EX250-TFL01GB

SMC

Installation & Maintenance Manual

SI unit-CANopen compatible

Type EX250-SCA1A

CE

Safety Instructions

The unit and this manual contain essential information to protect users and others from possible injury and property damage and to ensure correct handling.
Please confirm that you fully understand the meaning of the following messages (signs) before reading the text, and always follow the instructions.
Please read the Installation & Maintenance Manual for related apparatus and understand it before operating the actuator.

IMPORTANT MESSAGES	
Read this manual and follow the instructions. Signal words such as WARNING, CAUTION and NOTE, will be followed by important safety information that must be reviewed carefully.	
⚠ 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	Provides 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 outside of the specification range.
Fire, malfunction or damage can result.
Please use it after confirming the specification.

Do not use the product in environments with possible-presence of flammable, explosive or corrosion gas.
Otherwise fire, explosion or corrosion can result.
The product is not designed to be explosion proof.

Do not apply voltages exceeding 250V between a lead wire and a metal fitting.
Pay attention to perform an insulation test because it could damage the insulation of the lead wire and cause failure.

These instructions must be followed when using the product in an interlocking circuit:
.Provide double interlocking through another system such as mechanical protection.
.Check the product regularly to ensure proper operation.
Otherwise malfunction can cause an accident.

These instructions must be followed when performing maintenance work:
.Turn off the power supply
.Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance work.
Otherwise it can cause injury.

Safety Instructions (continued)

⚠CAUTION

Perform a proper functional check after completing maintenance work.
Stop operation when an abnormality is observed or the product is not working properly.
Safety cannot be assured due to unexpected malfunctions.

NOTE

The direct-current power supply should be a UL authorized power supply.
1.Limited voltage current circuit in accordance with UL508
A circuit to which power is supplied by the secondary coil of a transformer that meets the following conditions.
·Max. voltage(with no load): less than 30Vrms(42.4V peak)
·Max. current:(1)less than 8A(including when short circuited)
(2)limited by circuit protector (such as fuse) with the following ratings

No load voltage (V peak)	Max.current rating (A)
0 to 20 [V]	5.0
Above 20 to 30 [V]	100 / peak voltage

2.UL1310 compatible class 2 power supply unit or circuit of max. 30Vrms (42.4V peak) or less using a UL1585 compatible class 2 transformer as power supply. (Class 2 circuit)

Follow the instructions given below when handling the product.
Failure to follow instructions may damage the unit.
·Operate the product within the specified voltage range.
·Reserve a space around the unit for maintenance.
·Do not remove labels.
·Do not drop, hit or apply excessive shock to the product.
·Do not bend or apply tensile force to cables, or apply a force by placing a 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 the same wiring route as a power line or high-voltage line.
·Verify the insulation of the wiring.
·Take proper measures against noise such as a noise filter when the product is incorporated in equipment or devices.
·Select an operation environment according to enclosure(IP67).
·Take sufficient shielding measures when installing the product at the following place.
(1)A place where a noise due to static electricity etc. is generated
(2)A place of high electric field strength
(3)A place possibly exposed to radioactivity
(4)A place near power cable
·Do not use the product nearby a place where an electric surge is generated.
·Use the product equipped with a surge absorber when a surge-generating load such as a solenoid valve is driven directly.
·Prevent foreign matter such as remnant of wires from entering the product.
·Do not expose the product to vibration and impact.
·Keep the specified ambient temperature range (-10 to +50ºC).
·Do not expose the product to heat radiation from a heat source located nearby.
·Use a precision screw driver with small flat blade when setting rotary switch and DIP switch.
·Perform maintenance and check at regular intervals.
·Perform a proper functional check.
·Do not use the product with chemicals such as benzine and thinner.

Specification

General specification

Item	Specification
Operating ambient temp.	-10 to +50ºC
Operating ambient humidity	35 to 85% RH (No dew condensation)
Storage ambient temp.	-20 to +60ºC
Vibration proof	10 to 57Hz 0.35mm (Constant amplitude) 57 to 150Hz 50m/s² (Constant acceleration)
Impact proof	100m/s² (peak), 11ms x three times in each direction ± X, Y and Z
Noise immunity	Normal mode : ±1500V Pulse duration 1us Common mode : ±1500V Pulse duration 1us Radiation : ±1000V Pulse duration 1us
Withstand voltage	500V AC for 1min.
Insulation resistance	500V DC min 10M ohm
Operating environment	No corrosive gas and no dust
Weight	About 250g
IP protection	IP67

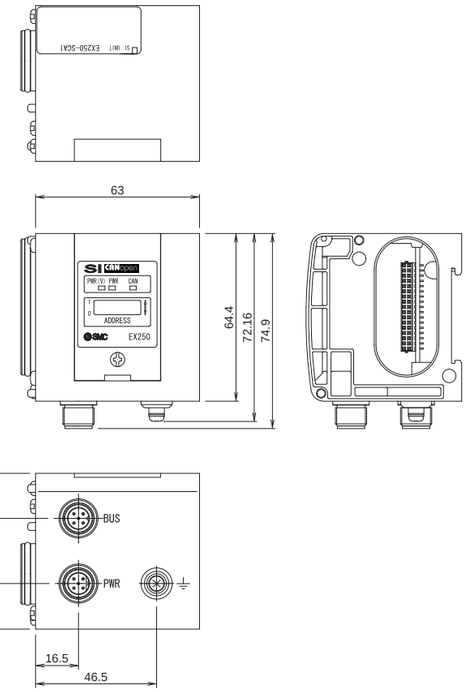
Electrical and network specifications

Item		Specification
Applicable system		CANopen CiA DS-301 V4.02 and CiA DS-401
Power voltage range Current consumption	Power for SI unit Current consumption	18 to 30V DC (24VDC typical.) 100mA or less
	Power for Input Block Current consumption	19.2 to 28.8V DC Depending on the number of Input Block stations and sensor specifications. Max 1.0A or less
	Power for solenoid valve Current consumption	22.8 to 26.4V DC Depending on the number of solenoid valve stations and specifications. Max 2.0A or less
Solenoid valve connection spec.	Output type	P-ch MOS-FET Open drain type
	Connection load	Solenoid valve with protection circuit for 24V DC and 1.5W or less surge voltage. (made by SMC)
	Insulation type	Opto coupler type
Residual voltage		0.3V DC or less
Node-ID setting range		1 to 63 (1 to 127 at the SW mode)
Baudrate setting range (Transmission speed)		1000k,800k,500k,250k,125k,50k, 20k,10kbps
COB-Identifier		11bit ID(CAN2.0A)
Input /Output		32 points/32 points

Applicable solenoid valve series

Valve type	Valve Series
VQC series	VQC1000, VQC2000, VQC4000
SV series	SV1000, SV2000, SV3000

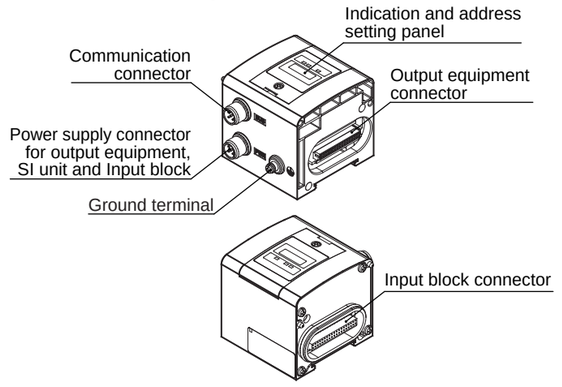
Outline with Dimensions (in mm)



Names and Functions of Individual Parts

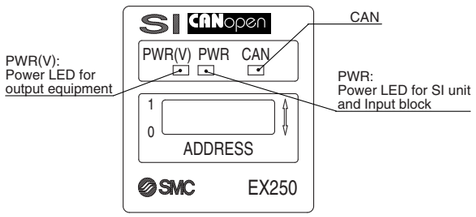
Body

· Communication connector
To send and receive communication signals through CANopen line.
To receive the power supply for SI unit.
· Power supply connector for output equipment, Input block
To supply power to the output equipment such as a solenoid valve, and output block, Input block.
· Output equipment connector
To connect the output equipment such as a solenoid valve and output block.
· Input block connector
To connect the Input block.
· Indication and address setting panel
To provide LED's to indicate the condition of the unit, and the setting of address and HOLD/CLEAR functions.
· Ground terminal
To be connected to the ground.



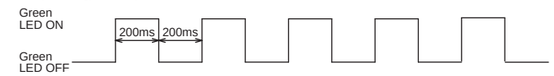
Names and Functions of Individual Parts (continued)

LED indication

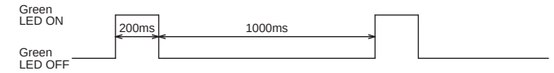


Indication	Contents	
PWR (V)	Green Light ON	When power for solenoid valves and output equipment is supplied
PWR	Green Light ON	When power for CANopen line, SI unit and input blocks is supplied
CAN	Green Light ON	When SI unit is in the Operational state
	Green Light (flashing)	SI unit is in the Pre-Operational state
	Green Light (single flash)	Single flash when SI unit is in Stopped state
	Red Light (single flash)	Single flash when CAN controller error occurs
	Red Light (double flash)	Double flash when Error Control Event occurs
	Green / Red Light (flashing)	Flashing when SI unit is in Configuration mode (LSS services)
	Red Light ON	SI unit is in “Bus OFF” state

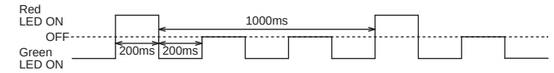
Green (Flashing) : Pre-Operational State



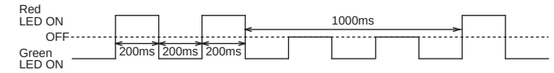
Green (Single Flash) : Stopped State



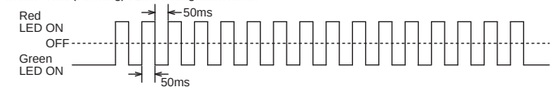
Red (Single Flash) : CAN Contoroller Error



Red (Double Flash) : Error Control Event



Green / Red (Flashing) : LSS Configration Mode

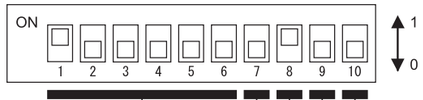


LED Indication of SI unit is based on CANopen Specification (CANopen Spec.DR-303-3).
Refer to DR-303-3 Indicator Specification for details.

SW Setting

Address setting

When DIP switch is to be set, turn OFF power supply to SI unit.



Setting of Node-ID

Node-ID	SW1	SW2	SW3	SW4	SW5	SW6
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

Set SW7 to 0. (SW7 is not used.)

Set SW8 to 1.(fixed)

Setting of output when communication stops

SW9	Output condition of solenoid valve when an error occurs (Error Control ,Emergency Object) or Fault message is received.
0	Output Value shall take the pre-defined condition specified in Error Value Output Object (6207h,6307h,6327h) Default: all outputs are cleared.
1	Output Value shall be kept.

Setting of mode

SW10	Mode
0	HW mode. Setting of Node-ID is achieved by DIP switches SW1-6.
1	SW mode. Setting of Node-ID is achieved through net work. SW1-8 become unavailable. Node-ID can be set up to 127. Default is 127 (7Fh).

Baud Rate

The baud rate can be set in the HW mode using the following methods: -

Method of re-setting to default baud rate (125kbps)

1) Turn off the power supply (for CANopen line) and set Node-ID to 0 with DIP switches SW1-6.
2) The CAN LED will flash RED for five seconds at the frequency of 2Hz when the power supply to the SI unit is restored.
3) The baud rate is set to 125kbps and the CAN LED illuminates green and red alternately (2Hz).
4) Turn off the power supply, set Node-ID, and turn on the power supply again.
5) The CAN LED illuminates (GREEN). The SI units state of communication is standby (When SI unit is stand by mode Pre-operational).

Method of setting baud rate to value within CiA specification

1) Turn OFF the power supply (for CANopen line) and set Node-ID to 0 with DIP switches SW1-6.
2) The CAN LED will flash RED for five seconds at the frequency of 2Hz when the power supply to the SI unit is restored.
3) Set DIP switch SW6 to 1 while the CAN LED is flashing (within five seconds).
4) The Flashing CAN LED stops (CAN LED is off). Set the baud rate with DIP switches SW1-4 within ten seconds according to the following table.

Baud Rate (continued)

Baud rate Table

DIP switches SW1-4 setting	0	1	2	3	4	5	6	7	8
Baud rate (kbps)	1000	800	500	250	125	-	50	20	10

The CAN LED illuminates RED when an invalid combination is set with DIP switches SW1-4.

<Example: If the baud rate of the SI unit is set to 500kbps.>

Because the baud rate is 500kbps, DIP switches SW1-4 setting is 2. i.e. SW1 = 0 , SW2 = 1 , SW3 = 0 and SW4 = 0

5) The CAN LED flashes RED for two seconds at the frequency of 1Hz when the setting is successful.
6) After that, the CAN LED flashes RED for five seconds at a frequency of 5Hz to acknowledge the end of the setting procedure.
7) The CAN LED illuminates GREEN and RED alternately (at the frequency of 2Hz).
8) Turn OFF the power supply, set the Node-ID, then turn ON the power supply again.
9) The CAN LED will illuminate GREEN. The SI units state ofcommunication is standby (Pre-operational mode).

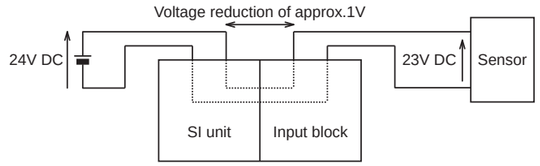
Wiring

Wiring of power supply

The Power supply connection inside the unit has individual power supplies for solenoid valve actuation (SV power supply) and for Control parts and Sensor (SW power supply). Supply 24V DC for each of them. Either single or dual power supply is available. Wiring is not necessary for SW power supply when no Input Blocks are used.

Power for a sensor is supplied to the sensor connected to an Input Block. There will be a voltage drop of up to approx. 1V inside the SI unit, therefore select a sensor which will operate with the resultant voltage.

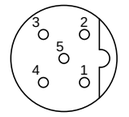
If a sensor requires 24V, it is necessary to lower power supply voltage for sensor slightly or secure a power supply for sensor separately without going through the SI unit so that sensor input voltage can be 24V with actual loading (allowable voltage of sensor power supply: 19.2V to 28.8V).



Wiring (continued)

Power supply connector

Power supply connector M12 male 5pins reverse key type

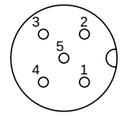


No.	Description	Function
1	SV 24V	+24V for solenoid valve.
2	SV 0V	0V for solenoid valve
3	SW 24V	+24V for sensor input
4	SW 0V	0V for sensor input
5	E	Earth

(Female connector cable: WAKW4.5T-2 TURCK Co. ,etc.)

Communication connector

Communication connector M12 male 5pins

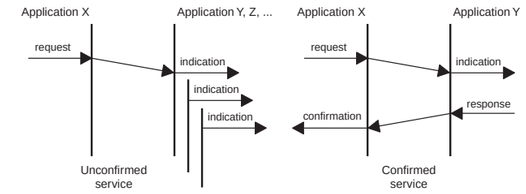


No.	Description	Function
1	CAN_SHLD	Shield
2	CAN_V+	Power supply + for CANopen
3	CAN_GND	Power supply - for CANopen
4	CAN_H	CAN_H bus line (dominant high)
5	CAN_L	CAN_L bus line (dominant low)

(Female connector cable: M12 female 5pins cable with shield (according to ISO11898))

⚠CAUTION

It is the responsibility of the machine builder to make sure that the machine operates correctly.
CANopen units from different manufacturers have different ability (minimum message interval) respectively.
The machine builder should consider the differences in the ability.
The method (confirmed service) of sending the following request after receiving the response to the request is recommended to ensure correct communication.
When using the method (unconfirmed service) of sending the following request without receiving a response to the request, if the request exceeding the processing performance of the unit is sent, it cannot be received.
Please confirm the normal operation beforehand when an SMC CANopen unit is used in your machine.
Please consult with SMC when there is a problem.



□To enquire about the product, please contact the following:

Contact

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