

Installation & Maintenance Manual

SI unit - DeviceNet compatible

Series **EX120-SDN1**

EX121-SDN1

EX122-SDN1

EX124D/U-SDN1



EMC Directives

EN61000-6-2:2001

Electromagnetic Compatibility (EMC). Generic standards - Immunity for industrial environments.

EN55011 A1+A2:2001

Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical radio-frequency equipment and light industrial environments.

Safety Instructions

This manual contains essential information for the protection of users and others from possible injury and property damage. To ensure correct handling, please follow the instructions. Please check that you fully understand the meaning of the following messages (signs) before going on to read the text, and always follow the instructions.

Please read the Installation & Maintenance Manual of related apparatus and understand it before operating the unit.

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IMPORTANT MESSAGES

Read this manual and follow its instructions. Titles such as WARNING, CAUTION and NOTE, will be followed by important safety information which must be carefully followed.

⚠ WARNING

Indicates a potentially hazardous situation which could result in death or serious injury if you do not follow instructions.

⚠ CAUTION

Indicates a potentially hazardous situation which if not avoided, may result in minor injury or moderate injury.

NOTE

Gives you helpful information.

⚠ WARNING

Do not disassemble, modify (including change of printed circuit board) or repair.

An injury or failure can result.

Do not operate beyond specification range.

Fire, malfunction or damage can result.

Only use the unit after confirming the specification.

Do not use the product in the environment with possible presence of flammable, explosive or corrosive gas with the product.

Fire, explosion or corrosion can result. This unit does not have an explosion proof construction.

Safety Instructions (continue)

⚠ WARNING

These instructions must be followed when using the product in an interlocking circuit:

- Provide double interlocking by another system such as mechanical protection

- Check the product regularly to ensure proper operation

Otherwise a malfunction can cause an accident.

These instructions must be followed while carrying out maintenance work:

- Turn off the power supply

- Stop the supplied air, exhaust the residual pressure and verify the release of air before performing maintenance

Otherwise it can cause injury.

⚠ CAUTION

Perform a performance inspection after completing the maintenance check.

Please do not use if there is any error.

There is a possibility that safety cannot be assured due to unintentional malfunction.

Note

Follow the instructions given below when handling the unit.

Failure to follow instructions may damage the unit.

- Operate the unit within the specified voltage range.
- Leave space around the unit for maintenance.
- Do not remove labels.
- Do not drop, hit or apply excessive shock to the unit.
- Follow the specified tightening torque.

- Do not bend or apply tensile force to cables, or apply force by placing heavy load on them.
- Connect wires and cables correctly.
- Do not connect wires while the power is on.
- Do not lay wires or cables with power cable or high-voltage cable in the same wiring route.
- Verify the insulation of wiring.
- Take proper measurements against noise such as noise filter when the unit is incorporated in equipment or devices.
- Select the proper type of protection according to the environment of operation.
- Take sufficient shielding measures when installing at the following places.
 - (1) A place where noise due to static electricity is generated
 - (2) A place where electric field strength is high
 - (3) A place where there is radioactive irradiation
 - (4) A place near power line

- Do not use the unit close to a place where electric surges are generated.
- Use surge absorber built-in type unit when a surge-generating load such as a solenoid valve is driven directly.
- Prevent foreign matter such as remnant of wires from entering this product.
- Do not expose the unit to vibration and impact.
- Keep the specified ambient temperature range.
- Do not expose the unit to heat radiation from a heat source located nearby.
- Use a precision screwdriver with small flat blade when setting DIP switch.
- Close the cover over the DIP switch before power is supplied.
- Perform maintenance and check regularly.
- Perform a proper functional check.
- Do not clean the product with chemicals such as benzene and thinner.

Specification

General specification

Item	Specification				
Model	EX120-SDN1	EX121-SDN1	EX122-SDN1	EX124D-SDN1	EX124U-SDN1
Operating ambient temp.	0 to +55°C (with 8 points of valve ON) 0 to +50°C (with 16 points of valve ON)				
Operating ambient humidity	35 to 85% RH (No dew condensation)				
Storage ambient temp.	-20 to +60°C				
Vibration proof	50m/s ² (comply with JIS C 0911)				
Impact proof	100m/s ² (comply with JIS C 0912)				
Noise immunity	Normal mode : ±1500V Pulse 1us Common mode : ±1500V Pulse 1us Radiation : 1000V Pulse 1us				
Withstand voltage	1000V AC for 1min. between FG and external terminal package				
Insulation resistance	500V DC, 2MΩ between FG and external terminal package				
Operating environment	No corrosive gas and no dust				
Weight	110g or less	140g or less	130g or less	240g or less	
Protection class	IP20			IP65	

Electrical and Network

Item	Specification	
Applicable system	DeviceNet Release 2.0	
Power supply voltage for communication	11 to 25V DC (supplied by communication connector)	
Power supply voltage for solenoid valve	24VDC +10% -5%	
Consumption current	Communication and Internal power supply	
	90mA or less (DC24V)	
Power supply for solenoid valve	1.5A or less (DC24V)	
	Output style	NPN output (Open collector)
Solenoid valve connection	Connected load	
	DC24V, Solenoid valve with lamp-surge voltage protection circuit of 2.1W or less. (made by SMC)	
	Insulation type	Opt-coupler insulation type
Residual voltage	0.4V DC or less	
Network connection spec.	Applicable DeviceNet	
	Volume Release 1.2 Volume Release 1.1	
	MAC ID setting range	0 to 63(Set by Dip switch)
	Baud Rate (Transmission speed)	500kbps, 250kbps, 125kbps (Set by Dip switch)
	Slave (branch station) type	Group 2 only server
	Connection type	T branch type, Multi drop type
	Device type	16
	Product code	288
	Revision	Refer to EDS file
	Vendor ID	7
Corresponding message	Polled command(I/O message), Explicit message	

Wiring

Connection type

DeviceNet can be connected by T branch, Multi branch, Branch line branch and Multi drop. Total extension length of trunk and Branch line is different for different Baud rate and thickness of communication cable.

Length of cable

Communication distance	Baud rate	Total length of trunk	Length of branch line	Total length of branch line
Thick cable	500kbps	100m or less	6m or less	39m or less
	250kbps	250m or less		78m or less
	125kbps	500m or less		156m or less
Thin cable	Common	100m or less		
Terminal resistance	121Ω (1/2W)			

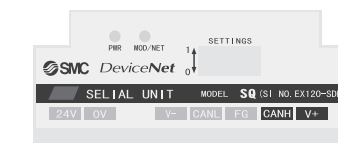
Cable specification

Item	Thick cable		Thin cable	
	Communication Signal	Power supply	Communication Signal	Power supply
Conductor cross section	0.82mm ²	1.65mm ²	0.20mm ²	0.33mm ²
Colors	Blue,White	Red,Black	Blue,White	Red,Black
Inpedance	120Ω±10% (1MHz)	-	120Ω±10% (1MHz)	-
Propagation delay	1.36ns/ft(max)	-	1.36ns/ft(max)	-
Attenuation rate	500k:0.25dB/ft 125k:0.13dB/ft 1.00M:0.40dB/ft	-	500k:0.50dB/ft 125k:0.29dB/ft 1.00M:0.70dB/ft	-
Conductor resistance	6.9Ω/1000ft(max)	3.6Ω/1000ft(max)	28Ω/1000ft(max)	17.5Ω/1000ft(max)

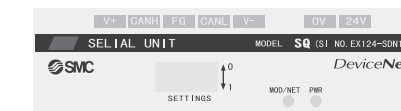
Names and Functions of Individual Parts

LED indication

EX120-SDN1
EX121-SDN1
EX122-SDN1



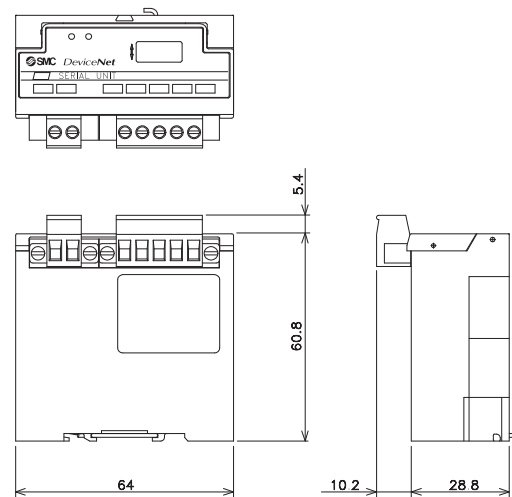
EX124D-SDN1
EX124U-SDN1



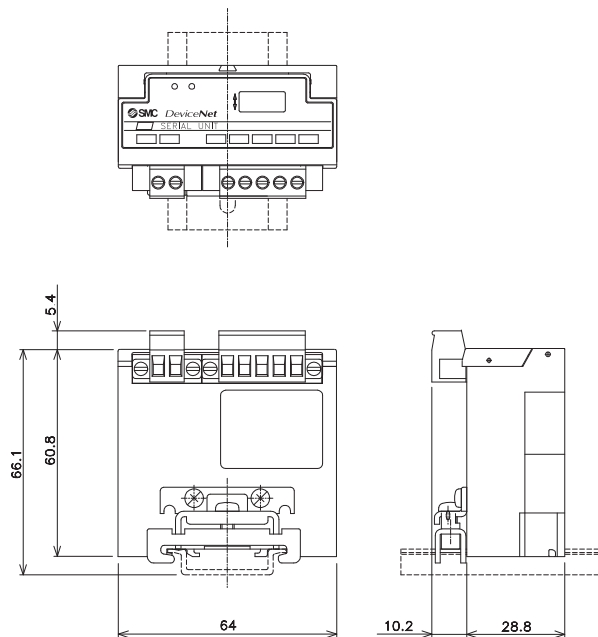
Indication	Contents	
PWR	Green LED is ON when power for DeviceNet line is supplied.	
MOD-NET	LED is OFF	SI unit is not on line or power supply for communication line is not turned on.
	Green LED flashing	Waiting for connection(ON line)
	Green LED is ON	Connection completed(ON line)
	Red LED flashing	Connection time out (Minor communication error)
	Red LED is ON	MAC ID duplication error or BUS OFF error (Major communication error)

Outline Dimensions (in mm)

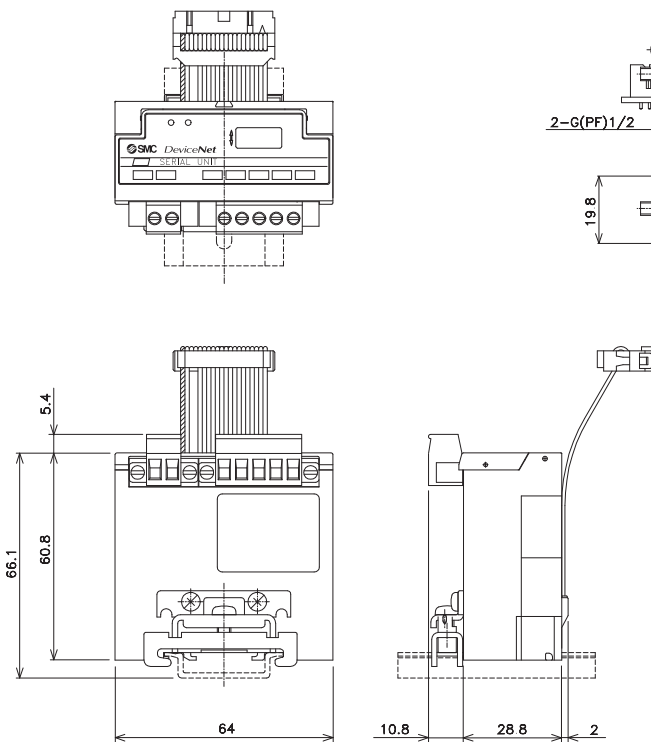
EX120-SDN1



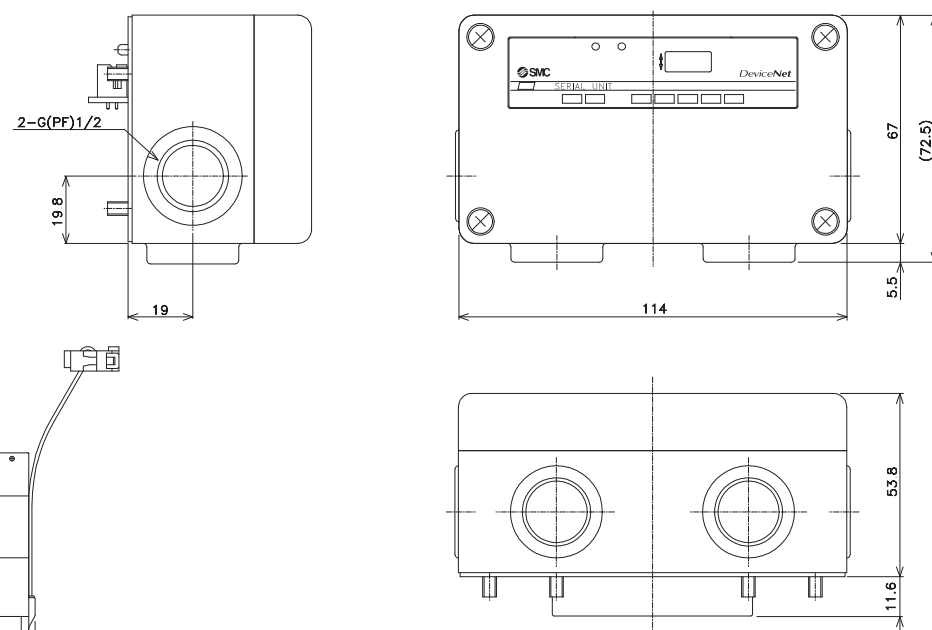
EX122-SDN1



EX121-SDN1

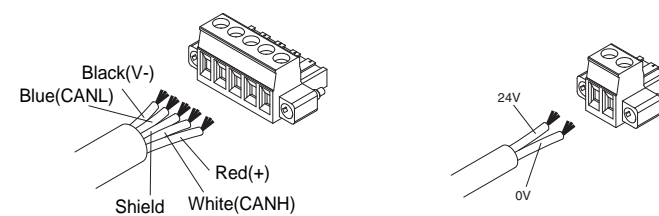


EX124D/U-SDN1



SW Setting

Wiring of cable for solenoid valve power supply and communication



Communication connector for DeviceNet

Terminal	Wire color	Connected to
V-	Black	(-) side of power supply cable
CANL	Blue	Low side of communication cable
FG	-	Ground / Shield
CANH	White	High side of communication cable
V+	Red	(+) side of power supply cable

Power supply connector for solenoid valve

Terminal	Wire color	Connected to
24V	-	(+) side of solenoid valve source supply
0V	-	(-) side of solenoid valve source supply

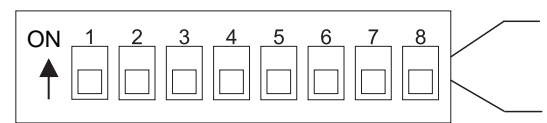
CAUTION

- Before wiring, be sure to turn power supply off.
- Screw for connectors is M3. Tighten them properly to torque of 0.5 to 0.6 [N•m].
- SI unit does not provide monitoring of power supply for solenoid valve.
- Do not route cable specified for DeviceNet with/near high voltage lines or strong electric lines such as drive lines.

Address setting

Before setting of address by DIP switch, turn the power supply for communication cable of SI unit "OFF". Setting (binary) of following items is available by DIP switch installed inside of the cover.

- 1) Node address setting(00 to 63)
 - 2) Communication speed (125kbps,250kbps,500kbps)
- Refer to the following table for corresponding between DIP switch and each setting in each bit.



<Setting of node address>

Node address	SW1	SW2	SW3	SW4	SW5	SW6
1	2	4	8	16	32	
#0	0	0	0	0	0	0
#1	1	0	0	0	0	0
#2	0	1	0	0	0	0
...						
#62	0	1	1	1	1	1
#63	1	1	1	1	1	1

<Setting of communication speed>

Setting	SW7	SW8	Communication speed (kbps)	Max. transmission distance(m)		
				Length of trunk	Length of branch line	Total length of branch line
	0	0	125	500		156
	1	0	250	250	100	78
	0	1	500	125		39
	1	1	Not used	Not used		

CAUTION

- When shipped, node address of 63 and communication speed of 125kbps are set in advance.
- When communication error occurs, output condition is cleared.

Error display function

MOD/NET LED	Cause & Countermeasure
LED is OFF	<p>PWR LED is OFF <Countermeasure> Confirm that power for SI unit circuit is supplied. Confirm correct wiring. If above countermeasures do not improve status, please exchange SI unit.</p> <p>PWR LED is OFF <Countermeasure> Confirm that baud rate is set correctly. If MOD/NET LED is OFF despite baud rate being set correctly, exchange SI unit.</p>
Green Flashing	<p>Connection waiting Shows communication waiting status between SI unit and master. <Countermeasure> Confirm master is operating correctly. If using scan list, ensure slave is recorded to scan list correctly.</p>
Red Flashing	<p>Communication wire disconnected error <Countermeasure> Confirm communication wire is not disconnected. <Remark> Red flashing if master power source is turned off during communication.</p>

Red LED is ON	<p>Node address overlapping error <Countermeasure> Confirm there is no overlapping on the node address.</p> <p>BUS OFF error Detects communication error. <Countermeasure> Case 1 Communication error due to noise. Confirm there is no component or high voltage cable that generate noise around communication wire. Make some distances between communication wire and noise source. Case 2 Communication cable problem. Confirm terminal resistance (121ohm) is connected to both ends of communication wire.</p> <p>If red MOD/NET LED is still ON in spite of above countermeasures. exchange SI unit.</p>
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CAUTION

When red MOD/NET LED is ON, even if cause is solved, SI unit does not auto-recover. In this case, please reset the power to SI unit circuit(Communication/Internal power supply). SI unit does not provide monitoring of power supply for solenoid valve.

☐ To inquire about the product, please contact the following.

SMC Corporation

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

- Phone
- | | |
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| AUSTRIA / (43) 2262-62 280 | ITALY / (39) 02-92711 |
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