Fieldbus System
(For Input/Output)

New

IP65

Compatible with 3 types of connector

AIDA*1 specifications compliant

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

SCRJ connectors

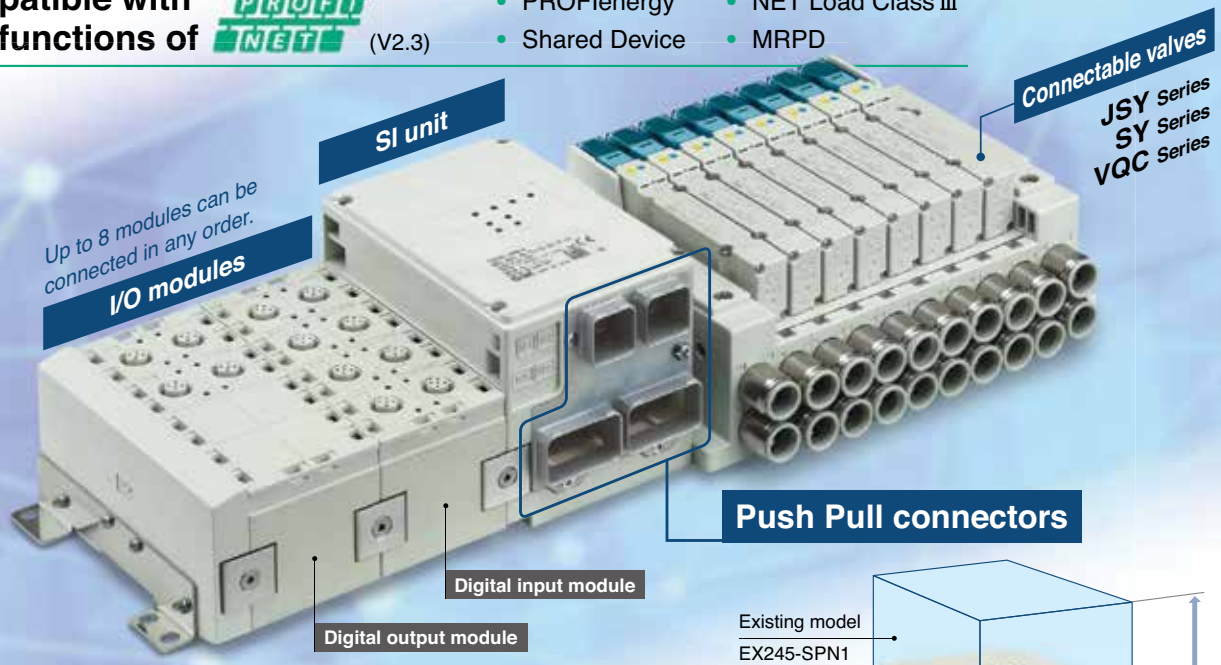
RJ45 connectors

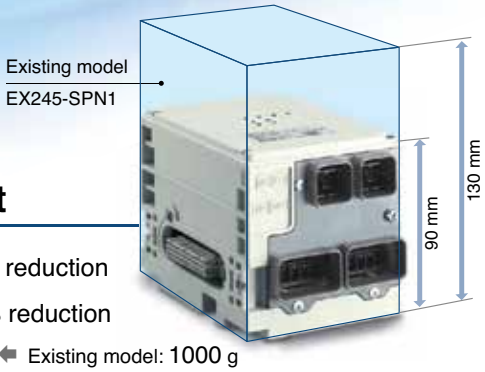
General-purpose connectors

*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





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

- Height: **40** mm reduction
- Weight: **53.5**% reduction

New **465** g ⬅ Existing model: 1000 g

EX245 Series

SMC

NAS02-29A

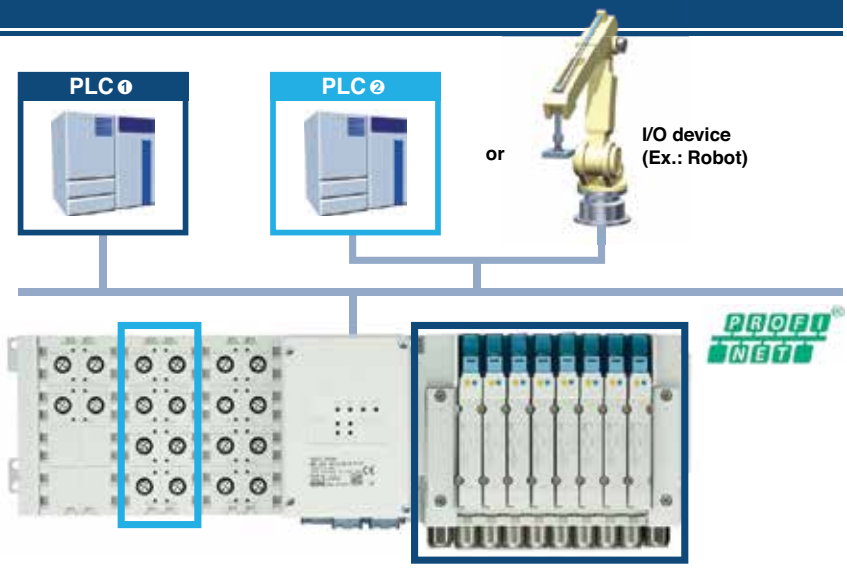
Compatible with PROFIenergy, the energy-saving function

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

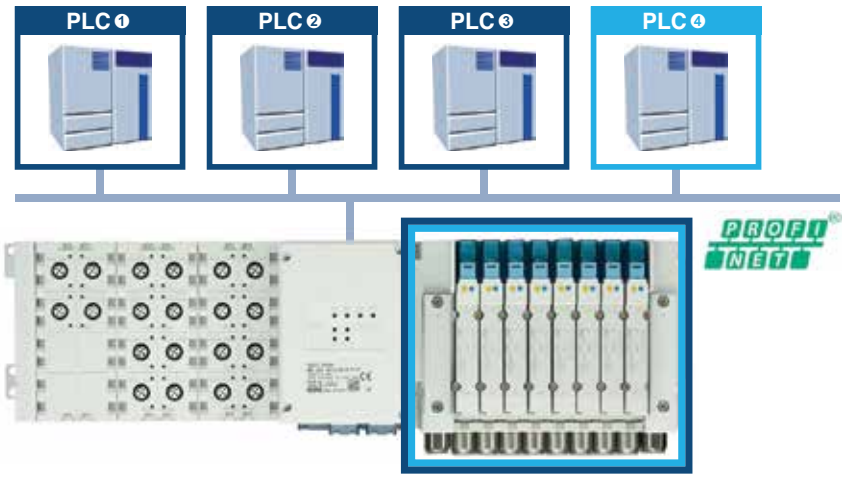
Shared Device function

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



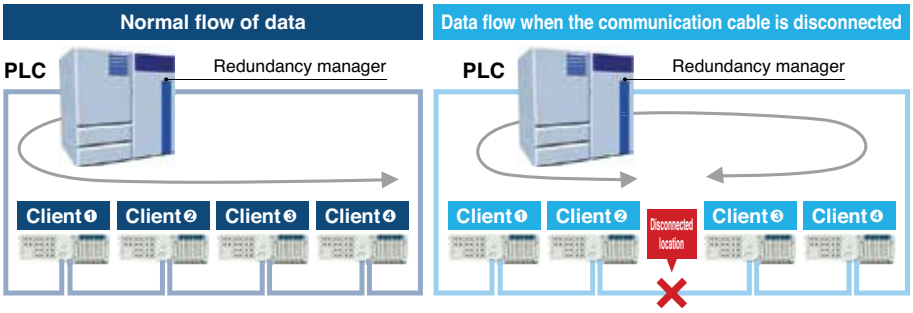
∗ Shared Device function enables an I/O module connected to the I/O device to be controlled by multiple I/O controllers (PLC). Control status can be shared among other I/O controllers. As the function is realized on one PROFINET line, the cost for hardware, cables, and installation space can be reduced.

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.



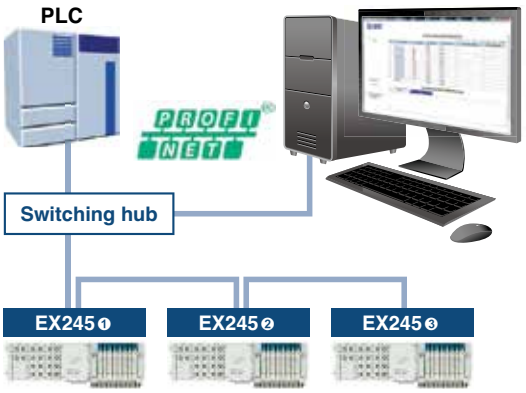
MRPD (Media Redundancy for Planned Duplication)

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

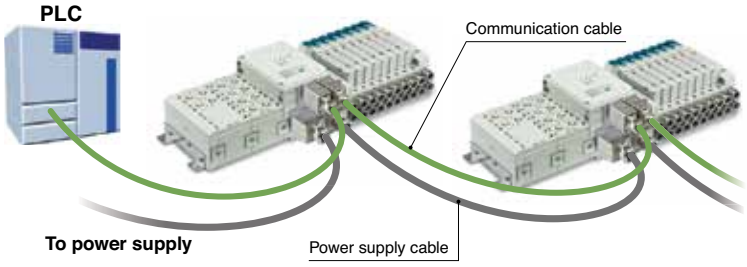
FW (firmware) update tool

- 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.



Unit conversion table is located inside back cover.

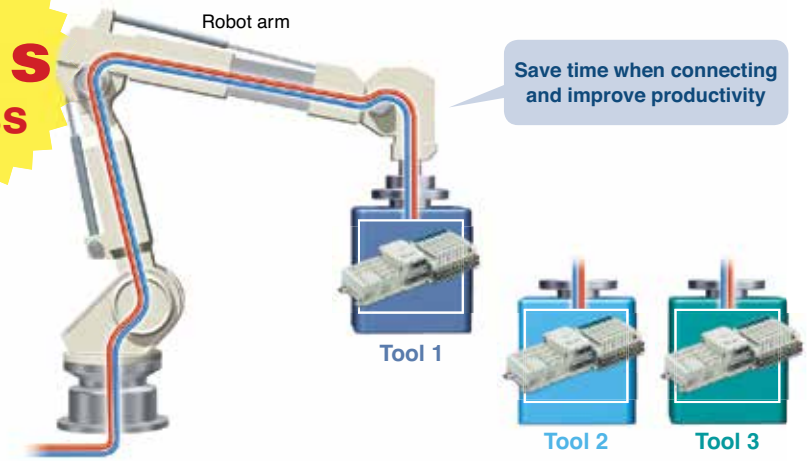
Fast Start Up function

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

Approx. 10 s → 0.5 s or less

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.

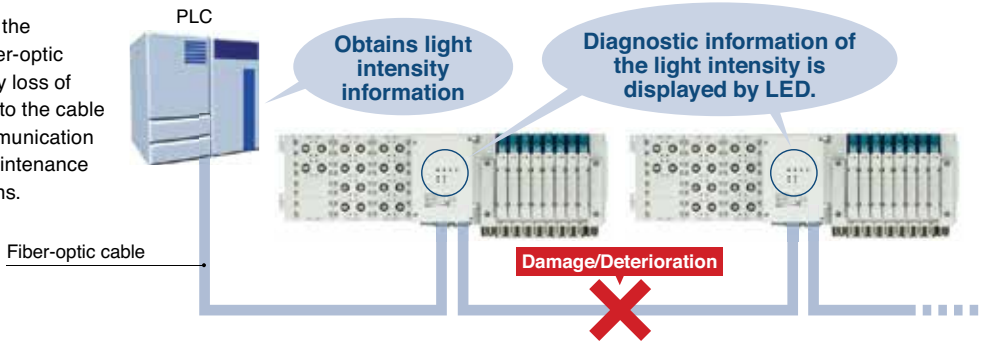
* To use the Fast Start Up function, the PLC should be able to support the Fast Start Up function.



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.

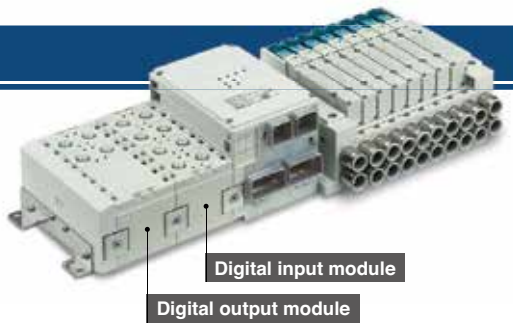


Modules can be combined flexibly.

- 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.

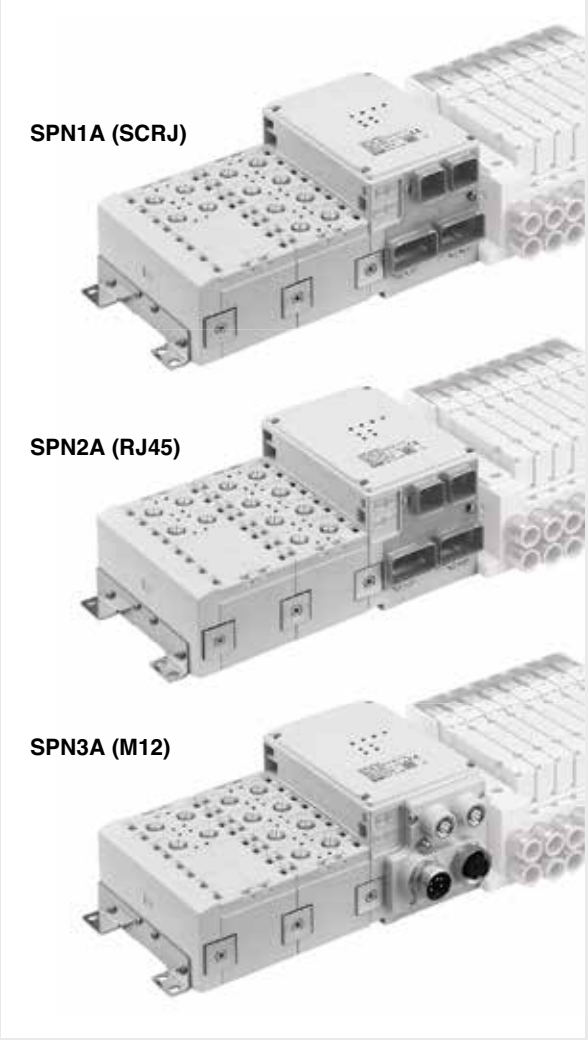


Connectable Valve Series

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

CONTENTS

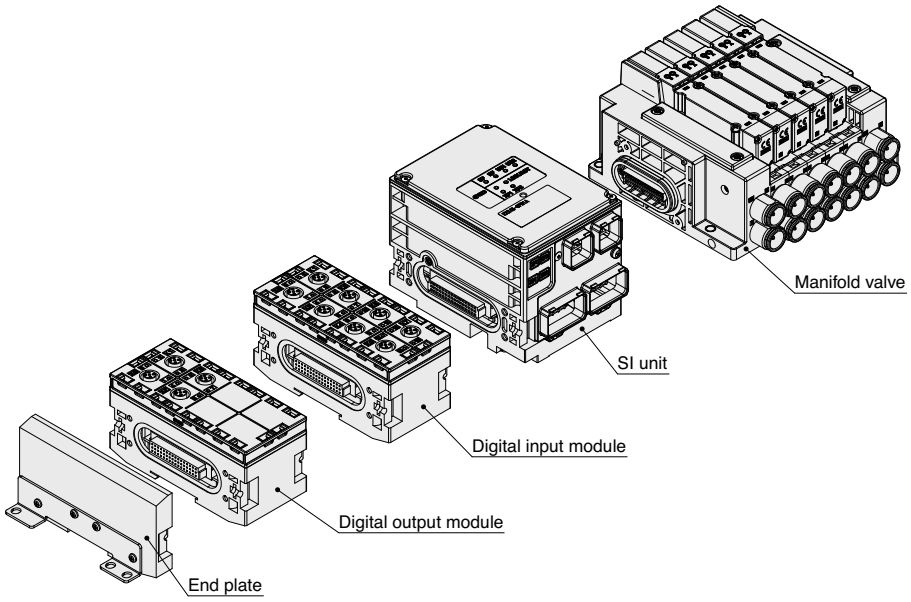
Fieldbus System (For Input/Output)
EX245 Series



Unit conversion table is located inside back cover.

Fieldbus System For Input/Output
EX245 Series

Construction



How to Order

SI Unit

EX245 – S PN 1A

- **S**: SI unit
- **PN**: PROFINET
- **1A**: Connector type

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.


EX245-SPN1A


EX245-SPN2A


EX245-SPN3A

Digital Input Module

EX245 – DX1

- **DX1**: Digital input module specification

DX1	Digital input (16 inputs)

Digital Output Module

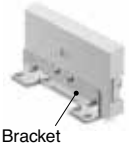
EX245 – DY1

- **DY1**: Digital output module specification

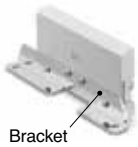
DY1	Digital output (8 outputs)

End Plate

EX245 – EA2 – 1



For JSY/SY



For VQC

- **1**: Bracket

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

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

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)

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 MRPD function Fast Start Up function Shared Device function PROFIenergy function Web server function FW update function Conformance Class C NET Load Class #		
			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.

EX245-SPN1A

EX245-SPN2A

EX245-SPN3A

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.

EX245-DX1

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.

EX245-DY1

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

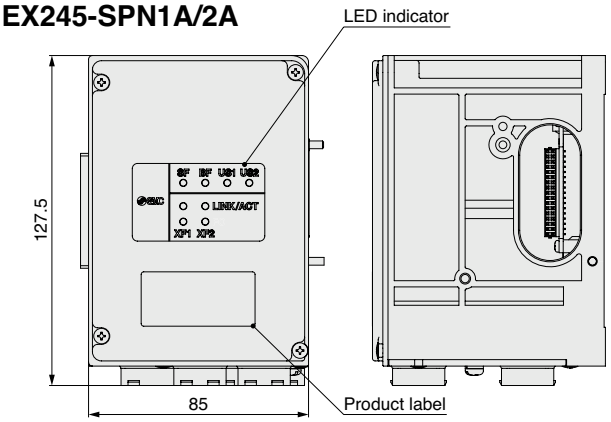
For JSY/SY **For VQC**

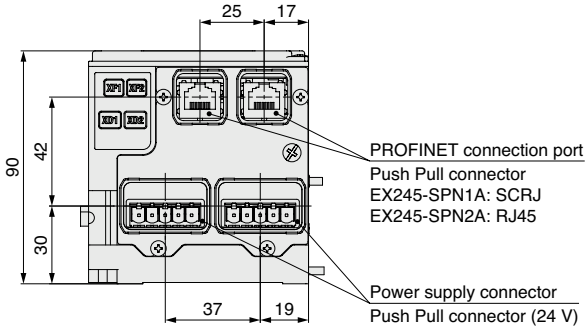
EX245-EA2-□

Dimensions/Parts Description

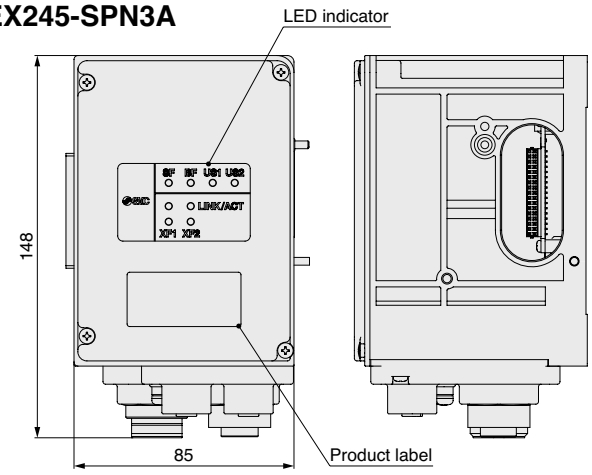
SI Unit

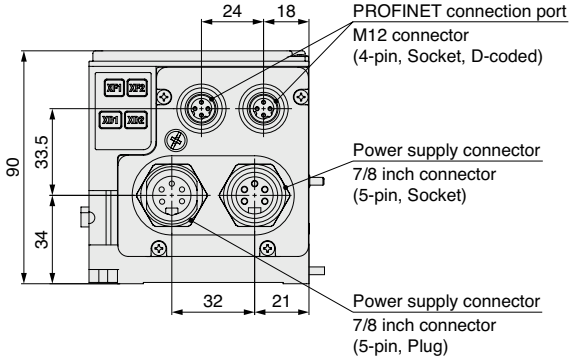
EX245-SPN1A/2A





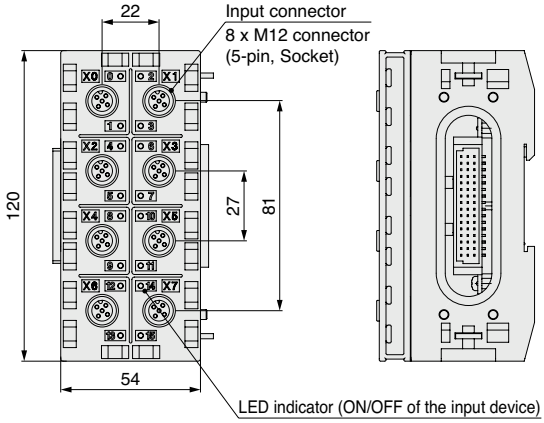
EX245-SPN3A

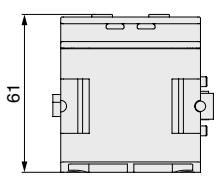




Digital Input Module

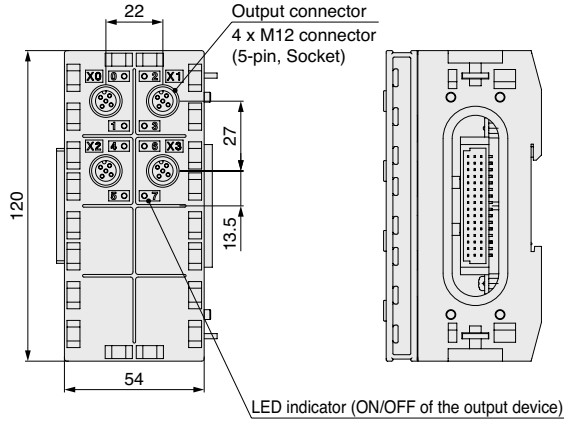
EX245-DX1

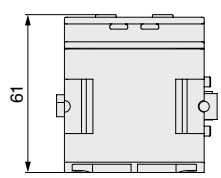




Digital Output Module

EX245-DY1

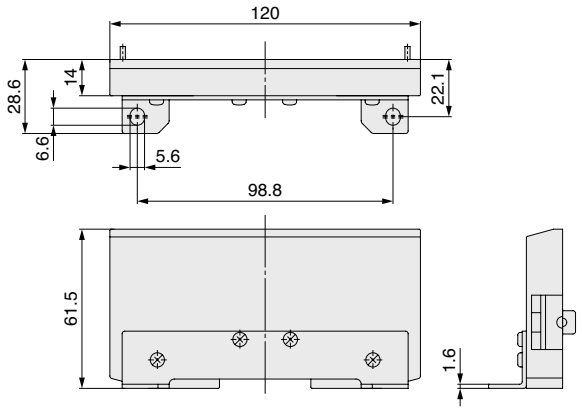




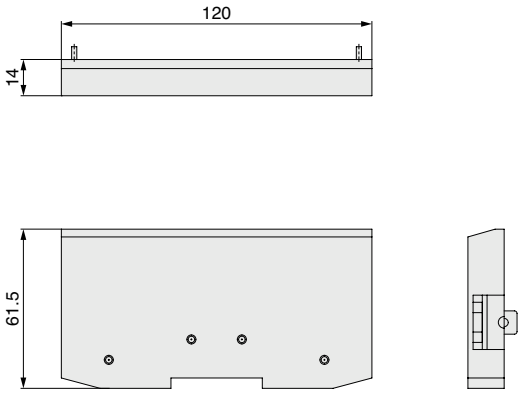
Dimensions/Parts Description

End Plate

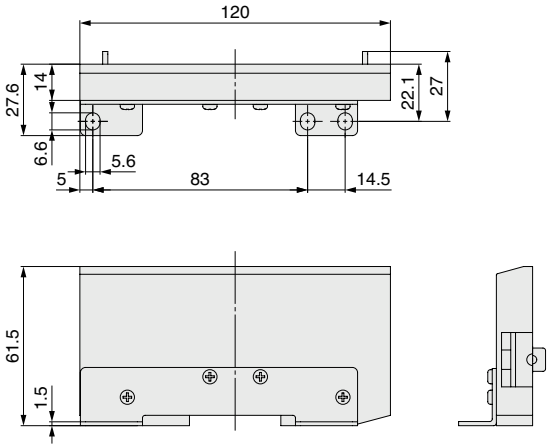
EX245-EA2-1



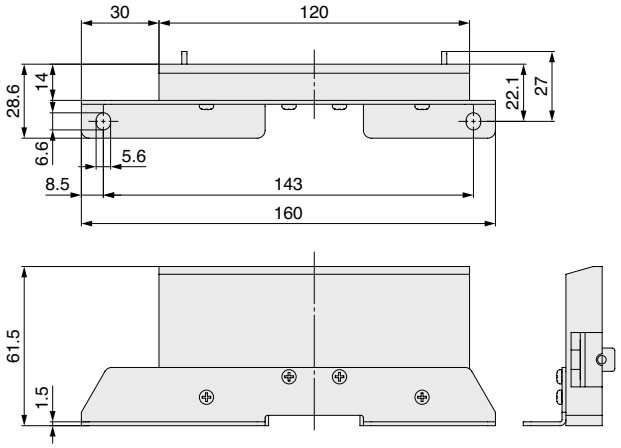
EX245-EA2-2



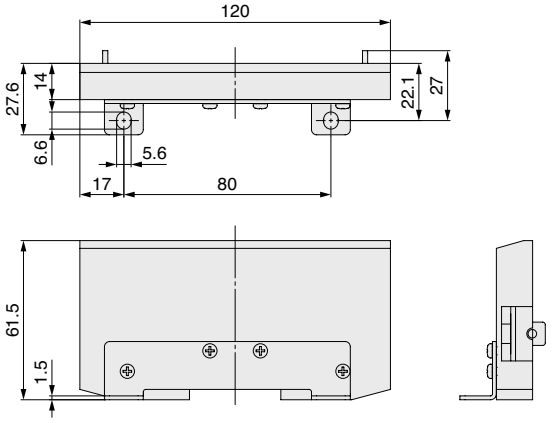
EX245-EA2-3 (For JSY/SY)



EX245-EA2-4 (For VQC4000)



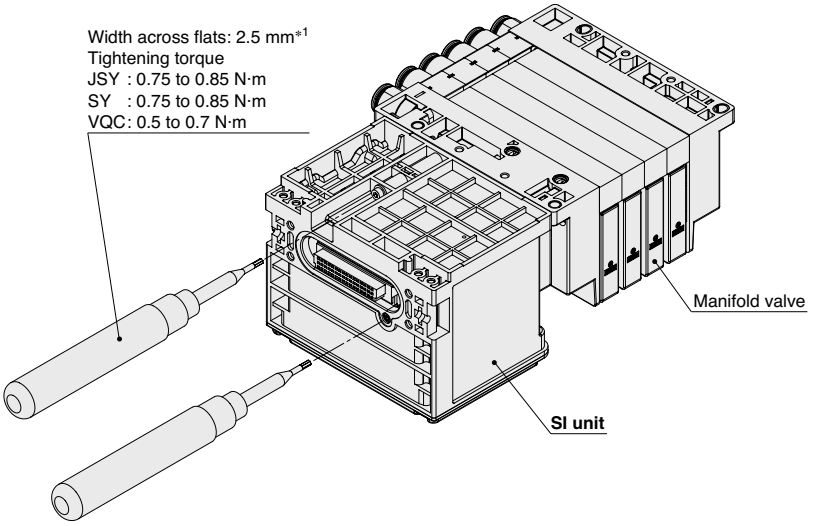
EX245-EA2-5 (For VQC2000)

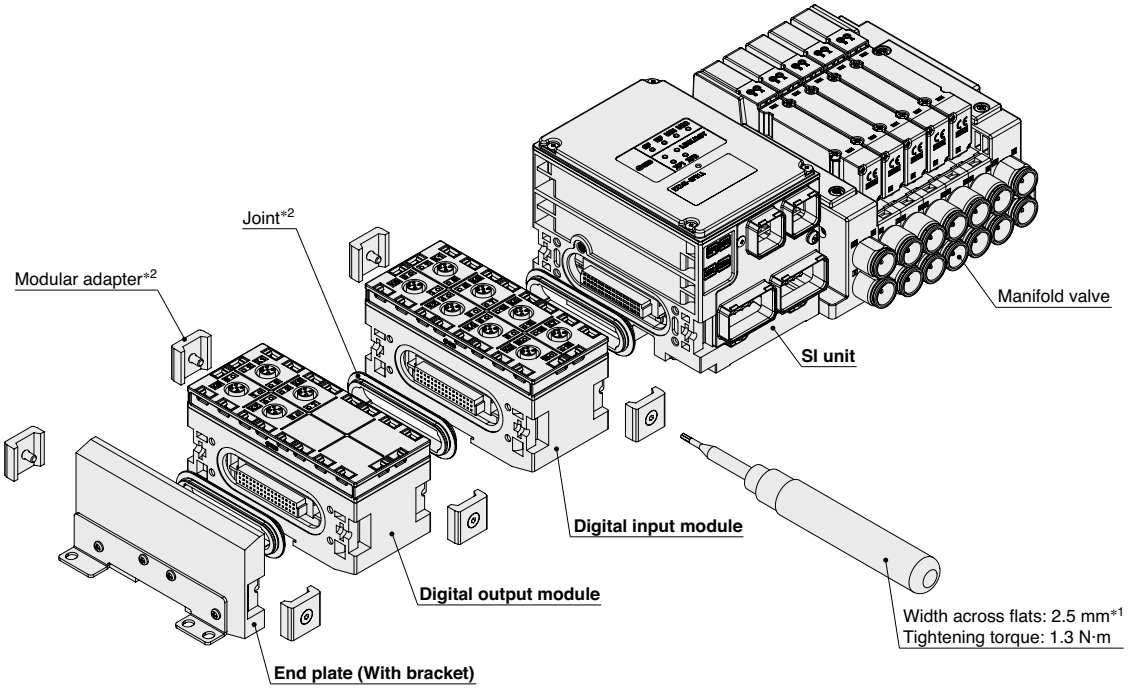


Assembly Examples

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

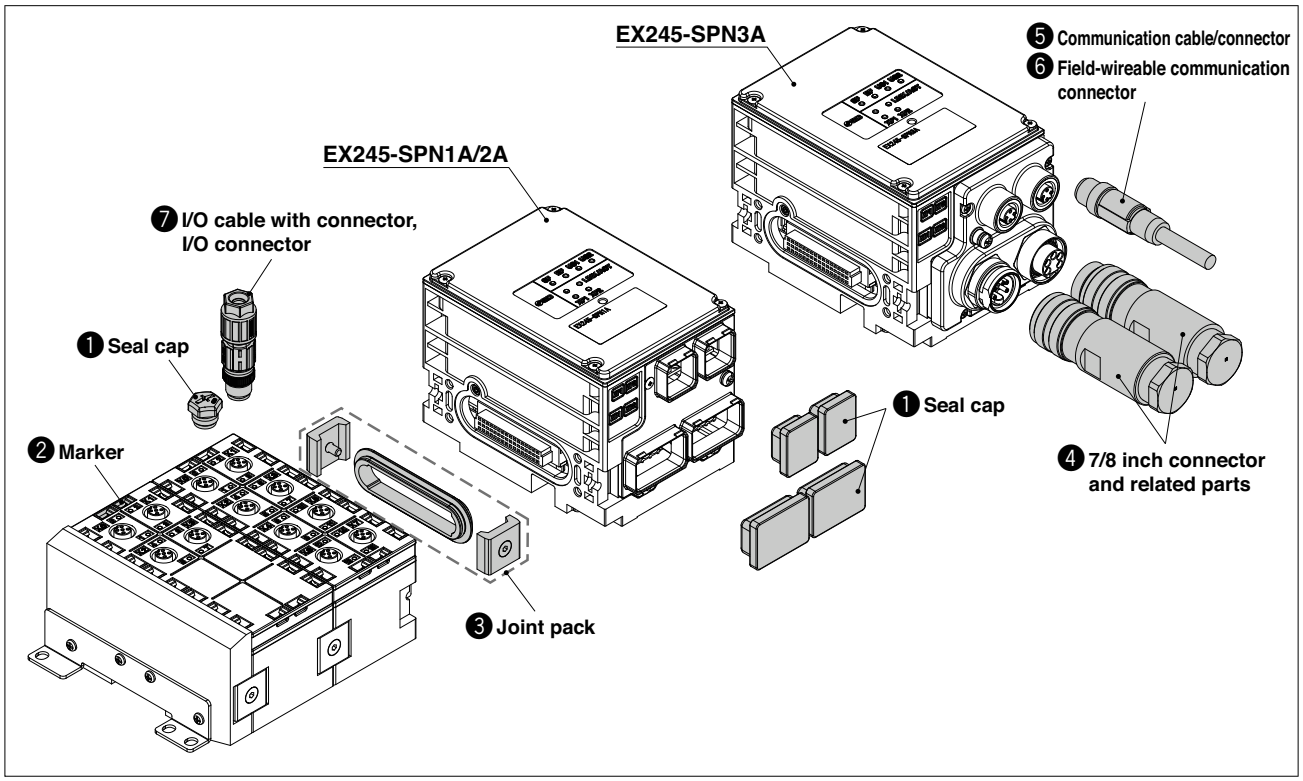
The modules and manifold valve are not assembled at the time of shipment.
After assembling the SI unit and manifold valve, assemble the modules.





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

EX245 Series
Accessories



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.)

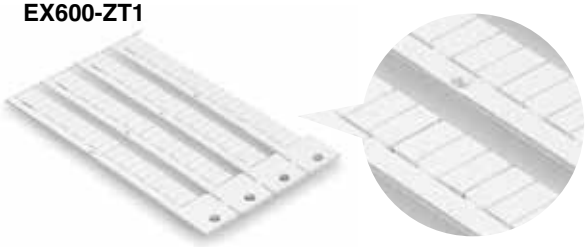
EX245-AWP
For power supply connectors (10 pcs.)

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

❷ Marker (1 sheet, 88 pcs.)

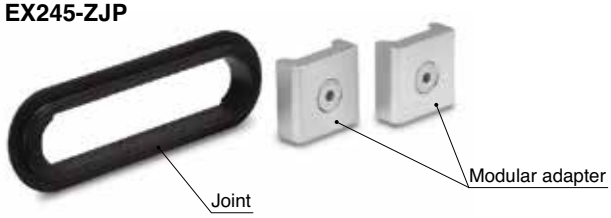
The signal name of I/O device and each module name can be entered and mounted on each module.

EX600-ZT1



❸ Joint Pack

EX245-ZJP



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

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

Unit conversion table is located inside back cover.

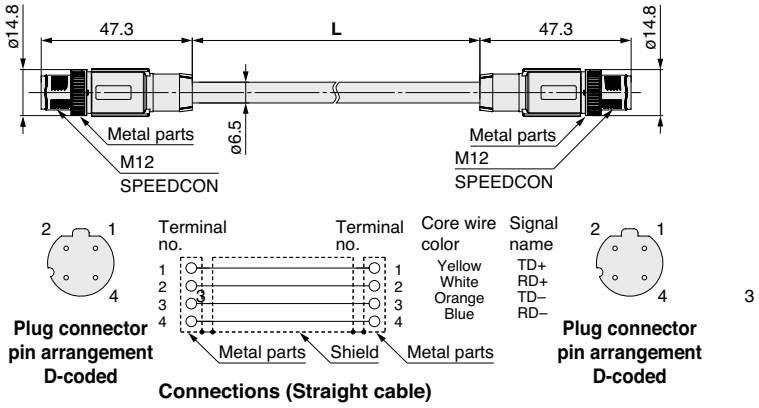
❺ Communication Cable/Connector

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



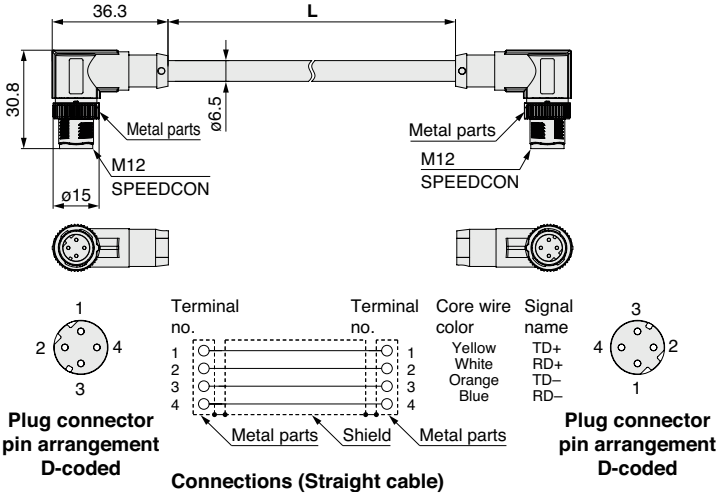
Connections (Straight cable)

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

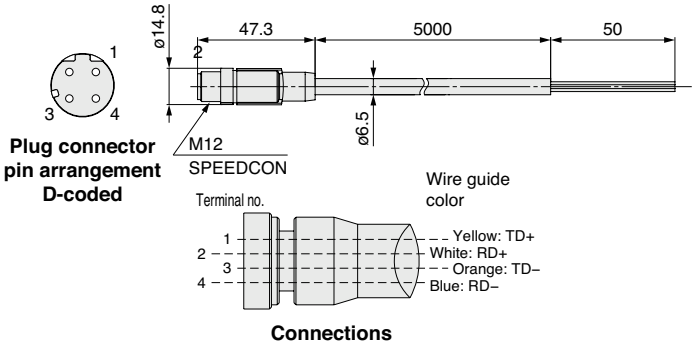
Item	Specifications
Cable O.D.	ø6.5 mm
Conductor nominal cross section	0.34 mm²/AWG22
Wire O.D. (Including insulator)	1.55 mm
Min. bending radius (Fixed)	19.5 mm



Connections (Straight cable)

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



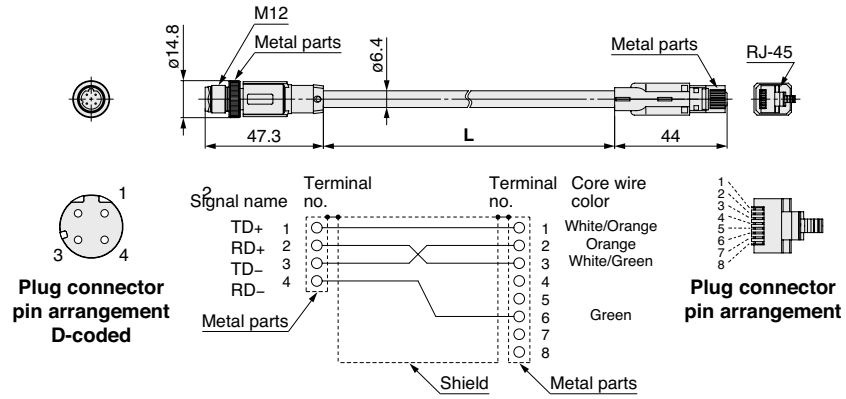
Connections

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

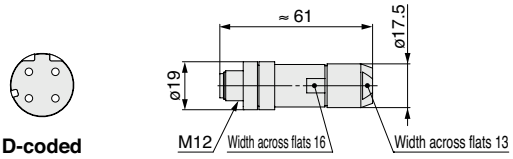


Connections (Straight cable)

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

❻ Field-wireable Communication Connector

PCA-1446553



D-coded

Applicable Cable

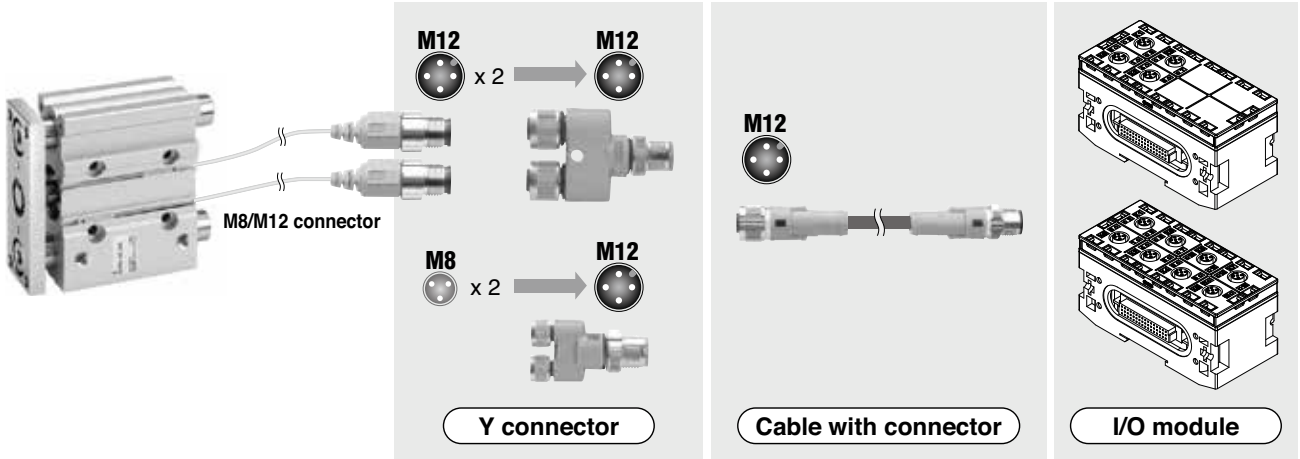
Item	Specifications
Cable O.D.	4.0 to 8.0 mm
Wire gauge (Stranded wire cross section)	0.14 to 0.34 mm²/AWG26 to 22

* 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.

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).



EX245 Series
Specific Product Precautions

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For fieldbus system precautions, refer to the "Operation Manual" on the SMC website.

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.

⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

⚠ 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.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

⚠ 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, whichever is first.*2)
   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.

***2) 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

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠ Caution

SMC products are not intended for use as instruments for legal metrology.
Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

UNIT CONVERSIONS

	unit	conversion	result
length	m	x 3.28	ft
	mm	x 0.04	in
mass	g	x 0.04	oz
volume	cm^3	÷ 16.387	in^3
	L	x 61.024	in^3
speed	mm/s	÷ 25.4	in/s
pressure	MPa	x 145	psi
	kPa	÷ 6.895	psi
temperature	°C	x1.8 then add 32	°F
torque	N·m	x 0.738	ft-lb
force	N	÷ 4.448	lbf
flow	L/min	÷ 28.317	cfm

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