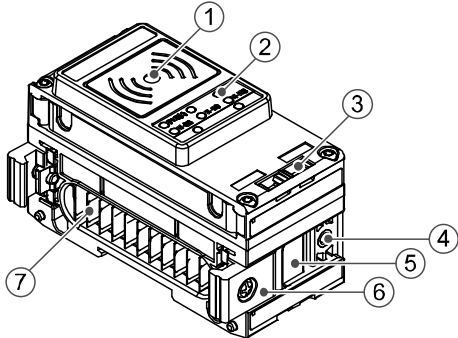
| No.	Item	Description
1	NFC antenna area	This area is for close contact with the NFC reader/writer. "O" marks the centre of the NFC antenna.
2	Status indication LED	LED display to indicate the unit status.
3	Marker groove	Marker (EX600-ZT1) can be mounted.
4	Valve plate mounting	Screw hole for mounting the valve plate.
5	Valve plate mounting groove	Groove to insert the valve plate.
6	Joint bracket	Bracket for mounting adjacent units.
7	Unit connector (plug)	Connector to transfer signals and power to the next unit.

4 Installation

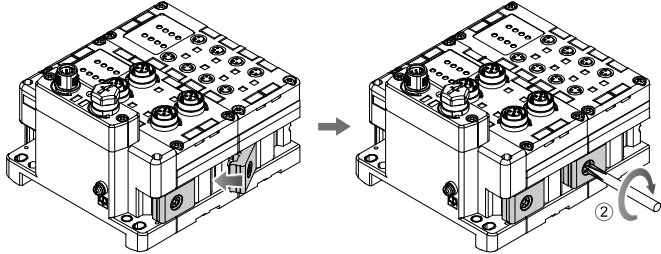## 4.1 Installation

> ⚠ **Warning**
> - Do not install the product unless the safety instructions have been read and understood.

- **Assembling the unit as a manifold**

(1) Connect a unit to the end plate.
Digital and analogue units can be connected in any order.
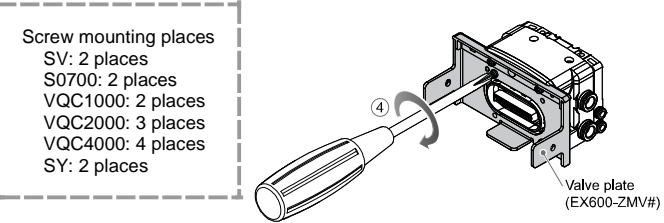(Tightening torque: 1.5 to 1.6 N•m)
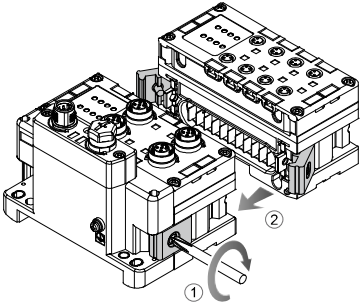
(2) Add more units.
Up to 9 units can be connected to one manifold.

(3) Connecting the wireless unit
After connecting the required I/O units, connect the wireless unit.

The connection method is as above.
(4) Mounting the valve plate. (Valve manifold not connected)
Mount the valve plate (EX600-ZMV*) to the valve manifold using the set screws (M3 x 8) provided with the product. (Tightening torque: 0.6 to 0.7 N•m)

Screw mounting places
SV: 2 places
S0700: 2 places
VQC1000: 2 places
VQC2000: 3 places
VQC4000: 4 places
SY: 2 places

Valve plate (EX600-ZMV#)

(5) Connect the wireless unit to the valve manifold.
Insert the valve plate into the valve plate mounting groove on the side of the wireless unit, and then fix both surfaces of the plate using the valve plate mounting screws (M4 x 6) provided with the product.
(Tightening torque: 0.7 to 0.8 N•m)

Valve plate mounting groove
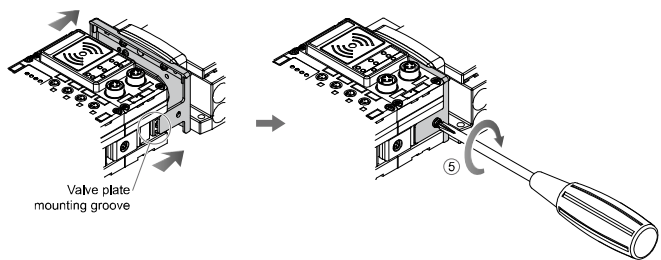
(6) When valve manifold is not connected.
Insert the end plate (EX600-EU1) into the valve plate mounting groove on the side of the wireless unit, and then fix both surfaces of the plate using the valve plate mounting screws (M4 x 6) provided with the product. (Tightening torque: 0.7 to 0.8 N•m)

4 Installation (continued)

End plate mounting groove
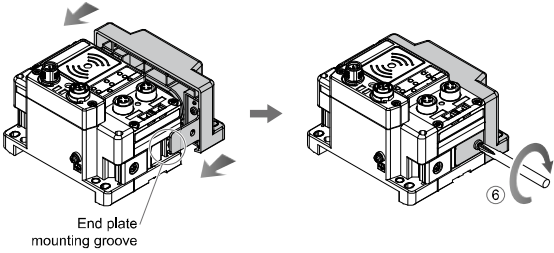
- **Direct mounting**
(1) When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB1) before mounting, using 2-M4 x 5 screws.
(Tightening torque: 0.7 to 0.8 N•m)

Intermediate reinforcing brace (EX600-ZMB1)
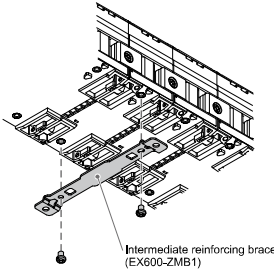
(2) Mount and tighten the end plate and the valve manifold (intermediate reinforcing brace if necessary) at one end of the unit. (M4)
(Tightening torque: 0.7 to 0.8 N•m)
Refer to the Operation Manual of the applicable valve manifold for the mounting method of the valve side.

- **DIN rail mounting**
(1) When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB2) for DIN rail 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 using 2-M4 x 14 screws.
(Tightening torque: 0.7 to 0.8 N•m) For the SY series, use the end plate bracket (EX600-ZMA3).

Intermediate reinforcing brace (EX600-ZMB2)

End plate bracket (EX600-ZMA2)
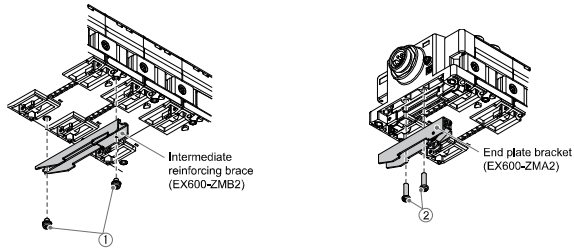
(3) Hook the DIN rail mounting groove on to the DIN rail.
(4) Press the manifold using its side hooked to the DIN rail as a fulcrum until the manifold is locked.
(5) Fix the end plate bracket (EX600-ZMA2) to the manifold using the M4 x 20 screws provided with the product. (Tightening torque: 0.7 to 0.8 N•m)
Refer to the Operation Manual of the applicable valve manifold on the SMC website (URL: https://www.smcworld.com) for the mounting method of the valve side.

DIN rail mounting groove

DIN rail

End plate bracket (EX600-ZMA2)
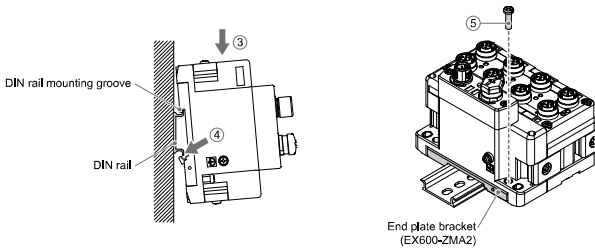
4 Installation (continued)

- **Mounting the marker**

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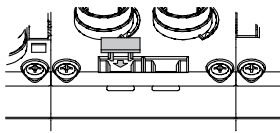
4.2 Wiring connections

- **Connector (Base only)**

This system is operated using power supplied from the EX600-ED# end plate. Refer to the end plate details for the power supply connection.

The base is connected to the upper level communication (EtherNet/IP™). The connection has 2 ports, PORT-1 and PORT-2, and both ports can connect to Ethernet.
The EtherNet/IP™ topology corresponds to star, line, tree and DLR (Device Level Ring).

- **Communication Connector**

M12 4-pin Socket D code

Connector		Pin No.	Signal name
PORT-1	PORT-2		
		1	TX+
		2	RX+
		3	TX-
		4	RX-

EtherNet connector of base

- **Power Supply Connector**

(1) EX600-ED2-#
PWR IN: M12 5-pin Plug B code

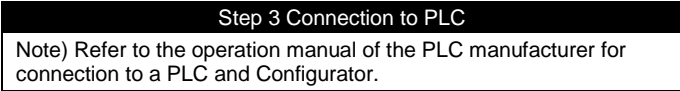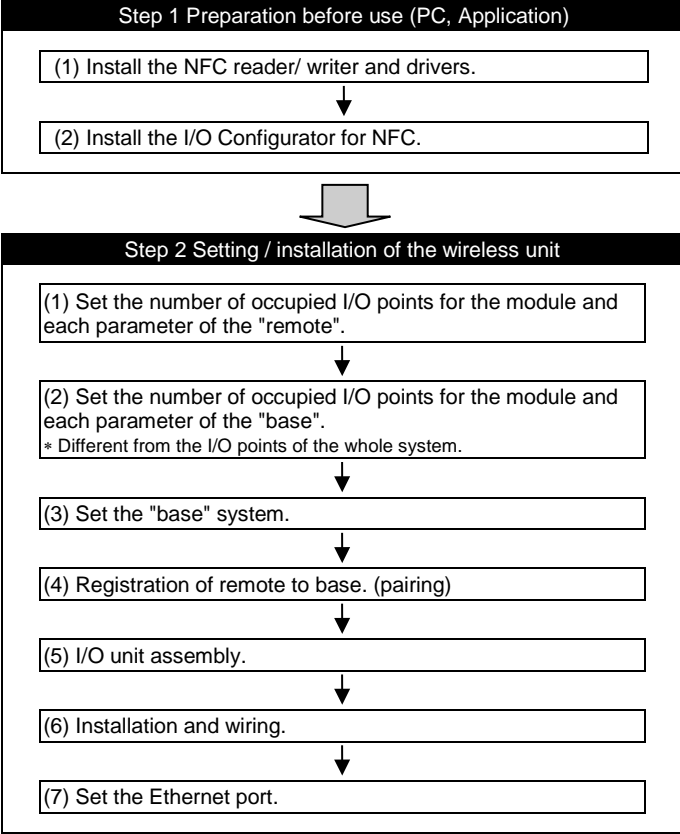| Configuration	Pin No.	Signal name
	1	24 V (Output)
	2	0 V (Output)
	3	24 V (Control and Input)
	4	0 V (Control and Input)
	5	F.E.

(2) EX600-ED3-#
PWR IN: 7/8 inch 5-pin Plug

Configuration	Pin No.	Signal name
	1	0 V (Output)
	2	0 V (Control and Input)
	3	F.E.
	4	24 V (Control and Input)
	5	24 V (Output)

(3) EX600-ED4-#
PWR IN: M12 4-pin Plug A code

Configuration	Pin No.	Signal name
	1	24 V (Control and Input)
	2	24 V (Output)
	3	0 V (Control and Input)
	4	0 V (Output)

PWR OUT: M12 5-pin Socket A code

Configuration	Pin No.	Signal name
	1	24 V (Control and Input)
	2	24 V (Output)
	3	0 V (Control and Input)
	4	0 V (Output)
	5	Not used

4 Installation (continued)

(4) EX600-ED5-#
PWR IN: M12 4-pin Plug A code

Configuration	Pin No.	Signal name
	1	24 V (Output)
	2	0 V (Output)
	3	24 V (Control and input)
	4	0 V (Control and input)

PWR OUT: M12 5-pin Socket A code

Configuration	Pin No.	Signal name
	1	24 V (Output)
	2	0 V (Output)
	3	24 V (Control and input)
	4	0 V (Control and input)
	5	Not used

4.3 Environment

> ⚠ **Warning**
> - Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
> - Do not use in an explosive atmosphere.
> - Do not expose to direct sunlight. Use a suitable protective cover.
> - Do not install in a location subject to vibration or impact in excess of the product's specifications.
> - Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.

5 Settings

- Flow chart for using the wireless system

Step 1 Preparation before use (PC, Application)

(1) Install the NFC reader/ writer and drivers.

(2) Install the I/O Configurator for NFC.

Step 2 Setting / installation of the wireless unit

(1) Set the number of occupied I/O points for the module and each parameter of the "remote".

(2) Set the number of occupied I/O points for the module and each parameter of the "base".
∗ Different from the I/O points of the whole system.

(3) Set the "base" system.

(4) Registration of remote to base. (pairing)

(5) I/O unit assembly.

(6) Installation and wiring.

(7) Set the Ethernet port.

Step 3 Connection to PLC

Note) Refer to the operation manual of the PLC manufacturer for connection to a PLC and Configurator.

With the above settings, it is possible to control the upper level controller.

Refer to the I/O Configurator for NFC operation manual and I/O Configurator (Web) operation manual on the SMC website (URL: https://www.smcworld.com) for details of the I/O Configurator.

6 LED Display

6.1 Base (EX600-WEN#)

LED	LED Colour	Operation
PWR (V)	Green LED ON.	Power supply voltage for output (US2) is normal.
	Red LED flashing	Power supply voltage for output (US2) is abnormal. Indication only. The product can be operated. (Power Supply voltage monitor (Output) is valid).
	OFF	Power supply for control and input (US1) is not supplied.
NS	Green LED ON	EtherNet/IP™ communication is established.
	Green LED flashing	EtherNet/IP™ communication is not established.
	Red LED flashing	EtherNet/IP™ communication time out.
	Red LED ON	Duplicated IP addresses are detected.
	OFF	IP address not set.
MS	Green LED ON	Base system status is normal.
	Green LED flashing	EtherNet/IP™ communication is not established.
	Red LED flashing	Restorable error is detected. (LED flashes when more than one diagnostic information item is detected). • Abnormal power supply voltage level for control and input (Power Supply voltage monitor (Control/Input) is valid) • Excessive I/O setting inputs/outputs • Analogue I/O upper and lower set limit exceeded • Analogue Input range upper and lower limit exceeded • Abnormal number of remote connections • Error in communication between units • EX600 I/O unit detects diagnostic information • Valve diagnostic information detected
	Red LED ON	Non restorable error is detected (e.g. hardware failure)
	OFF	Power supply for control and input (US1) is not supplied.
W-SS	Green LED ON	Received Radio wave intensity power level from all remote is 3
	Green LED flashing (1 Hz)	There are connected remote with received power level 2.
	Green LED flashing (2 Hz)	There are connected remote with received power level 1.
	Red LED flashing	No remote connected.
	OFF	Remote is not registered.

6 LED Display (continued)

LED	LED Colour	Operation
W-NS	Green LED ON	All remote are connected correctly.
	Green LED flashing	There are unconnected remote.
	Red LED flashing	All remote are unconnected.
	Red LED ON	All remote are unconnected. (non-restorable error in wireless communication)
	Red / Green	Wireless communication connection is under construction (Pairing)
	Orange LED ON	Forced output mode is ON
	OFF	Remote is not registered.
W-MS	Green LED ON	Remote status is normal.
	Red LED flashing	Restorable error is detected (LED flashes when more than one diagnostic information item is detected) • Abnormal power supply voltage level for control and input (US1) • Abnormal power supply voltage level for output (US2) • Excessive I/O setting inputs/outputs • Analogue I/O upper and lower set limit exceeded • Analogue Input range upper and lower limit exceeded • Error in communication between units • EX600 I/O unit detects diagnostic information • Valve diagnostic information detected
	Red LED ON	Non-restorable error is detected (e.g. hardware failure)
	OFF	No remote connected.
LINK / ACT1	Green LED ON	Link, No Activity (100 Mbps)
	Green LED flashing	Link, Activity (100 Mbps)
	Orange LED ON	Link, No Activity (10 Mbps)
LINK / ACT2	Orange LED flashing	Link, Activity (10 Mbps)
	Red LED ON	IP address has been duplicated.
	OFF	EtherNet/IP™ is not connected.

* If there are multiple conditions for LED ON / Flashing, the detailed information can be seen only when the setting of the diagnostic information is "Simple" or "Detailed".

6 LED Display (continued)

6.2 Remote (EX600-WSV#)

LED	LED Colour	Operation
PWR (V)	Green LED ON	Power supply voltage for output (US2) is normal.
	Red LED flashing	Power supply voltage for output (US2) is abnormal (Indication only. The product can be operated). (Power Supply voltage monitor (Output) is valid)
	OFF	Power supply for control and input (US1) is not supplied.
W-SS	Green LED ON	Received Radio wave intensity power level is 3.
	Green LED flashing (1 Hz)	Received power level is 2.
	Green LED flashing (2 Hz)	Received power level is 1.
	Red LED flashing	Wireless communication is not connected.
	OFF	Base is not registered.
W-NS	Green LED ON	Remote is connected correctly.
	Red LED flashing	No remote connected.
	Red LED ON.	No remote connected (non-restorable error in wireless communication)
	Red / Green	Wireless communication connection is under construction (Pairing)
	Orange LED ON	Forced output mode is ON
	OFF	Base is not registered.
MS	Green LED ON	Remote status is Normal.
	Red LED flashing	Restorable error is detected. (LED flashes when more than one diagnostic information item is detected). • Abnormal power supply voltage level for control and input (Power Supply voltage monitor (Control / Input) is valid) • Excessive I/O setting inputs / outputs • Analogue I/O upper and lower set limit exceeded • Analogue Input range upper and lower limit exceeded • Error in communication between units • EX600 I/O unit detects diagnostic information • Valve diagnostic information detected
	Red LED ON	Non-restorable error is detected (e.g. Hardware failure)
	OFF	Power supply for control and input (US1) is not supplied.

* If there are multiple conditions for LED ON / Flashing, the detailed information can be seen only when the setting of the diagnostic information is "Simple" or "Detailed".

Refer to the Operation manual on the SMC website (URL: https://www.smcworld.com) for further LED Display details.

7 How to Order

Refer to the Operation manual or catalogue on the SMC website (URL: https://www.smcworld.com) for How to Order information.

8 Outline Dimensions (mm)

Refer to the Operation manual or catalogue on the SMC website (URL: https://www.smcworld.com) for Outline dimensions.

9 Maintenance

9.1 General Maintenance

⚠ Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.
- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

- **Influence of radio frequency on implantable medical devices:**
The radio frequency generated by this product may give an adverse effect on implantable medical devices, such as implantable cardiac pacemakers and implantable cardioverter defibrillators. Please read catalogues or instruction manuals of the equipment and device which may be affected by radio frequencies for any instructions for use or contact their manufacturers.

10 Limitations of Use

10.1 Limited warranty and Disclaimer/Compliance Requirements
Refer to Handling Precautions for SMC Products.

11 Product Disposal

This product shall not be disposed of as municipal waste. Check your local regulations and guidelines to dispose of this product correctly, in order to reduce the impact on human health and the environment.

12 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor / importer.

SMC Corporation