No. EX##-OMO1009

Operation Manual

SI Unit

PRODUCT NAME

EX245-SPR1-X171

MODEL / Series

Digital Input Module

PRODUCT NAME

EX245-DX1-X36

MODEL / Series

Digital Output Module

PRODUCT NAME

EX245-DY1-X37

EX245-DY2-X37

MODEL / Series

Analog Input Module

PRODUCT NAME

EX245-AX2-X38

MODEL / Series

SMC Corporation

Contents

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), Japan Industrial Standards (JIS)[*1)] and other safety regulations[*2)].

*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 10218-1992: Manipulating industrial robots -Safety.
JIS B 8370: General rules for pneumatic equipment.
JIS B 8361: General rules for hydraulic equipment.
JIS B 9960-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)
JIS B 8433-1993: Manipulating industrial robots - Safety.
etc.

*2) Labor Safety and Sanitation Law, etc.

⚠ **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

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

⚠ Caution

1. The product is provided for use in manufacturing industries.
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered.*3)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*3) Vacuum pads are excluded from this 1 year warranty.
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

When the product is exported, strictly follow the laws required by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Law).

Operator

- This operation manual has been written for those who have knowledge of machinery and apparatus that use pneumatic equipment and have full knowledge of assembly, operation and maintenance of such equipment.
- Please read this operation manual carefully and understand it before assembling, operating or providing maintenance to the product.

■Precautions

⚠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

■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 Serial System.
Individual grounding should be provided close to the product with a short cable.

■NOTE

○Follow the instructions given below when designing, selecting and handling the product.

•The instructions on design and selection (installation, wiring, environment, adjustment, operation, maintenance, etc.) described below must also be followed.

.Product specifications

•Use the specified voltage.

Otherwise failure or malfunction can result.

•Reserve a space for maintenance.

Allow sufficient space for maintenance when designing the system.

•Do not remove any nameplates or labels.

This can lead to incorrect maintenance, or misreading of the operation manual, which could cause damage or malfunction to the product.

It may also result in non-conformity to safety standards.

•Product handling

.Installation

•Do not drop, hit or apply excessive shock to the fieldbus system.

Otherwise damage to the product can result, causing malfunction.

•Tighten to the specified tightening torque.

If the tightening torque is exceeded the mounting screws may be broken.

IP65 protection cannot be guaranteed if the screws are not tightened to the specified torque.

•Never mount a product in a location that will be used as a foothold.

The product may be damaged if excessive force is applied by stepping or climbing onto it.

.Wiring

•Avoid repeatedly bending or stretching the cables, or placing heavy load on them.

Repetitive bending stress or tensile stress can cause breakage of the cable.

•Wire correctly.

Incorrect wiring can break the product.

•Do not perform wiring while the power is on.

Otherwise damage to the fieldbus system and/or I/O device can result, causing malfunction.

•Do not route wires and cables together with power or high voltage cables.

Otherwise the fieldbus system and/or I/O device can malfunction due to interference of noise and surge voltage from power and high voltage cables to the signal line.

Route the wires (piping) of the fieldbus system and/or I/O device separately from power or high voltage cables.

•Confirm proper insulation of wiring.

Poor insulation (interference from another circuit, poor insulation between terminals, etc.) can lead to excess voltage or current being applied to the product, causing damage.

•Take appropriate measures against noise, such as using a noise filter, when the fieldbus system is incorporated into equipment.

Otherwise noise can cause malfunction.

.Environment

- Select the proper type of protection according to the environment of operation.
  IP65 protection is achieved when the following conditions are met.
  (1) Connectors that are not used must be closed with covering caps.
  (2) All covering caps must be screwed down correctly after wiring and setting has been completed.
  (3) Apply the recommended tightening torque and all manifold parts must be installed correctly.
  If using in an environment that is exposed to water splashes, please take measures such as using a cover.
  If the product is to be used in an environment containing oils or chemicals such as coolant or cleaning solvent, even for a short time, it may be adversely affected (damage, malfunction etc.).
- Do not use in a place where the product could be splashed by oil or chemicals.
  If the product is to be used in an environment containing oils or chemicals such as coolant or cleaning solvent, even for a short
  time, it may be adversely affected (damage, malfunction etc.).
- Do not use the product in an environment where corrosive gases or fluids could be splashed.
  Otherwise damage to the product and malfunction can result.
- Do not use in an area where surges are generated.
  If there is equipment which generates a large amount of surge (solenoid type lifter, high frequency induction furnace, motor, etc.) close to the fieldbus system, this may cause deterioration or breakage of the internal circuit of the fieldbus system. Avoid sources of surge generation and crossed lines.
- When a surge-generating load such as a relay or solenoid is driven directly, use an fieldbus system with a built-in surge absorbing element.
  Direct drive of a load generating surge voltage can damage the fieldbus system.
- The product is CE marked, but not immune to lightning strikes. Take measures against lightning strikes in the system.
- Prevent foreign matter such as remnant of wires from entering the fieldbus system to avoid failure and malfunction.
- Mount the product in a place that is not exposed to excessive vibration or impact.
  Otherwise failure or malfunction can result.
- Do not use the product in an environment that is exposed to temperature cycle.
  Heat cycles other than ordinary changes in temperature can adversely affect the inside of the product.
- Do not expose the product to direct sunlight.
  If using in a location directly exposed to sunlight, shade the product from the sunlight.
  Otherwise failure or malfunction can result.
- Keep within the specified ambient temperature range.
  Otherwise malfunction can result.
- Do not operate close to a heat source, or in a location exposed to radiant heat.
  Otherwise malfunction can result.

.Adjustment and Operation

- Set the switches by using a sharp-pointed screwdriver etc.
  It may damage set switches.
- Perform settings suitable for the operating conditions.
  Incorrect setting can cause operation failure.
- Please refer to the PLC manufacturer's manual etc. for details of programming and addresses.
  For the PLC protocol and programming refer to the relevant manufacturer's documentation.

.Maintenance

- Turn off the power supply, stop the supplied air, exhaust the residual pressure and verify the release of air before performing maintenance.
  There is a risk of unexpected malfunction.
- Perform regular maintenance and inspections.
  There is a risk of unexpected malfunction.
- After maintenance is complete, perform appropriate functional inspections.
  Stop operation if the equipment does not function properly.
  Otherwise safety is not assured due to an unexpected malfunction or incorrect operation.
- Do not use solvents such as benzene, thinner etc. to clean the SI unit and the each module.
  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.

2. Product Summary

2.1. Features

SI Unit

The SI (Serial Interface) Unit represents a PROFINET IO-device for SMC pneumatic valves. It is designed for digital and analogue data control by connecting compatible EX245 modules and for use within rugged industrial environments, especially automotive plants. The SI Unit has the following properties:

(1) IP65 protection
(2) Two M12 connectors (4 pins socket / D-coded) for PROFINET IO connection and one 7/8 inch connector (5 pins plug) for the power supplies
(3) Up to 32 solenoid valves
(4) Up to 128 digital inputs
(5) Up to 64 digital outputs independent of solenoid valves
(6) Up to 8 modules (limited by the total current consumption)
(7) Integrated diagnostic and protection function
(8) Galvanically isolated all power supplies
(9) Free module configuration
(10) Flexible power supply combination

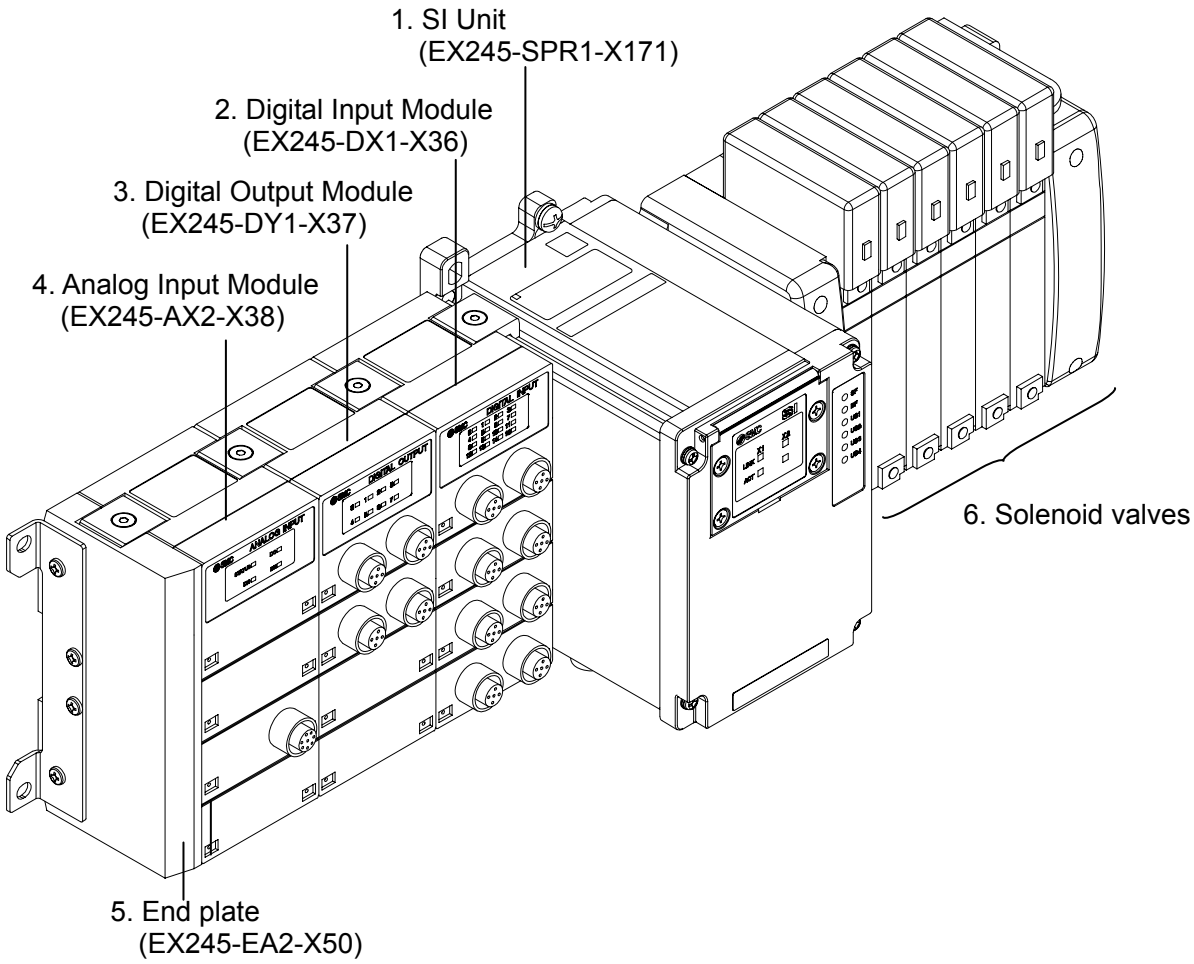
Corresponding solenoid valve manifolds

- VQC1000 / 2000 / 4000
- SV1000 / 2000 / 3000
- VSS8-2 / 8-4, VSR8-2 / 8-4

Compatible EX245 modules

- Digital Input Module : EX245-DX1-X36 (16 digital inputs)
- Digital Output Module : EX245-DY1-X37 (8 digital outputs)
- Digital Output Module : EX245-DY2-X37 (8 digital outputs with additional supply for the loads)
- Analog Input Module : EX245-AX2-X38 (1 channel analogue input, 2 digital inputs and 1 digital output)

2.2. Structure



No.	Components	Function
1	SI Unit	Fieldbus, valve interface and supply voltage to modules
2	Digital Input Module	Supply voltage to sensors and input digital data
3	Digital Output Module	Output to electric loads
4	Analog Input Module	Supply voltage to analogue sensors and input digitized data
5	End plate	End plate of module
6	Solenoid valves	Operate pneumatic devices

Fig. 2-1 System structure

3. General Specifications

Table. 3-1 EX245 series general specifications

Item	Specification
Rated voltage	24 V DC
Allowable instantaneous electrical stop	1 ms or less
Protection class	IP65 (when fully installed or fitted with protective cover) (complies with IEC 60529)
Applicable standard	CE Marking (complies with EMC directive (2004/108/EC) EN 61000-6-2/2005, EN 55011/1998+A1+A2)
Withstand voltage	500 VAC 1 min. (between FE and all accessible terminals)
Insulation resistance	10 MΩ or more (500 V DC is given between FE and all accessible terminals)
Ambient temperature	Operation: -10 °C to 50 °C Storage: -20 °C to 60 °C
Ambient humidity	35% to 85% RH (non-condensing)
Vibration resistance	10 Hz to 57 Hz (constant amplitude) 0.75 mm 57 Hz to 150 Hz (constant acceleration) 49 m/s^2 2 hours for each direction X, Y and Z
Impact resistance	147 m/s^2 is given 3 times for each direction X, Y and Z
Operating environment	No corrosive gas

4. Power Supply Concept

4.1. Power distribution

In the EX245 product series, the supply for the logic / sensors “US1” and the supply for the valves / loads “US2” provide the connected modules and the valve coils via the SI Unit. When a module with an additional supply for the loads “US3, US4, etc.” connector is inserted into the manifold, it interrupts the previous supply for the loads and provides an additional supply for the loads to the modules down the line. All supplies are isolated electrically and can be switched independently.

Example

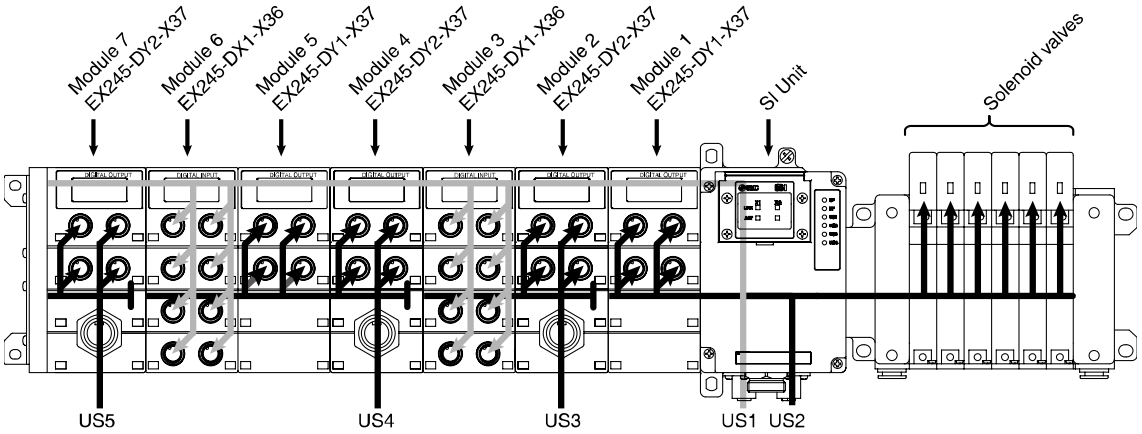


Fig. 4-1 Diagram of power supply concept (example)

- SI unit provides US1 and US2.
- Module 1 is operated by US2.
- Module 2 interrupts US2 and provides US3.
- Module 4 interrupts US3 and provides US4.
- Module 5 is operated by US4.
- Module 7 interrupts US4 and provides US5.
- All digital / analogue input modules (Module 3 and Module 6 in this case) are operated by US1.
- US1: 6 A max.
- US2: 4 A max.
- US3 to US5: 4 A max.
- Galvanically isolated supplies (US1 to US5).

4.2. Under-voltage detection

4.2.1. LED indicator

US1 indicator shows the status of the supply for the logic / sensors. US2 indicator shows the status of the supply for the valves / loads. US3 indicator shows the status of the first additional supply for the loads (US3). US4 indicator shows the status of all the additional supplies for the loads excluding the first one (US4, US5, etc.) in common.

Example

Refer to Fig4.1, page-13.

- If US3 to US5 supplies are above the permissible level, US3 and US4 indicators turns ON.
- If US3 and US4 supplies are above the permissible level and US5 supply is below the permissible level but above the dropout level, US3 indicator turns ON and US4 indicator flashes.
- If US3 and US4 supplies are above the permissible level and US5 supply is below the dropout level, US3 indicator turns ON and US4 indicator turns OFF.

4.2.2. Diagnostic data

“General diagnostics 1” byte shows under-voltage detection.
“US1 Diagnostics” bit shows under-voltage detection of the supply for the logic / sensors.
“US2 Diagnostics” bit shows under-voltage detection of the supply for the valves / loads.
“US3 Diagnostics” bit shows under-voltage detection of the first additional supply for the loads (US3).
“US4 Diagnostics” bit shows under-voltage detection of all the additional supplies for the loads excluding the first one (US4, US5, etc.) in common.

Example

Refer to Fig.4.1, page-13.

- If US3 to US5 supplies are above the permissible level, “US3 / US4 Diagnostics” bits are assigned “0”.
- If US3 and US4 supplies are above the permissible level and US5 supply is below the permissible level but above the dropout level, “US3 Diagnostics” bit is assigned “0” and “US4 Diagnostics” bit is assigned “1”.

5. Valve Manifold

The EX245 product series can use the following valve manifolds:

- VQC1000 / 2000 / 4000
- SV1000 / 2000 / 3000
- VSS8-2 / 8-4, VSR8-2 / 8-4

Refer to catalogue and technical operation manual for details of solenoid valves, manifolds, etc.
Contact SMC sales for its compatibility with other solenoid valves.

6. Installation

6.1. Mounting

⚠Caution

To prevent manifold components being damaged, apply the recommended tightening torque.

Mount the manifold using the 8 mounting positions on the base with screws.
Required screws are as follows:

① 2 x M5 (End plate: torque = 1.5 N·m)
② 2 x M5 (SI Unit: torque = 1.5 N·m)
③ 4 x M* (Valve manifold: refer to valve manifold catalogue)

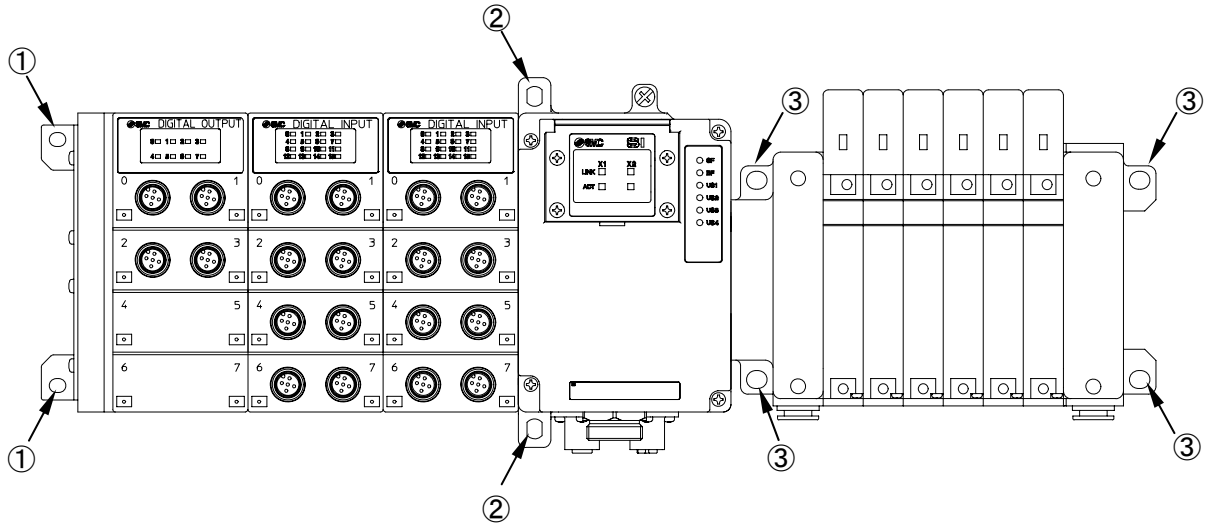


Fig. 6-1 Required screws

All manifolds are mounted using 8 screws (except VQC4000 which uses 7 screws).

6.1.1. Valve manifold connection

Connect the valve manifold with the 2 screws on the SI Unit. (hexagonal socket wrench size 2.5)

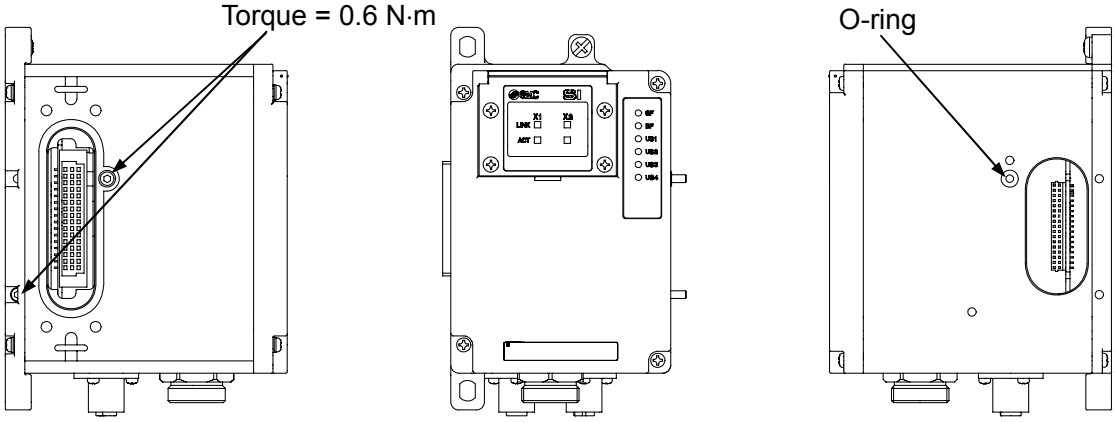


Fig. 6-2 Valve manifold connection

⚠ Caution

For a protection rating of IP65 to be ensured, apply the recommended tightening torque and make sure that the O-ring is positioned correctly on the screw.

6.1.2. Module connection

Connect the modules with the 2 modular adaptor assemblies and a joint assembly.

① 1 x Joint assembly
② 2 x Modular adaptor assembly (hexagonal socket wrench size 2.5, torque = 1.3 N·m)

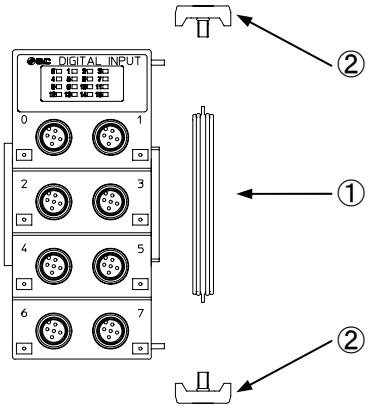


Fig. 6-3 Module connection

⚠ Caution

- For a protection rating of IP65 to be ensured, modular adaptor assemblies and joint assembly must be installed between each module correctly.
- To prevent the modules and assemblies being damaged, apply the recommended tightening torque.

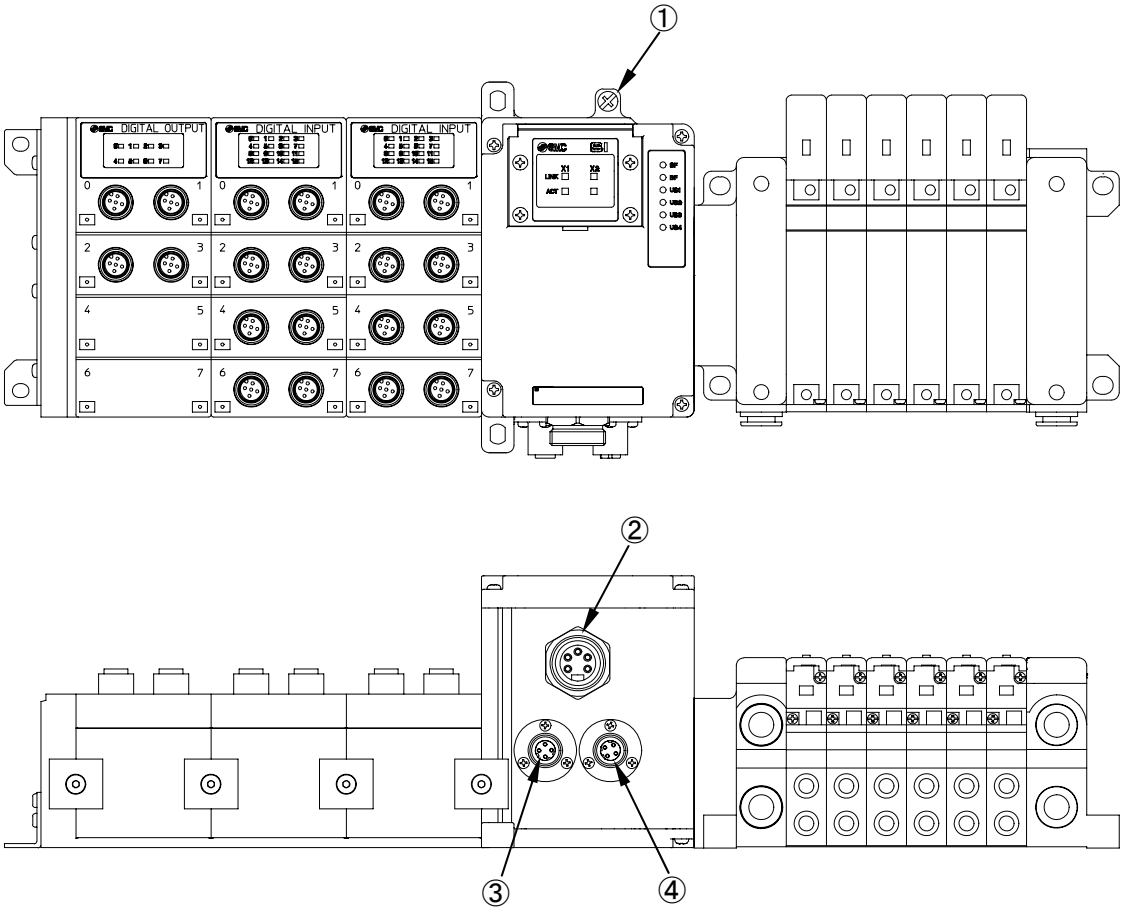
6.2. Wiring

⚠ Caution

To prevent damage, all voltages to the SI Unit must be turned off (i.e. de-energized) before the modules are installed or removed.

Wire the grounding cable, the PROFINET cables and the power cable.

① M5, FE terminal screw (torque = 1.5 N·m)
② 7/8 inch connector, Power connection
③ M12 connector, PROFINET connection Port1 (X1)
④ M12 connector, PROFINET connection Port2 (X2)

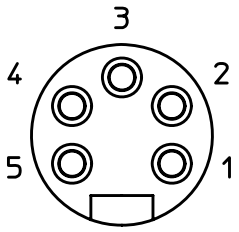


6.2.1. Bus / Power connection

The SI Unit has two PROFINET connectors (Port1 and Port2). If only one connector is used, cover the another connector with a dummy cap so that a protection rating of IP65 is ensured.

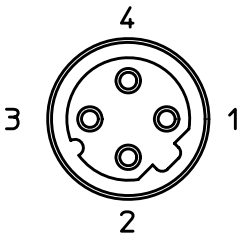
⚠ Caution

- For reasons of EMC a secure connection to the cable shield must be established on the PROFINET (Port1 / Port2) and Power..
- Power and bus lines must be installed correctly.
- To prevent manifold components of the EX245 from being damaged, the supply lines for the electronics and for the load voltage must be protected externally with a fuse.



Pin	Remarks
1	0V (US2)
2	0V (US1)
3	FE
4	24V (US1)
5	24V (US2)

Fig. 6-4 Pin allocation of Power connector



Pin	Remarks
1	TD+ Transmit Data+
2	RD+ Receive Data+
3	TD- Transmit Data-
4	RD- Receive Data-

Fig. 6-5 Pin allocation of PROFINET connectors

6.2.2. FE terminal

The SI Unit must be connected to FE (Functional Earth) to divert electromagnetic interference. Connect to the grounding cable with FE terminal screw on the SI Unit. The other end of the grounding cable should be terminated to ground potential.

6.2.3. Sensor / Load / Power connection

Regarding the wiring of each module, refer to following section:

- EX245-DX1-X36: **10.3**, page-48
- EX245-DY1-X37: **11.3**, page-52
- EX245-DY2-X37: **12.3**, page-56
- EX245-AX2-X38: **13.3**, page-61

7. Commissioning

7.1. Configuration

The EX245-SPR1-X171 is a modular station that consists of several modules. Setup your PROFINET master's software to reflect the configuration of your system.

7.1.1. GSDML file and symbol files

In order to configure the EX245-SPR1-X171 with your PROFINET master's software the appropriate GSDML file is required. The GSDML file contains all of necessary information to configure the EX245-SPR1-X171 on your PROFINET master's software.
In order to represent the EX245-SPR1-X171 in your PROFINET master's software the appropriate symbol files are required.
Current GSDML file and symbol files name are as follows.

- GSDML file: GSDML-V2.2-SMC-EX245-V*.*-********.xml (for FSU function)
  GSDML-V2.1-SMC-EX245-V*.*-********.xml
- Symbol files: GSDML_0083_0056_EX245N.bmp

7.1.2. Modules

EX245-SPR1-X171 can consists of the following modules.

Table. 7-1 Overview of modules for EX245-SPR1-X171

Module name	Occupied bytes	Allowable slot	Note
Diagnostics type 1	4 bytes (IN)	1	Refer to Section 8.1.1
Diagnostics type 2	4 bytes (IN)	1	Refer to Section 8.1.2
Valves (16 coils)	2 bytes (OUT)	1…2	Refer to Section 5
Valves (32 coils)	4 bytes (OUT)	1…2	
EX245-DX1-X36	2 bytes (IN)	2…10	Refer to Section 10
EX245-DY1-X37	1 byte (OUT)	2…10	Refer to Section 11
EX245-DY2-X37	1 byte (OUT)	2…10	Refer to Section 12
EX245-AX2-X38	3 bytes (IN) 1 byte (OUT)	2…10	Refer to Section 13

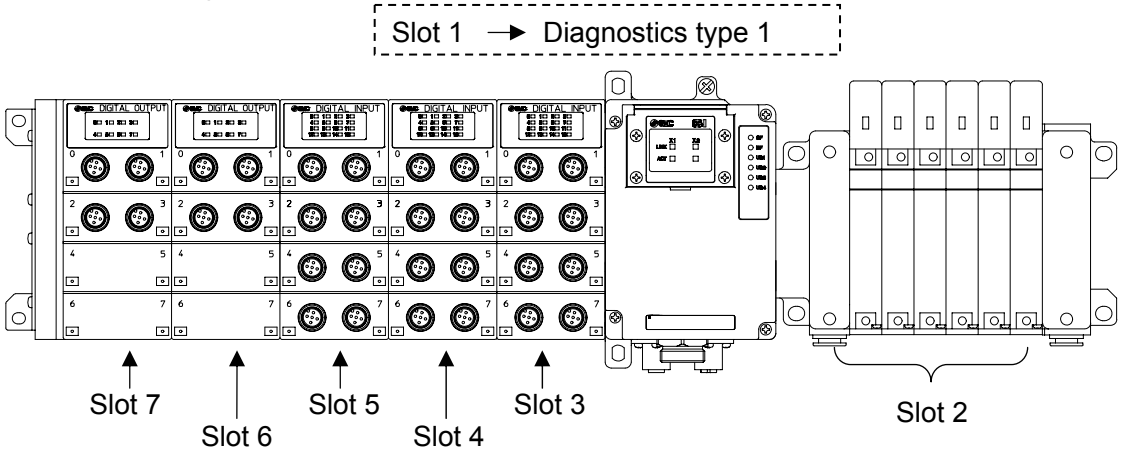
7.1.3. Configuration steps

Enter the modules in your configuration program corresponding to the actual module layout and a "Diagnostics type" module if required. If the configuration does not match the actual layout, the connection to the IO Controller will not be established.

Configuration steps:

- Enter one of the “Diagnostics type” modules in Slot 1 if required.
- Enter one of the “Valves” modules in Slot 1 when without any of “Diagnostics type”, or in Slot 2 if Slot 1 has one of “Diagnostic type” modules.
- Enter all other modules that are connected on the left hand side of the SI Unit (max. 8 modules).

Example of a configuration



Slot number	Model	Input bytes	Output bytes
Slot 1	Diagnostics type 1	4	-
Slot 2	Valves (16 coils)	-	2
Slot 3	EX245-DX1-X36	4	-
Slot 4	EX245-DX1-X36	4	-
Slot 5	EX245-DX1-X37	4	-
Slot 6	EX245-DY1-X37	-	2
Slot 7	EX245-DY1-X37	-	2

Fig. 7-1 Example of assignment of modules

NOTE

- Even if the valves are not connected to the SI Unit, you have to enter one of the “Valves” modules in Slot 1 or Slot 2.
- When you change the module configuration in your configuration program, you need to turn off the supply for the logic / sensors "US1" and turn it on again.

7.2. Parameterisation

7.2.1. System parameters

The EX245-SPR1-X171 has the following system parameters.

Table. 7-2 System parameters

Parameters	Range of values	Default	Meaning
US1 Diagnosis	Enable Disable	Enable	When this parameter is enabled, the system generates a diagnostics event if it detects that US1 has dropped or off.
US2 Diagnosis	Enable Disable	Disable	When this parameter is enabled, the system generates a diagnostics event if it detects that US2 has dropped or off.
US3 Diagnosis	Enable Disable	Disable	When this parameter is enabled, the system generates a diagnostics event if it detects that first additional loads supply (US3) has dropped or off.
US4 ...US10 Diagnosis	Enable Disable	Disable	When this parameter is enabled, the system generates a diagnostics event if it detects that one of additional loads supplies excluding the first one (US4, US5, etc.) has dropped or off.

7.2.2. Module parameters

7.2.2.1. Module parameters for valves

The “Valves (16 coils)” has the following module parameters:

Table. 7-3 Module parameters of Valves (16 coils)

Name	Range of values	Default	Meaning
Valve Output 0	Force to OFF Force to ON Hold last state	Force to OFF	When a bus fault occurs, the output can be made to react in one of the following ways: Force to OFF Force to ON Hold last state
Valve Output 1	Force to OFF Force to ON Hold last state	Force to OFF	
…	…	…	
Valve Output 15	Force to OFF Force to ON Hold last state	Force to OFF	

The “Valves (32 coils)” has the following module parameters.

Table. 7-4 Module parameters of Valves (32 coils)

Name	Range of values	Default	Meaning
Valve Output 0	Force to OFF Force to ON Hold last state	Force to OFF	When a bus fault occurs, the output can be made to react in one of the following ways: Force to OFF Force to ON Hold last state
Valve Output 1	Force to OFF Force to ON Hold last state	Force to OFF	
…	…	…	
Valve Output 31	Force to OFF Force to ON Hold last state	Force to OFF	

7.2.2.2. Module parameters for EX245-DX1-X36

The EX245-DX1-X36 has no module parameters that you can set.

7.2.2.3. Module parameters for EX245-DY1/2-X37

The EX245-DY1-X37 and EX245-DY2-X37 have the following module parameters.

Table. 7-5 Module parameters of EX245-DY1/2-X37

Name	Range of values	Default	Meaning
Digital Output 0	Force to OFF Force to ON Hold last state	Force to OFF	When a bus fault occurs, the output can be made to react in one of the following ways: Force to OFF Force to ON Hold last state
Digital Output 1	Force to OFF Force to ON Hold last state	Force to OFF	
…	…	…	
Digital Output 7	Force to OFF Force to ON Hold last state	Force to OFF	

7.2.2.4. Module parameters for EX245-AX2-X38

The EX245-AX2-X38 has the following module parameters.

Table. 7-6 Module parameters of EX245-AX2-X38

Name	Range of values	Default	Meaning
Data Transmission order	MSB first LSB first	MSB first	When this parameter is MSB first, byte 0 and byte 1 for the analogue value are swapped (see the Fig. 7-2), making it suitable for use with Siemens PLC's and so on.
Output Channel 0	Force to OFF Force to ON Hold last state	Force to OFF	When a bus fault occurs, the output can be made to react in one of the following ways: Force to OFF Force to ON Hold last state
Input limit current 0	0 to 100	100	Analogue input current is compared with the limit current*. When analogue input current is equal or greater than the limit current, digital input bit is set to “1” (refer to 13.4.1 page 61).
Input limit current 1	0 to 100	100	
Input limit current 2	0 to 100	100	

*: Limit current = 0.16 x Limit + 4 [mA]

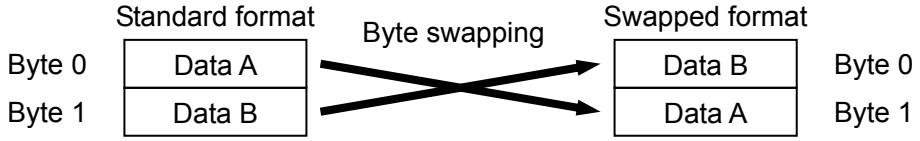


Fig. 7-2 Data Transmission order

7.3. Connection to the SIEMENS PLC S7

This section guides the user through the most important steps by means of a worked example. It illustrates how to correctly set up the master software “SIMATIC STEP 7 Version 5.4” to reflect the slave units’ configuration.

7.3.1. Install the GSDML file

The GSDML file for the EX245-SPR1-X171 must be installed into “STEP 7”.
In the “HW Config”, start “Install GSD file…” on the “Option” in the menu bar.

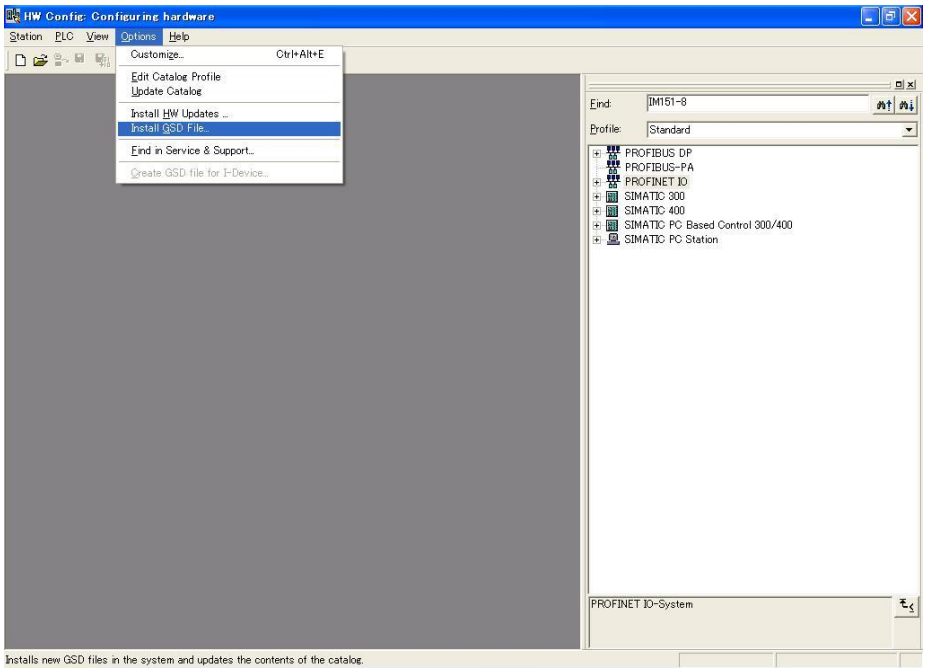


Fig. 7-3 Start "Install GSD file"

Browse and choose the GSDML file for the EX245-SPR1-X171.

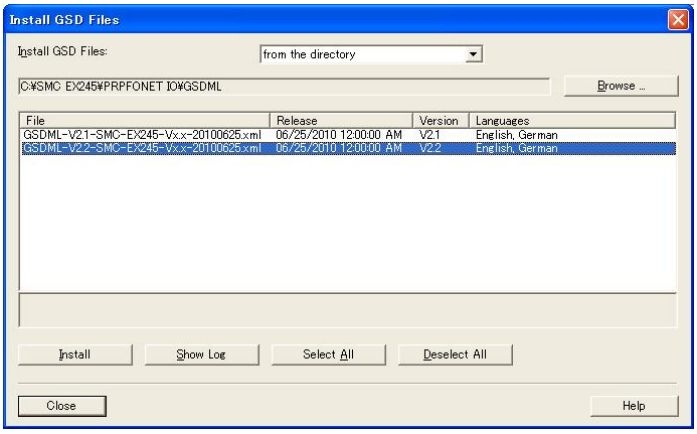


Fig. 7-4 Browse and choose GSD file

7.3.2. Assignment “Device Name” on the EX245-SPR1-X171

Connect an EX245-SPR1-X171 and start “Edit Ethernet Node” in “HW Config” on the STEP 7.

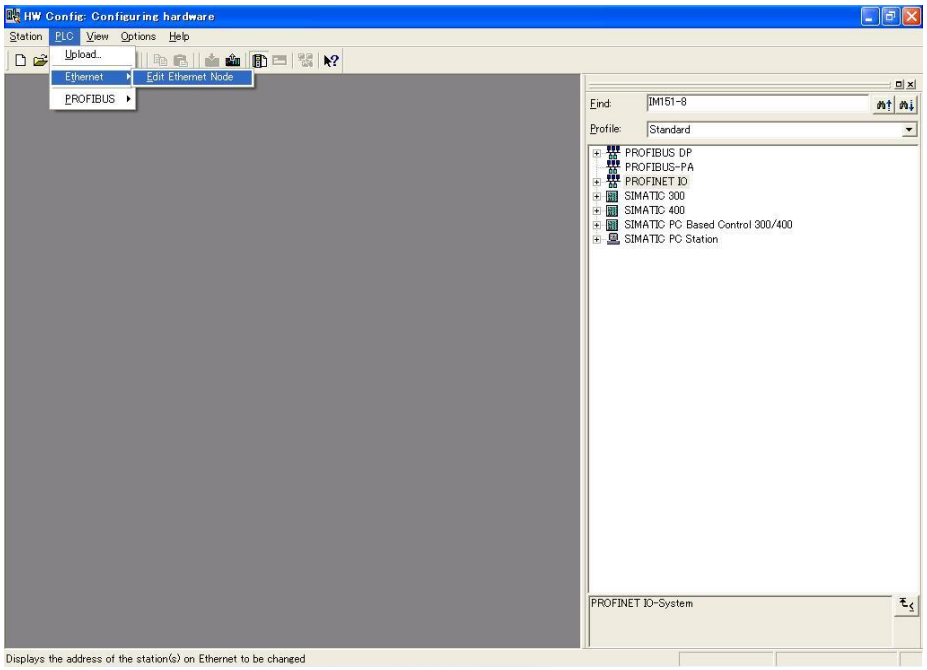


Fig. 7-5 Start ”Edit Ethernet Node”

Enter MAC address for the connected EX245-SPR1-X171 if it is known. Or use “Browse” to find the connected unit. After finding the unit, assign its “Device name”.

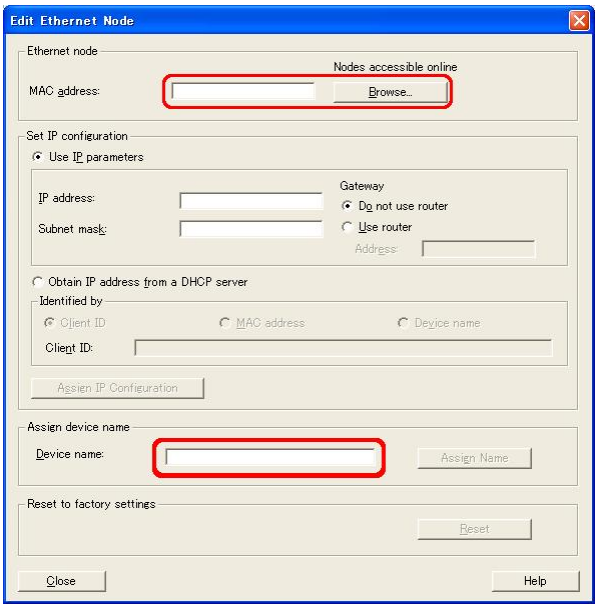


Fig. 7-6 Specify or find a unit and assign its “Device name”

NOTE

・Giving “Device name” is not necessary for replacing unit because EX245-SPR1-X171 supports LLDP function.

7.3.3. Station selection

Drag the folder “SMC EX245 PN Cu” onto the PROFINET line on the PN master (drag & drop).

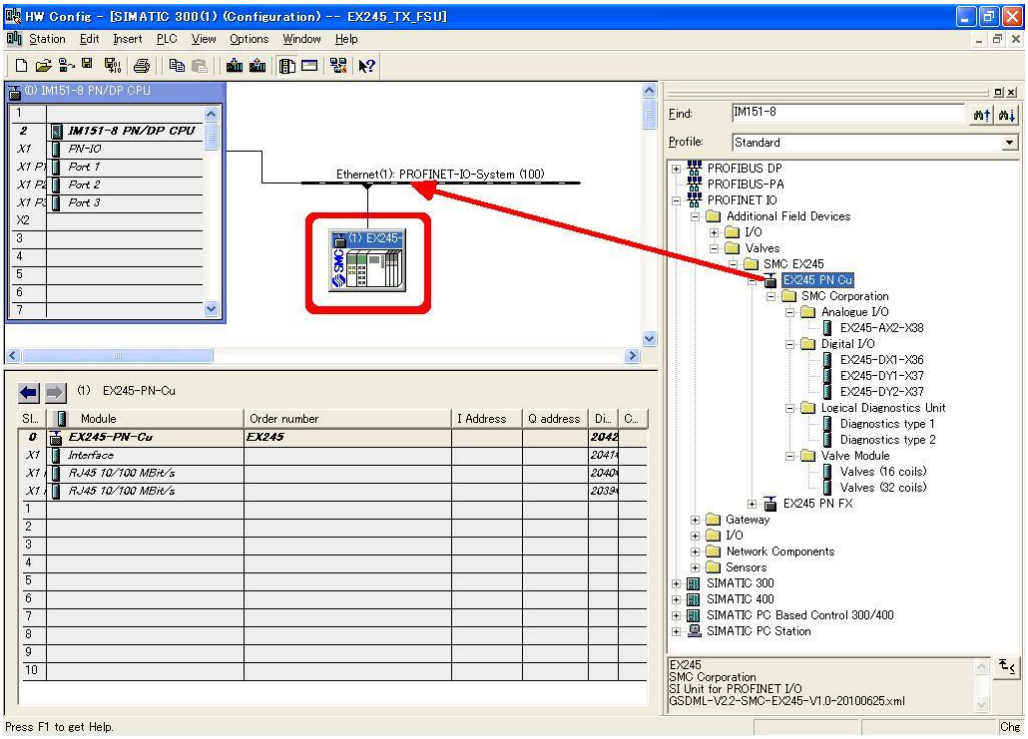


Fig. 7-7 Add EX245 onto a PROFINET network

Double click on the symbol of the EX245, or choose its “Object property” after right click on the symbol. Edit its “Device name” according to what the unit has been assigned before.

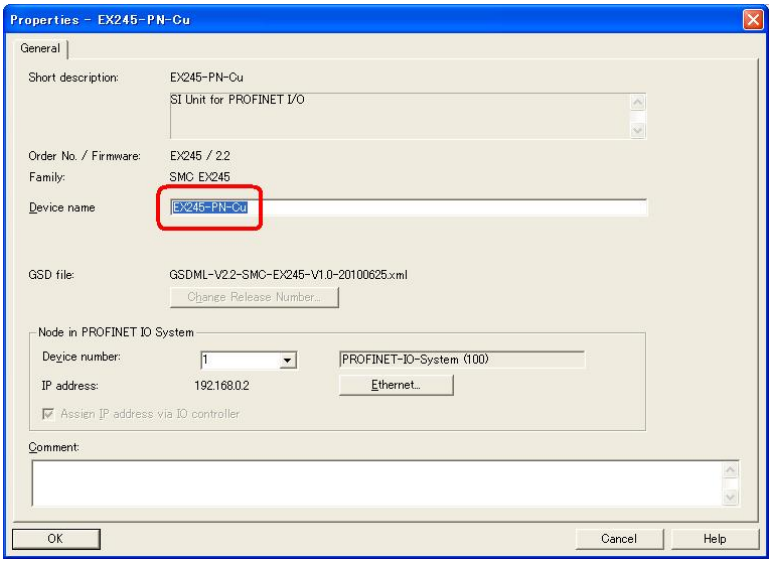


Fig. 7-8 Edit “Device name”

7.3.4. Configuration

Fill in the configuration table with module that are present in your hardware ensuring the modules correspond to those allocated earlier.

- Select the symbol “EX245 PN Cu” to be configured in the dialogue window “HW Config”.
- Select the module in the dialogue window “Hardware Catalog”. Drag it onto same slot as slot 1 in the configuration table.
- Repeat this step for further module. Drag these onto the next free slot.

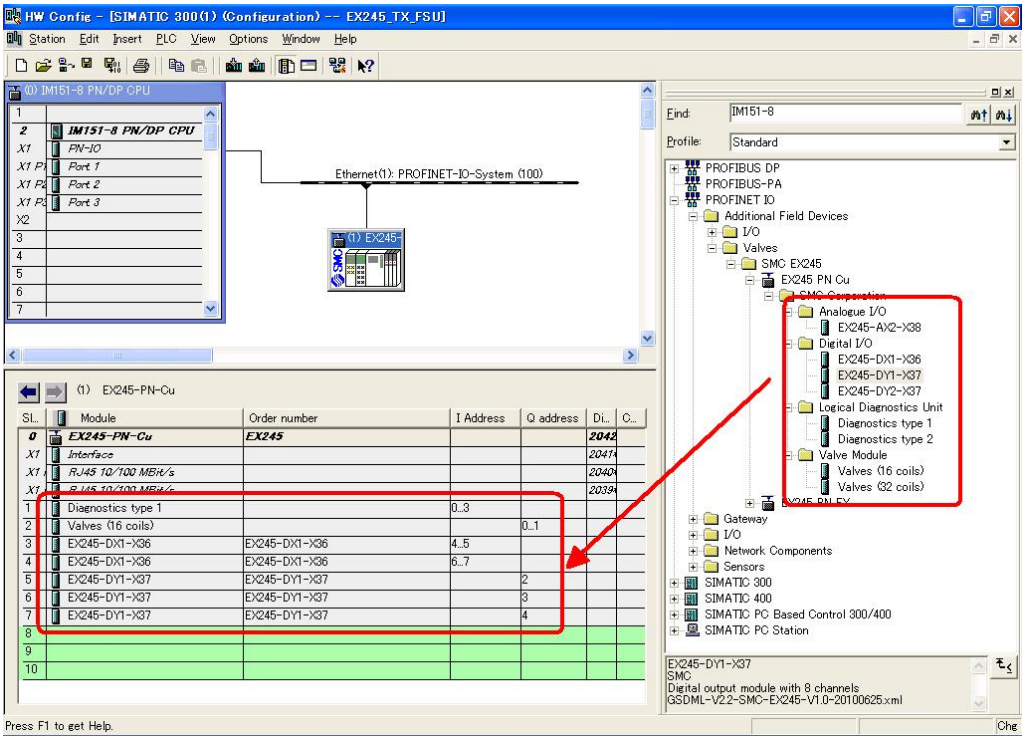


Fig. 7-9 Configure EX245 valve manifold

7.3.5. Parameterisation

7.3.5.1. Setting of system parameters

- Double click slot 0 in the bottom window. The window “Properties” with its device name appears.
- Select the tab “Parameters”. The list with the parameters and the present active values will be displayed.
- Click the value of the parameter you wish to modify. A dropdown list with the possible values will open up.
- Modify the value by clicking and confirm with OK.

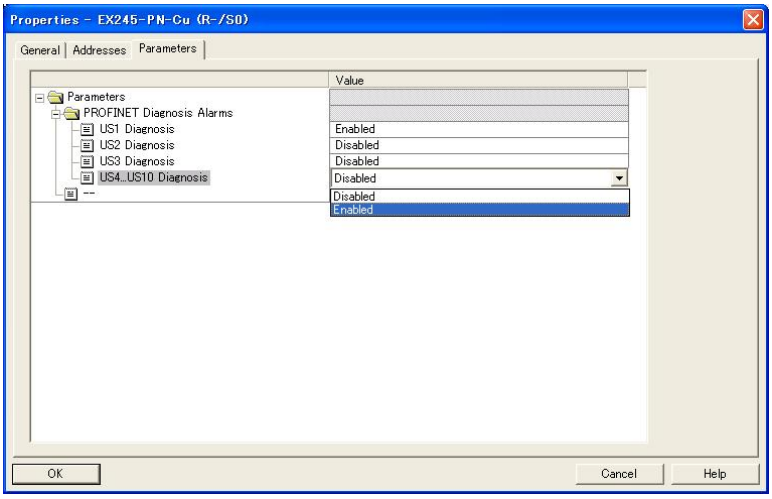


Fig. 7-10 System parameters of the EX245-SPR1-X171

7.3.5.2. Setting of module parameters

- Double click in the configuration table on the line of the module you wish to edit. The dialogue window “Properties” for the selected module appears.
- Continue as described in system parameters (see above).

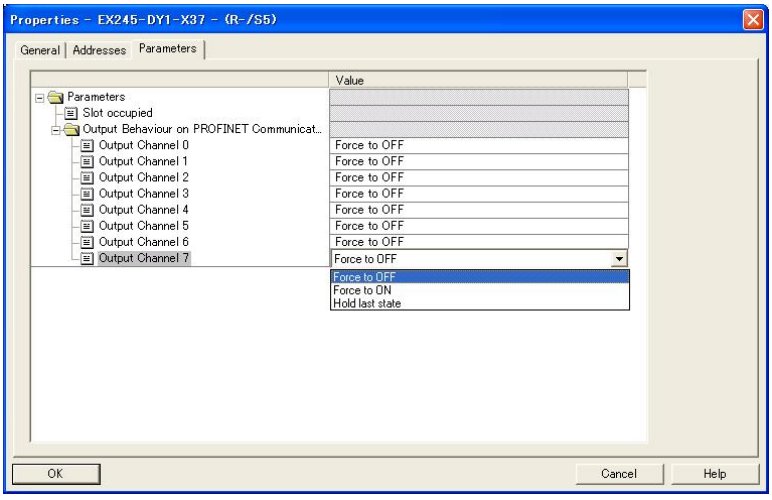


Fig. 7-11 Module parameters of the output module EX245-DY1-X37

7.3.5.3. Enabling FSU (First Start Up) function

EX245-SPR1-X171 supports FSU function as an option.
A connected controller should also support the FSU function in order to enable the FSU function for the EX245-SPR1-X171.

7.3.5.3.1. Configuration of controller to enable FSU function

- Double click PROFINET port of the controller connected to EX245-SPR1-X171 needs to have FSU function.
- Open tab “Options”, choose “TP / ITP 100Mbps full duplex” in “Connection” and tick “Disable autonegotiation”.

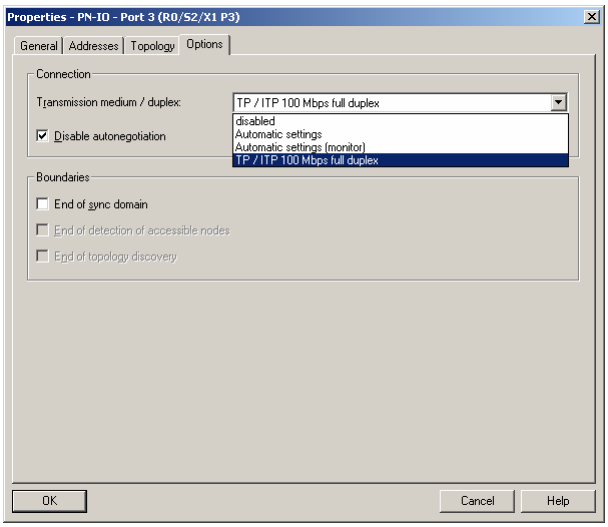


Fig. 7-12 Configure the PROFINET port of the controller for FSU

7.3.5.3.2. Configuration of EX245-SPR1-X171 to enable FSU function

- Select the symbol “EX245 PN Cu” to be configured in the dialogue window “HW Config”.
- Double click its slot X1 Interface, and tick “Prioritized startup” in General tab.
-

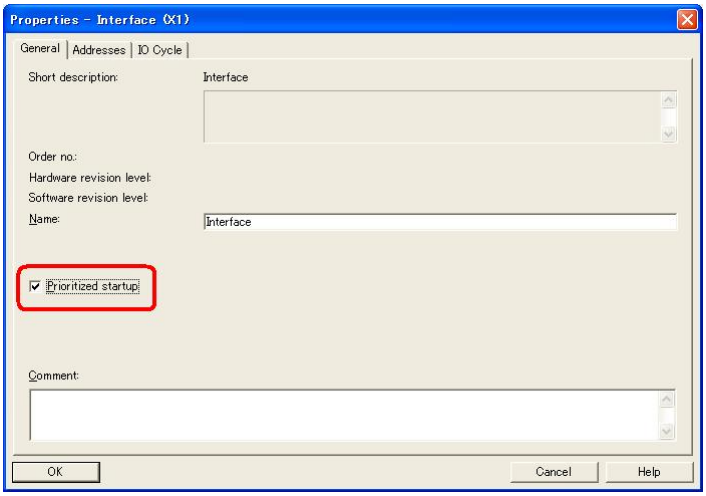


Fig. 7-13 Configure interface of the EX245-SPR1-X171 for FSU

- Double click EX245 PROFINET port either X1P1 or X1P2 that needs to have FSU function.
- Open tab “Options”, choose “TP / ITP 100Mbps full duplex” in “Connection” and tick “Disable autonegotiation”.

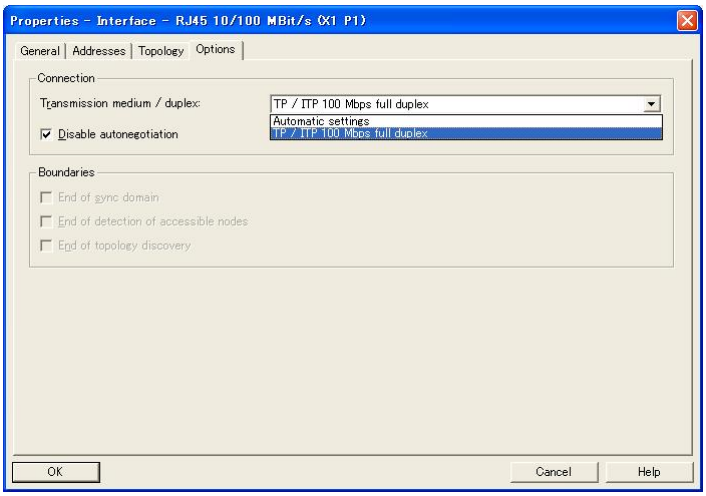


Fig. 7-14 Configure PROFINET port of the EX245-SPR1-X171 for FSU

8. Diagnosis

8.1. Diagnostics data on I/O mapping

The EX245-SPR1-X171 can be allocated diagnostics data as digital input data on I/O mapping, if one of the module, Diagnostics type 1 or Diagnostics type 2, is configured. Use HW Config on Step 7, for example, to select a requested diagnostics type to allocate the diagnostics data on I/O mapping.

8.1.1. Diagnostics type 1

Table. 8-1 Overview of Diagnostics type 1

Byte	Description
0	General diagnostics 1
1	General diagnostics 2
2	Valve diagnostics 1
3	Valve diagnostics 2

8.1.1.1. General diagnostics 1

Table. 8-2 General diagnostics 1

Bit	Description	Explanation
0	System fault	0: No error 1: At least one error has occurred
1	Valve-coil(s) short circuit	0: No valve coil(s) have a short circuit 1: At least one valve coil has a short circuit
2	Module error	0: No module has an error 1: At least one connected module has an error
3	Changed module layout	0: Module layout has not changed 1: Module layout has changed or is different from Configuration setting
4	US1 Diagnostics	0: US1 present (> approx. 21.6V DC) 1: US1 has dropped (< approx. 20.4V DC)
5	US2 Diagnostics	0: US2 present (> approx. 22.8V DC) 1: US2 has dropped (< approx. 21.6V DC)
6	US3 Diagnostics	0: First additional supply for the loads (US3) present (> approx. 22.8V DC) 1: First additional supply for the loads (US3) has dropped (< approx. 21.6V DC)
7	US4 Diagnostics	0: All additional supplies for the loads excluding the first one (US4, US5, etc.) present (> approx. 22.8V DC) 1: At least one of additional supplies for the loads excluding the first one (US4, US5, etc) has dropped (< approx. 21.6V)

8.1.1.2. General diagnostics 2

Table. 8-3 General diagnostics 2

Bit	Description	Explanation
0	Module 1 error	0: No error or not connected, 1: Module 1 has an error
1	Module 2 error	0: No error or not connected, 1: Module 2 has an error
2	Module 3 error	0: No error or not connected, 1: Module 3 has an error
3	Module 4 error	0: No error or not connected, 1: Module 4 has an error
4	Module 5 error	0: No error or not connected, 1: Module 5 has an error
5	Module 6 error	0: No error or not connected, 1: Module 6 has an error
6	Module 7 error	0: No error or not connected, 1: Module 7 has an error
7	Module 8 error	0: No error or not connected, 1: Module 8 has an error

8.1.1.3. Valve diagnostics 1

Table. 8-4 Valve diagnostics 1

Bit	Description	Explanation
0	Valve 0, 1 diagnostics	0: No error, 1: Short circuit
1	Valve 2, 3 diagnostics	0: No error, 1: Short circuit
2	Valve 4, 5 diagnostics	0: No error, 1: Short circuit
3	Valve 6, 7 diagnostics	0: No error, 1: Short circuit
4	Valve 8, 9 diagnostics	0: No error, 1: Short circuit
5	Valve 10, 11 diagnostics	0: No error, 1: Short circuit
6	Valve 12, 13 diagnostics	0: No error, 1: Short circuit
7	Valve 14, 15 diagnostics	0: No error, 1: Short circuit

8.1.1.4. Valve diagnostics 2

Table. 8-5 Valve diagnostics 2

Bit	Description	Explanation
0	Valve 16, 17 diagnostics	0: No error, 1: Short circuit
1	Valve 18, 19 diagnostics	0: No error, 1: Short circuit
2	Valve 20, 21 diagnostics	0: No error, 1: Short circuit
3	Valve 22, 23 diagnostics	0: No error, 1: Short circuit
4	Valve 24, 25 diagnostics	0: No error, 1: Short circuit
5	Valve 26, 27 diagnostics	0: No error, 1: Short circuit
6	Valve 28, 29 diagnostics	0: No error, 1: Short circuit
7	Valve 30, 31 diagnostics	0: No error, 1: Short circuit

8.1.2. Diagnostics type 2

Table. 8-6 Overview of Diagnostics type 2

Byte	Description
0	General diagnostics 1
1	Valve diagnostics 1
2	General diagnostics 2
3	Valve diagnostics 2

8.1.2.1. General diagnostics 1

Table. 8-7 General Diagnostics 1

Bit	Description	Explanation
0	Maximum number of valves	0: 16 coils 1: 32 coils
1	Valve coil(s) short circuit	0: No valve coils have short circuit 1: At least one valve coil has a short circuit
2	US1 diagnostics 1	0: US1 present (> approx. 21.6 V DC) 1: US1 has dropped (< approx. 20.4 V DC)
3	Reserved	Fixed 0
4	US2 diagnostics 1	0: US2 present (> approx. 22.8 V DC) 1: US2 has dropped (< approx. 21.6 V DC)
5	US2 diagnostics 2	0: US2 present (> approx. 17.0 V DC) 1: US2 has dropped (< approx. 17 V DC)
6	Reserved	Fixed 0
7	US1 diagnostics 2	0: US1 present (> approx. 17.0 V DC) 1: US1 has dropped (< approx. 17 V DC)

8.1.2.2. Valve diagnostics 1

Table. 8-8 Valve diagnostics 1

Bit	Description	Explanation
0	Valve 0, 1 diagnostics	0: Short circuit, 1: No error
1	Valve 2, 3 diagnostics	0: Short circuit, 1: No error
2	Valve 4, 5 diagnostics	0: Short circuit, 1: No error
3	Valve 6, 7 diagnostics	0: Short circuit, 1: No error
4	Valve 8, 9 diagnostics	0: Short circuit, 1: No error
5	Valve 10, 11 diagnostics	0: Short circuit, 1: No error
6	Valve 12, 13 diagnostics	0: Short circuit, 1: No error
7	Valve 14, 15 diagnostics	0: Short circuit, 1: No error

8.1.2.3. General diagnostics 2

Table. 8-9 General diagnostics 2

Bit	Description	Explanation
0	Module 1 diagnostics	0: No error or not connected, 1: Short circuit
1	Module 2 diagnostics	0: No error or not connected, 1: Short circuit
2	Module 3 diagnostics	0: No error or not connected, 1: Short circuit
3	Module 4 diagnostics	0: No error or not connected, 1: Short circuit
4	Module 5 diagnostics	0: No error or not connected, 1: Short circuit
5	Module 6 diagnostics	0: No error or not connected, 1: Short circuit
6	Module 7 diagnostics	0: No error or not connected, 1: Short circuit
7	Module 8 diagnostics	0: No error or not connected, 1: Short circuit

8.1.2.4. Valve diagnostics 2

If the maximum number of valves is 16 coils in the EX245-SPR1-X171, the diagnostics will be set FFh.

Table. 8-10 Valve diagnostics 2

Bit	Description	Explanation
0	Valve 16, 17 diagnostics	0: Short circuit, 1: No error
1	Valve 18, 19 diagnostics	0: Short circuit, 1: No error
2	Valve 20, 21 diagnostics	0: Short circuit, 1: No error
3	Valve 22, 23 diagnostics	0: Short circuit, 1: No error
4	Valve 24, 25 diagnostics	0: Short circuit, 1: No error
5	Valve 26, 27 diagnostics	0: Short circuit, 1: No error
6	Valve 28, 29 diagnostics	0: Short circuit, 1: No error
7	Valve 30, 31 diagnostics	0: Short circuit, 1: No error

8.2. Diagnosis via PROFINET

PROFINET forms the basis for comprehensive diagnostics functions and information over your automation network. This section illustrate how to use the diagnostics features when the SI Unit is used in conjunction with the "SIMATIC STEP 7 Version 5.4" by means of following examples.

8.2.1. Online Diagnostics with Siemens STEP 7

With “HW Config” you can read the current diagnostics data from the EX245-SPR1-X171.

- Switch from offline to online in the dialogue window “HW Config”.
- Double click the symbol “EX245-SPR1-X171”; the dialogue window “Module information” appears.
- Read the diagnostics information.

Example

Let us assume the following conditions:

- Configuration:

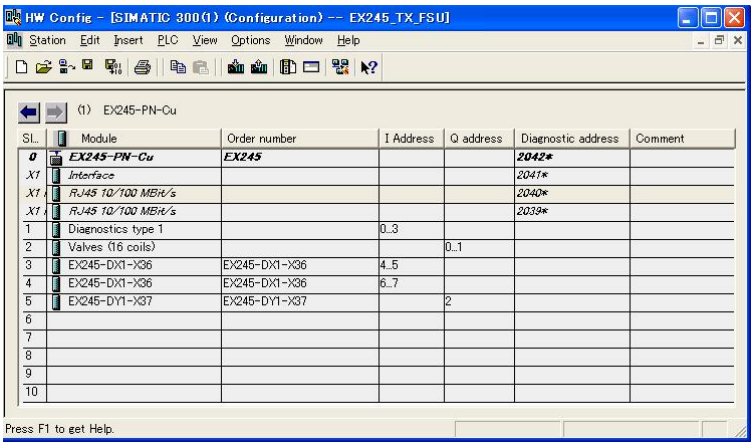


Fig. 8-1 Example of configuration

- The supply for valves / loads "US2" has been below permissible level and 2nd EX245-DX1-X36’s (Slot 4) connector 7 has a short circuit.
- The system parameter for "US2 Diagnosis" is set "Enable".

Module information will show following diagnostics massages

General information:

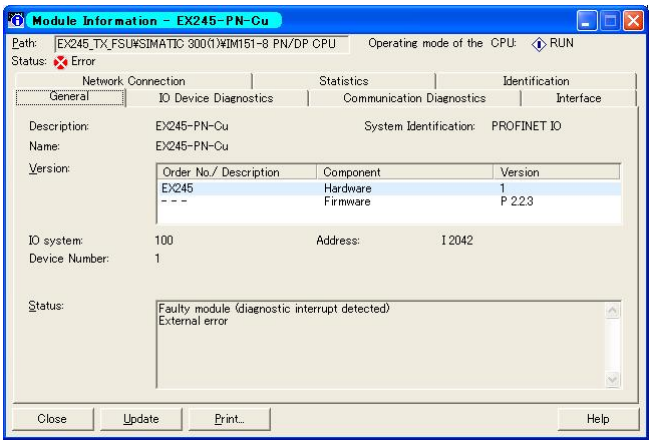


Fig. 8-2 General information

Single Channel Diagnostics information:

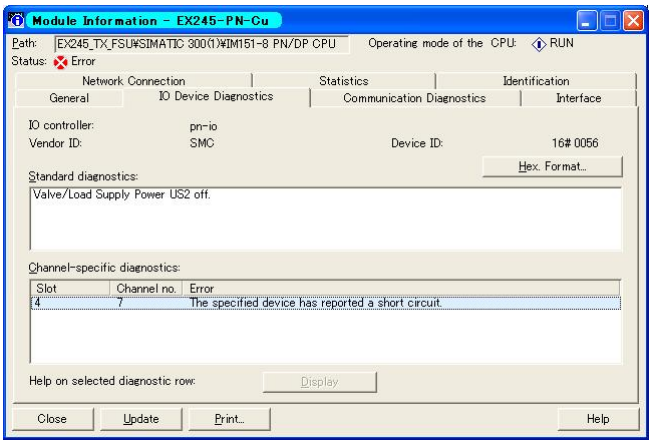


Fig. 8-3 Single Channel Diagnostic information

9. SI Unit - EX245-SPR1-X171

9.1. Parts and description

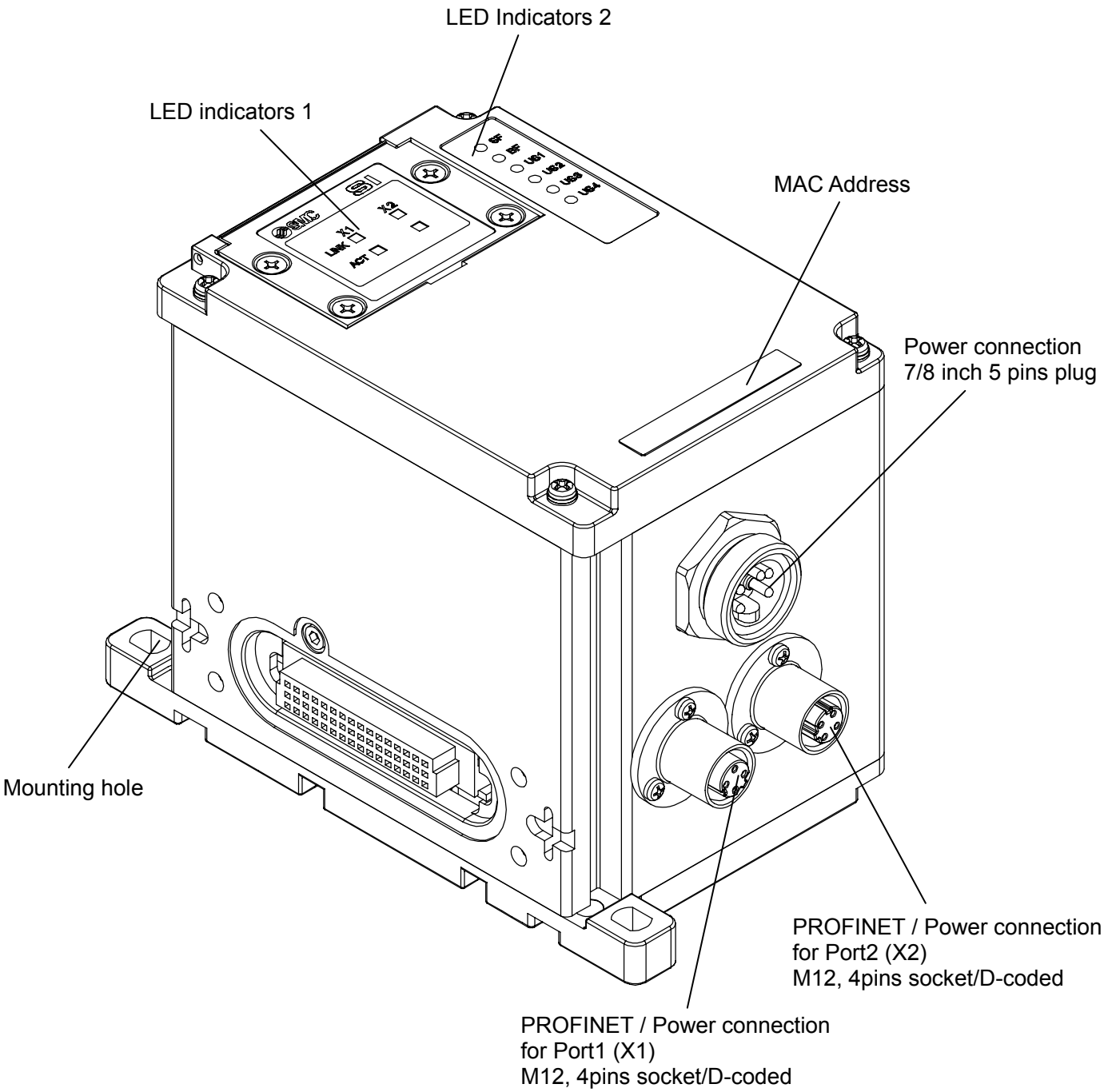


Fig. 9-1 Allocation of parts on the EX245-SPR1-X171

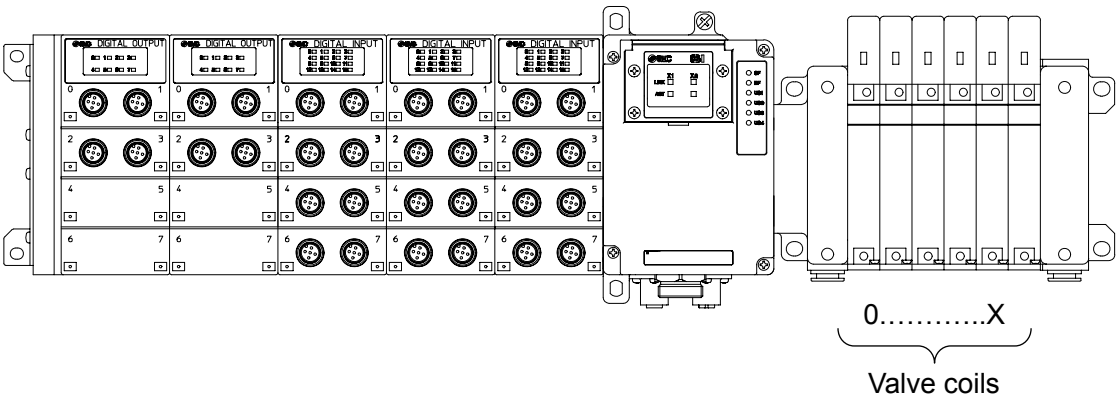
9.2. Specifications

Table. 9-1 EX245-SPR1-X171 specifications

Item		Description
General		
Dimensions (W x L x H) in mm		85 x 148.5 x 109
Weight		1300 g or less
Housing material		Aluminium
Bus connection		Port1 (X1) : M12, 4 pins socket / D-coded Port2 (X2) : M12, 4 pins socket / D-coded
Power connection		7/8 inch connector, 5 pins plug
Max. number of modules		8
Max. number of digital inputs		128
Max. number of analogue inputs		8
Max. number of digital outputs		64 (independent of solenoid valves)
Electrical		
Internal current consumption at 24 V DC (via US1)		250 mA or less
Protection against pole reversal		Yes (US1 and US2)
US1	Operating voltage	24 V DC±10%
	Under-voltage detection	Detected : < approx. 20.4 V DC Cancelled : > approx. 21.6 V DC
	Max. current	6 A
	Dropout voltage (sensors)	< approx. 17 V DC
US2	Operating voltage	24 V DC+10%/-5%
	Under-voltage detection	Detected : < approx. 21.6 V DC Cancelled : > approx. 22.8V DC
	Max. current	4 A
	Dropout voltage (valves / loads)	< approx. 17 V DC
Galvanic isolation		Yes (between US1 and US2)
Solenoid valve		
Applicable series		VQC1000 / 2000 / 4000, SV1000 / 2000 / 3000, VSS8-2 /8-4, VSR8-2 / 8-4
Max. number of solenoid valves		32 valve coils
Output type of solenoid		PNP
Over current protection		Yes
Over current detection		Yes (100 mA or less)
Fieldbus		
Bus protocol		PROFINET IO (PROFINET RT)
Interface		Industrial Ethernet based on IEEE802.3
Fast start up supported		Yes
Vendor ID		0083h
Device ID		0056h
GSDML file		GSDML-V2.2-SMC-EX245-V*.*-********.xml GSDML-V2.1-SMC-EX245-V*.*-********.xml
Certifications		
EMC		Yes
PI		Yes

9.3. Process data for valves

The SI Unit occupies 2 or 4 bytes of output data for valves. The counting of valve coils starts at the SI Unit from left to right.



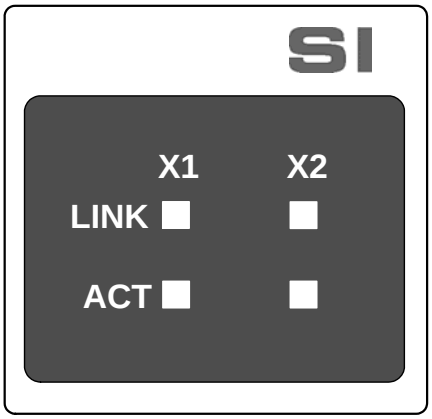
Byte	Output data	
	Valves (16 coils)	Valves (32 coils)
0	Valve coils 0-7	Valve coils 0-7
1	Valve coils 8-15	Valve coils 8-15
2		Valve coils 16-23
3		Valve coils 24-31

Fig. 9-2 The process data

9.4. LED indicators

9.4.1. LED indicators 1

The LED indicators 1 are arranged on the SI Unit as shown in the illustration below.



Designation	Description	Colour
LINK (X1)	Connection via PROFINET on Port1 (X1)	Green
ACT (X1)	Data exchange on Port1 (X1)	Yellow
LINK (X2)	Connection via PROFINET on Port2 (X2)	Green
ACT (X2)	Data exchange on Port2 (X2)	Yellow

Fig. 9-3 LED indicators 1 of the EX245-SPR1-X171

9.4.1.1. LINK indicator

Table. 9-2 LINK indicator

LINK	Meaning
ON	Connection via Ethernet to the SI Unit via Port 1/2 (X1/2)
OFF	No connection established via Port 1/2 (X1/2)

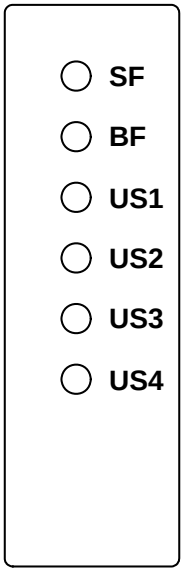
9.4.1.2. ACT indicator

Table. 9-3 ACT indicator

ACT	Meaning
ON	Transmission or reception of Ethernet telegrams on Port 1/2 (X1/2)
OFF	No transmission or reception of Ethernet telegrams on Port 1/2 (X1/2)

9.4.2. LED indicators 2

The LED indicators 2 are arranged on the SI Unit as shown in the illustration below.



Designation	Description	Colour
SF	System fault	Red
BF	Bus fault	Red
US1	Supply for the logic / sensors	Green
US2	Supply for the valves / loads	Green
US3	First additional supply for the loads	Green
US4	All additional supplies for the loads excluding the first one	Green

Fig. 9-4 LED indicators 2 of the EX245-SPR1-X171

9.4.2.1. SF and BF indicators

Table. 9-4 SF and BF indicators

SF	BF	Meaning
OFF	OFF	No fault (The SI Unit is currently exchanging data with the IO Controller without errors.)
---	Flash	Faulty or no connect message frame (although the SI Unit is physically connected to the bus). ・Configuration is defective, or before initial commissioning has been done. ・Device name or IP Address is different from Programming setting. ・The GSDML file is not correct. ・The IO Controller is defective.
OFF	ON	No IO Controller on the bus
Flash at 2 Hz	OFF	The connection to the IO Controller is OK but the following diagnostic event occurred. ・At least one valve coil has a short circuit.
Flash at 0.5 Hz	---	The following diagnostic event occurred. ・At least one connected module has a short circuit or the module layout has changed.
ON	---	The following diagnostic event occurred. ・The configuration data sent by the IO Controller does not match the actual layout. ・Power supply is not present or is bellow the dropout level. ・At least one valve coil has a short circuit and at least one connected module has a short circuit or the module layout has changed. The SI Unit has an internal error. ・An incompatible module is connected to the SI Unit.

9.4.2.2. US1 indicator

Table. 9-5 US1 indicator

US1	Meaning
OFF	US1 is not present or is below the dropout level (< approx. 17 V DC).
Flash	US1 is below the permissible level but above the dropout level (17 to 20.4 V DC).
ON	US1 is present (> approx. 21.6 V DC).

9.4.2.3. US2 indicator

Table. 9-6 US2 indicator

US2	Meaning
OFF	US2 is not present or is below the dropout level (< approx. 17 V DC).
Flash	US2 is below the permissible level but above the dropout level (17 to 21.6 V DC).
ON	US2 is present (> approx. 22.8 V DC).

9.4.2.4. US3 indicator

This indicator shows the status of the first additional supply for the loads.

Table. 9-7 US3 indicator

US3	Meaning
OFF	First additional supply for the loads is not present or is below the dropout level (< approx. 17 V DC).
Flash	First additional supply for the loads is below the permissible level but above the dropout level (17 to 21.6 V DC).
ON	First additional supply for the loads is present (> approx. 22.8 V DC).

9.4.2.5. US4 indicator

This indicator shows the status of all additional supplies for the loads excluding the first one in common. If several EX245-DY2-X37 are present in the manifold, this indicator shows the worst status of all.

Table. 9-8 US4 indicator

US4	Meaning
OFF	At least one of all the additional supplies for the loads excluding the first one is not present or is below the dropout level (< approx. 17 V DC).
Flash	At least one of all the additional supplies for the loads excluding the first one is below the permissible level but above the dropout level (17 to 21.6 V DC).
ON	All the additional supplies for the loads excluding the first one are present (> approx. 22.8 V DC).

9.5. Block diagram

The following figure shows the block diagram of the EX245-SPR1-X171.

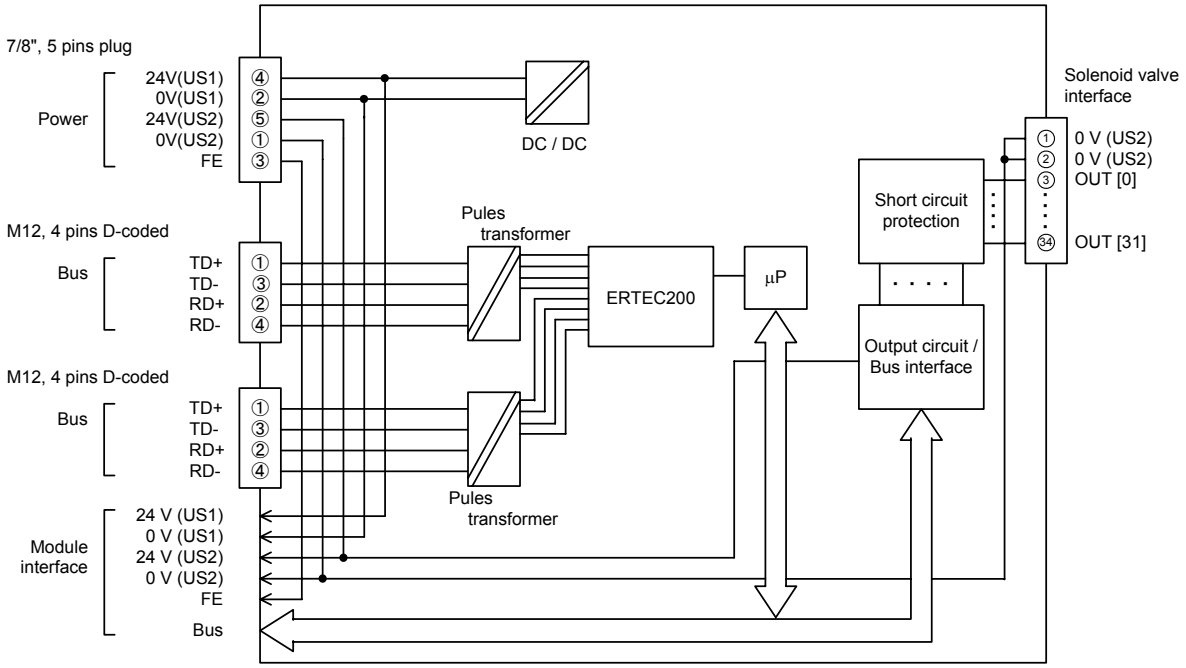


Fig. 9-5 Block diagram of the EX245-SPR1-X171

10. Digital Input Module - EX245-DX1-X36

10.1. Parts and description

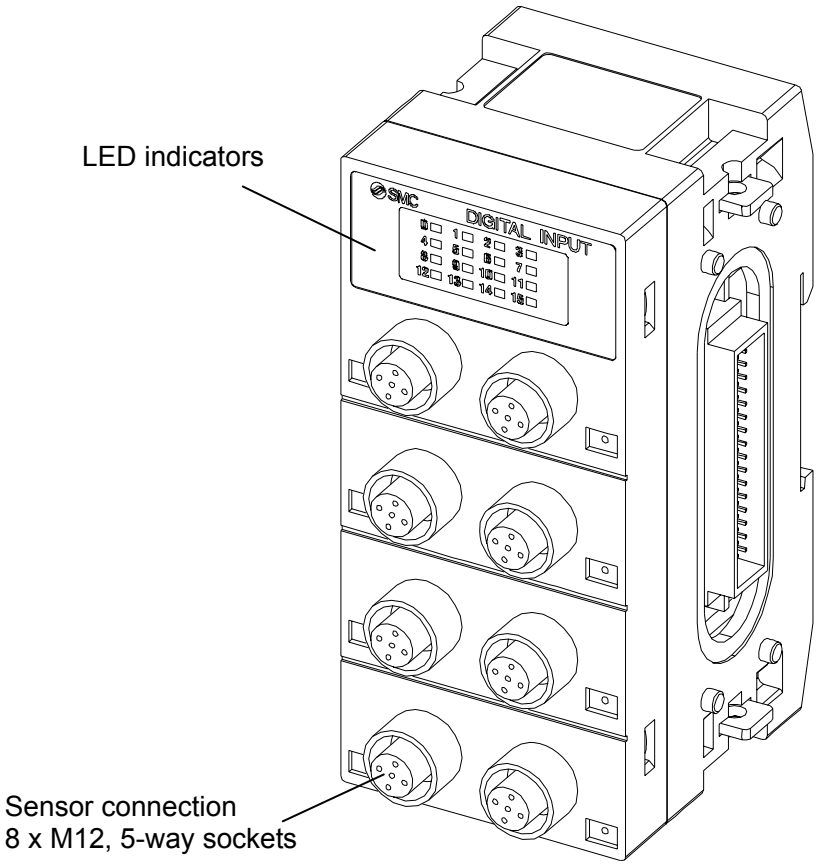


Fig. 10-1 Allocation of parts on the EX245-DX1-X36

10.2. Specifications

Table. 10-1 EX245-DX1-X36 specifications

Item	Description
General	
Dimensions (W x L x H) in mm	54 x 120 x 61.5 (71.6 incl. height of connectors)
Weight	370 g or less
Housing material	Nylon
Electrical	
Rated supply voltage	24 V DC
Voltage drop to sensor supply	Max. 1.6 V
Internal current consumption at 24V DC	50 mA or less
Dropout voltage (sensors)	< approx. 17 V DC
Input connection type	8 x M12, 5-way sockets with double allocation
Short circuit protection	Yes, approx. 180 mA per connector
Max. sensor supply current per module	1.5 A
Status indication	Yes, per input
Short circuit indication	Yes, per connector
Digital input	
Number of inputs	16
Input type	PNP
Signal 1	15 to 26.4 V
Signal 0	0 to 5 V
Input current signal 1	Typ. 7 mA
Input characteristic	Complies with IEC 61131, type 2 Also connection of 2-wire proximity switches
Certifications	
EMC	Yes

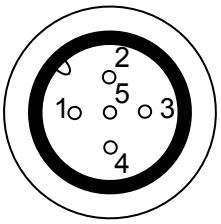
10.3. Wiring

⚠Caution

- To prevent damage, all power for the SI Unit and modules must be turned off (i.e. de-energized) before the modules are installed or removed.
- For a protection rating of IP65 to be ensured, sockets that are not used must be closed with M12 covering caps.
- For a protection rating of IP65 to be ensured, all covering caps must be screwed down correctly after wiring and setting have been performed.

Pin allocation of the M12, 5-way socket connector as shown in the following table:

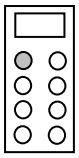
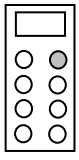
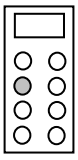
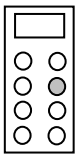
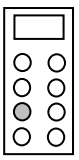
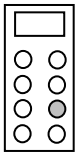
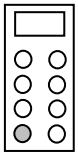
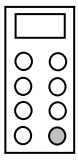
Table. 10-2 Pin allocation of the connector for EX245-DX1-X36

Pin	Allocation	View of connector (module side)
1	24 V	
2	DI (input signal “n+1”)	
3	0 V (US1)	
4	DI (input signal “n”)	
5	FE / Shield	

10.4. Process data

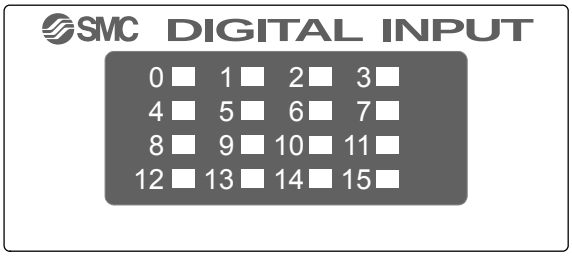
The EX245-DX1-X36 occupies 2 bytes of input data. The following table shows the allocation of the digital inputs and the process image.

Table. 10-3 Digital input allocation and the process data

Connector position									
Connector designation		0	1	2	3	4	5	6	7
Input	Pin 2	Bit 1	Bit 3	Bit 5	Bit 7	Bit 9	Bit 11	Bit 13	Bit 15
	Pin 4	Bit 0	Bit 2	Bit 4	Bit 6	Bit 8	Bit 10	Bit 12	Bit 14

10.5. LED indicators

The status indicators are arranged on the EX245-DX1-X36 as shown in the illustration below.



0 to15	Description
OFF	Input is not activated and no errors.
Green ON	Input is activated.
Red ON	Short circuit is detected.

Fig. 10-2 Status indicators of the EX245-DX1-X36

10.6. Block diagram

The following figure shows the block diagram of the EX245-DX1-X36.

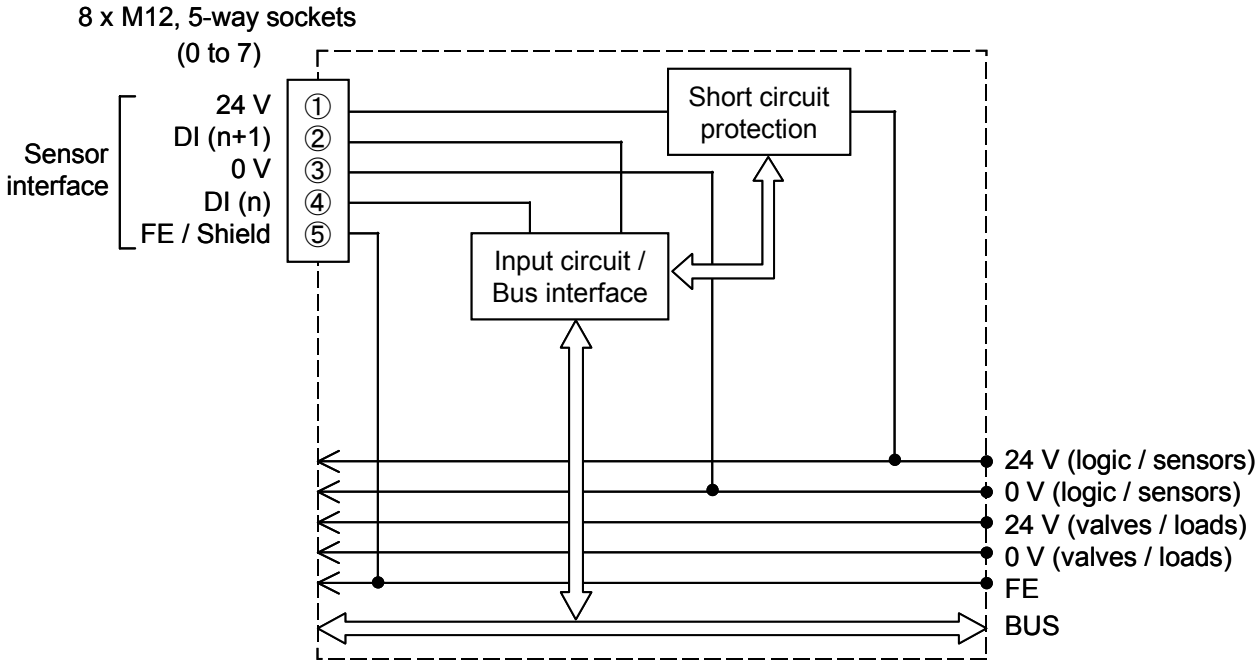


Fig. 10-3 Block diagram of the EX245-DX1-X36

11. Digital Output Module - EX245-DY1-X37

11.1. Parts and description

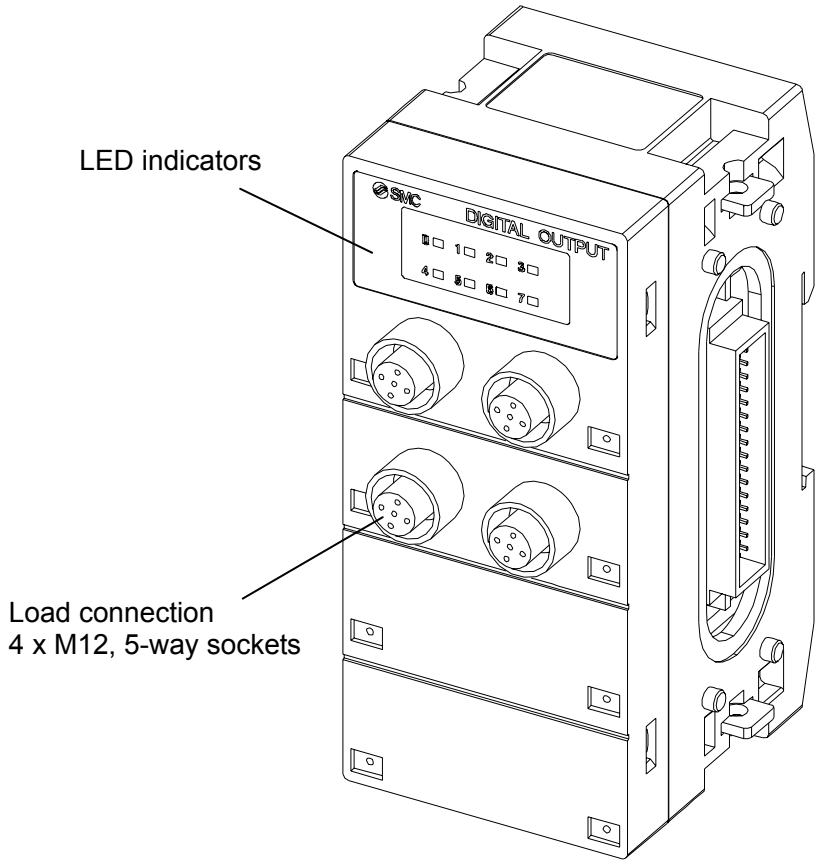


Fig. 11-1 Allocation of parts on the EX245-DY1-X37

11.2. Specifications

Table. 11-1 EX245-DY1-X37 specifications

Item	Description
General	
Dimensions (W x L x H) in mm	54 x 120 x 61.5 (71.6 incl. height of connectors)
Weight	370 g or less
Housing material	Nylon
Electrical	
Rated supply voltage	24 V DC
Voltage drop to load supply	Max. 1.6 V
Internal current consumption at 24 V DC	50 mA or less
Dropout voltage (loads)	< approx. 17 V DC
Output connection type	4 x M12, 5-way sockets with double allocation
Short circuit protection	Yes, approx. 500 mA per point
Max. output current per module	2 A
Status indication	Yes, per output
Short circuit indication	Yes, per output
Digital output	
Number of outputs	8
Output type	PNP
Certifications	
EMC	Yes

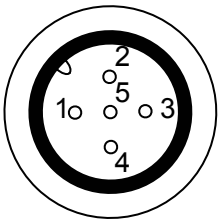
11.3. Wiring

⚠ Caution

- To prevent damage, all power for the SI Unit and modules must be turned off (i.e. de-energized) before the modules are installed or removed.
- For a protection rating of IP65 to be ensured, sockets that are not used must be closed with M12 covering caps.
- For a protection rating of IP65 to be ensured, all covering caps must be screwed down correctly after wiring and setting have been performed.

Pin allocation of the M12, 5-way socket connector as shown in the following table:

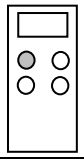
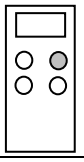
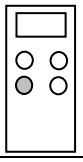
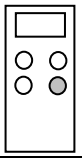
Table. 11-2 Pin allocation of the connector for EX245-DY1-X37

Pin	Allocation	View of connector (module side)
1	N.C.	
2	DO (output signal “n+1”)	
3	0 V (valves / loads)	
4	DO (output signal “n”)	
5	FE / Shield	

11.4. Process data

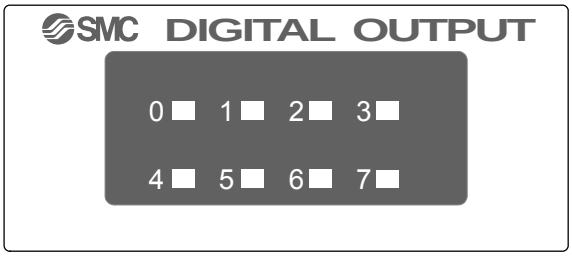
The EX245-DY1-X37 occupies 1 byte of output data. The following table shows the allocation of the digital outputs and the process image.

Table. 11-3 Digital output allocation and the process data

Connector position					
Connector designation		0	1	2	3
Output	Pin 2	Bit 1	Bit 3	Bit 5	Bit 7
	Pin 4	Bit 0	Bit 2	Bit 4	Bit 6

11.5. LED indicators

The status indicators are arranged on the EX245-DY1-X37 as shown in the illustration below.



0 to 7	Description
OFF	Output is not activated and no errors.
Green ON	Output is activated.
Red ON	Short circuit is detected.

Fig. 11-2 Status indicators of the EX245-DY1-X37

11.6. Block diagram

The following figure shows the block diagram of the EX245-DY1-X37.

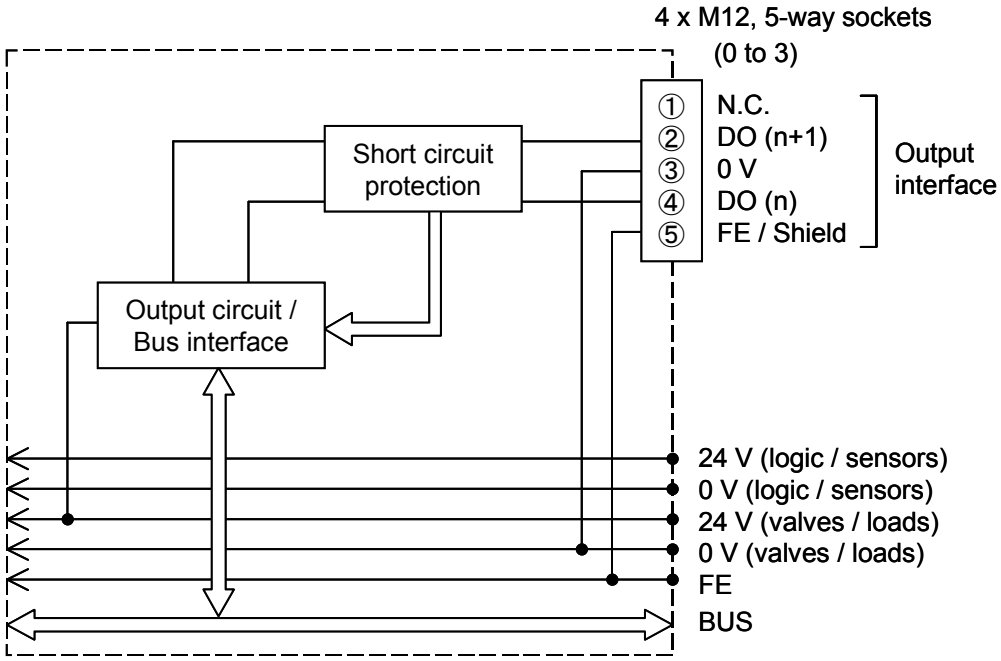


Fig. 11-3 Block diagram of the EX245-DY1-X37

12. Digital Output Module - EX245-DY2-X37

12.1. Parts and description

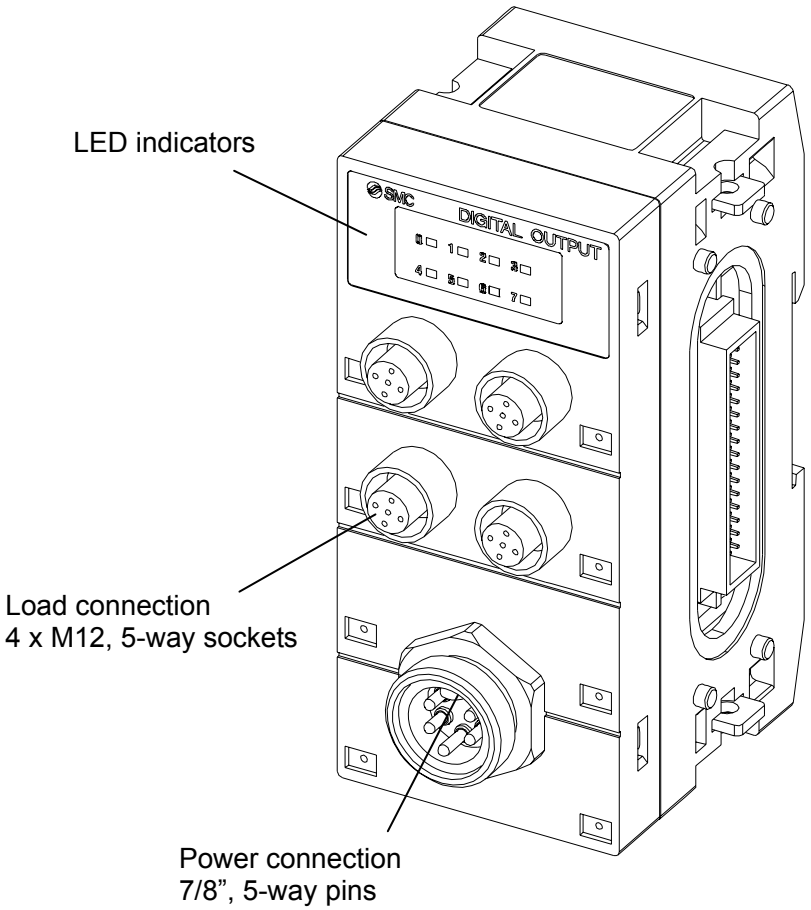


Fig. 12-1 Allocation of parts on the EX245-DY2-X37

12.2. Specifications

Table. 12-1 EX245-DY2-X37 specifications

Item		Description
General		
Dimensions (W x L x H) in mm		54 x 120 x 61.5 (73.9 incl. height of connectors)
Weight		420 g or less
Housing material		Nylon
Power connection		7/8”, 5-way pins
Electrical		
Voltage drop to load supply		Max. 1.6 V
Internal current consumption at 24 V DC		50 mA or less
Protection against pole reversal		Yes
Additional supply for the loads	Operating voltage	24 V DC+10% / -5%
	Under-voltage detection	Detected: < approx. 21.6 V DC Cancelled: < approx. 22.8 V DC
	Max. current	4 A
	Dropout voltage (loads)	< approx. 17 V DC
Galvanic isolation		Yes
Output connection type		4 x M12, 5-way sockets with double allocation
Short circuit protection		Yes, approx. 500 mA per point
Max. output current per module		2 A
Status indication		Yes, per output
Short circuit indication		Yes, per output
Digital output		
Number of outputs		8
Output type		PNP
Certifications		
EMC		Yes

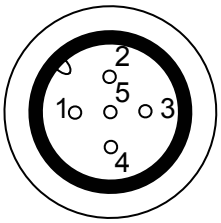
12.3. Wiring

⚠ Caution

- To prevent damage, all power for the SI Unit and modules must be turned off (i.e. de-energized) before the modules are installed or removed.
- For a protection rating of IP65 to be ensured, sockets that are not used must be closed with M12 covering caps.
- For a protection rating of IP65 to be ensured, all covering caps must be screwed down correctly after wiring and setting have been performed.

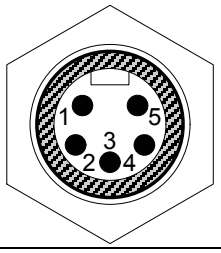
Pin allocation of the M12, 5-way socket connector as shown in the following table:

Table. 12-2 Pin allocation of the connector for EX245-DY2-X37

Pin	Allocation	View of connector (module side)
1	N.C.	
2	DO (output signal “n+1”)	
3	0 V (additional supply for the loads)	
4	DO (output signal “n”)	
5	FE / Shield	

Pin allocation of the 7/8”, 5-way pins connector as shown in the following table:

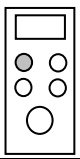
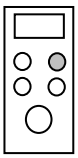
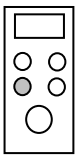
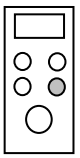
Table. 12-3 Pin allocation of Power connector for EX245-DY2-X35

Pin	Allocation	View of connector (module side)
1	0 V (additional supply for the loads)	
2	N.C.	
3	FE	
4	N.C.	
5	24 V (additional supply for the loads)	

12.4. Process data

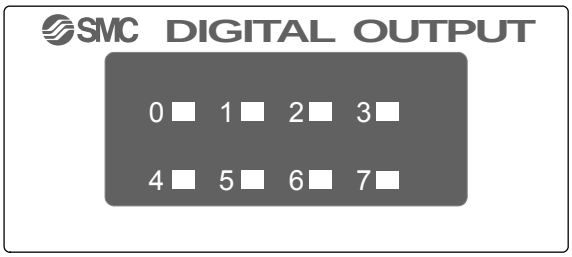
The EX245-DY2-X37 occupies 1 byte of output data. The following table shows the allocation of the digital outputs and the process image.

Table. 12-4 Digital output allocation and the process data

Connector position					
Connector designation		0	1	2	3
Output	Pin 2	Bit 1	Bit 3	Bit 5	Bit 7
	Pin 4	Bit 0	Bit 2	Bit 4	Bit 6

12.5. LED indicators

The status indicators are arranged on the EX245-DY2-X37 as shown in the illustration below.



0 to 7	Description
OFF	Output is not activated and no errors.
Green ON	Output is activated.
Red ON	Short circuit is detected.

Fig. 12-2 Status indicators of the EX245-DY2-X37

Under-voltage detection of additional supply for loads is confirmed by US4 indicator on the SI Unit.

12.6. Block diagram

The following figure shows the block diagram of the EX245-DY2-X37.

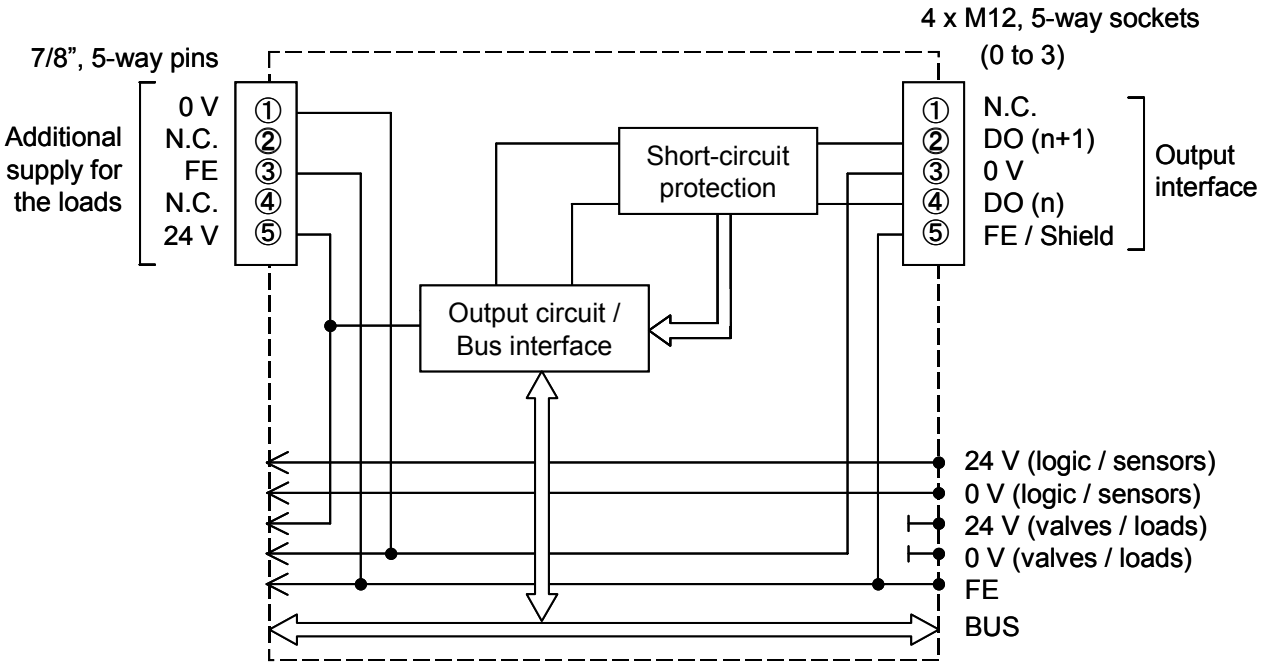


Fig. 12-3 Block diagram of the EX245-DY2-X37

13. Analog Input Module - EX245-AX2-X38

13.1. Parts and description

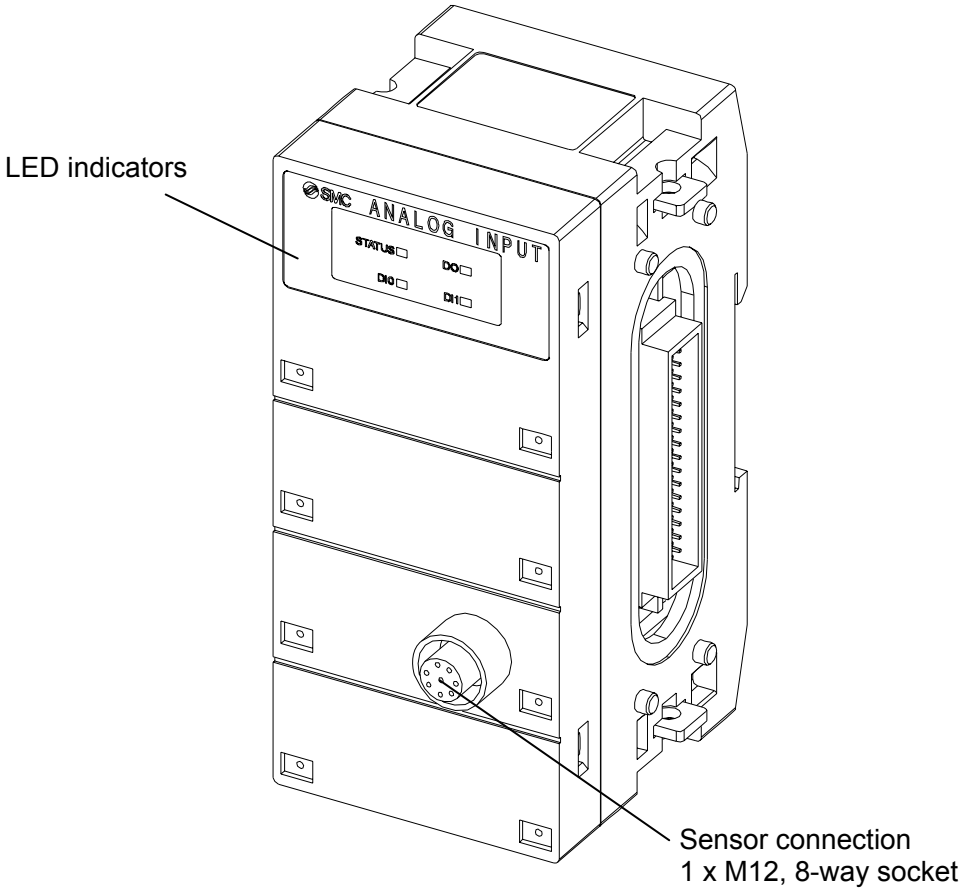


Fig. 13-1 Allocation of parts on the EX245-AX2-X38

13.2. Specifications

Table. 13-1 EX245-AX2-X38 specifications

Item	Description
General	
Dimensions (W x L x H) in mm	54 x 120 x 61.5 (71.6 incl. height of connectors)
Weight	370 g or less
Housing material	Nylon
Electrical	
Rated supply voltage	24 V DC
Voltage drop to sensor supply	Max. 1.6 V
Internal current consumption at 24 V DC	50 mA or less
Dropout voltage (sensors)	< approx. 17 V DC
Input connection type	1 x M12, 8-way socket
Short circuit protection	Yes, approx. 200 mA per connector
Status indication	Yes, per point
Short circuit and over / under-current indication	Yes
Digital input	
Number of inputs	2
Input type	PNP
Signal 1	15 to 26.4 V
Signal 0	0 to 5 V
Input current signal 1	Typ. 7 mA
Digital output	
Number of outputs	1
Output type	PNP
Analogue input	
Number of channels	1
Signal range	4 to 20 mA
Resolution	12 bit + sign bit
Absolute precision	1.2% of F.S.
Input resistance	< approx. 250 Ω
Input signal cut-off frequency	120 Hz
Max. permissible input current	40 mA
Certifications	
EMC	Yes

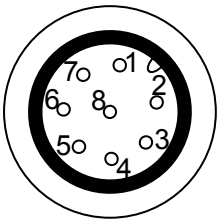
13.3. Wiring

⚠ Caution

- To prevent damage, all power for the SI Unit and modules must be turned off (i.e. de-energized) before the modules are installed or removed.
- For protection rating of IP65 to be ensured, sockets that are not used must be closed with M12 covering caps.
- For protection rating of IP65 to be ensured, all covering caps must be screwed down correctly after wiring and setting have been performed.

Pin allocation of the M12, 8-way socket connector as shown in the following table:

Table. 13-2 Pin allocation of the EX245-AX2-X38

Pin	Allocation	View of connector (module Side)
1	DI (input signal “1”)	
2	24 V	
3	0 V (US1)	
4	N.C.	
5	DO (output signal)	
6	Analogue input (+)	
7	Analogue input (-)	
8	DI (input signal “0”)	

13.4. Process data

The EX245-AX2-X38 occupies 3 bytes of input data and 1 byte of output data. The following shows the data format.

13.4.1. Input data

The measured analogue valve is represented in bits 11 to 0 of bytes 0 and 1.

Table 13-1 Bytes 0 and 1

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	F4	F3	F2	F1	Analogue value											

Under range flag: F2: 3.2 to 4.0mA, F1: < 3.2mA
Over range flag: F3: 20 to 21.5mA, F4: >21.5mA

Table 13-2 Significant measured value for byte 0 and 1

Input data		Analogue Input current [mA]
Diagnostics value	Analogue value	
1	000h	< 3.2 (wire broken)
2	000h	3.2 ... 4
0	000h	4.000000
0	001h	4.003907
	…	…
0	FFEh	19.996093
0	FFFh	20.000000
4	FFFh	20 ... 21.5
8	FFFh	> 21.5 (Overflow range)

Table. 13-3 Byte 3

Bit	Meaning
0	0: Digital input 0 is OFF. 1: Digital input 0 is ON.
1	0: Digital input 1 is OFF. 1: Digital input 1 is ON.
2	0: Analogue input current is less than the input limit current 0. 1: Analogue input current is equal or greater than the input limit current 0.
3	0: Analogue input current is less than the input limit current 1. 1: Analogue input current is equal or greater than the input limit current 1.
4	0: Analogue input current is less than the input limit current 2. 1: Analogue input current is equal or greater than the input limit current 2.
5 to 7	Reserved

For details of the parameters “limit current”, see 7.2.2.4 in page 24

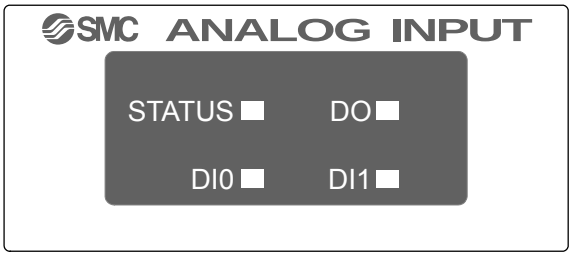
13.4.2. Digital output data

Table. 13-4 Output data format

Bit	Meaning
0	0: Digital output 0 is OFF. 1: Digital output 0 is ON.
1 to 7	Reserved.

13.5. LED indicator

The LED indicators are arranged on the EX245-AX2-X38 as shown in the illustration below.



Designation		Description
STATUS	OFF	Analogue input current below the permissible level (< 3.2 mA).
	Green ON	Analogue input current within the permissible level (3.2 to 21.5 mA).
	Red flash	Analogue input current over the permissible level (> 21.5 mA).
	Red ON	Short circuit.
DO	OFF	Digital output is not activated.
	Green ON	Digital output is activated.
DI0	OFF	Digital input 0 is not activated.
	Green ON	Digital input 0 is activated.
DI1	OFF	Digital input 1 is not activated.
	Green ON	Digital input 1 is activated.

Fig. 13-2 LED indicators of the EX245-AX2-X38

13.6. Block diagram

The following figure shows the block diagram of the EX245-AX2-X38.

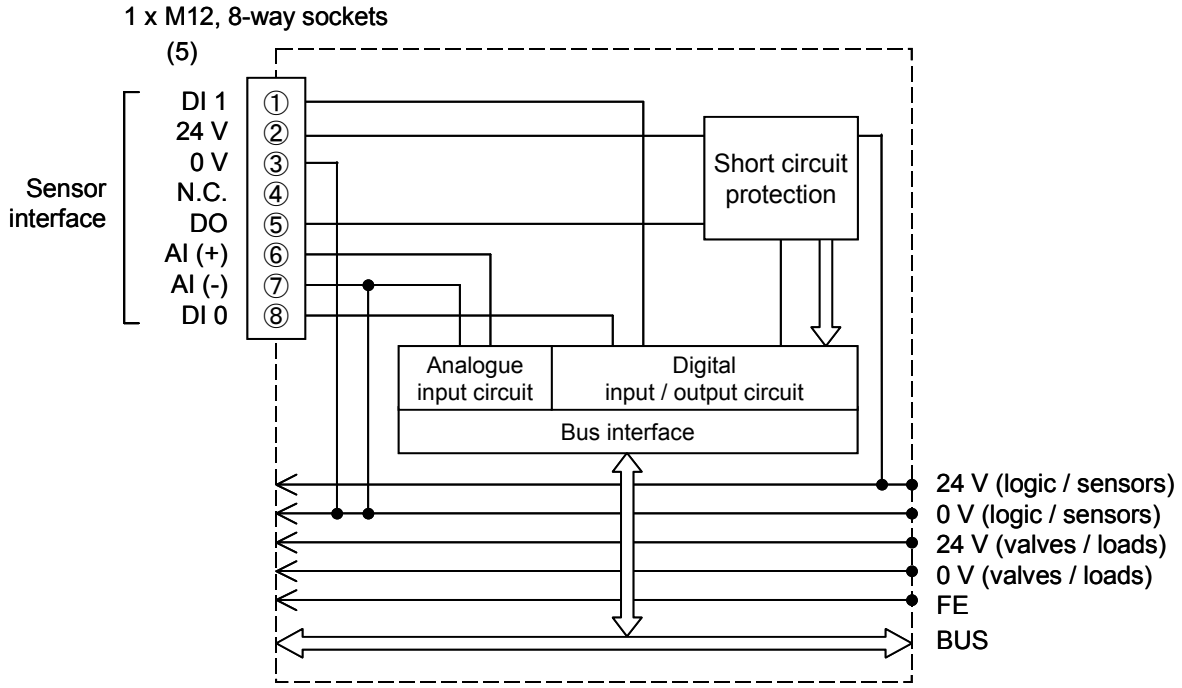


Fig. 13-3 Block diagram of the EX245-AX2-X38

14. Dimensions

14.1. VQC1000 manifold

The following figure shows the dimensions of the VQC1000 manifold.

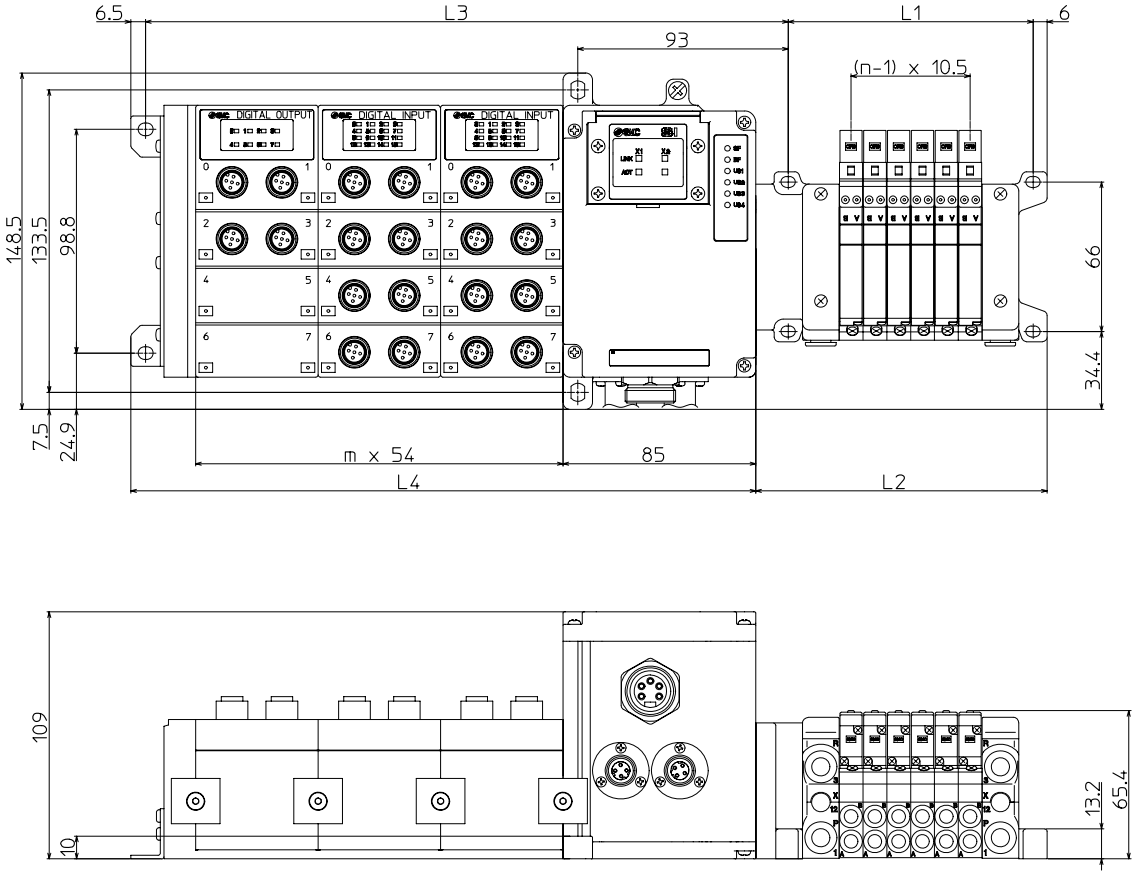


Fig. 14-1 Dimensions of the VQC1000 manifold

The following table shows the length of the VQC1000 series valve manifold.

Table. 14-1 Length of the VQC1000 series valve manifold

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
L1	55.5	66	76.5	87	97.5	108	118.5	129	139.5	150	160.5	171	181.5	192	202.5	213
L2	76	86.5	97	107.5	118	128.5	139	149.5	160	170.5	181	191.5	202	212.5	223	233.5

Formulas: L1 = 10.5n + 45, L2 = 10.5n + 65.5 (max. 16 single wiring stations)

The following table shows the length of the EX245 series module.

Table. 14-2 Length of the EX245 series module

M	0	1	2	3	4	5	6	7	8
L3	121.6	175.6	229.6	283.6	337.6	391.6	445.6	499.6	553.6
L4	113.6	167.6	221.6	275.6	329.6	383.6	437.6	491.6	545.6

Formulas: L3 = 54m + 121.6, L4 = 54m + 113.6 (max. 8 modules)

14.2. VQC2000 manifold

The following figure shows the dimensions of the VQC2000 manifold.

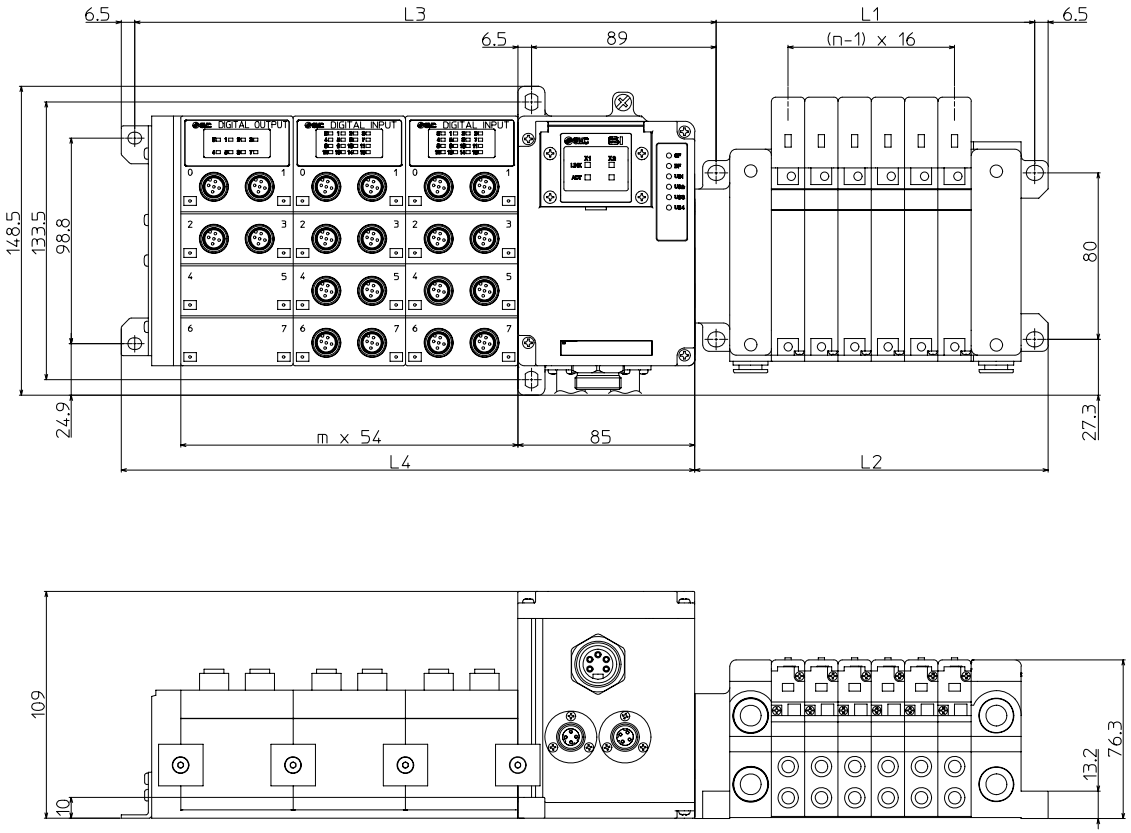


Fig. 14-2 Dimensions of the VQC2000 manifold

The following table shows the length of the VQC2000 series valve manifold.

Table. 14-3 Length of the VQC2000 series valve manifold

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
L1	73	89	105	121	137	153	169	185	201	217	233	249	265	281	297	313
L2	90	106	122	138	154	170	186	202	218	234	250	266	282	298	314	330

Formulas: L1 = 16n + 57, L2 = 16n + 74 (max. 16 single wiring stations)

The following table shows the length of the EX245 series module.

Table. 14-4 Length of the EX245 series module

m	0	1	2	3	4	5	6	7	8
L3	117.6	171.6	225.6	279.6	333.6	387.6	441.6	495.6	549.6
L4	113.6	167.6	221.6	275.6	329.6	383.6	437.6	491.6	545.6

Formulas: L3 = 54m + 117.6, L4 = 54m + 113.6 (max. 8 modules)

14.3. VQC4000 manifold

The following figure shows the dimensions of the VQC4000 manifold.

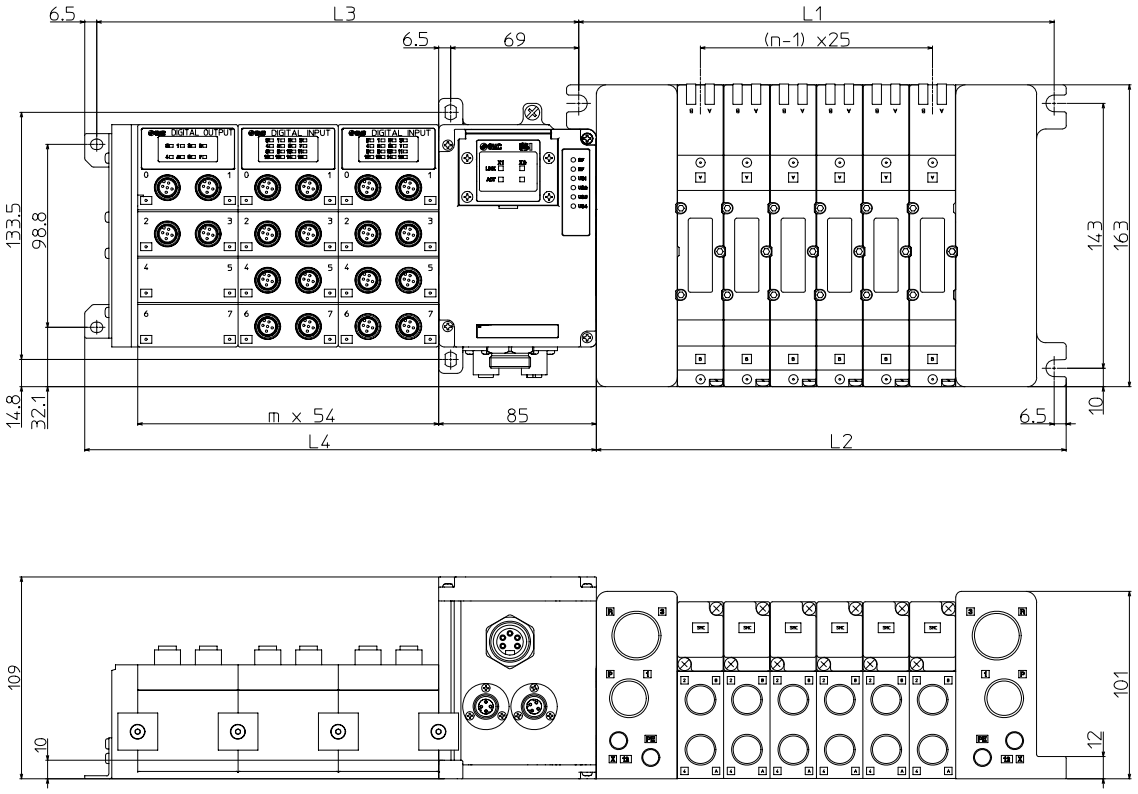


Fig. 14-3 Dimensions of the VQC4000 manifold

The following table shows the length of the VQC4000 series valve manifold.

Table. 14-5 Length of the VQC4000 series valve manifold

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
L1	131	156	181	206	231	256	281	306	331	356	381	406	431	456	481	506
L2	128	153	178	203	228	253	278	303	328	353	378	403	428	453	478	503

Formulas: L1 = 25n + 106, L2 = 25n + 103 (max. 16 single wiring stations)

The following table shows the length of the EX245 series module.

Table. 14-6 Length of the EX245 series module

m	0	1	2	3	4	5	6	7	8
L3	97.6	151.6	205.6	259.6	313.6	367.6	421.6	475.6	529.6
L4	113.6	167.6	221.6	275.6	329.6	383.6	437.6	491.6	545.6

Formulas: L3 = 54m + 97.6, L4 = 54m + 113.6 (max. 8 modules)

14.4. SV1000 manifold

The following figure shows the dimensions of the SV1000 manifold.

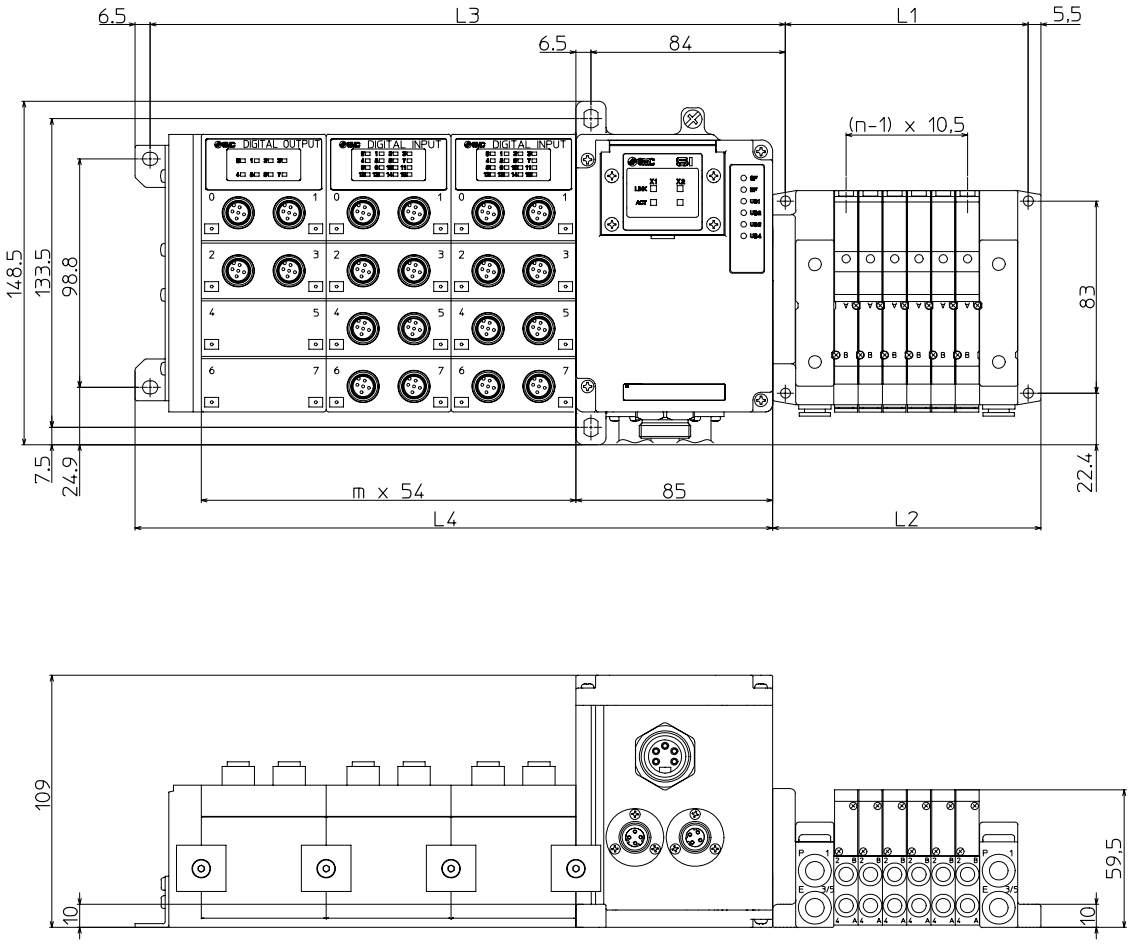


Fig. 14-4 Dimensions of the SV1000 manifold

The following table shows the length of the SV1000 series valve manifold.

Table. 14-7 Length of the SV1000 series valve manifold

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
L1	52.5	63	73.5	84	94.5	105	115.5	126	136.5	147	157.5	168	178.5	189	199.5	210
L2	63.5	74	84.5	95	105.5	116	126.5	137	147.5	158	168.5	179	189.5	200	210.5	221

Formulas: L1 = 10.5n + 42, L2 = 10.5n + 53

The following table shows the length of the EX245 series module.

Table. 14-8 Length of the EX245 series module

m	0	1	2	3	4	5	6	7	8
L3	112.6	166.6	220.6	274.6	328.6	382.6	436.8	490.6	544.6
L4	113.6	167.6	221.6	275.6	329.6	383.6	437.6	491.6	545.6

Formulas: L3 = 54m + 112.6, L4 = 54m + 113.6 (max. 8 modules)

14.5. SV2000 manifold

The following figure shows the dimensions of the SV2000 manifold.

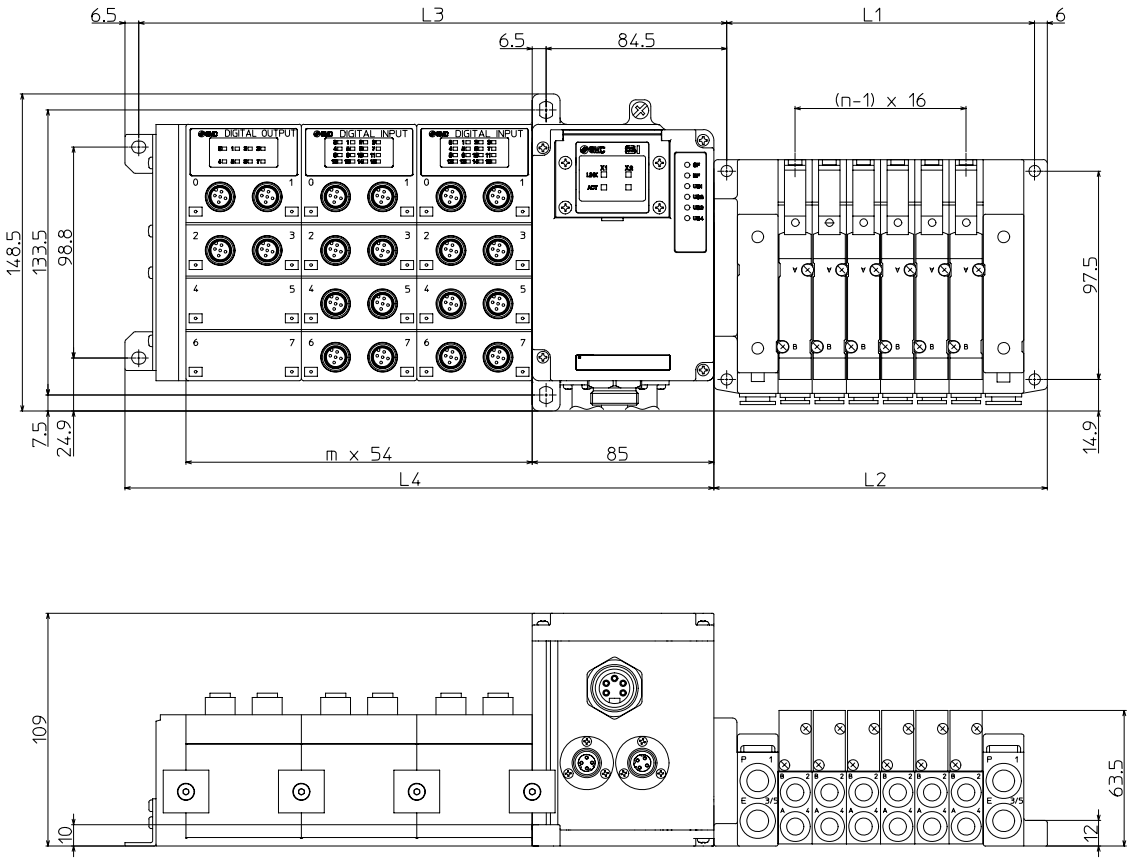


Fig. 14-5 Dimensions of the SV2000 manifold

The following table shows the length of the SV2000 series valve manifold.

Table. 14-9 Length of the SV2000 series valve manifold

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
L1	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304
L2	76	92	108	124	140	156	172	188	204	220	236	252	268	284	300	316

Formulas: L1 = 16n + 48, L2 = 16n + 60

The following table shows the length of the EX245 series module.

Table. 14-10 Length of the EX245 series module

m	0	1	2	3	4	5	6	7	8
L3	113.1	167.1	221.1	275.1	329.1	383.1	437.1	491.1	545.1
L4	113.6	167.6	221.6	275.6	329.6	383.6	437.6	491.6	545.6

Formulas: L3 = 54m + 113.1, L4 = 54m + 113.6 (max. 8 modules)

14.6. SV3000 manifold

The following figure shows the dimensions of the SV3000 manifold.

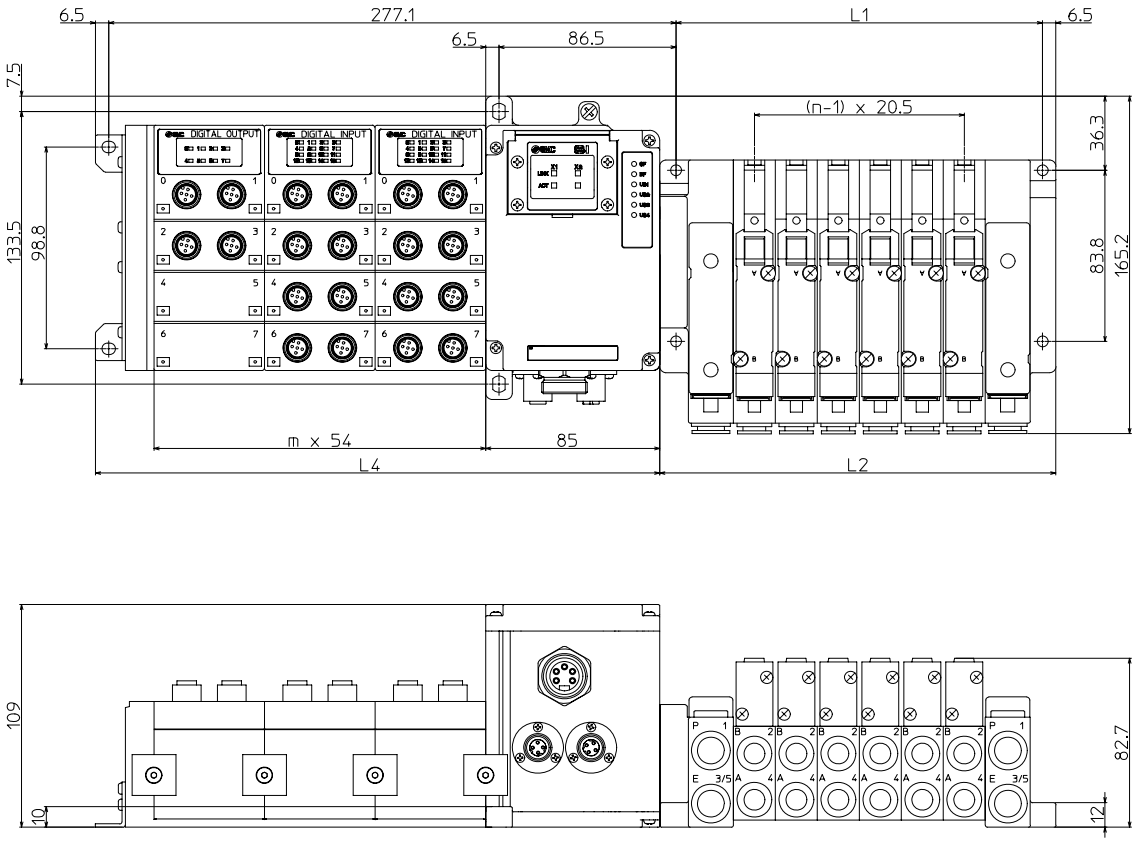


Fig. 14-6 Dimensions of the SV3000 manifold

The following table shows the length of the SV3000 series valve manifold.

Table. 14-11 Length of the SV3000 series valve manifold

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
L1	76.5	97	117.5	138	158.5	179	199.5	220	240.5	261	281.5	302	322.5	343	363.5	384
L2	91	111.5	132	152.5	173	193.5	214	234.5	255	275.5	296	316.5	337	357.5	378	398.5

Formulas: L1 = 20.5n + 56, L2 = 20.5n + 70.5

The following table shows the length of the EX245 series module.

Table. 14-12 Length of the EX245 series module

m	0	1	2	3	4	5	6	7	8
L3	115.1	169.1	223.1	277.1	331.1	385.1	439.1	493.1	547.1
L4	113.6	167.6	221.6	275.6	329.6	383.6	437.6	491.6	545.6

Formulas: L3 = 54m + 115.1, L4 = 54m + 113.6 (max. 8 modules)

14.7. VSS8-2 / VSR8-2 manifold

The following figure shows the dimensions of the VSR8-2 / VSS8-2 manifold.

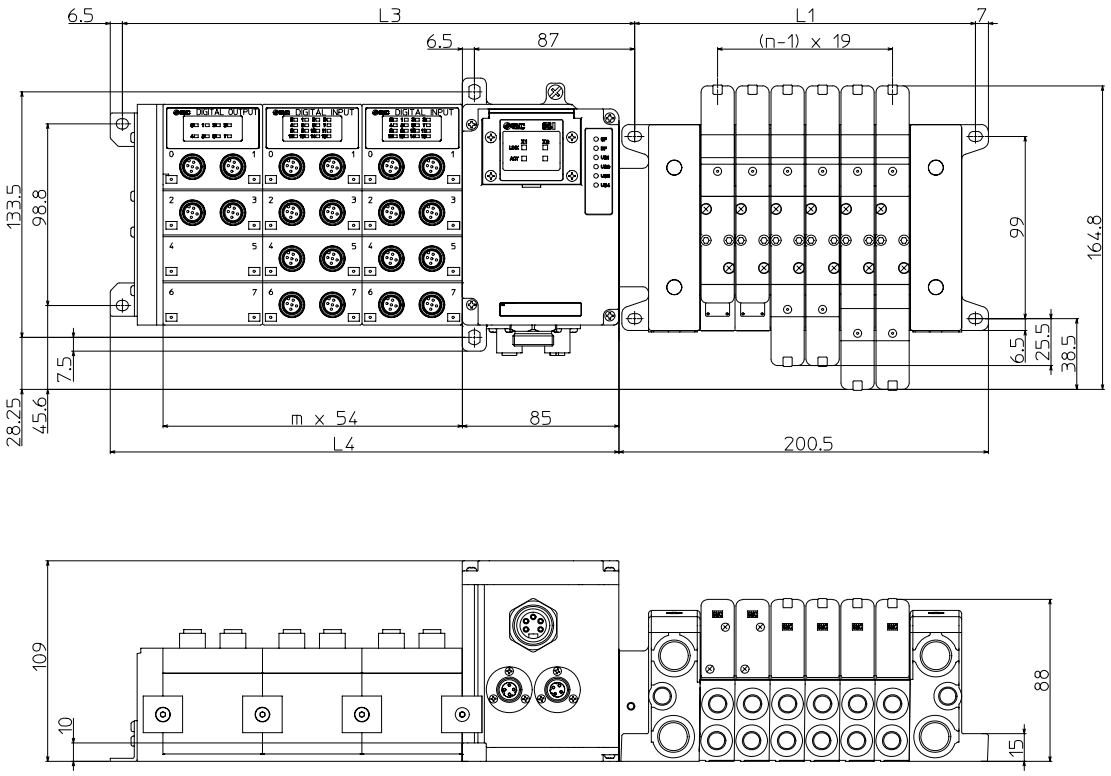


Fig. 14-7 Dimensions of the VSS8-2 / VSR8-2 manifold

The following table shows the length of the VSS8-2 / VSR8-2 series valve manifold.

Table. 14-13 Length of the VSS8-2 / VSR8-2 series valve manifold

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
L1	90	109	128	147	166	185	204	223	242	261	280	299	318	337	356	375
L2	105.5	124.5	143.5	162.5	181.5	200.5	219.5	238.5	257.5	276.5	295.5	314.5	333.5	352.5	371.5	390.5

Formulas: L1 = 19n + 71, L2 = 19n + 86.5 (max. 16 single wiring stations)

The following table shows the length of the EX245 series module.

Table. 14-14 Length of the EX245 series module

m	0	1	2	3	4	5	6	7	8
L3	115.6	169.6	223.6	277.6	331.6	385.6	439.6	493.6	547.6
L4	113.6	167.7	221.6	275.6	329.6	383.6	437.6	491.6	545.6

Formulas: L3 = 54m + 115.6, L4 = 54m + 113.6 (max. 8 modules)

14.8. VSS8-4 / VSR8-4 manifold

The following figure shows the dimensions of the VSR8-4 / VSS8-4 manifold.

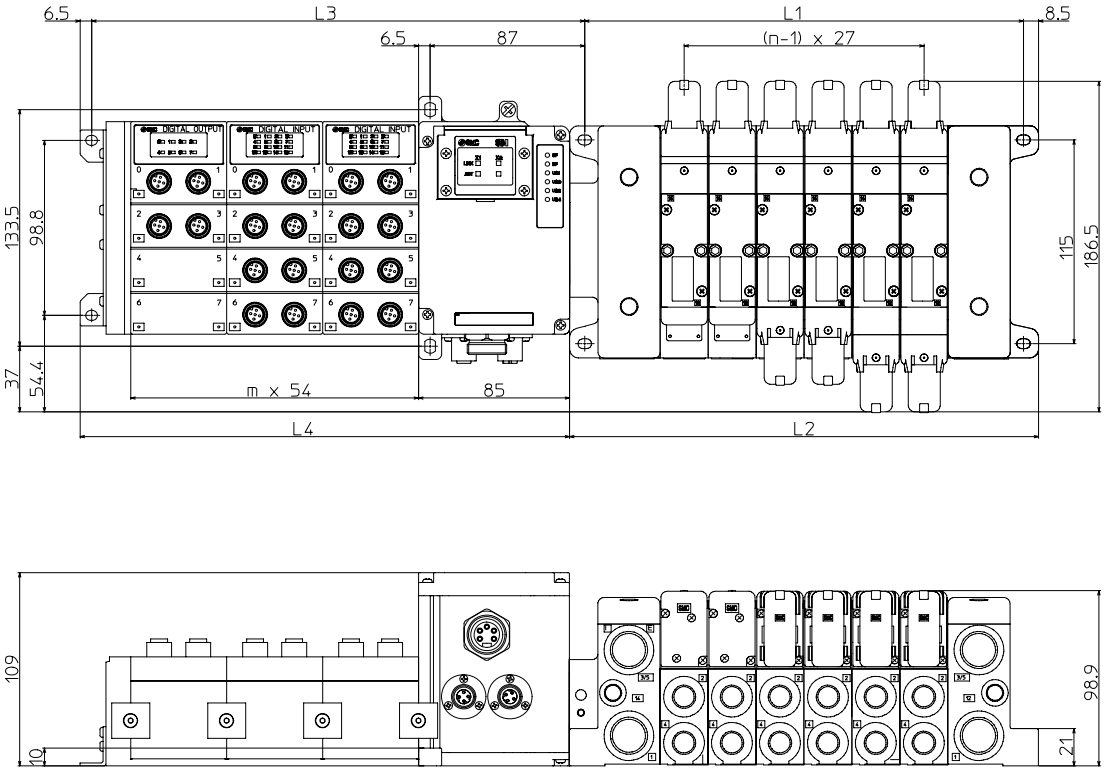


Fig. Fig. 14-8-Dimensions of the VSR8-4 / VSS8-4 manifold

The following table shows the length of the VSR8-4 / VSS8-4 series valve manifold.

Table. 14-15 Length of the VSR8-4 / VSS8-4 series valve manifold

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
L1	112	139	166	193	220	247	274	301	328	355	382	409	436	463	490	517
L2	129	156	183	210	237	264	291	318	345	372	399	426	453	480	507	534

Formulas: L1 = 27n + 85, L2 = 27n + 102 (max. 16 single wiring stations)

The following table shows the length of the EX245 series module.

Table. 14-16 Length of the EX245 series module

m	0	1	2	3	4	5	6	7	8
L3	115.6	169.6	223.6	277.6	331.6	385.6	439.6	493.6	547.6
L4	113.6	167.6	221.6	275.6	329.6	383.6	437.6	491.6	545.6

Formulas: L3 = 54m + 115.6, L4 = 54m + 113.6 (max. 8 modules)

15. Troubleshooting

15.1. EX245-SPR1-X171

Table. 15-1 Troubleshooting for Ethernet communication on Port 1 (X1) and Port 2 (X2)

No.	Problem	Possible cause	Remedy
1	・LINK indicator is OFF. ・ACT indicator is OFF.	No connection to the IO Controller (no IO Controller available on the bus)	・Check the bus connection. ・Set uniform baud rate. ・Autonegotiation not successful.

Table. 15-2 Troubleshooting for PROFINET communication

No.	Problem	Possible cause	Remedy
1	BF indicator flashes.	The SI Unit is physically connected to the IO Controller but the following problem has occurred.	---
		・Configuration is defective.	Check the configuration.
		・Device name is not correct.	Check the device names.
		・The GSDML file is not correct.	Check the GSDML file.
		・The IO Controller is defective.	Check the IO Controller.
2	BF indicator is ON.	No IO Controller is on the bus.	・Check the PROFINET connection. ・Check the IO Controller. ・Check the bus configuration. ・Check all cables in your PROFINET network. ・Check whether the bus connectors are securely connected on the SI Unit.
3	・SF indicator is flashes at 2 Hz. ・BF indicator is OFF.	The connection to the IO Controller is OK but the following diagnostic event occurred.	Check the diagnostic event.
		・At least one valve coil has a short circuit.	・Check the solenoid valve for a short circuit.
4	SF indicator is flashes at 0.5 Hz.	The following diagnostic event occurred.	Check the diagnostic event.
		・At least one connected module has a short circuit.	・Check the module error.
		・The module layout has changed.	・Check the module layout.

Table. 15-2 Troubleshooting for PROFINET communication (continued)

No.	Problem	Possible cause	Remedy
5	SF indicator is ON.	The following diagnostic event occurred.	Check the diagnostic event.
		・The configuration data sent by the IO Controller does not match the actual layout.	・Check the configuration of the SI Unit and the module layout.
		・One of the "Valves" modules is not set in Slot 1 or Slot 2 in your configuration program.	・Check the configuration of the SI Unit.
		・Power supply is not present or is bellow the dropout level.	・Check the power supply.
		・At least one valve coil has a short circuit and at least one connected module has a short circuit or the module layout has changed.	・Check both the solenoid valve for a short circuit and the module error / layout.
		・An incompatible module is connected to the SI Unit.	・Check the connected module.
		・A connected module is defective.	・Check the connected module.

Table. 15-3 Troubleshooting for Overall system

No.	Problem	Possible cause	Remedy
1	US1 indicator is OFF.	Incorrect wiring.	・Check the cable. ・Check the wiring and pin numbers.
		US1 is not present or below the dropout level (< approx. 17 V DC).	Check the supply for the logic / sensors.
2	US1 indicator is flashing.	US1 is below the permissible level but above the dropout level (17 to 21.6 V DC).	Check the supply for the logic / sensors.
3	US2 indicator is OFF.	Incorrect wiring.	・Check the cable. ・Check the wiring and pin numbers.
		US2 is not present or below the dropout level (< approx. 17 V DC).	Check the supply for the valves / loads.
4	US2 indicator is flashing.	US2 is below the permissible level but above the dropout level (17 to 22.8 V DC).	Check the supply for the valves / loads.
5	US3 indicator is OFF.	Incorrect wiring.	・Check the cable. ・Check the wiring and pin numbers.
		First additional supply for the loads is not present or below the dropout level (< approx. 17 V DC).	Check the first additional supply for the loads.
		EX245-DY2-X37 does not exist.	Check the module layout.

Table. 15-3 Troubleshooting for Overall system (continued)

No.	Problem	Possible cause	Remedy
6	US3 indicator is flashing.	First additional supply for the loads is below the permissible level but above the dropout level (17 to 22.8 V DC).	Check the first additional supply for the loads.
7	US4 indicator is OFF.	Incorrect wiring.	・Check the cable. ・Check the wiring and pin numbers.
		At least one of all the additional supplies for the loads excluding the first one is not present or below the dropout level (< approx. 17 V DC).	・Check all the additional supplies for the loads excluding the first one.
		Two or more EX245-DY2-X37 does not exist.	・Check the module layout.
8	US4 indicator is flashing.	At least one of all the additional supplies for the loads excluding the first one is below the permissible level but above the dropout level (17 to 22.8 V DC).	・Check all the additional supplies for the loads excluding the first one.
9	A solenoid valve is not operating.	Incorrect connection.	Check the connection with the SI Unit.
		Solenoid valve is faulty.	Check the solenoid valve.
		US2 is not present or below the dropout level (< approx. 17 V DC).	Check the supply for the valves.
10	The connection to the IO Controller is defective.	Configuration is defective. (The "EX245 PN FX" folder is selected (drag & drop) onto the PROFINET line on the PN master in the "HW Config" on the STEP 7.)	Check the configuration in the "HW Config" on the STEP 7 and change the configuration from "EX245 PN FX" to "EX245 PN Cu" folder.

15.2. EX245-DX1-X36

Table. 15-4 Troubleshooting for EX245-DX1-X36

No.	Problem	Possible cause	Remedy
1	Signals cannot be received even with sensor.	Incorrect wiring.	Check the wiring and pin numbers.
		US1 is not present or below the dropout level (< approx. 17 V DC).	Check the supply for the sensors.
		Sensor is faulty.	Check the sensor.
2	Status indicator is red ON.	Connector has a short circuit.	・Check the wiring and pin numbers. ・Check the sensor.

15.3. EX245-DY1-X37

Table. 15-5 Troubleshooting for EX245-DY1-X37

No.	Problem	Possible cause	Remedy
1	A load is not operating.	Incorrect wiring.	Check the wiring and pin numbers.
		US2 or additional supply for the loads is not present or below the dropout level (< approx. 17 V DC).	Check the (additional) supply for the loads.
		Load is faulty.	Check the load.
2	Status indicator is red ON.	Output has a short circuit.	・Check the wiring and pin numbers. ・Check the load.

15.4. EX245-DY2-X37

Table. 15-6 Troubleshooting for EX245-DY2-X37

No.	Problem	Possible cause	Remedy
1	A load is not operating.	Incorrect wiring.	Check the wiring and pin numbers.
		Additional supply for the loads is not present or below the dropout level (< approx. 17 V DC).	Check the additional supply for the loads.
		Load is faulty.	Check the load.
2	Status indicator is red ON.	Output has a short circuit.	・Check the wiring and pin numbers. ・Check the load.

15.5. EX245-AX2-X38

Table. 15-7 Troubleshooting for EX245-AX2-X38

No.	Problem	Possible cause	Remedy
1	Correct measured value cannot be received even with sensor.	Incorrect wiring.	Check the wiring and pin numbers.
		US1 is present or below the dropout level (< approx. 17 V DC).	Check the supply for the sensors.
		Sensor is faulty.	Check the sensor.
2	A load is not operating.	Incorrect wiring.	Check the wiring and pin numbers.
		US1 is not present or below the dropout level (< approx. 17 V DC).	Check the supply for the sensors.
		Load is faulty.	Check the load.
3	STATUS indicator is red ON.	Connector has a short circuit.	・Check the wiring and pin numbers. ・Check the sensor.
4	STATUS indicator is OFF.	Analogue input current below the permissible level (< 3.2 mA).	・Check the wiring and pin numbers. ・Check the sensor.
5	STATUS indicator red flashes.	Analogue input current over the permissible level (< 21.5 mA).	・Check the wiring and pin numbers. ・Check the sensor.

Revision history

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