



Hardware and Engineering

PS416-INP-40x PS416-OUT-4xx Digital I/O Card

01/00 AWB27-1239-GB

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Warning! **Dangerous electrical voltage!**

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (AWA) of the device concerned.
- Only suitably qualified personnel in accordance with EN 50 110-1/-2 (VDE 0 105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE) must be connected to the protective earth (PE) or to the potential equalisation. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the low voltage for the 24 volt supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0 100 Part 410) or HD 384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented.
- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks etc.).

List of revisions for AWB27-1239-GB

Edition	Page	Description	new	Modification
01/00	1-3	Tables		X
	1-10	Section "PS416-OUT-400/-410"	X	
	2-3, 2-9	Figure		X
	2-10, 2-18	Notes about this manual		X
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Overview

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About this Manual

This manual describes the PS416-INP-400/-401 digital input cards and the PS416-OUT-400/-410 digital output cards for the Moeller modular control PS416.

Descriptions dealing with all cards are presented in the first section "General description". The varying characteristics are described separately in Parts 2 and 3 of the manual. The digital input cards and the output cards are grouped together in the descriptions.

For orientation, the chapter "General description, Setup" presents the elements of the cards and the commissioning procedure.

The manual is intended for project engineers, programmers and commissioning engineers. The reader is assumed to have general knowledge of control technology.

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1 About the cards

Task

The digital input cards detect 24 V DC input signals from external signal encoders via their 16 inputs and make them available for further processing to the central processor of the PLC.

Depending upon the requirements, the PS416-INP-400 or the PS416-INP-401 can be used. The basic difference has to do with the on/off delay (see “Technical Data” on page 4-1).

The digital output cards supply the 24-V-DC for the actuators. For this, the PS416-OUT-400 features 16 500 mA outputs; the PS416-OUT-410 has 8 2 A outputs.

Hard-/Software requirements

The following hardware and software components are required when using the digital input and output cards in a PS416 system.

Table 1-1: Hardware and software requirements

Sucosoft for PS416-CPU-223 ¹⁾ : for PS416-CPU-200/-300: for PS416-CPU-400	Operating system version 1.32 or higher, S30-S316-D/-GB/-F version 2.31 or higher Operating system version 2.0 or higher, S40-D/-GB/-F version 2.0 or higher Operating system version 1.0 or higher, S40-D/-GB/-F version 1.0 or higher
Rack	PS416-BGT-400/-410/-420 or -421 with potential equalisation bar, PS416-ZBX-401/-402/-403
Power supply cards	PS416-POW-400/-410/-420
CPU	PS416-CPU-200/-300/-400, PS416-CPU-223 ¹⁾
Programming cable or interface converter	PS416-ZBK-210 (PRG/RS232) UM1.5 (PRG/RS485)

1) For Hardware Configuration of PS416-CPU-223 see AWB27-1243GB.

Setup

The scope of delivery of all cards includes the plug connector housing with a plug-in screw terminal and the label strip with a plexiglass cover.

The plug connector is required for the card to function in the PS416 automation system.

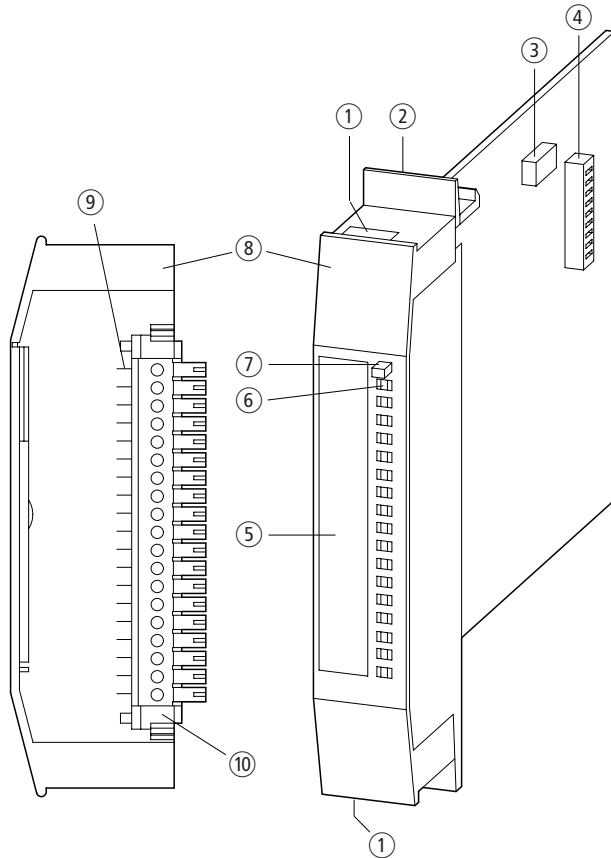


Figure 1-1: Setup of the digital input/output cards

Pos.	PS416-INP-400/401	PS416-OUT-400	PS416-OUT-410
①	Cable exit (bottom standard, top as an option)		
②	Locking mechanism		
③	–	Operating mode selector switch	–
④	Code switch		
⑤	Marking strip		
⑥	–	Short-circuit indication for central disconnection module (ZAA)	
⑦	–	Reset button	
⑧	Connector plug		
⑨	–	Connection terminal for “ZAA”	
⑩	Plug-in screw terminal		

Procedure

The following basic instructions ensure a correct commissioning of the cards:

1. Setting the card address

The card is assigned a unique address with code switch ④ and thus defines the addressing by the PLC programm. The address to be set depends on the card type and is explained for each card in the chapter "Hardware Configuration".

2. Setting the mode

The setting of the operating mode selector switch ③ determines how the card will react in the event of a short-circuit. This function is only implemented with the PS416-OUT-400 and is described in the chapter “Hardware Configuration”.

3. Wiring the plug-in screw terminal

The 19-pole plug-in screw terminal ⑩ is wired according to the connection diagram. For the external 24-V-DC power supply, wire with a 1.5 mm² diameter is recommended. Wire with a 0.75 mm² diameter is recommended for the signal lines. The wiring scheme is illustrated in the chapter “Engineering” for each card.

The plug-in screw terminal is then locked into the housing of the connection plug ⑧ and the cables are pushed through the underside ① of the housing (see chapter “Installation” on page 1-13).

4. Filling out the marking strip

The marking strip ⑤ is used to document how you address the card's inputs and outputs via the software. The software addresses are related directly to the card address setting (see step 1). The chapter “Operation” of each card describes how the user program addresses the card.

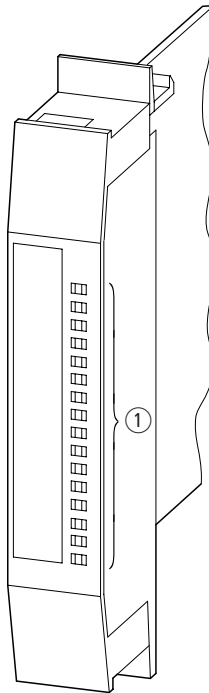


Figure 1-2: Marking strip for PS416-INP-400/401

① Status display

5. Inserting the card in the rack

The voltage-free card can now be inserted in the rack. The card is fastened or removed via the locking mechanism ②. The cards are all inserted and removed in the same way (see chapter “Installation” on page 1-13).

6. Fitting the plug connector

The connection plug ⑧ is plugged in. This concludes the installation of the card (see chapter “Installation” on page 1-13).

2 Engineering

General engineering notes

The relevant regulations for safety and prevention of accidents must be observed. Machines and systems which are fitted with the PS416 are subject to the relevant EN-, IEC-, VDE regulations.

Emergency OFF devices acc. EN 60204/IEC 204 (VDE 0113) must always be active in all operation modes of the controller. A deactivation of the emergency OFF device must not cause an uncontrolled or undefined restart.

Power supply

When using 24 V power supplies, a safe electrical isolation of the low voltage must be ensured. Only power supply units designed acc. IEC 364-4-41 or VDE 0100 Part 410 may be used.

An isolation monitoring device must be implemented (IEC 364-4-41 or VDE 0100 Part 410) when using an unearthed power supply.

With a potentially isolated operation the 24-V-DC power supply must be a protective low voltage acc. IEC 364-4-41 or VDE 0100 Part 410 or equivalent.

Suppression of interference sources

Connected inductive loads must always be protected with suppressor circuits. When connecting loads, the manufacturers specifications must be adhered to.

Interference measures

- ▶ Power, control and signal cables must be laid as far away from each other as possible in order to avoid capacitive and inductive coupling. If separate cabling is not possible, then those cables that are the interference sources must be screened without fail.
- ▶ Avoid long, parallel runs of cables with differing power ratings.

You can find further information on this subject in the Moeller Manual “Electromagnetic Compatibility of Automation Systems (EMC)” (TB27-001-GB) and “EMC-Engineering Guidelines for Automation Systems PS4/PS416” (AWB27-1287GB).

PS416-OUT-400

PS416-OUT-410

The following engineering guideline must be observed in order to conform to the EMC guidelines:

The voltage supply cables must be provided with a ferrite ring. It should be installed in the closest possible proximity of the card. One or more voltage supply cables may be present. The cables may not be connected to further devices.



HF-ferrite rings are not supplied with the card.
Place a separate order for type PS416-ZBX-405.

Example

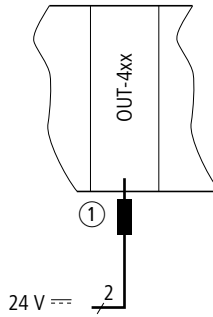


Figure 1-3: Engineering guideline for voltage supply cables of the output card

① Ferrite ring

3 Installation

Inserting and removing cards



Note

The PLC must be disconnected from the power supply before you insert or remove cards. Otherwise, voltage peaks at the bus plug can damage the card.

Inserting cards

- ▶ Insert the card into any slot of the rack to the right of the power supply PS416-CPU-4x0 or the SUCOnet K card PS416-NET-400.
The card requires one slot.
- ▶ Press the lever and insert the card into the rack until you hear a click.
- ▶ Plug in the connection plug.

Removing

- ▶ Remove the connection plug.
- ▶ Press the lever to release the locking mechanism.
- ▶ Pull the card forward.

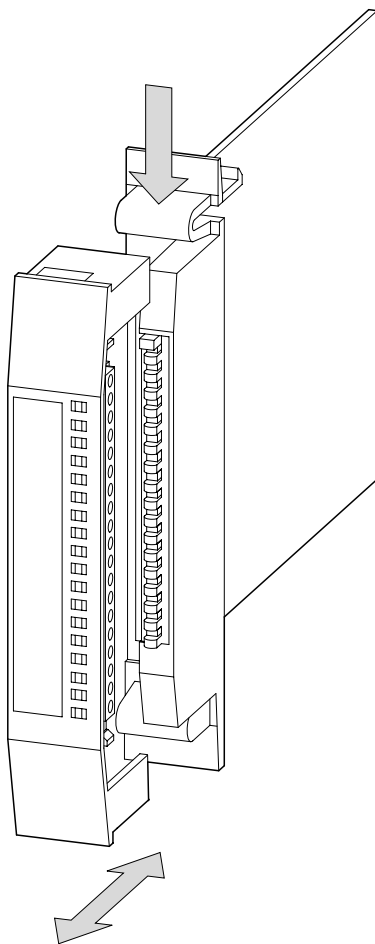


Figure 1-4: Inserting and removing cards

Screw terminal Inserting-/Removing

When connecting the cards to stations, you are recommended to remove the screw terminal from the housing of the connection plug. The following figure illustrates how the screw terminal is inserted and removed.

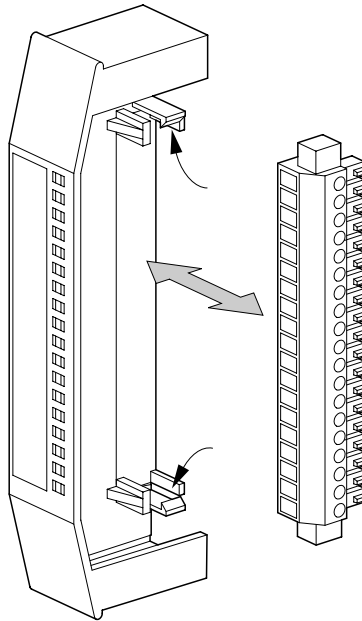


Figure 1-5: Inserting and removing the plug-in screw terminal

Inserting and removing the marking strip

The marking strip can be removed from the housing of the connection plug very simply.

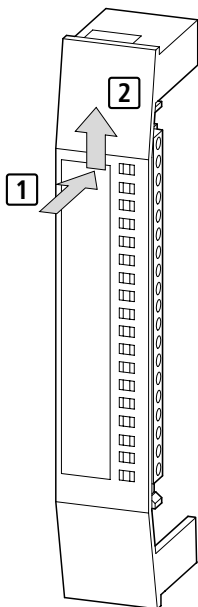


Figure 1-6: Inserting and removing the marking strip

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1 Engineering

Connecting the stations

Connections are made to the stations by means of the plug-in screw terminal in the connector plug housing:

- ▶ Remove the connector plug housing from the card.
- ▶ Remove the plug-in screw terminal.
- ▶ Wire the plug-in screw terminal according to the wiring plan.

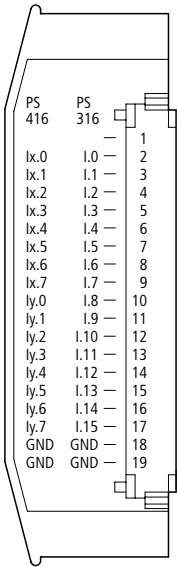


Figure 2-1: Plug connector assignment



The second GND connection is the continuation of the GND signal.

- ▶ Use wire diameters of 0.75 mm^2 for the signal cables.
- ▶ Lock the plug-in screw terminal in the connector plug housing and push the cables through the underside of the housing.



You can push the cables through the top if necessary. Then, you must push out the plastic window on the top of the plug housing.

Power supply

The PS416-POW-4x0 power supply card supplies the cards with 5 V DC from the internal bus of the rack. The external signal sources must be supplied separately with 24-V-DC.

2 Hardware Configuration

Setting addresses

In order for the digital input cards to be addressed, each card must be assigned a separate address. The addresses are assigned with the coding switch on each card (see table 2-1 on page 2-6). This address assigns to each card a special range in the central unit. The status of the inputs are recorded there and can be scanned via software. The chapter “Operation” page 2-13 fully explains the syntax of addressing the cards.

Two bytes are reserved in the central unit for the 16 inputs of each digital input card. The cards are therefore addressed in two steps; only even-numbered addresses are allowed. The first digital input card is given the address 0.

- Address the cards one after another, starting with address 0 for the first card. A maximum of 18 digital input cards can be used in each rack. In this case, the last card is given the address 34.

Table 2-1 shows how poles 1 to 6 of the coding switch must be set for each card address. It also shows the input byte used to address the cards via the software.

Table 2-1: Address coding for the PS416-INP-400/-401

Card address	Input byte	S1	S2	S3	S4	S5	S6
0	0.0 to 0.7 1.0 to 1.7	1	1	1	1	1	1
2	2.0 to 2.7 3.0 to 3.7	0	1	1	1	1	1
4	4.0 to 4.7 5.0 to 5.7	1	0	1	1	1	1
6	6.0 to 6.7 7.0 to 7.7	0	0	1	1	1	1
8	8.0 to 8.7 9.0 to 9.7	1	1	0	1	1	1
10	10.0 to 10.7 11.0 to 11.7	0	1	0	1	1	1
12	12.0 to 12.7 13.0 to 13.7	1	0	0	1	1	1
14	14.0 to 14.7 15.0 to 15.7	0	0	0	1	1	1
16	16.0 to 16.7 17.0 to 17.7	1	1	1	0	1	1
18	18.0 to 18.7 19.0 to 19.7	0	1	1	0	1	1
20	20.0 to 20.7 21.0 to 21.7	1	0	1	0	1	1
22	22.0 to 22.7 23.0 to 23.7	0	0	1	0	1	1
24	24.0 to 24.7 25.0 to 25.7	1	1	0	0	1	1
26	26.0 to 26.7 27.0 to 27.7	0	1	0	0	1	1
28	28.0 to 28.7 29.0 to 29.7	1	0	0	0	1	1
30	30.0 to 30.7 31.0 to 31.7	0	0	0	0	1	1
32	32.0 to 32.7 33.0 to 33.7	1	1	1	1	0	1
34	34.0 to 34.7 35.0 to 35.7	0	1	1	1	0	1

Setting addresses

The positions of switches 7 and 8 do not matter.

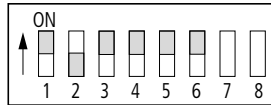


Figure 2-2: Coding switch set for Address 4

Example

The following figure illustrates a sample assignment of a rack with input and output cards. It shows how the marked input cards are addressed.

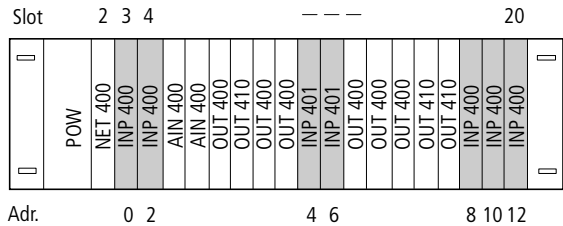


Figure 2-3: Addressing of digital input cards using an example configuration

3 Software Configuration

Configuring cards

The digital input cards are configured in the Device Configurator of the Sucosoft S40.

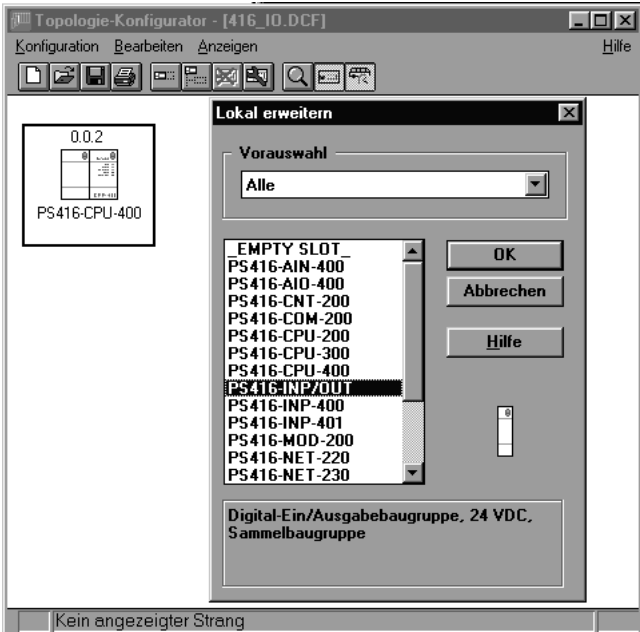


Figure 2-4: Device Configurator

PS416-INP-400/-401

The following entries are made in the fields:

Line: Number of the network line (0 = Basic unit; 1 to 9 = Expander rack)

Rack/Station: Number of the rack (0 = Basic unit; 1 bis 30 = Expander rack)

Slot/Module: Slot number in the rack. All digital input and output cards are given the slot number "0".

Type: PS416-INP/OUT card



Several digital input and output cards can be grouped together in one rack as the type "PS416-INP/OUT" and can be defined just once for each rack.

How to use the Topology Configurator is explained in detail in the manual "Sucosoft S40 Programming Software – User Interface" (AWB2700-1305GB).

Setting card parameters

The card parameters are set in the "Parameters" dialog box of the Device Configurator. Specify the highest available input byte address of all inserted digital input cards of a rack. The basis for this is the address set on the card.

Example

A rack contains seven digital input cards, to which you assigned the addresses 0, 2, 4, 6, 8, 10, and 12 with the coding switch. The highest available input bytes are thus IB 12 and IB 13 (see Table 2-1 on page 2-6). Set “12” as the highest input address for the parameters.

Strang:	0
Rack/Teilnehmer:	0
<hr/>	
Höchste Eingangsadresse (max. IB126):	IB 12
Höchste Ausgangsadresse (max. QB126):	QB
<hr/>	
Summe Daten (max. 256 Bytes):	14
<div>OK</div> <div>Abbrechen</div> <div>Hilfe</div>	

Figure 2-5: Parameter setting of the PS416-INP-400/-401

4 Operation

Function

The digital input cards are the interface between the input level and the processing level. In order to improve the reliability of the control system, the internal bus logic isolates the DC signals from the process by means of optical couplers. There is an LED for each input, which displays the signal status.

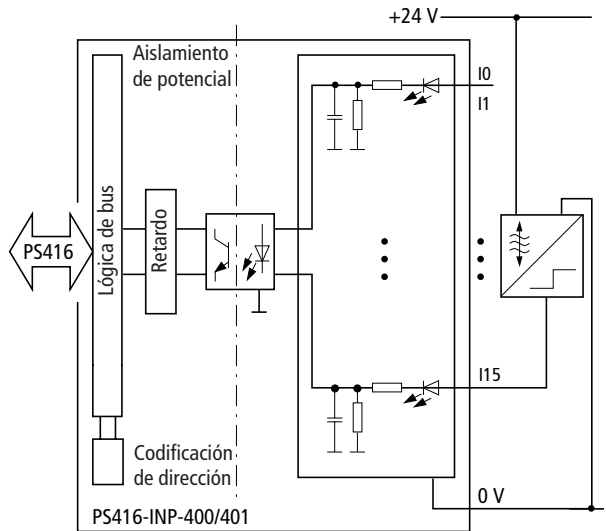


Figure 2-6: Block diagram of the PS416-INP-400/-401

Software addressing

After you have configured the card in the Device Configurator (see chapter “Software Configuration”), you can define the inputs using the Sucosoft S40 Editor and scan them with the IL Editor in bit, byte or word format. The following specifications are required to address the inputs:

Operand: I

Data type: Bit, Byte, word, double word¹⁾

Line number: 1 to 9 (0 = Basic unit)

Slot number: 1 to 30

(0 = Basic unit)

Slot number: 0

Word or Byte number

(word: 0 to 34; byte: 0 to 35)

Bit number: 0 to 7

The general syntax rule is:

Operand-data type-line-rack/station-slot/module-byte/word-bit

Example

You wish to scan the inputs of a digital input card. The card is located in the basic unit (line 0, station 0). The address 12 was set on the card..

1) A double word access is only possible with adjacent cards.

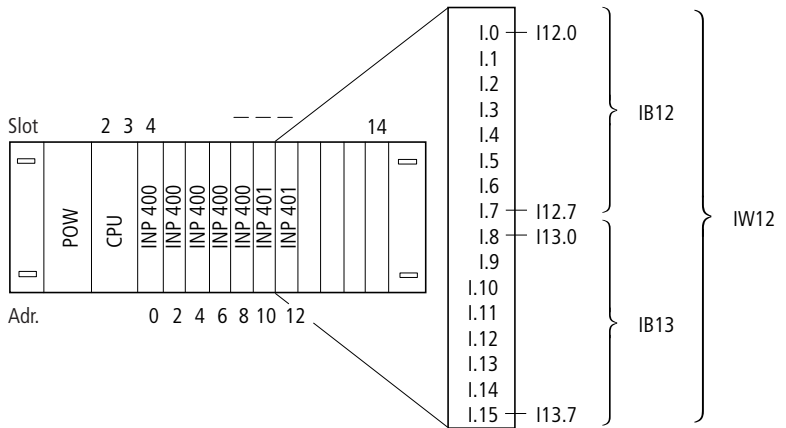


Figure 2-7: Bit, byte and word addressing for digital input card with address 12

Wordwise addressing addresses all 16 inputs of the PS416-INP-400/-401 simultaneously with one command:

Variable declaration:

```
VAR
    Input_Slave_IW12 AT%IW0.0.0.12:WORD;
END_VAR
```

User program:

```
LD Input_Slave_IW12
ST ...
```

Bytewise addressing addresses inputs 0 to 7 or 8 to 15 simultaneously. In this example, inputs 8 to 15 are addressed:

Variable declaration:

```
VAR
    Input_Slave_IB13 AT%IB0.0.0.13:BYTE;
END_VAR
```

User program:

```
LD Input_Slave_IB13
ST ...
```

Bitwise addressing always addresses exactly one input of a card. In this example input I 15 (bit 7 of the most significant byte) is addressed.

Variable declaration:

```
VAR
    Input_Slave_I15 AT%I0.0.0.13.7:BOOL;
END_VAR
```

User program:

```
LD Input_Slave_I15
ST ...
```

5 Test/Commissioning/Diagnostics

LED display

The front panel contains green LEDs, each of which indicates the status of one input.

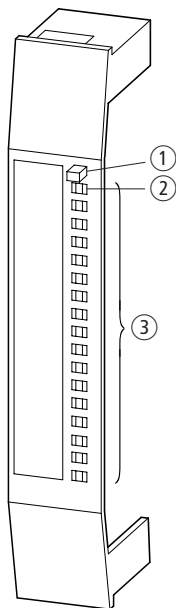


Figure 2-8: LED display on the card

- ① Reset button
- ② LED ZAA
- ③ Status display

LED lit: The input has the status “1”.

LED off: The input has the status “0”.

Sucosoft S40

You can scan the logical status of the card inputs in the Sucosoft S40 menu “Test and Commissioning”. You will find more information on this subject in the manual “Sucosoft S40 Programmiing Software – User Interface” (AWB2700-1305GB).

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1 Engineering

Connecting the stations

Connections are made to the stations by means of the plug-in screw terminal in the connector plug housing:

- ▶ Remove the connector plug housing from the card.
- ▶ Wire the plug-in screw terminal according to the terminal connection diagram.

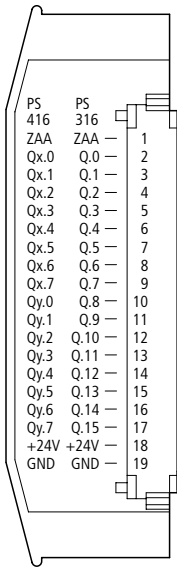


Figure 3-1: Plug connector assignment for the PS416-OUT-400

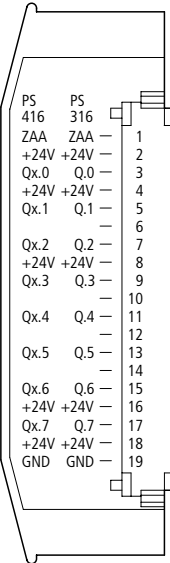


Figure 3-2: Plug connector assignment for the PS416-OUT-410

For the PS416-OUT-410, the external 24-V-DC supply voltage must be supplied to the card via at least three cables.

- For the external 24-V-DC supply voltage, use 1.5 mm² wire diameters. Use 0.75 mm² diameters for the signal cables.
- The cables are passed through the bottom of the housing.



You can push the cables through the top if necessary. In this case, the plastic blindplate on the top of the housing must be broken and removed.

Power supply

The rack's internal bus supplies the cards with 5 V DC from the power supply card PS416-POW-4x0. An external 24 V DC voltage must be connected to the card to provide the output power supply.

2 Hardware Configuration

Setting addresses

In order for the digital output cards to be addressed, each card must be assigned a separate address. The addresses are assigned with the coding switch on each card (see Table 3-1 from page 3-8). This address assigns to each card a special area in the central unit. The chapter “Operation” from page 3-19 fully explains the syntax of addressing the cards.

Address the digital outputs cards one after each other, starting with address 0 for the first digital output card.

PS416-OUT-400

Two bytes are reserved in the central unit for the 16 outputs for each digital output card. The cards are therefore addressed in two steps; only even-numbered addresses are allowed.

A maximum of 18 PS416-OUT-400 digital output cards can be used in each rack. In this case, the last card is given the address 34.

Table 3-1 shows how poles 1 to 6 of the coding switch must be set for each card address. It also shows the output byte used to address the cards via the software.

Table 3-1: Address coding for the PS416-OUT-400

Card address	Input byte	S1	S2	S3	S4	S5	S6
0	0.0 to 0.7 1.0 to 1.7	1	1	1	1	1	1
2	2.0 to 2.7 3.0 to 3.7	0	1	1	1	1	1
4	4.0 to 4.7 5.0 to 5.7	1	0	1	1	1	1
6	6.0 to 6.7 7.0 to 7.7	0	0	1	1	1	1
8	8.0 to 8.7 9.0 to 9.7	1	1	0	1	1	1
10	10.0 to 10.7 11.0 to 11.7	0	1	0	1	1	1
12	12.0 to 12.7 13.0 to 13.7	1	0	0	1	1	1
14	14.0 to 14.7 15.0 to 15.7	0	0	0	1	1	1
16	16.0 to 16.7 17.0 to 17.7	1	1	1	0	1	1
18	18.0 to 18.7 19.0 to 19.7	0	1	1	0	1	1
20	20.0 to 20.7 21.0 to 21.7	1	0	1	0	1	1
22	22.0 to 22.7 23.0 to 23.7	0	0	1	0	1	1
24	24.0 to 24.7 25.0 to 25.7	1	1	0	0	1	1
26	26.0 to 26.7 27.0 to 27.7	0	1	0	0	1	1
28	28.0 to 28.7 29.0 to 29.7	1	0	0	0	1	1
30	30.0 to 30.7 31.0 to 31.7	0	0	0	0	1	1
32	32.0 to 32.7 33.0 to 33.7	1	1	1	1	0	1
34	34.0 to 34.7 35.0 to 35.7	0	1	1	1	0	1

The positions of switches 7 and 8 do not matter.

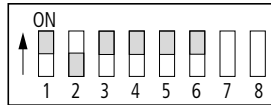


Figure 3-3: Coding switch set for Address 4

Example

The following figure illustrates a sample assignment of a rack with input and output cards. It shows how the marked digital output cards are addressed.

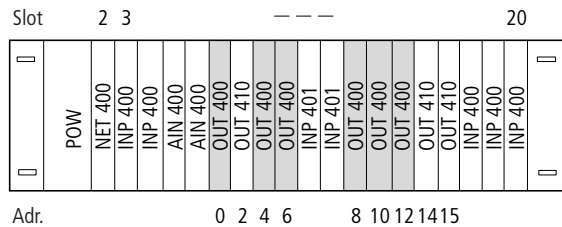


Figure 3-4: Addressing of PS416-OUT-400 digital output cards using an example configuration

PS416-OUT-410

A byte is reserved in the central unit for the eight outputs of the PS416-OUT-410 card. The cards are therefore addressed one after another. Both even-numbered and odd-numbered addresses are allowed.

Table 3-2 from page 3-10 illustrates how poles 1 to 7 of the coding switch must be set for each card. It also shows the output bytes used by the software to address the cards.

Table 3-2: Address coding for the PS416-OUT-410

Card address	Input byte	S1	S2	S3	S4	S5	S6	S7
0	0.0 to 0.7	1	1	1	1	1	1	1
1	1.0 to 1.7	0	1	1	1	1	1	1
2	2.0 to 2.7	1	0	1	1	1	1	1
3	3.0 to 3.7	0	0	1	1	1	1	1
4	4.0 to 4.7	1	1	0	1	1	1	1
5	5.0 to 5.7	0	1	0	1	1	1	1
6	6.0 to 6.7	1	0	0	1	1	1	1
7	7.0 to 7.7	0	0	0	1	1	1	1
8	8.0 to 8.7	1	1	1	0	1	1	1
9	9.0 to 9.7	0	1	1	0	1	1	1
10	10.0 to 10.7	1	0	1	0	1	1	1
11	11.0 to 11.7	0	0	1	0	1	1	1
12	12.0 to 12.7	1	1	0	0	1	1	1
13	13.0 to 13.7	0	1	0	0	1	1	1
14	14.0 to 14.7	1	0	0	0	1	1	1
15	15.0 to 15.7	0	0	0	0	1	1	1
16	16.0 to 16.7	1	1	1	1	0	1	1
17	17.0 to 17.7	0	1	1	1	0	1	1
18	18.0 to 18.7	1	0	1	1	0	1	1
19	19.0 to 19.7	0	0	1	1	0	1	1
20	20.0 to 20.7	1	1	0	1	0	1	1
21	21.0 to 21.7	0	1	0	1	0	1	1
22	22.0 to 22.7	1	0	0	1	0	1	1
23	23.0 to 23.7	0	0	0	1	0	1	1
24	24.0 to 24.7	1	1	1	0	0	1	1
25	25.0 to 25.7	0	1	1	0	0	1	1
26	26.0 to 26.7	1	0	1	0	0	1	1
27	27.0 to 27.7	0	0	1	0	0	1	1
28	28.0 to 28.7	1	1	0	0	0	1	1
29	29.0 to 29.7	0	1	0	0	0	1	1

Card address	Input byte	S1	S2	S3	S4	S5	S6	S7
30	30.0 to 30.7	1	0	0	0	0	1	1
31	31.0 to 31.7	0	0	0	0	0	1	1
32	32.0 to 32.7	1	1	1	1	1	0	1
33	33.0 to 33.7	0	1	1	1	1	0	1
34	34.0 to 34.7	1	0	1	1	1	0	1

The position of pole 8 does not matter.

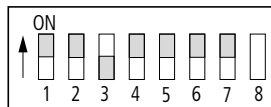


Figure 3-5: Coding switch set for Address 4

Example

The following figure illustrates a sample assignment of a rack with input and output cards. It shows how the marked digital output cards are addressed.

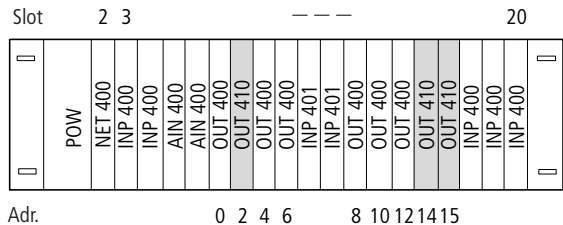


Figure 3-6: Addressing of PS416-OUT-410 digital output cards using an example configuration

Defining the short-circuit behaviour

The behaviour of the card in case of a short-circuit is defined with the operating mode selector switch on the card. This setting is only possible on the PS416-OUT-**400**. The short-circuit behaviour of the PS416-OUT-**410** is equivalent to Mode 1.

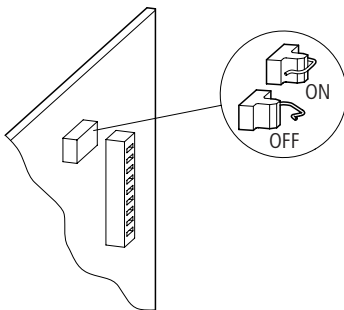


Figure 3-7: Operating mode selector switch

Mode 1 (switch in position OFF/opened):

In the event of a short-circuit, **all** outputs of the card are switched off until the short-circuit is eliminated and there is a manual acknowledgement with the Reset button.

A red LED indicates any short-circuit.

The cards “ZAA” output is activated. A “ZAA” central disconnection module can be used to register the short-circuit.

Mode 2: (switch in position ON/closed)

In case of a short-circuit, the **affected** output is switched off for approx. 200 ms. Then, an automatic restart attempt is made. This repeats itself until the short-circuit is eliminated.

The red LED displays a short-circuit until the Reset button is pressed as an acknowledgement.

The cards “ZAA” output is activated. A “ZAA” central disconnection module can be used to register the short-circuit.

The function of the “ZAA” output on the digital output cards PS416-OUT-400/-410 can be used as illustrated below.

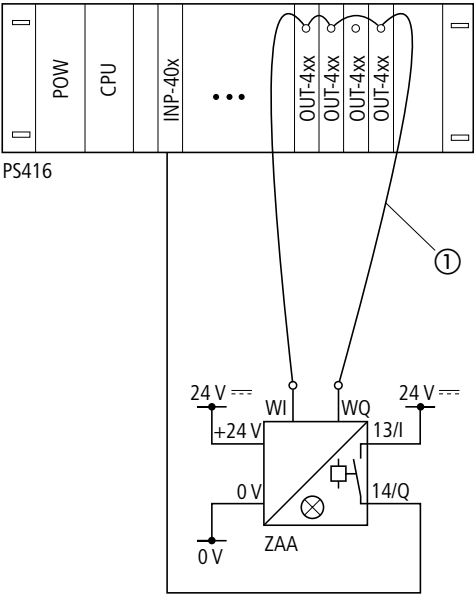


Figure 3-8: Monitoring 24-V-DC output cards using the ZAA central disconnection module

① ZAA loop

The “ZAA” central disconnection module is addressed when WI/WQ has a low resistance compared to 0 V, or when the loop between the connections WI and WQ is broken.

The “ZAA” card drives a constant current from the output “WQ” through the monitoring loop to the input “WI” of the “ZAA” card. The “ZAA” connection on the digital output cards PS416-OUT-400/-410 pulls the loop to GND in the event of a short-circuit. The short-circuit is recognized by the “ZAA” card and registered by an input card, as shown in Fig. 3-8.

3 Software Configuration

Configuring cards

The digital output cards are configured in the Sucosoft S40 Device Configurator.

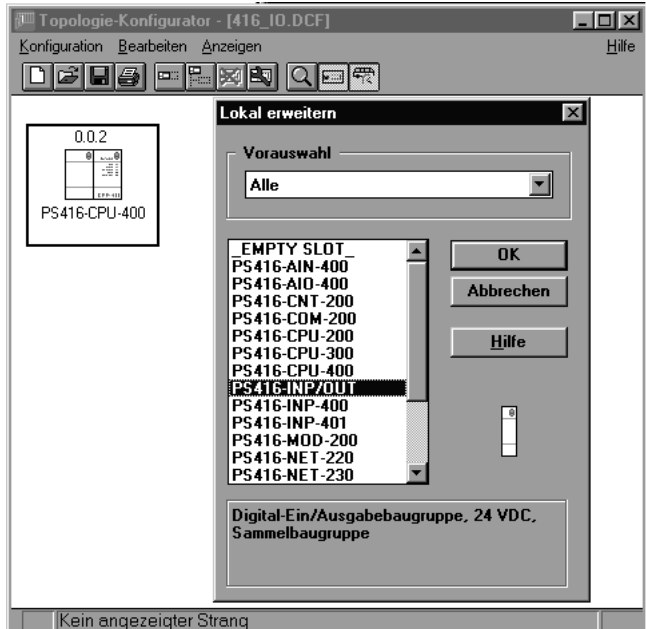


Figure 3-9: Device configurator

The entries specifications must be made in the following boxes:

Line: Number of the network line
(0 = Basic unit; 1 to 9 = Expander rack)

Rack/Station: Number of the rack
(0 = Basic unit; 1 to 30 = Expander rack)

Slot/Module: Slot number in the rack. All digital input and output cards are given the slot number "0".

Type: PS416-INP/OUT card



Several digital input and output cards can be grouped together in one rack as type "PS416-INP/OUT" and only defined once for each rack.

How to use the Topology Configurator is explained in detail in the manual "Sucosoft S40 Programming-Software User Interface" (AWB2700-1305GB).

Setting the card parameters

The card parameters are set in the "Parameters" dialog box of the Device Configurator. Specify the highest available output byte address of all inserted digital output cards of a rack. The basis for this is the address set on the card.

Example

Set the address 4 on one of several digital output cards as the highest address. Enter “4” in the dialog box “Parameters” for the highest available output byte address, irrespective of whether the card is a PS416-OUT-400 or a PS416-OUT-410.

The screenshot shows a dialog box titled "PS416-INP/OUT". Inside, there are two input fields: "Strang:" with the value "0" and "Rack/Teilnehmer:" with the value "0". Below these, there are two more input fields: "Höchste Eingangsadresse (max. IB126):" with the value "IB" and "Höchste Ausgangsadresse (max. QB126):" with the value "QB" and "4". A horizontal line separates these from the "Summe Daten (max. 256 Bytes):" field, which has the value "6". At the bottom, there are three buttons: "OK", "Abbrechen", and "Hilfe".

Figure 3-10: Parameter setting of the PS416-OUT-400/-410

4 Operation

Function

The digital output cards are the interface between the processing level and the output level. The output circuits are galvanically isolated from the internal logic by means of optocouplers. Fuses or electronic fuses protect the PS416-OUT-400 against overloads.

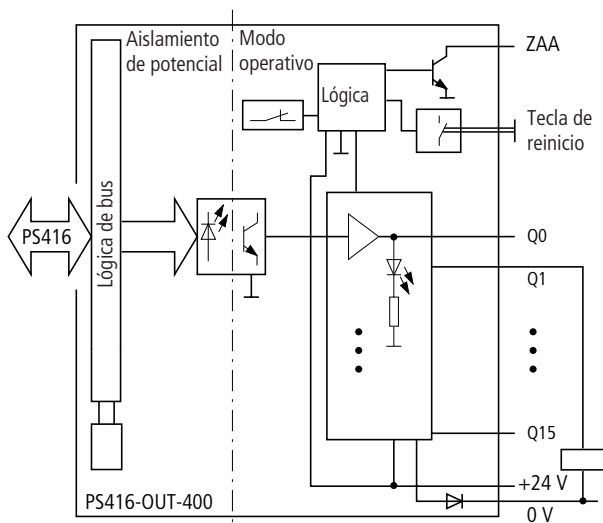


Figure 3-11: PS416-OUT-400 block diagram

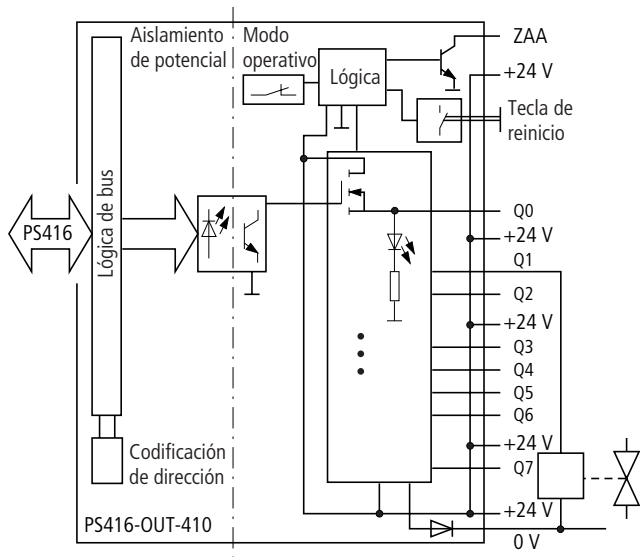


Figure 3-12: PS416-OUT-410 block diagram

Software addressing

After you have configured the card in the Device Configurator (see chapter “Software Configuration”), you can define the outputs using the Sucosoft S40 Editor and scan them with the IL Editor in bit, byte or word format. The following specifications are required to address the outputs:

Operand: I

Data type: bit, byte, word, double word¹⁾

Line number: 1 to 9 (0 = Basic unit)

Station number: 1 to 30

(in the basic unit = 0)

Slot number: 0

Word or Byte number

(word: 0 to 34; byte: 0 to 35)

Bit number: 0 to 7

The general syntax rule is:

Operand-data type-line-rack/station-slot/module-byte/word-bit

1) A double word access is only possible with adjacent PS416-OUT-400/-410 cards. A word access to the PS416-OUT-410 cards is only possible if the outputs of two adjacent PS416-OUT-410 cards are to be addressed simultaneously.

Example

You want to read or write the outputs of a digital output card. The card is located in the basic unit (line 0, station 0). The address 12 was set on the card.

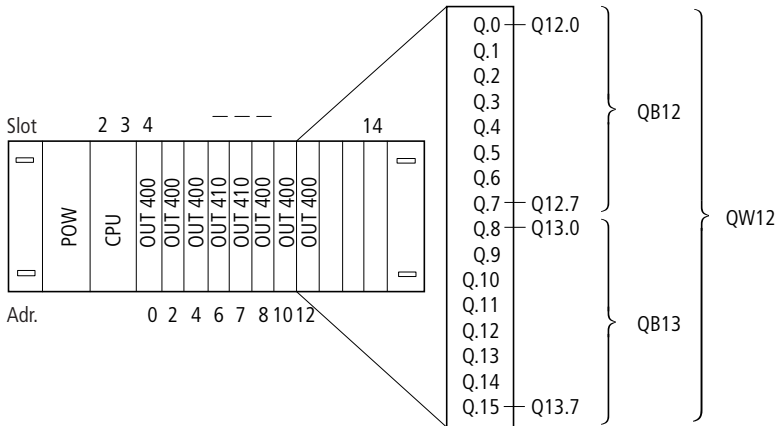


Figure 3-13: Bit-, byte and word addressing with the PS416-OUT-400 with address 12

Wordwise addressing addresses all 16 outputs of the PS416-OUT-400 simultaneously with one command:

Variable declaration:

```
VAR
    Output_Slave_QW12 AT%QW0.0.0.12:WORD;
END_VAR
```

User program:

```
LD Output_Slave_QW12
ST..
```

```
LD..
ST Output_Slave_QW12
```

Bytewise addressing addresses outputs 0 to 7 or 8 to 15 simultaneously. In this example, outputs 8 to 15 are addressed:

Variable declaration:

```
VAR
    Output_Slave_QB13 AT%QB0.0.0.13:BYTE;
END_VAR
```

User program:

```
LD Output_Slave_QB13
ST..
```

```
LD..
ST Output_Slave_QB1B13
```

Bitwise addressing always addresses exactly one output of a card. In this example output Q15 (bit 7 of the most significant byte) is addressed.

Variable declaration:

```
VAR
    Output_Slave_Q15 AT%IO.0.0.13.7:BOOL;
END_VAR
```

User program:

```
LD Output_Slave_Q15
ST..
```

```
LD..
ST Output_Slave_Q15
```


5 Test/Commissioning/Diagnostics

LED display

The front panel contains green LEDs, each of which indicates the status of one output.

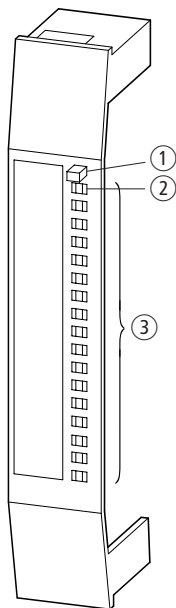


Figure 3-14: LED display on the card

- ① Reset button
- ② LED ZAA
- ③ Status display

LED lit: The output has the status “1”.

LED off: The output has the status “0”.

The red “ZAA” LED is lit in case of a short-circuit (see section “Defining the short-circuit behaviour” on page 3-12).

Sucosoft S40

You can scan and force the logical status of the card outputs by means of the menu “Test and Commissioning” of Sucosoft S40. You will find more detailed information on this subject in the manual “Sucosoft S40 Programming software – User Interface” (AWB2700-1305GB).

Appendix

Technical Data

PS416-INP-400/-401

Number of inputs	16
Galvanic isolation between input and logic 5 V (bus)	yes
Terminal design	plug-in screw terminal
Connector cross-section	$\leq 1.5 \text{ mm}^2$
Display elements	LED
Ambient temperature	0 °C ... +55 °C
Storage temperature	-25 °C ... +70 °C
Humidity class	RH1
EMV	see page 4-4
Dimensions [D × H × W]	215 × 130 × 20 (mm)
Weight	approx. 150 g
Required space	4 space units = 1 Slot
Current consumption 5 V bus	normally 30 mA
Power dissipation	
internal 5 V bus side	normally 0.15 W
external 16 × input	max. 5.8 W
Input voltage U_i	
Input current I_i	normally 8.6 mA $\pm 0.5 \text{ mA}$
Input resistance	normally 2.8 kOhm
Voltage range U_i	
„0“ signal	-3 ... +5 V
„1“ signal	+15 ... +30.2 V
Current range I_i	
„0“ signal	0 ... 0.6 mA
„1“ signal	2.5 ... 12 mA

On/Off delay	
INP 400	normally 3.0/3.0 ms
INP 401	normally 0.2/0.3 ms
Utilization factor	1
Operating factor	100 %

PS416-OUT-400/PS416-OUT-410

	PS416-OUT-400	PS416-OUT-410
Number of outputs	16	8
Output current I_{nom} pro Output for $U_{\text{nom}} = 24 \text{ V}$	0.5 A	2.0 A
Galvanic isolation between output and logic 5 V (bus)	yes	
Terminal design	plug-in screw terminal	
Connector cross-section	$\leq 1.5 \text{ mm}^2$	
Display elements	LED	
Ambient temperature	0 °C ... +55 °C	
Storage temperature	−25 °C ... +70 °C	
Humidity class	RH1	
EMV	see page 4-4	
Dimensions [D × H × W]	215 × 130 × 20 mm	
Weight	approx. 150 g	
Required space	4 space units = 1 Slot	
Current consumption		
Logic 5 V (bus)	normally 150 mA	normally 85 mA
external 24 V	normally 230 mA (ohne Last)	normally 70 mA (without load)
Power dissipation		
Logic 5 V (bus)	approx. 0.74 W	approx. 0.425 W
external 24 V	approx. 5.6 W	approx. 4.5 W

	PS416-OUT-400	PS416-OUT-410
Input U_e		
U_{nom}	24 V	
Tolerance	+20 %, -15 %	
Residual ripple	≤ 5 %	
Reverse polarity protections	present	
Mode 1 Short-circuit release	with start disable	
Mode 2 Short-circuit release	without start disable	–
Parallel connection of outputs	max. 4	no
Indication of monitoring activation		
LED	present	
ZAA	active low	
Residual current for OFF signal	$\leq 300\text{ }\mu\text{A}$	$\leq 400\text{ }\mu\text{A}$
Output voltage U_a		
OFF signal for U_{nom}	$\leq 2.5\text{ V}$	$\leq 2\text{ V}$
ON signal for U_{nom}	23.4 V	
Output current I_a		
for $U = 24\text{ V}$	0.5 A	2.0 A
for $U_{max} = 30\text{ V}$	0.6 A	2.4 A
Monitoring		
Short-circuit	present	
Thermal	present	no
Overload	present	no
Suppressor circuit US [V]	present	
Operating frequency f [Hz]/ P [W]		
inductive load	acc. DC 13	
Delay t		
On 0 V to 24 V	60 μs	
Off 24 V to 0 V	100 μs	700 μs
Utilization factor	1	
Operating factor	100 %	

Details for electromagnetic compatability (EMC) of automation devices

Emitted interference	DIN EN 55 011/22 Class A		
Noise immunityt			
ESD	DIN EN 61 000-4-2	Contact discharge Air discharge	4 kV 8 kV
RFI	DIN EN 61 000-4-3	AM/PM	10 V/m
Burst	DIN EN 61 000-4-4	Line/Digital I/O Analog I/O, Field bus	2 kV 1 kV
Surge	DIN EN 61 000-4-5	Digital I/O, asymmetrical DC line, asymmetrical DC line, symmetrical AC line, asymmetrical AC line, symmetrical	0.5 kV 1 kV 0.5 kV 2 kV 1 kV
Immunity to line-conducted interference	DIN EN 61 000-4-6	AM	10 V

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