## Type 3 — Integrated input-output type

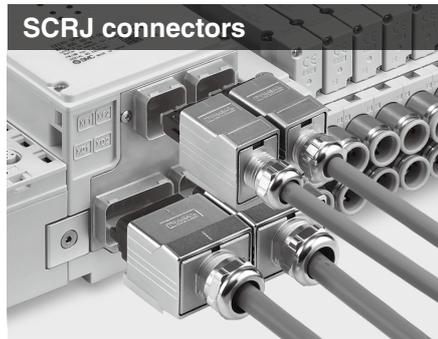# Fieldbus System (For Input/Output)

## *EX245 Series*

CE  RoHS

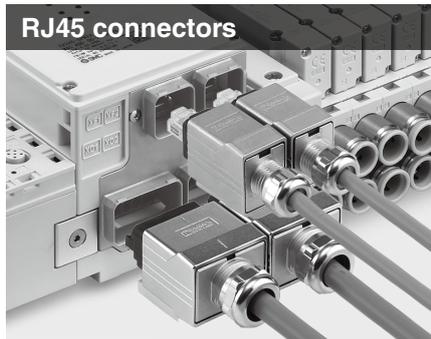# Compatible with 3 types of connector  IP65

## AIDA*[1] specifications compliant

**Push Pull connectors**
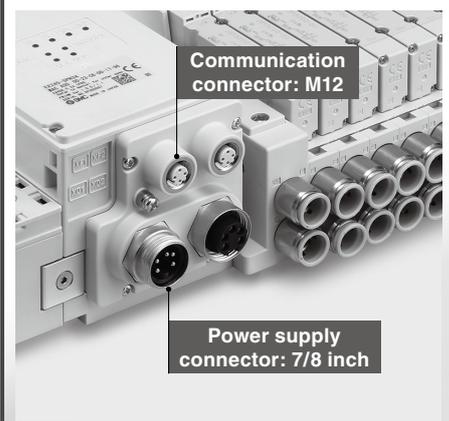One-touch removal/mounting requires fewer work-hours

### SCRJ connectors

### RJ45 connectors

## General-purpose connectors
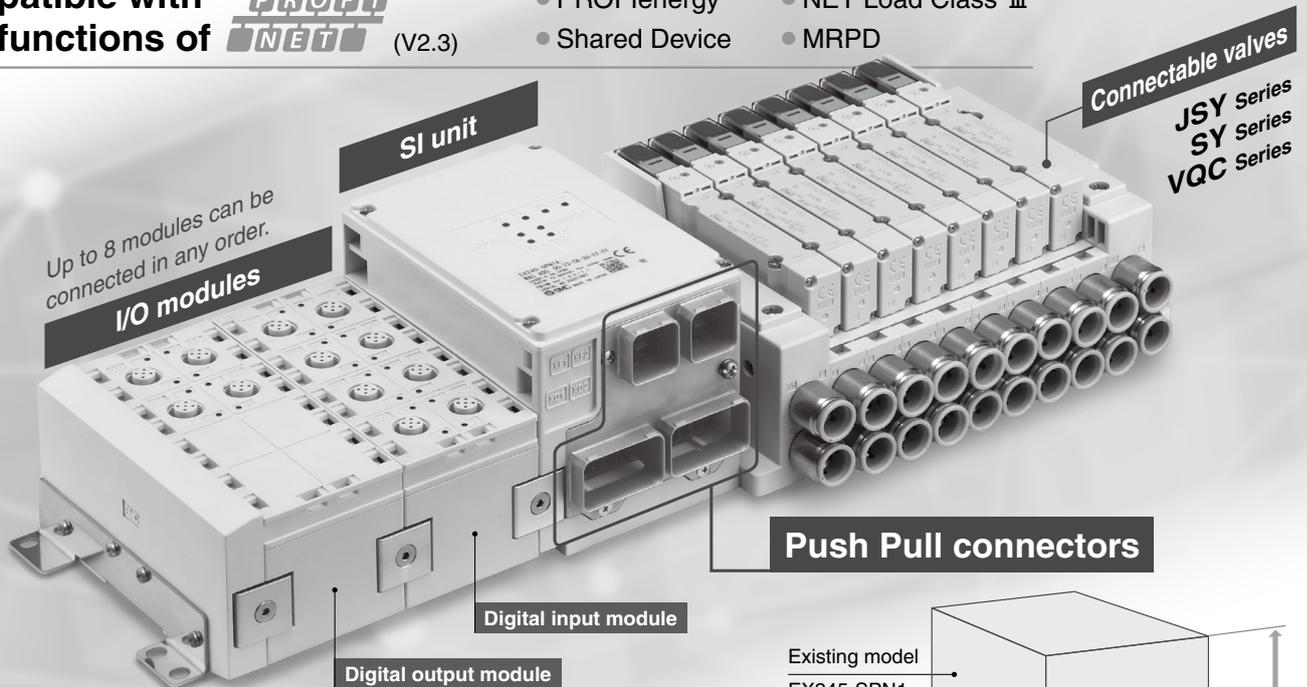
**Communication connector: M12**

**Power supply connector: 7/8 inch**

*[1] Abbreviation of the Automation Initiative of German (Deutschland) Automobile Manufacturers

## Compatible with new functions of PROFINET® (V2.3)

- PROFIenergy
- Shared Device
- NET Load Class Ⅲ
- MRPD

**Connectable valves**
JSY Series
SY Series
VQC Series

SI unit

Up to 8 modules can be connected in any order.

I/O modules

**Digital input module**

**Digital output module**

**Push Pull connectors**

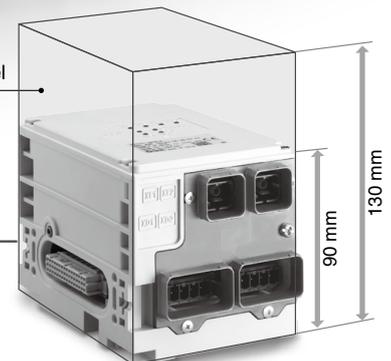## FW (firmware) update function

Simultaneous writing is possible from network connection.

## Web server function

Status check and valve ON/OFF are possible on the web browser.

## Compact, Lightweight

Existing model
EX245-SPN1

130 mm
90 mm

- Height: **40** mm reduction
- Weight: **53.5**% reduction
  *New* **465** g ← Existing model: 1000 g

SMC

## Compatible with PROFIenergy, the energy-saving function

**PROFIenergy**

Generally, the switching off of the facilities in factories consumes a lot of time to restart them.
PROFIenergy enables PROFINET communication to continue while saving energy by minimizing the time for restarting. When the commands for PROFIenergy energy-saving mode are sent from the I/O controller (PLC) to the I/O device (SI unit), the information of time for pausing is also sent (such as lunch breaks, nighttime, weekends, holidays).
The SMC SI unit does not require time for restarting. However, for the connected I/O equipment, such as pressure switch, flow switch, auto switch, valves, three types of energy-saving modes are available for customers to choose from depending on their application.

| Mode | Output (Valve/Digital) | Input device (Pressure switch, flow switch, auto switch, etc.) | Input data |
|---|---|---|---|
| Shut down/Clear value mode | OFF | OFF (Power supply) | OFF |
| Shut down/Hold last value mode | Hold | OFF (Power supply) | Hold |
| PROCEED mode | Hold | Hold | Hold |

## Shared Device function

I/O module connected to an SI unit can be controlled by multiple I/O controllers (PLC).
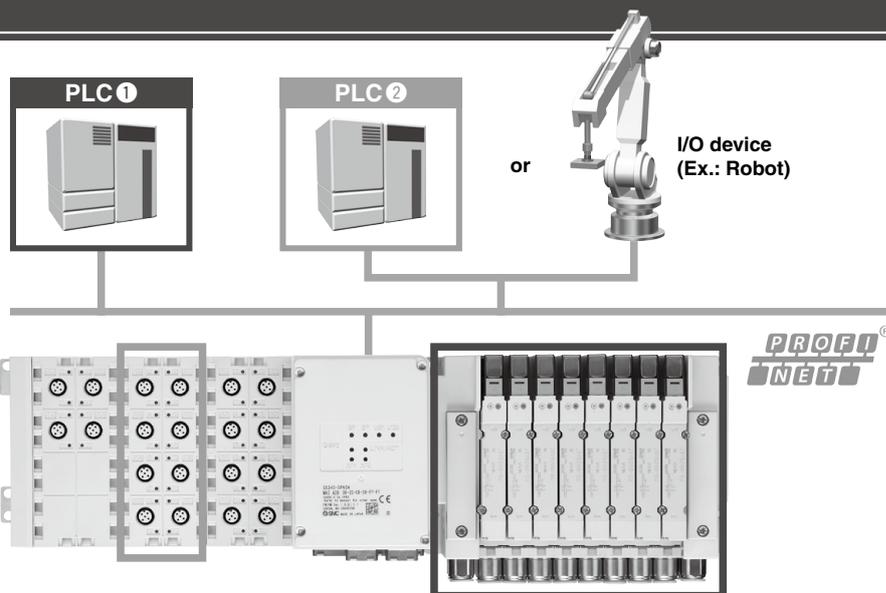


- Information can be shared with up to 3 controllers in addition to the control PLC.
- The cost of the hardware, cables, and installation space can be reduced.

PLC① to ③: For monitoring
PLC④        : For control
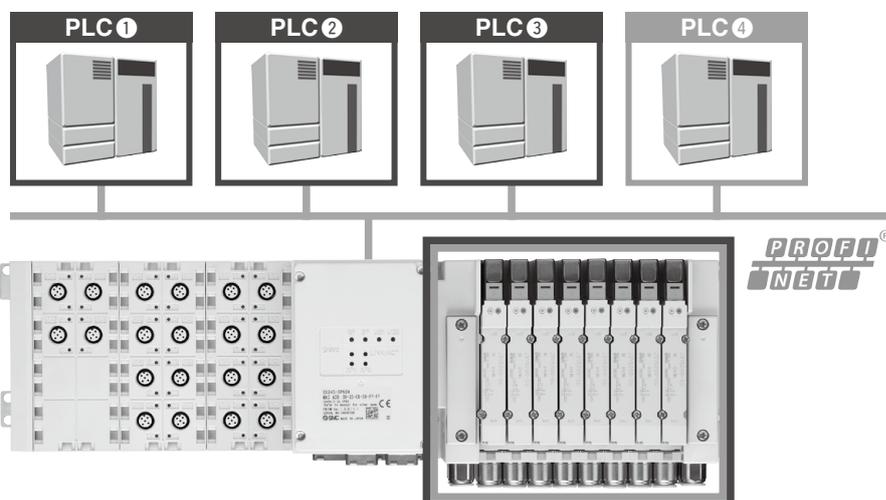


∗ Shared Device function enables an I/O module connected to the I/O device to be controlled by multiple I/O controllers (PLC). Control status can be shared among other I/O controllers. As the function is realized on one PROFINET line, the cost for hardware, cables, and installation space can be reduced.

**SMC**

# MRP/MRPD function

## MRP (Media Redundancy Protocol) function

Even if a communication cable is disconnected or damaged at any location, communication can be continued. Furthermore, it is possible to identify the disconnection point, and the network disconnection time can be made within 200 ms.

∗ To use the MRP function, the PLC should be able to support the MRP function.

| Normal flow of data | Data flow when the communication cable is disconnected |
|---|---|
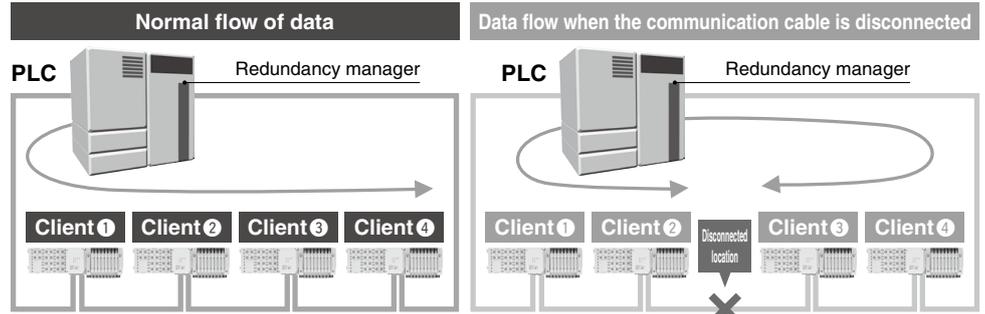


### MRPD (Media Redundancy for Planned Duplication)

It is possible to duplicate routes (Redundant) with a ring topology configured with PROFINET IRT communication.

Communication reconnection time is faster than the MRP function, so communication can be continued without recovery time.
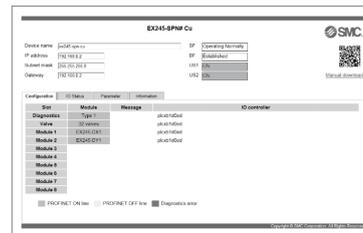
# NET Load Class Ⅲ compatible

Passed and certified under the highest network load (Class Ⅲ) specified by PROFINET.

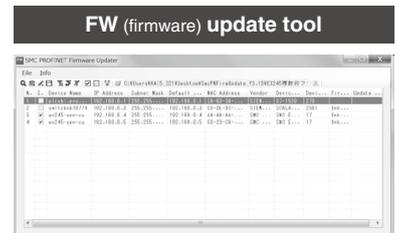# Built-in web server function and FW (firmware) update possible



**Connection example**
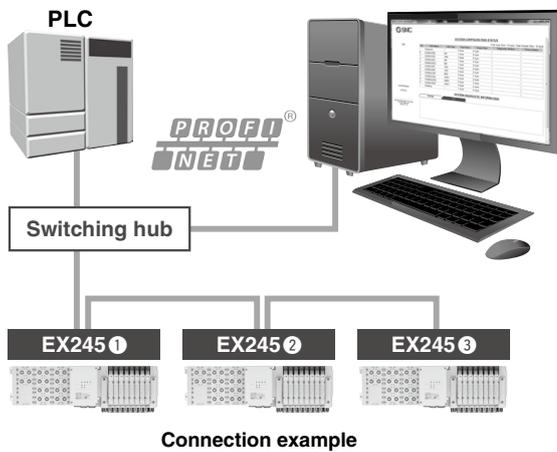
## All products are accessible from the PC.

● FW update  ● Status check  ● Forced output, etc.



● Status (errors and diagnostic contents) can be checked on a web browser.

● Easy operation test, initial operation check of equipment and maintenance without PLC

### FW (firmware) update tool



● Batch firmware updates for up to 225 units is possible from the Ethernet line.

● Easy to handle future version upgrades

# Dual communication and dual power connectors

● 2 power connectors and 2 communication connectors are mounted, making daisy-chain connection possible.

● An external branch connector is not necessary. Reduced wiring space

● Loop through current between power connectors supports up to 16 A∗1 max.

∗1  Maximum allowable current for 7/8 inch power supply connector is 10A. Loop through current between connectors is 6 A max.



**To power supply**    Power supply cable

Communication cable
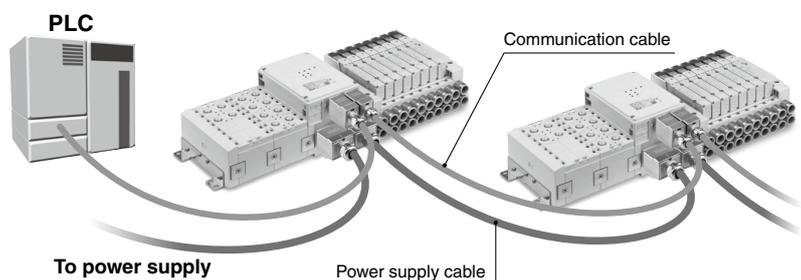
Side tabs:
Type 1 — EX260
EX123/124/126
Type 2 — EX500
EX600
Type 3 — EX245
EX250
EX120/121/122
Type 1 — EX140
EX180
Type 2 — EX510
M8/M12
ATEX

SMC

## Fast Start Up function

**For the Fast Start Up function, time from power ON to communication connection**

**Approx. 10 s**

**0.5 s or less**

Robot arm

Save time when connecting and improve productivity

In the case of a tool changer, it takes about 10 seconds for communication to be connected in some products after the power to the device installed on the tool is turned ON.
For products which support the Fast Start Up function, communication can be operational even faster.
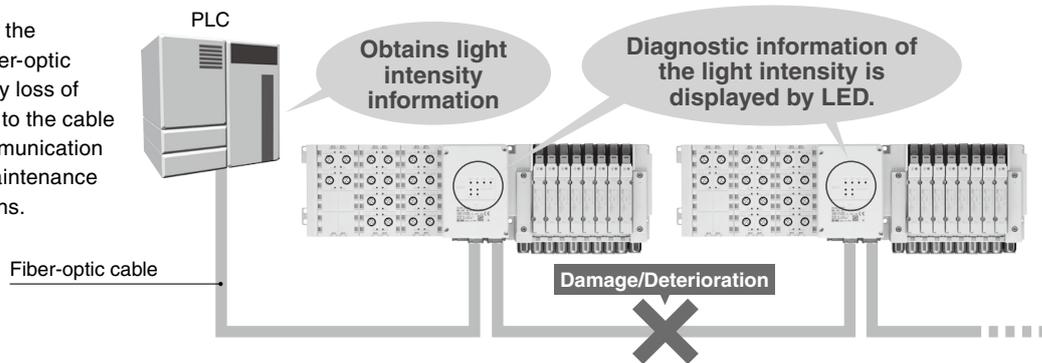
∗ To use the Fast Start Up function, the PLC should be able to support the Fast Start Up function.

**Tool 1**

**Tool 2**          **Tool 3**
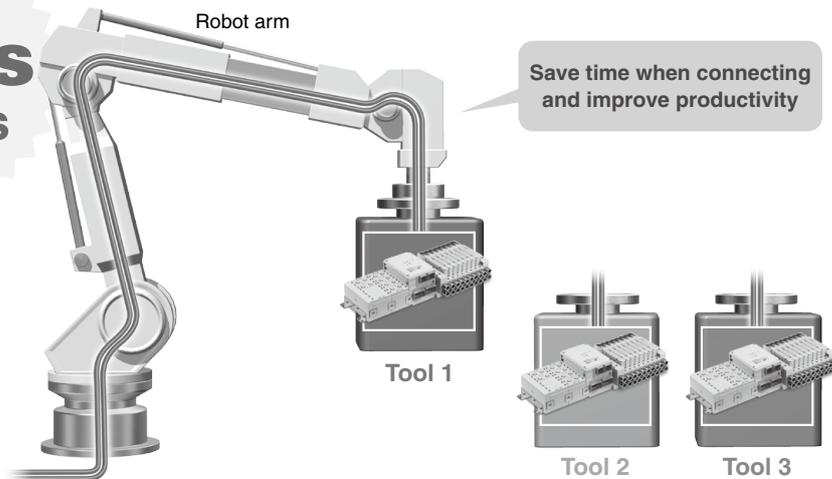
## Fiber-optic cable maintenance alarm*1

∗1  Only available for the EX245-SPN1A

This feature continuously monitors the received light intensity from the fiber-optic cable and reports it to the PLC. Any loss of intensity is an indicator of damage to the cable so may give a warning before communication is lost. This allows preventative maintenance and so avoids unplanned shutdowns.

PLC

Obtains light intensity information

Diagnostic information of the light intensity is displayed by LED.

Fiber-optic cable

Damage/Deterioration

## Modules can be combined flexibly.

● Number of valves, digital inputs/outputs

| Solenoid valve | Max. 32 valves |
|---|---|
| Digital input | Max. 128 inputs |
| Digital output | Max. 64 outputs |

● I/O modules can be connected and removed one by one.
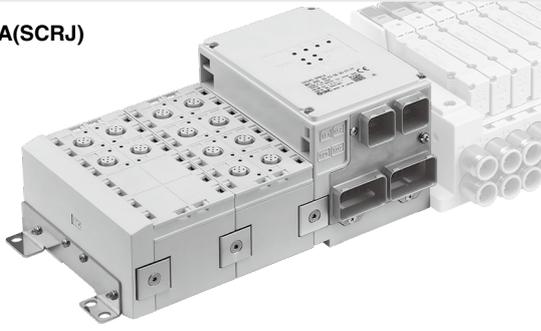● Up to 8 modules can be connected in any order.

Digital input module

Digital output module
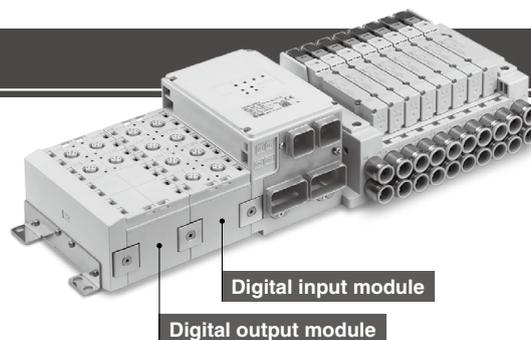
## Connectable Valve Series

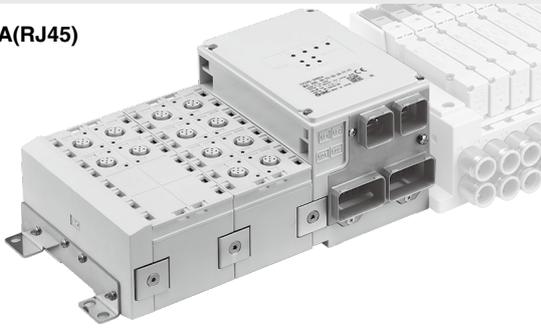| Series | | | Flow rate characteristics (4/2 → 5/3) | | Maximum number of solenoids | Power consumption [W] | Applicable cylinder size |
|---|---|---|---|---|---|---|---|
| | | | C [dm³/(s·bar)] | b | | | |
| IP65 | | JSY3000 | 2.77 | 0.27 | 32 | 0.4 (Standard) 0.1 (With power-saving circuit) | ø50 |
| | | JSY5000 | 6.59 | 0.22 | | | ø80 |
| IP65 | | SY3000 | 1.6 | 0.19 | 32 | 0.35 (Standard) 0.1 (With power-saving circuit) | ø50 |
| | | SY5000 | 3.6 | 0.17 | | | ø63 |
| IP65 | | VQC2000 | 3.2 | 0.30 | 24 | 0.4 (Standard) | ø63 |
| | | VQC4000 | 7.3 | 0.38 | | 0.95 (Standard) 0.4 (Low-wattage type) | ø160 |

SMC

# CONTENTS

**Type 3** Integrated input-output type

**Fieldbus System (For Input/Output)**
## *EX245 Series*

**SPN1A(SCRJ)**

**SPN2A(RJ45)**

**SPN3A(M12)**

EX260

Type 1

EX123/124/126

EX500

Type 2

EX600

EX245

Type 3

EX250

EX120/121/122

Type 1

EX140

EX180

Type 2

EX510

M8/M12

ATEX

# Fieldbus System
# For Input/Output
# EX245 *Series*

CE  c**UL**us  RoHS

## Construction



Manifold valve

SI unit

Digital input module

Digital output module

End plate
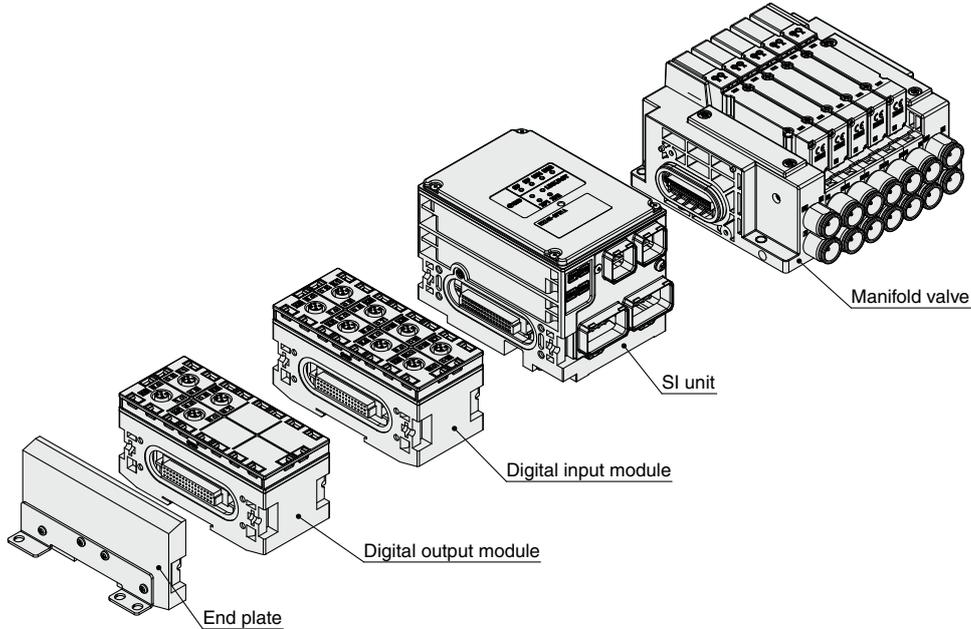
## How to Order

### SI Unit

**EX245 – S PN 1A**

SI unit
PROFINET
Connector type

**EX245-SPN1A    EX245-SPN2A    EX245-SPN3A**

| Symbol | Communication connector | Power supply connector |
|---|---|---|
| 1A | Push Pull connector (SCRJ): 2 pcs. | Push Pull connector (24 V): 2 pcs. |
| 2A | Push Pull connector (RJ45): 2 pcs. | Push Pull connector (24 V): 2 pcs. |
| 3A | M12 connector (4-pin, Socket, D-coded): 2 pcs. | 7/8 inch connector (5-pin, Plug): 1 pc. 7/8 inch connector (5-pin, Socket): 1 pc. |

### Digital Input Module

**EX245 – DX1**

Digital input module specification

| DX1 | Digital input (16 inputs) |
|---|---|

### Digital Output Module

**EX245 – DY1**

Digital output module specification

| DY1 | Digital output (8 outputs) |
|---|---|

### End Plate

**EX245 – EA2 – 1**

Bracket

| 1 | General-purpose |
|---|---|
| 2 | None |
| 3 | For JSY/SY |
| 4 | For VQC4000 |
| 5 | For VQC2000 |

Bracket        Bracket

**For JSY/SY        For VQC**

∗ Refer to the **Web Catalog** for manifold valve part numbers.
Bracket 3 to 5 correspond to the mounting hole pitch of each manifold valve.

**SMC**

## Specifications

### Common Specifications for All Units/Modules

| Item | Specifications |
|---|---|
| Operating temperature range | Operating: −10 to 50°C, Stored: −20 to 60°C (No condensation) |
| Operating humidity range | Operating, Stored: 35 to 85% RH (No condensation) |
| Withstand voltage | 500 VAC for 1 minute between external terminals and FE |
| Insulation resistance | 500 VDC, 10 MΩ or more between external terminals and FE |
| Enclosure | IP65 (Manifold assembly, With seal cap) |
| Standards | CE marking (EMC directive/RoHS directive), UL (CSA) |

### SI Unit Specifications

| | Model | EX245-SPN1A | EX245-SPN2A | EX245-SPN3A |
|---|---|---|---|---|
| Communication | Protocol | PROFINET | | |
| | Device type | PROFINET IO | | |
| | Communication speed | 100 Mbps full duplex | | |
| | Configuration file*1 | GSD file | | |
| | Applicable function | MRP function<br>MRPD function<br>Fast Start Up function<br>Shared Device function<br>PROFIenergy function<br>Web server function<br>FW update function<br>Conformance Class C<br>NET Load Class Ⅲ | | |
| | | Fiber-optic cable maintenance alarm | — | |
| Electrical | Internal current consumption (US1) | 300 mA or less | 200 mA or less | |
| | Loop through current between power connector | 16 A | 6 A | |
| | Operating voltage/ US1 | 24 VDC +20%, −15%/6 A | | |
| | Max. current US2 | 24 VDC +20%, −15%/4 A | | |
| Output | Output type | Source/PNP (Negative common) | | |
| | Number of outputs | 32 outputs | | |
| | Load | Solenoid valve with surge voltage suppressor of 24 VDC, 1 W or less (SMC) | | |
| | Power supply | 24 VDC, 2 A | | |
| | Protection | Short-circuit protection | | |
| General | Max. number of modules | 8 | | |
| | Max. number of digital inputs | 128 | | |
| | Max. number of digital outputs | 64 | | |
| | Weight | 465 g | | 540 g |

∗1 The configuration file can be downloaded from the SMC website, https://www.smcworld.com

### Digital Input Module

| | Model | EX245-DX1 |
|---|---|---|
| Input | Input type | PNP |
| | Input connector | M12 (5-pin) socket*1 |
| | Number of inputs | 16 inputs |
| | Supplied voltage | 24 VDC |
| | Max. supplied current | 0.5 A/Connector, 2 A/Module |
| | Protection | Short-circuit protection |
| | Input current (at 24 VDC) | Typ. 4.5 mA |
| | ON voltage | 11 to 30 V |
| | OFF voltage | −3 to 5 V |
| Internal current consumption | | 50 mA or less |
| Weight | | 280 g |

∗1 An M12 (4-pin) connector can also be connected.

### Digital Output Module

| | Model | EX245-DY1 |
|---|---|---|
| Output | Output type | PNP |
| | Output connector | M12 (5-pin) socket*1 |
| | Number of outputs | 8 outputs |
| | Supplied voltage | 24 VDC |
| | Max. load current | 0.5 A/Output, 2 A/Module |
| | Protection | Short-circuit protection |
| Current consumption | | 50 mA or less |
| Weight | | 280 g |

∗1 An M12 (4-pin) connector can also be connected.

### End Plate

| Model | EX245-EA2-1 | EX245-EA2-2 | EX245-EA2-3 | EX245-EA2-4 | EX245-EA2-5 |
|---|---|---|---|---|---|
| Bracket | Yes | No | Yes | Yes | Yes |
| Weight | 120 g | 80 g | 120 g | 150 g | 120 g |
| Note | General-purpose | — | Mounting hole for JSY/SY | Mounting hole for VQC4000 | Mounting hole for VQC2000 |

**EX245-SPN1A**

**EX245-SPN2A**

**EX245-SPN3A**

**EX245-DX1**

**EX245-DY1**

**For JSY/SY**

**For VQC**

**EX245-EA2-□**

EX260
EX123/124/126
Type 1

EX500
Type 2

EX600

EX245
Type 3

EX250

EX120/121/122
EX140
Type 1

EX180

EX510
Type 2

M8/M12

ATEX

# *EX245* Series
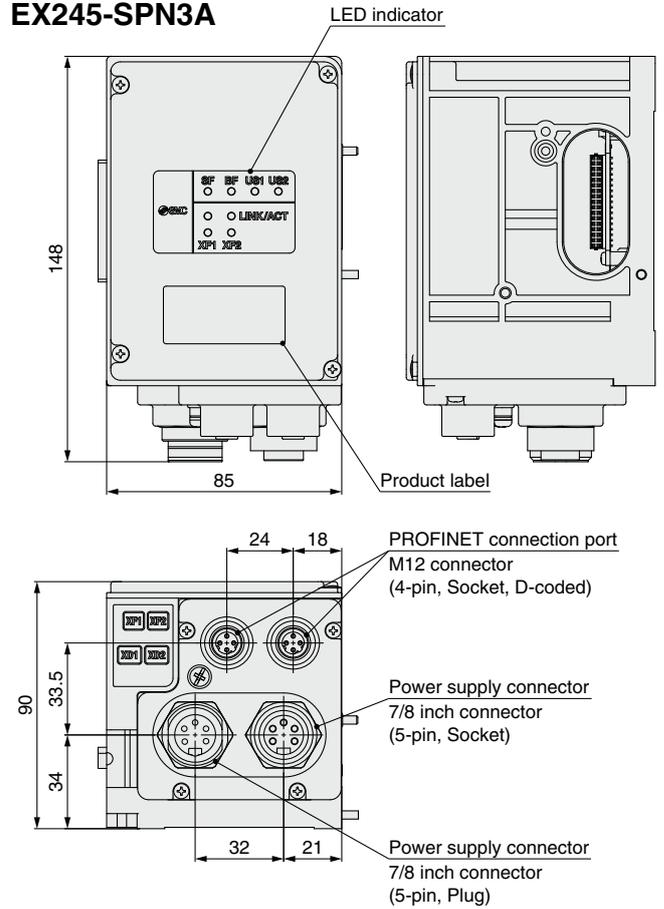
## Dimensions/Parts Description

### SI Unit

#### EX245-SPN1A/2A

LED indicator

127.5

85

Product label

25 | 17

90

42

30

37 | 19

PROFINET connection port
Push Pull connector
EX245-SPN1A: SCRJ
EX245-SPN2A: RJ45

Power supply connector
Push Pull connector (24 V)

#### EX245-SPN3A

LED indicator

148

85

Product label

24 | 18

90

33.5

34

32 | 21

PROFINET connection port
M12 connector
(4-pin, Socket, D-coded)

Power supply connector
7/8 inch connector
(5-pin, Socket)

Power supply connector
7/8 inch connector
(5-pin, Plug)

### Digital Input Module

#### EX245-DX1

22

Input connector
8 x M12 connector
(5-pin, Socket)

120

27 | 81

54

LED indicator (ON/OFF of the input device)

61

### Digital Output Module

#### EX245-DY1

22

Output connector
4 x M12 connector
(5-pin, Socket)

120

27

13.5

54

LED indicator (ON/OFF of the output device)

61

**SMC**

# Dimensions/Parts Description

## End Plate

### EX245-EA2-1
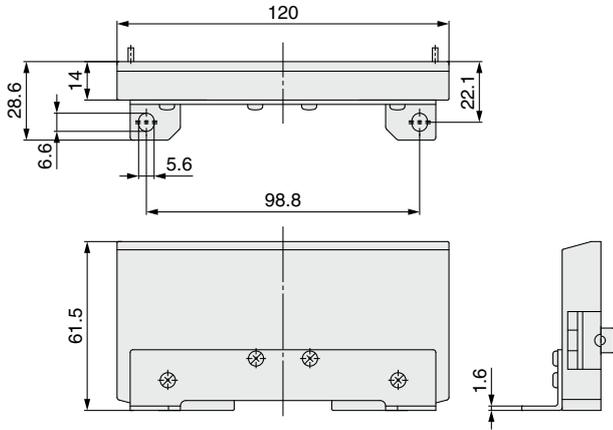


### EX245-EA2-2
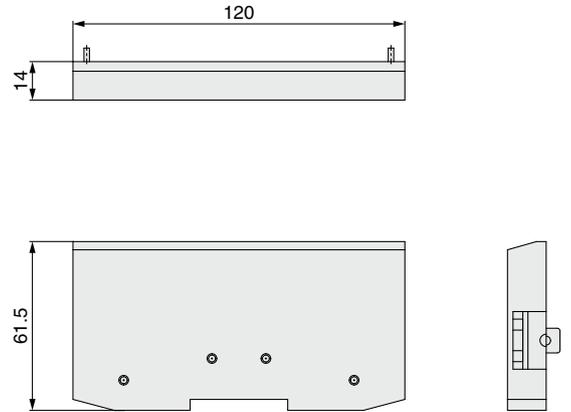


### EX245-EA2-3 (For JSY/SY)
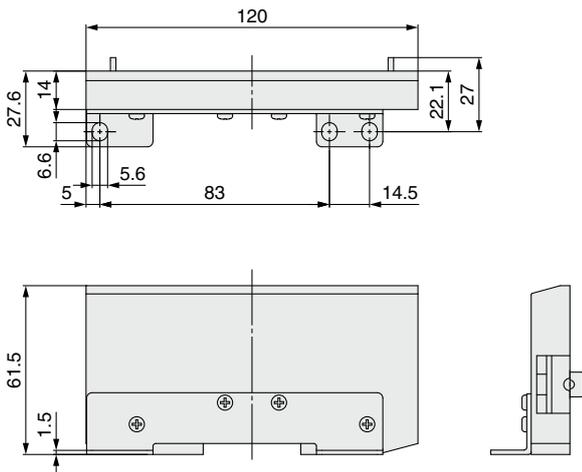


### EX245-EA2-4 (For VQC4000)
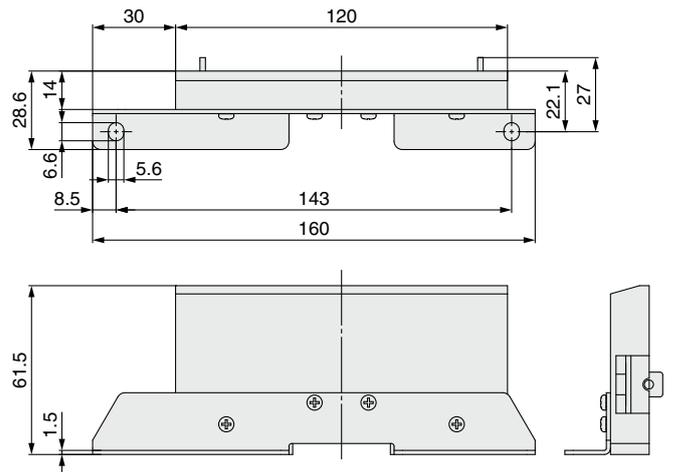


### EX245-EA2-5 (For VQC2000)
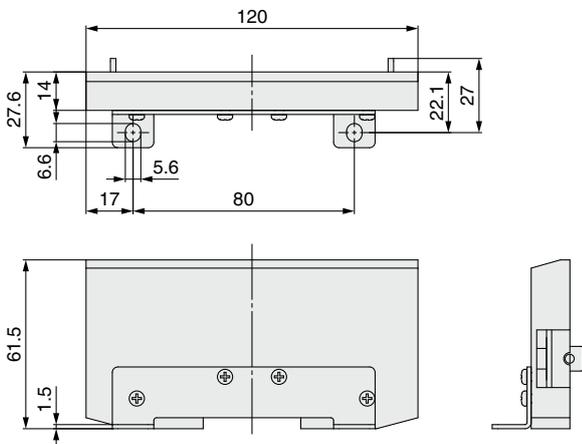
Side navigation tabs: EX260, EX123/124/126, Type 1 | EX500, Type 2 | EX600 | EX245, Type 3 | EX250 | EX120/121/122, EX140, Type 1 | EX180 | EX510, Type 2 | M8/M12 | ATEX

# EX245 *Series*

## Assembly Examples

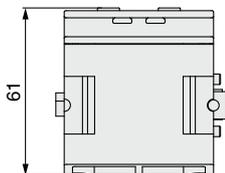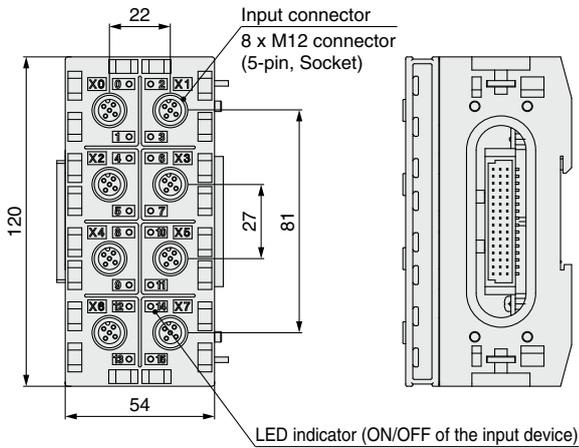Manifold valve ———————— Refer to the **Web Catalog** for order numbers.
SI unit ————————————— EX245-SPN1A
Digital input module ———— EX245-DX1
Digital output module ———— EX245-DY1
End plate ————————————— EX245-EA2-3

The modules and manifold valve are not assembled at the time of shipment.
After assembling the SI unit and manifold valve, assemble the modules.

Width across flats: 2.5 mm*1
Tightening torque
JSY : 0.75 to 0.85 N·m
SY : 0.75 to 0.85 N·m
VQC: 0.5 to 0.7 N·m

Manifold valve

**SI unit**

Joint*2

Modular adapter*2

Manifold valve

**SI unit**

**Digital input module**

**Digital output module**

Width across flats: 2.5 mm*1
Tightening torque: 1.3 N·m

**End plate (With bracket)**
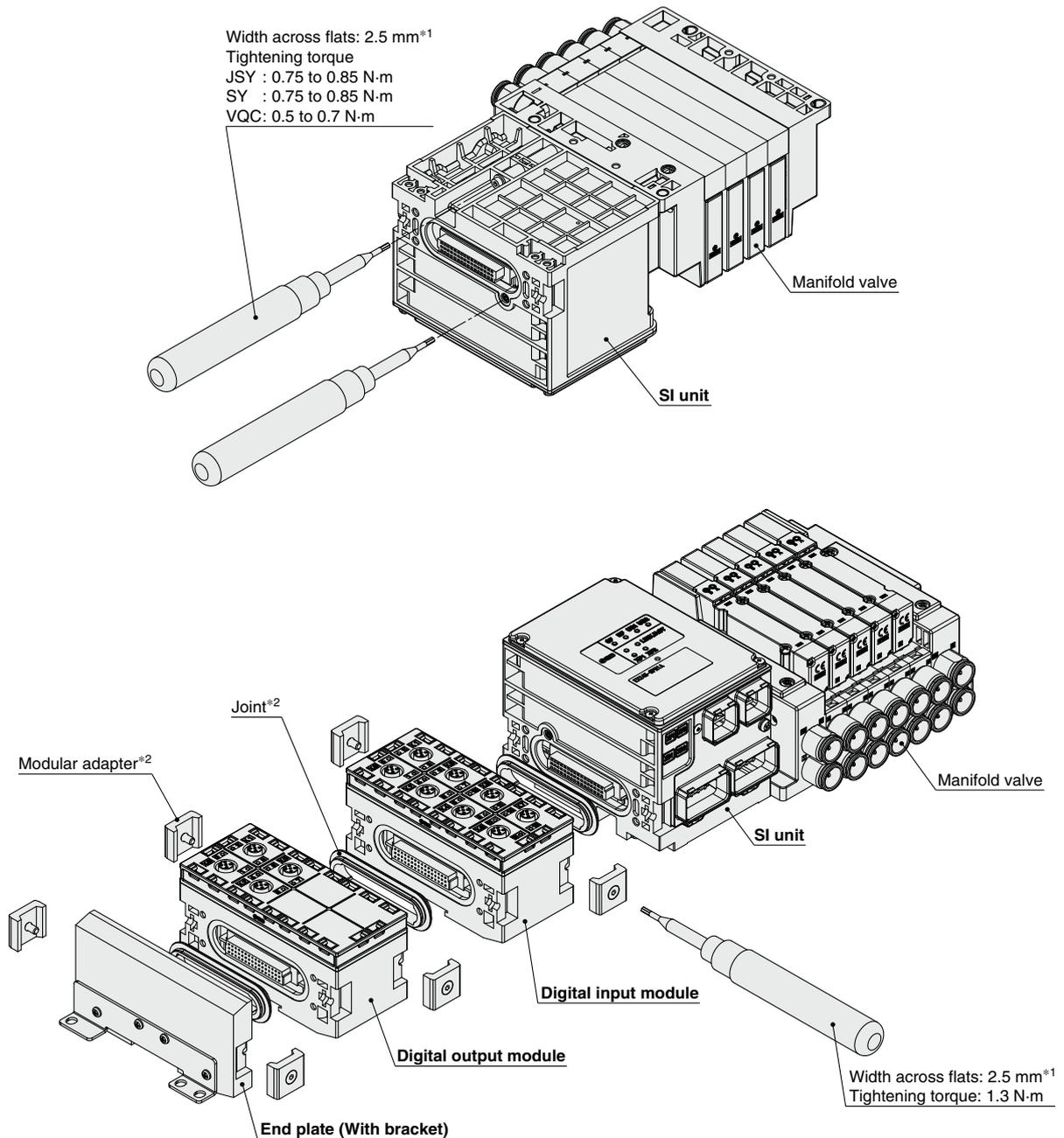
*1 Tightening tool is not included. It should be provided by the customer.
*2 Joint and modular adapter are shipped together with the product.

SMC

EX260
Type 1
EX123/124/126
Type 2
EX500
EX600
Type 3
EX245
EX250
EX120/121/122
Type 1
EX140
EX180
Type 2
EX510
M8/M12
ATEX

# *EX245 Series*
# **Accessories**



EX245-SPN3A

❺ **Communication cable/connector**
❻ **Field-wireable communication connector**

EX245-SPN1A/2A

❼ **I/O cable with connector, I/O connector**

❶ **Seal cap**

❷ **Marker**

❸ **Joint pack**

❶ **Seal cap**

❹ **7/8 inch connector and related parts**
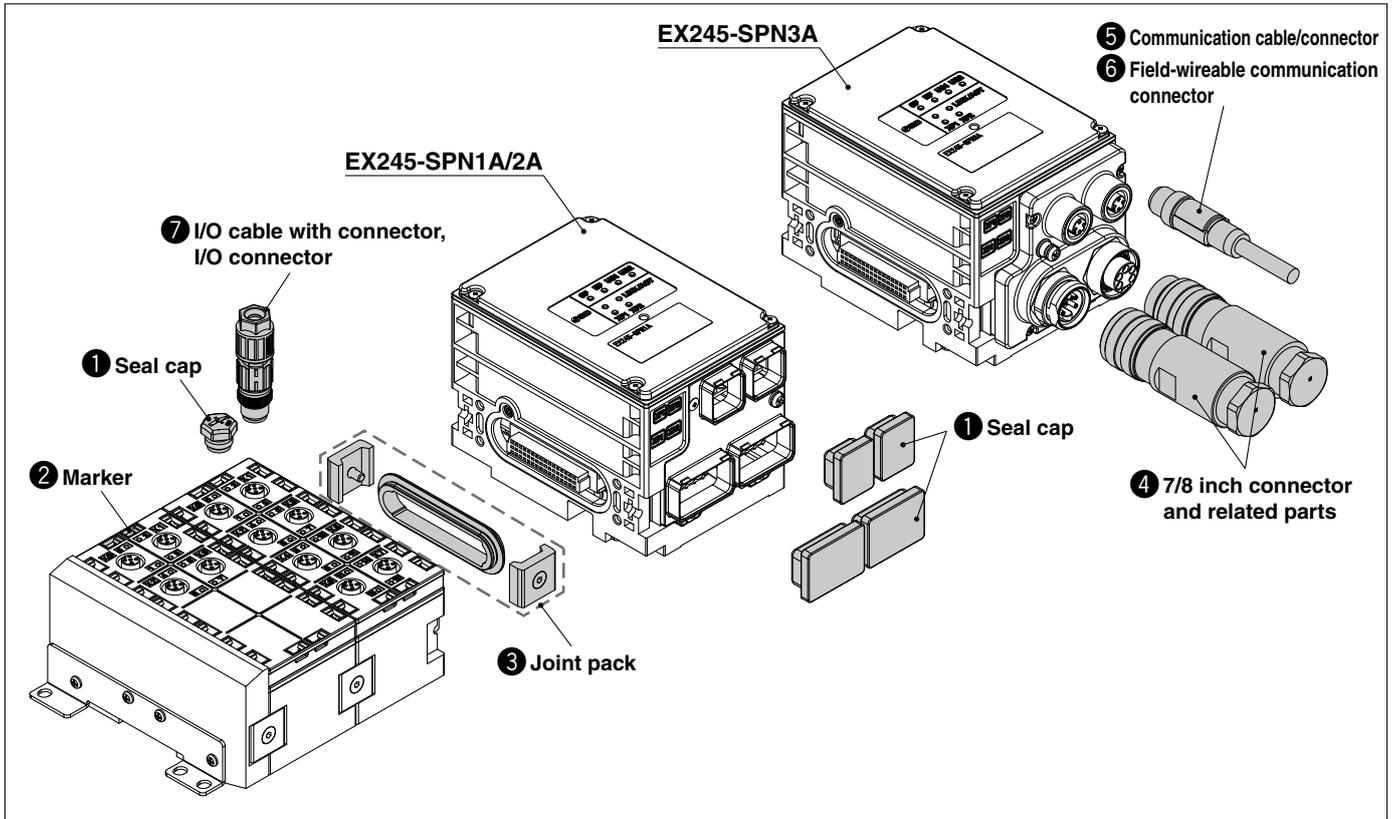
## ❶ **Seal Cap (10 pcs.)**

Be sure to mount a seal cap on any unused I/O connectors. Otherwise, the specified enclosure cannot be maintained.

**EX9-AWTS**
**For M12 (10 pcs.)**



**EX245-AWC**
**For communication connectors (10 pcs.)**



**EX245-AWP**
**For power supply connectors (10 pcs.)**



Seal cap for communication connector and power supply connector are included when **EX245-SPN1A/2A** is shipped (2 caps for each unit).

## ❸ **Joint Pack**

**EX245-ZJP**



Joint

Modular adapter
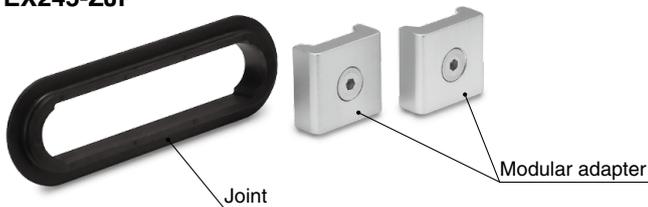
Included when **EX245-DX1/DY1**, **EA2-□** are shipped.

## ❷ **Marker (1 sheet, 88 pcs.)**

The signal name of I/O device and each module name can be entered and mounted on each module.

**EX600-ZT1**
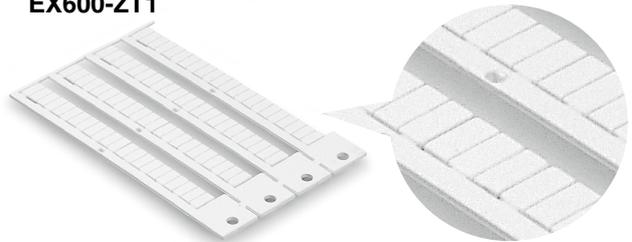


## ❹ **7/8 Inch Connector and Related Parts**

· **Power supply cable (7/8 inch connector)**

| | |
|---|---|
| PCA-1558810 | Straight 2 m |
| PCA-1558823 | Straight 6 m |



· **Power supply field-wireable connector (7/8 inch)**
[Compatible with AWG22-16]

| | |
|---|---|
| PCA-1578078 | Plug |
| PCA-1578081 | Socket |

SMC

# EX245 *Series*

## ❺ Communication Cable/Connector

### EX9-AC 005 EN-PSPS (With connector on both sides (Plug/Plug))

**Cable length (L)**

| 005 | 500 mm |
|-----|---------|
| 010 | 1000 mm |
| 020 | 2000 mm |
| 030 | 3000 mm |
| 050 | 5000 mm |
| 100 | 10000 mm |

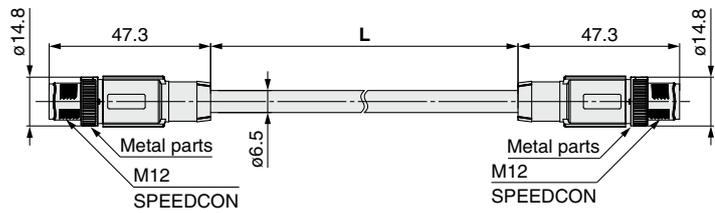| Item | Specifications |
|------|----------------|
| **Cable O.D.** | ø6.5 mm |
| Conductor nominal cross section | 0.34 mm²/AWG22 |
| Wire O.D. (Including insulator) | 1.55 mm |
| Min. bending radius (Fixed) | 19.5 mm |

ø14.8 — 47.3 — L — 47.3 — ø14.8
ø6.5
Metal parts / M12 SPEEDCON

**Plug connector pin arrangement D-coded**

| Terminal no. | | Terminal no. | Core wire color | Signal name |
|---|---|---|---|---|
| 1 | | 1 | Yellow | TD+ |
| 2 | | 2 | White | RD+ |
| 3 | | 3 | Orange | TD– |
| 4 | | 4 | Blue | RD– |

Metal parts / Shield / Metal parts

**Connections (Straight cable)**

**Plug connector pin arrangement D-coded**
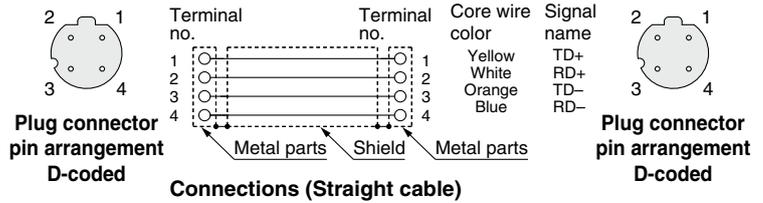
### EX9-AC 005 EN-PAPA (With angled connector on both sides (Plug/Plug))

**Cable length (L)**

| 005 | 500 mm |
|-----|---------|
| 010 | 1000 mm |
| 020 | 2000 mm |
| 030 | 3000 mm |
| 050 | 5000 mm |
| 100 | 10000 mm |

| Item | Specifications |
|------|----------------|
| **Cable O.D.** | ø6.5 mm |
| Conductor nominal cross section | 0.34 mm²/AWG22 |
| Wire O.D. (Including insulator) | 1.55 mm |
| Min. bending radius (Fixed) | 19.5 mm |

36.3 — L
30.8
ø6.5
Metal parts / M12 SPEEDCON
ø15

**Plug connector pin arrangement D-coded**

| Terminal no. | | Terminal no. | Core wire color | Signal name |
|---|---|---|---|---|
| 1 | | 1 | Yellow | TD+ |
| 2 | | 2 | White | RD+ |
| 3 | | 3 | Orange | TD– |
| 4 | | 4 | Blue | RD– |

Metal parts / Shield / Metal parts

**Connections (Straight cable)**

**Plug connector pin arrangement D-coded**
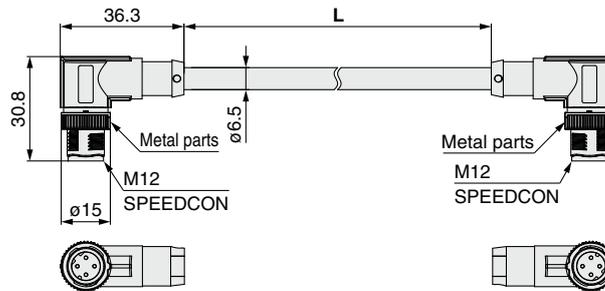
### PCA-1446566 (Plug)

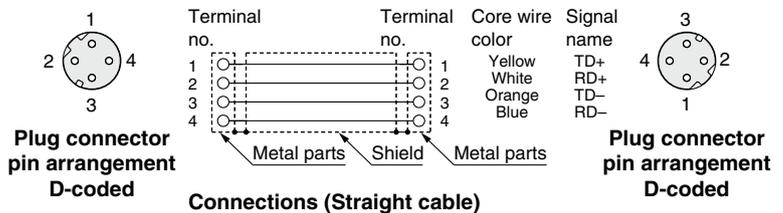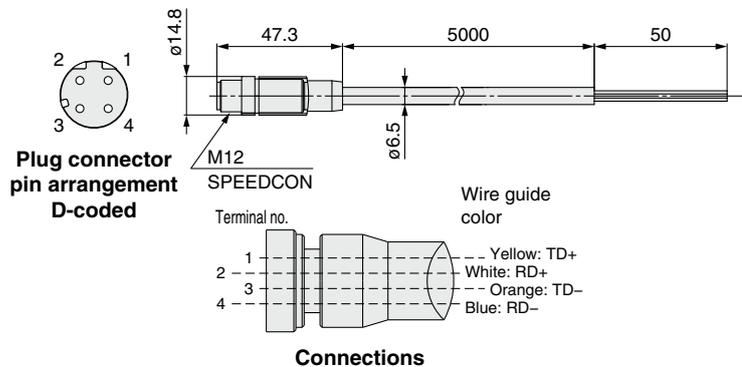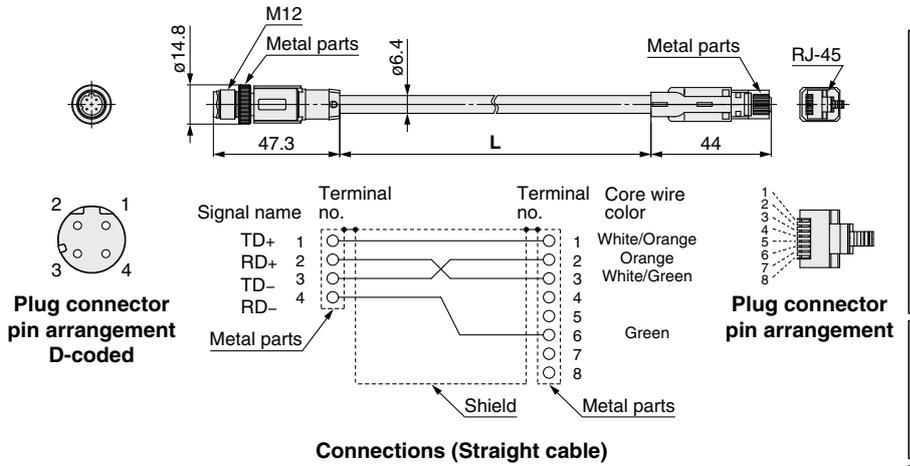| Item | Specifications |
|------|----------------|
| **Cable O.D.** | ø6.5 mm |
| Conductor nominal cross section | AWG22 |
| Wire O.D. (Including insulator) | 1.55 mm |
| Min. bending radius (Fixed) | 45.5 mm |

ø14.8 — 47.3 — 5000 — 50
ø6.5
M12 SPEEDCON

**Plug connector pin arrangement D-coded**

Wire guide color

Terminal no.
1 — Yellow: TD+
2 — White: RD+
3 — Orange: TD–
4 — Blue: RD–

**Connections**

**SMC**

## ❺ Communication Cable/Connector

### EX9-AC 020 EN-PSRJ (Plug/RJ-45 connector)

● **Cable length (L)**

| 010 | 1000 mm |
|-----|---------|
| 020 | 2000 mm |
| 030 | 3000 mm |
| 050 | 5000 mm |
| 100 | 10000 mm |

| Item | Specifications |
|------|----------------|
| **Cable O.D.** | ø6.4 mm |
| **Conductor nominal cross section** | 0.14 mm²/AWG26 |
| **Wire O.D. (Including insulator)** | 0.98 mm |
| **Min. bending radius (Fixed)** | 26 mm |

**Plug connector pin arrangement D-coded**

| Signal name | Terminal no. | | Terminal no. | Core wire color |
|---|---|---|---|---|
| TD+ | 1 | | 1 | White/Orange |
| RD+ | 2 | | 2 | Orange |
| TD– | 3 | | 3 | White/Green |
| RD– | 4 | | 4 | |
| | | | 5 | |
| | | | 6 | Green |
| | | | 7 | |
| | | | 8 | |

Metal parts / Shield / Metal parts

**Plug connector pin arrangement**

**Connections (Straight cable)**

## ❻ Field-wireable Communication Connector

### PCA-1446553

**D-coded**

M12  Width across flats 16  Width across flats 13
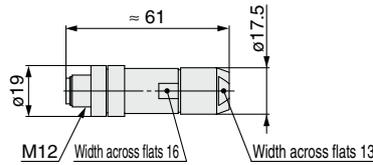
**Applicable Cable**

| Item | Specifications |
|------|----------------|
| **Cable O.D.** | 4.0 to 8.0 mm |
| **Wire gauge (Stranded wire cross section)** | 0.14 to 0.34 mm²/AWG26 to 22 |

∗ The table above shows the specifications for the applicable cable. Adaptation for the connector may vary on account of the conductor construction of the electric wire.
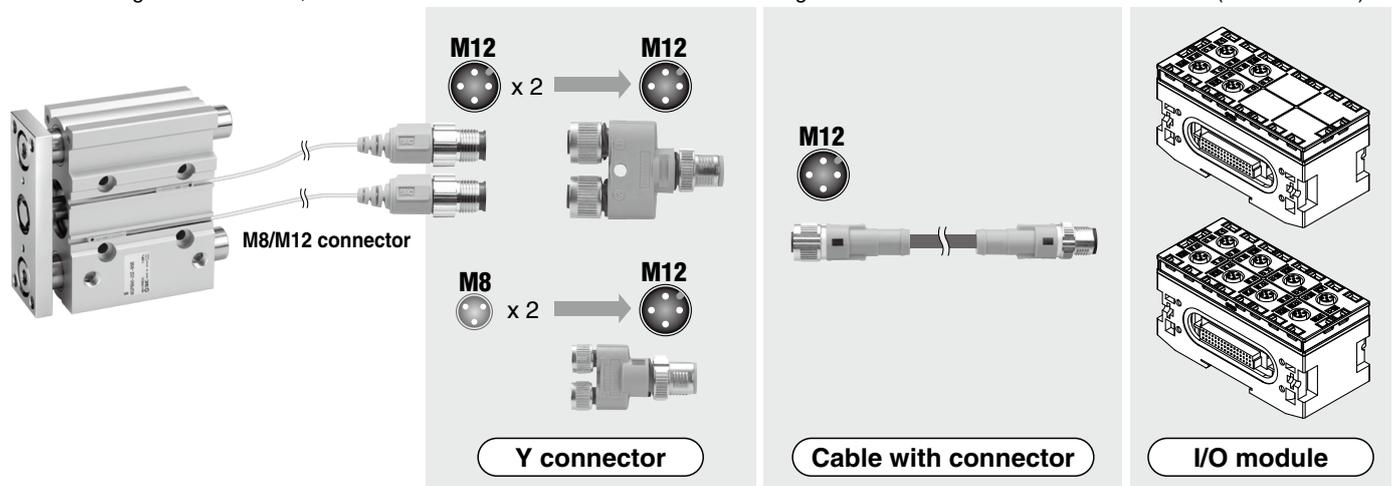
EX260
EX123/124/126
Type 1
EX500
Type 2
EX600
EX245
Type 3
EX250
EX120/121/122
EX140
Type 1
EX180
EX510
Type 2
M8/M12
ATEX

# EX245 *Series*

## ❼ I/O Cable with Connector, I/O Connector

| Name | Use | | Part no. | Description |
|------|-----|---|----------|-------------|
| **Cable with connector** | For sensor | | **PCA-1557769** | Cable with M12 connector (4 pins/3 m) |
| | | | **PCA-1557772** | Cable with M8 connector (3 pins/3 m) |
| **Field-wireable connector** | For sensor | | **PCA-1557730** | Field-wireable connector (M8/3 pins/Plug/Piercecon® connection) |
| | | | **PCA-1557743** | Field-wireable connector (M12/4 pins/Plug/QUICKON-ONE connection/SPEEDCON) |
| | | | PCA-1557756 | |
| **Y connector** | For sensor | | **PCA-1557785** | Y connector (2 x M12 (5 pins)-M12 (5 pins)/SPEEDCON) |
| | | | **PCA-1557798** | Y connector (2 x M8 (3 pins)-M12 (4 pins)/SPEEDCON) |

∗ When using the Y connector, connect it to the connector on the I/O module through the sensor cable with the M12 connector (PCA-1557769).



**M8/M12 connector**

**M12** ⬤ x 2 → **M12** ⬤

**M8** ⬤ x 2 → **M12** ⬤

**M12** ⬤

( **Y connector** )  ( **Cable with connector** )  ( **I/O module** )

**SMC**

| Operating Environment |
| --- |

## ⚠ Caution

**1. Select the proper type of enclosure according to the operating environment.**

IP65 is achieved when the following conditions are met.

1) Provide appropriate wiring of the electrical wiring cables, communication connectors, and cables with M12 connectors.

2) Suitable mounting of the SI unit, each module, and the manifold valve

3) Be sure to mount a seal cap on any unused connectors.

If using in an environment where it may be exposed to water splash, please take measures such as using a cover.

EX260
Type 1
EX123/124/126

EX500
Type 2

EX600
Type 3
EX245

EX250

EX120/121/122
Type 1
EX140

EX180

EX510
Type 2

M8/M12

ATEX