Fieldbus System
(For Input/Output)

Compatible with 3 types of connectors

AIDA*1 specifications compliant

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

- General-purpose connectors
  Communication connector: M12
  Power supply connector: 7/8 inch

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

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

- Connectable valves
  JSY Series
  SY Series
  VQC Series

- I/O modules
- SCRJ connectors
- RJ45 connectors

- SI unit
- Digital input module
- Digital output module

- Compact, Lightweight
  - Height: 40 mm reduction
  - Weight: 53.5% reduction

New

- 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.

EX245 Series

CAT.E02-29A
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.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Output (Valve/Digital)</th>
<th>Input device (Pressure switch, flow switch, auto switch, etc.)</th>
<th>Input data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shut down/Clear value mode</td>
<td>OFF</td>
<td>OFF (Power supply)</td>
<td>OFF</td>
</tr>
<tr>
<td>Shut down/Hold last value mode</td>
<td>Hold</td>
<td>OFF (Power supply)</td>
<td>Hold</td>
</tr>
<tr>
<td>PROCEED mode</td>
<td>Hold</td>
<td>Hold</td>
<td>Hold</td>
</tr>
</tbody>
</table>

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

All products are accessible from the PC.

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

**FW (firmware) update tool**

- Status (errors and diagnostic contents) can be checked on a web browser.
- Easy operation test, initial operation check of equipment and maintenance without PLC
- 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 10 A. Loop through current between connectors is 6 A max.
Fast Start Up function

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

Approx. 10 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

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.

*1 Only available for the EX245-SPN1A Series

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

<table>
<thead>
<tr>
<th>Series</th>
<th>JSY3000</th>
<th>JSY5000</th>
<th>SY3000</th>
<th>SY5000</th>
<th>VQC2000</th>
<th>VQC4000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.77</td>
<td>6.59</td>
<td>1.6</td>
<td>3.6</td>
<td>3.2</td>
<td>7.3</td>
</tr>
<tr>
<td>C [dm³/(s·bar)]</td>
<td>0.27</td>
<td>0.22</td>
<td>0.19</td>
<td>0.17</td>
<td>0.30</td>
<td>0.38</td>
</tr>
<tr>
<td>Maximum number of solenoids</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Power consumption [W]</td>
<td>0.4 (Standard) 0.1 (With power-saving circuit)</td>
<td>0.35 (Standard) 0.1 (With power-saving circuit)</td>
<td>0.4 (Standard) 0.1 (With power-saving circuit)</td>
<td>0.95 (Standard) 0.4 (Low-wattage type)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applicable cylinder size</td>
<td>ø50</td>
<td>ø80</td>
<td>ø50</td>
<td>ø63</td>
<td>ø63</td>
<td>ø160</td>
</tr>
</tbody>
</table>
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Fieldbus System
For Input/Output

EX245 Series

Construction

How to Order

SI Unit

EX245-SPN 1A

Connector type

Symbol | Communication connector | Power supply connector
---|---|---

End Plate

EX245-EA2 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

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

### SI Unit Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>EX245-SPN1A</th>
<th>EX245-SPN2A</th>
<th>EX245-SPN3A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>PROFINET</td>
<td>PROFINET</td>
<td>PROFINET</td>
</tr>
<tr>
<td>Device type</td>
<td>PROFINET IO</td>
<td>PROFINET IO</td>
<td>PROFINET IO</td>
</tr>
<tr>
<td>Communication speed</td>
<td>100 Mbps full duplex</td>
<td>100 Mbps full duplex</td>
<td>100 Mbps full duplex</td>
</tr>
<tr>
<td>Configuration file</td>
<td>GSD file</td>
<td>GSD file</td>
<td>GSD file</td>
</tr>
<tr>
<td>Applicable function</td>
<td>MRP function, MRPD function, Fast Start Up function, Shared Device function, PROFInet function, Web server function, FW update function</td>
<td>MRP function, MRPD function, Fast Start Up function, Shared Device function, PROFInet function, Web server function, FW update function</td>
<td>MRP function, MRPD function, Fast Start Up function, Shared Device function, PROFInet function, Web server function, FW update function</td>
</tr>
</tbody>
</table>

### Electrical

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal current consumption (US1)</td>
<td>50 mA or less</td>
</tr>
<tr>
<td>Voltage</td>
<td>24 VDC +20%, −15% to 8 A</td>
</tr>
<tr>
<td>Current</td>
<td>0.5 A/Connector, 2 A/Module</td>
</tr>
<tr>
<td>Protection</td>
<td>Short-circuit protection</td>
</tr>
<tr>
<td>Weight</td>
<td>280 g</td>
</tr>
</tbody>
</table>

### Digital Input Module

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

### Digital Output Module

<table>
<thead>
<tr>
<th>Model</th>
<th>EX245-DY1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output type</td>
<td>PNP</td>
</tr>
<tr>
<td>Output connector</td>
<td>M12 (5-pin) socket††</td>
</tr>
<tr>
<td>Number of outputs</td>
<td>8 outputs</td>
</tr>
<tr>
<td>Supplied voltage</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Max. load current</td>
<td>0.5 A/Output, 2 A/Module</td>
</tr>
<tr>
<td>Protection</td>
<td>Short-circuit protection</td>
</tr>
<tr>
<td>Current consumption</td>
<td>50 mA or less</td>
</tr>
<tr>
<td>Weight</td>
<td>280 g</td>
</tr>
</tbody>
</table>

### End Plate

<table>
<thead>
<tr>
<th>Model</th>
<th>EX245-EA2-1</th>
<th>EX245-EA2-2</th>
<th>EX245-EA2-3</th>
<th>EX245-EA2-4</th>
<th>EX245-EA2-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bracket</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Weight</td>
<td>120 g</td>
<td>60 g</td>
<td>120 g</td>
<td>150 g</td>
<td>120 g</td>
</tr>
</tbody>
</table>

### Note

- General-purpose — Mounting hole for JSY/SY
- Mounting hole for VQC4000
- Mounting hole for VQC2000
EX245 Series

Dimensions/Parts Description

SI Unit

**EX245-SPN1A/2A**
- **LED indicator**
- **Product label**
- **PROFINET connection port**
  - Push Pull connector
  - EX245-SPN1A: SCRU
  - EX245-SPN2A: PU4S
- **Power supply connector**
  - Push Pull connector (24 V)

**EX245-SPN3A**
- **LED indicator**
- **Product label**
- **PROFINET connection port**
- **M12 connector**
  - (4-pin, Socket, D-coded)
- **Power supply connector**
  - 7/8 inch connector
    - (5-pin, Socket)
  - 7/8 inch connector
    - (5-pin, Plug)

**Digital Input Module**

**EX245-DX1**
- **Input connector**
  - 8 x M12 connector
    - (5-pin, Socket)
- **LED indicator (ON/OFF of the input device)**

**Digital Output Module**

**EX245-DY1**
- **Output connector**
  - 4 x M12 connector
    - (5-pin, Socket)
- **LED indicator (ON/OFF of the output device)**
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
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

*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

1. 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).

2. 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

3. Joint Pack
EX245-ZJP

Joint
Modular adapter

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

4. 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
EX245 Series

3 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

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable O.D.</td>
<td>ø6.5 mm</td>
</tr>
<tr>
<td>Conductor nominal cross section</td>
<td>0.34 mm²/AWG22</td>
</tr>
<tr>
<td>Wire O.D. (Including insulator)</td>
<td>1.55 mm</td>
</tr>
<tr>
<td>Min. bending radius (Fixed)</td>
<td>19.5 mm</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable O.D.</td>
<td>ø6.5 mm</td>
</tr>
<tr>
<td>Conductor nominal cross section</td>
<td>0.34 mm²/AWG22</td>
</tr>
<tr>
<td>Wire O.D. (Including insulator)</td>
<td>1.55 mm</td>
</tr>
<tr>
<td>Min. bending radius (Fixed)</td>
<td>19.5 mm</td>
</tr>
</tbody>
</table>

PCA-1446566 (Plug)

- 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        |
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

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable O.D.</td>
<td>ø6.4 mm</td>
</tr>
<tr>
<td>Conductor nominal cross section</td>
<td>0.14 mm²/AWG26</td>
</tr>
<tr>
<td>Wire O.D. (Including insulator)</td>
<td>0.98 mm</td>
</tr>
<tr>
<td>Min. bending radius (Fixed)</td>
<td>26 mm</td>
</tr>
</tbody>
</table>

Field-wireable Communication Connector

PCA-1446553

- Applicable Cable
  - 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.
# I/O Cable with Connector, I/O Connector

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

* 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: https://www.smcworld.com

---

**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.
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.

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: *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.

**Limited warranty and Disclaimer**

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

**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”.

1. The warranty period of the product is 1 year in service or 1.5 years after the delivery.
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.
3. The SMC products are not intended for use as instruments for legal metrology. Measurement instruments that SMC manufactures or sells have not been qualified 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.

**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**

Safety Instructions: Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.