

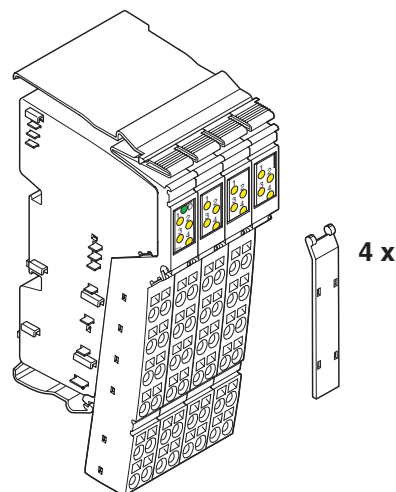
# IB IL 24 DI 16 ...

## Inline Terminal With 16 Digital Inputs

### AUTOMATIONWORX

Data Sheet  
5553\_en\_04

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### Description

The terminal is designed for use within an Inline station. It is used to acquire digital signals.

### Features

- Connections for 16 digital sensors
- Connection of sensors in 2 and 3-wire technology
- Maximum permissible load current per sensor: 250 mA
- Maximum permissible load current from the terminal: 4.0 A
- Diagnostic and status indicators
- **IB IL 24 DI 16 and IB IL 24 DI 16-PAC:**  
Approved for use in potentially explosive areas (observe the notes on page 6)



This data sheet is only valid in association with the IL SYS INST UM E user manual or the Inline system manual for your bus system.



Please note that the numbering of the terminal points differs for the various connector versions (see Figure 2 on page 5).



Make sure you always use the latest documentation.  
It can be downloaded at [www.download.phoenixcontact.com](http://www.download.phoenixcontact.com).  
A conversion table is available on the Internet at  
[www.download.phoenixcontact.com/general/7000\\_en\\_00.pdf](http://www.download.phoenixcontact.com/general/7000_en_00.pdf).



This data sheet is valid for all products listed on the following page:

## Ordering Data

### Products

| Description  | Type                       | Order No. | Pcs./Pck. |
|--|----------------------------|-----------|-----------|
| Terminal with 16 digital inputs; complete with accessories (connectors consecutively numbered and labeling fields); transmission speed of 500 kbps     | IB IL 24 DI 16-PAC         | 2861250   | 1         |
| Terminal with 16 digital inputs; complete with accessories (connectors not consecutively numbered and labeling fields); transmission speed of 500 kbps | IB IL 24 DI 16-PAC/SN      | 2862958   | 1         |
| Terminal with 16 digital inputs; without accessories; transmission speed of 500 kbps   | IB IL 24 DI 16             | 2726230   | 1         |
| Terminal with 16 digital inputs; complete with accessories (connectors not consecutively numbered and labeling fields); transmission speed of 2 Mbps   | IB IL 24 DI 16-2MBD-PAC    | 2861595   | 1         |
| Terminal with 16 digital inputs; complete with accessories (connectors not consecutively numbered and labeling fields); transmission speed of 2 Mbps   | IB IL 24 DI 16-2MBD-PAC/SN | 2878120   | 1         |
| Terminal with 16 digital inputs; without accessories; transmission speed of 2 Mbps   | IB IL 24 DI 16-2MBD        | 2855114   | 1         |



Four of the listed connectors or one connector set are needed for the complete fitting of the IB IL 24 DI 16 and IB IL 24 DI 16-2MBD.

### Accessories

| Description  | Type                  | Order No. | Pcs./Pck. |
|--|-----------------------|-----------|-----------|
| Connector with twelve spring-cage connections (green, without color print)                     | IB IL SCN-12          | 2726340   | 10        |
| Connector with twelve spring-cage connections (green, with color print)                        | IB IL SCN-12-ICP      | 2727611   | 10        |
| Connector set with 48 spring-cage connections (green, without color print)                     | IB IL DI/DO 16-PLSET  | 2860976   | 1         |
| Connector set numbered consecutively with 48 spring-cage connections (green, with color print) | IB IL DI 16-PLSET/ICP | 2860989   | 1         |

### Documentation

| Description   | Type                         | Order No. | Pcs./Pck. |
|---|------------------------------|-----------|-----------|
| "Automation Terminals of the Inline Product Range" user manual                    | IL SYS INST UM E             | 2698737   | 1         |
| "Configuring and Installing the INTERBUS Inline Product Range" user manual        | IB IL SYS PRO UM E           | 2743048   | 1         |
| "INTERBUS Addressing" data sheet  | DB GB IBS SYS ADDRESS        | 9000990   | 1         |
| "Inline Terminals for Use in Zone 2 Potentially Explosive Areas" application note | AH EN IL EX ZONE 2           | 7217      | 1         |
| "Addressing of 16-Channel Inline Terminals" application note                      | AH IB IL 24 DI/DO 16 ADDRESS | 9014124   | 1         |

## Technical Data

### General Data

|  |   |
|--|---|
| Housing dimensions (width x height x depth)            | 48.8 mm x 120 mm x 71.5 mm  |
| Weight   | 122 g (without connectors), 210 g (with connectors)                         |
| Operating mode   | Process data mode with 1 word   |
| Connection method for sensors                          | 2 and 3-wire technology   |
| Permissible temperature (operation)                    | -25°C to +55°C  |
| Permissible temperature (storage/transport)            | -25°C to +85°C  |
| Permissible humidity (operation/storage/transport)     | 10% to 95% according to DIN EN 61131-2                                      |
| Permissible air pressure (operation/storage/transport) | 70 kPa to 106 kPa (up to 3000 m above sea level)                            |
| Degree of protection                                   | IP20 according to IEC 60529   |
| Protection class                                       | Class 3 according to EN 61131-2, IEC 61131-2                                |
| Connection data for connectors                         |   |
| Connection method                                      | Spring-cage terminals   |
| Conductor cross-section                                | 0.2 mm <sup>2</sup> to 1.5 mm <sup>2</sup> (solid or stranded), 24 - 16 AWG |

### Interface

|           |                      |
|-----------|----------------------|
| Local bus | Through data routing |
|-----------|----------------------|

### Transmission Speed

|                            |          |
|----------------------------|----------|
| IB IL 24 DI 16-PAC         | 500 kbps |
| IB IL 24 DI 16-PAC/SN      | 500 kbps |
| IB IL 24 DI 16             | 500 kbps |
| IB IL 24 DI 16-2MBD-PAC    | 2 Mbps   |
| IB IL 24 DI 16-2MBD-PAC/SN | 2 Mbps   |
| IB IL 24 DI 16-2MBD        | 2 Mbps   |

### Supply of the Module Electronics and I/O Through Bus Terminal/Power Terminal

|                   |                           |
|-------------------|---------------------------|
| Connection method | Through potential routing |
|-------------------|---------------------------|

### Power Consumption

|  | 500 kbps                | 2 Mbps                  |
|--|-------------------------|-------------------------|
| Communications power                   | 7.5 V                   | 7.5 V                   |
| Current consumption from the local bus | 60 mA, maximum          | 80 mA, maximum          |
| Power consumption from the local bus   | 0.45 W, maximum         | 0.6 W, maximum          |
| Segment supply voltage $U_S$           | 24 V DC (nominal value) | 24 V DC (nominal value) |
| Nominal current consumption at $U_S$   | 4 A, maximum            | 4 A, maximum            |

### Digital Inputs

|  |   |
|--|---|
| Number                                 | 16  |
| Input design                           | According to EN 61131-2 Type 1  |
| Definition of switching thresholds     |   |
| Maximum low-level voltage              | $U_{Lmax} < 5 \text{ V}$  |
| Minimum high-level voltage             | $U_{Hmin} > 15 \text{ V}$   |
| Common potentials                      | Segment supply, ground  |
| Nominal input voltage $U_{IN}$         | 24 V DC   |
| Permissible range                      | $-30 \text{ V} < U_{IN} < +30 \text{ V DC}$   |
| Nominal input current for $U_{IN}$     | 3 mA, minimum   |
| Delay time                             | None  |
| Permissible cable length to the sensor | 30 m (to ensure conformance with EMC directive 89/336/EEC)  |
| Use of AC sensors                      | AC sensors in the voltage range $< U_{IN}$ are limited in application (according to the input design) |

| Characteristic Curve: Current Depending on the Input Voltage and the Ambient Temperature $T_A$ |               |                                 |                              |
|--|---------------|---------------------------------|------------------------------|
| Supply Voltage   | Input Current | Input Current for $t \geq 20$ s |                              |
|  |               | For $T_A = 25^\circ\text{C}$    | For $T_A = 55^\circ\text{C}$ |
| 18 V   | 3.0 mA        | 2.9 mA                          | 2.5 mA                       |
| 24 V   | 3.9 mA        | 3.8 mA                          | 3.5 mA                       |
| 30 V   | 4.5 mA        | 4.2 mA                          | 3.0 mA                       |

The current is reduced depending on the ambient temperature  $T_A$  and the number of inputs that are switched on (internal module temperature).

## Power Dissipation

### Formula to Calculate the Power Dissipation of the Electronics

#### 500 kbps

$$P_{EL} = 0.525 \text{ W} + \sum_{n=1}^{16} [U_{INn} \times 0.003 \text{ A}]$$

#### 2 Mbps

$$P_{EL} = 0.6 \text{ W} + \sum_{n=1}^{16} [U_{INn} \times 0.003 \text{ A}]$$

Where

$P_{EL}$  Total power dissipation in the terminal  
 $n$  Index of the number of set inputs  $n = 1$  to 16  
 $U_{INn}$  Input voltage of input  $n$

### Power Dissipation of the Housing $P_{HOU}$

2.8 W, maximum (within the permissible operating temperature)

## Limitation of Simultaneity, Derating

Derating

No limitation of simultaneity, no derating

## Error Messages to the Higher-Level Control or Computer System

None

## Safety Equipment

Overload in segment circuit

No

Surge voltage

Protective elements in the power terminal

Polarity reversal

Protective elements in the power terminal

## Electrical Isolation/Isolation of the Voltage Areas



To provide electrical isolation between the logic level and the I/O area it is necessary to supply the station bus coupler and the digital input terminal described here via the bus coupler or a power terminal from separate power supply units. Interconnection of the power supply units in the 24 V area is not permitted (see also user manual).

## Common Potentials

The 24 V main voltage, 24 V segment voltage, and GND have the same potential. FE is a separate potential area.

## Separate Potentials in the System Consisting of Bus Terminal/Power Terminal and I/O Terminal

### Test Distance

5 V supply incoming remote bus/7.5 V supply (bus logic)

5 V supply outgoing remote bus/7.5 V supply (bus logic)

7.5 V supply (bus logic)/24 V supply (I/O)

24 V supply (I/O)/functional earth ground

### Test Voltage

500 V AC, 50 Hz, 1 min.

500 V AC, 50 Hz, 1 min.

500 V AC, 50 Hz, 1 min.

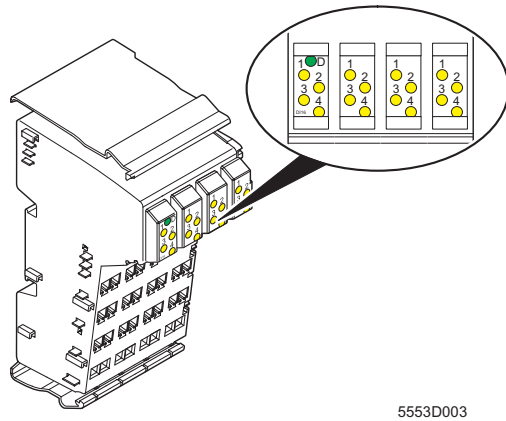
500 V AC, 50 Hz, 1 min.

## Approvals

For the latest approvals, please visit [www.download.phoenixcontact.com](http://www.download.phoenixcontact.com) or [eshop.phoenixcontact.com](http://eshop.phoenixcontact.com).

## Local Diagnostic and Status Indicators and Terminal Point Assignment

### Local Diagnostic and Status Indicators



5553D003

Figure 1 Local diagnostic and status indicators

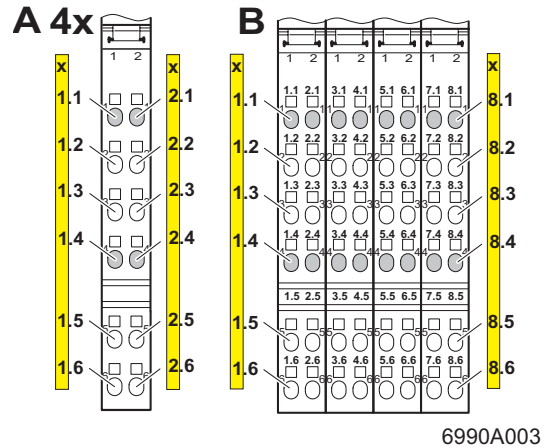
| Des.                      | Color  | Meaning                         |
|---------------------------|--------|---------------------------------|
| <b>D</b>                  | Green  | Diagnostics                     |
| <b>For Each Connector</b> |        |                                 |
| <b>1, 2, 3, 4</b>         | Yellow | Status indicators of the inputs |

### Function Identification

Light blue

2 Mbps: White stripe in the vicinity of the D LED

### Terminal Point Assignment for Each Connector



6990A003

Figure 2 Terminal point numbering:  
individual connectors (A) and connector  
sets (B)

- A** – Using the IB IL 24 DI 16-PAC/SN and IB IL 24 DI 16-2MBD-PAC/SN with the connectors provided
  - Using individual connectors (IB IL SCN-12 or IB IL SCN-12-ICP)
- B** – Using the IB IL 24 DI 16-PAC and IB IL 24 DI 16-2MBD-PAC with the original connector set
  - Using the IB IL 24 DI 16-PLSET/ICP or IB IL DI/DO 16-PLSET connector sets

| Terminal Point | Assignment   |
|----------------|--|
| <b>x.1</b>     | Signal input (IN)                                  |
| <b>x.2</b>     | Segment voltage $U_S$ for 2 and 3-wire termination |
| <b>x.3</b>     | Ground contact (GND) for 3-wire termination        |
| <b>x.4</b>     | Signal input (IN)                                  |
| <b>x.5</b>     | Segment voltage $U_S$ for 2 and 3-wire termination |
| <b>x.6</b>     | Ground contact (GND) for 3-wire termination        |

## PHOENIX CONTACT 6

## Internal Basic Circuit Diagram

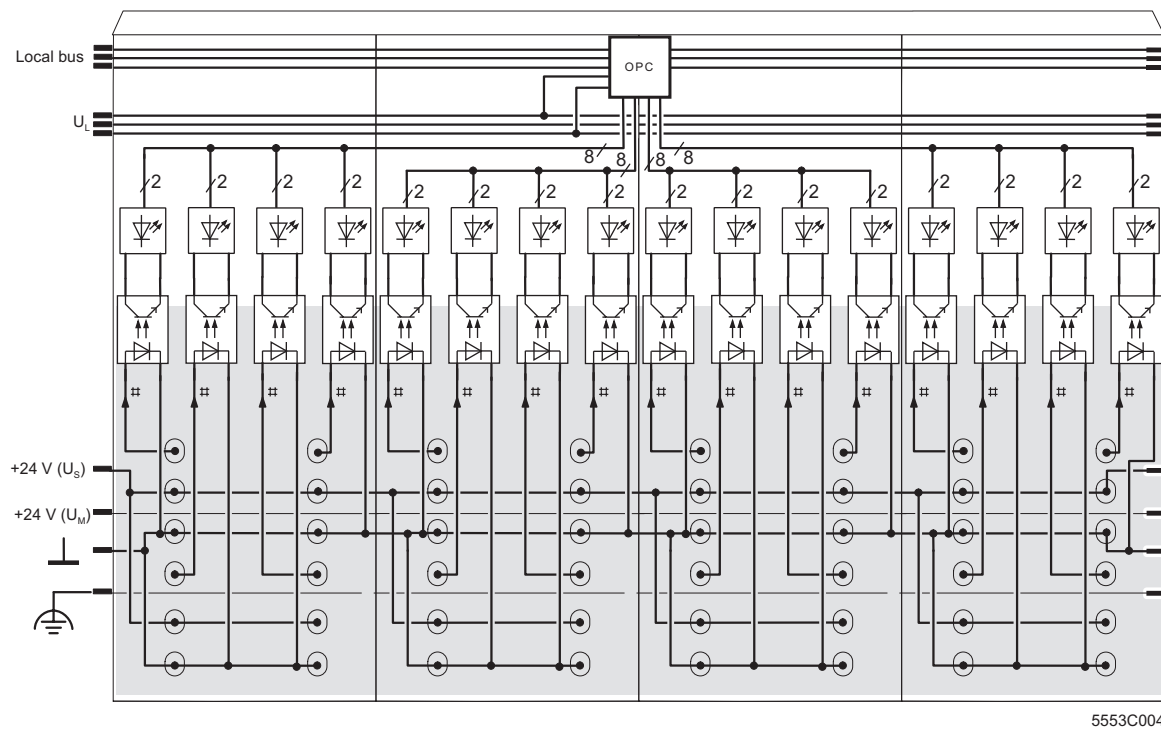
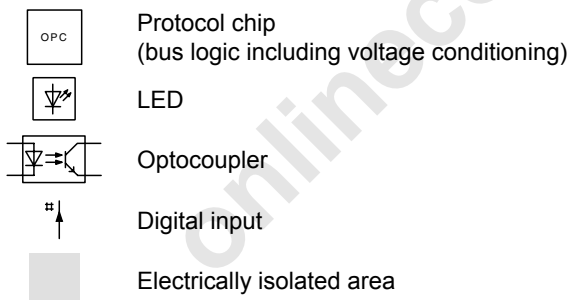


Figure 4 Internal wiring of the terminal points

Key:



Other symbols used are explained in the IL SYS INST UM E user manual or in the Inline system manual for your bus system.

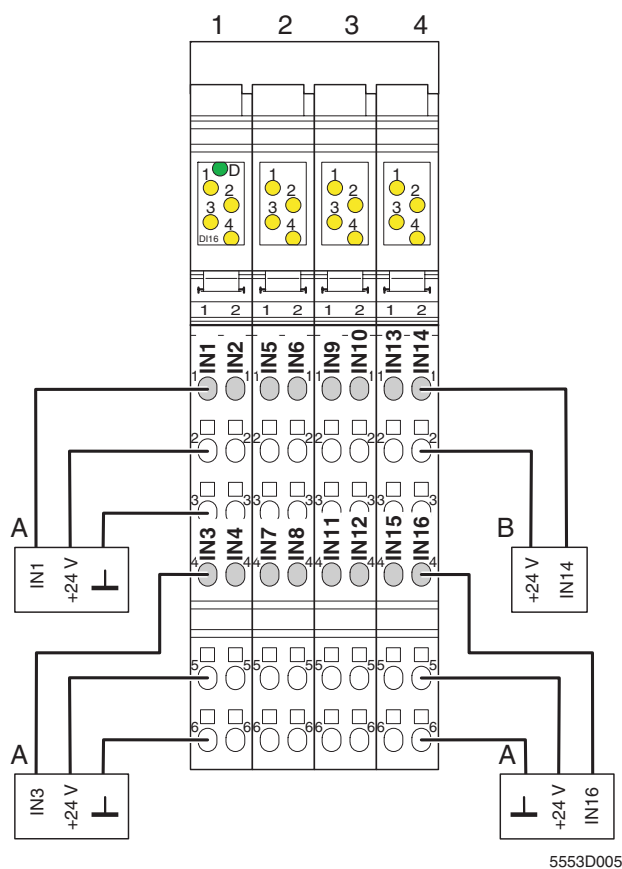
## Connection Notes and Connection Example



Please note that the terminal must be provided with supply voltage  $U_S$ , as it is used internally as the auxiliary supply.



When connecting the sensors observe the assignment of the terminal points to the process data (see page 9).



5553D005

Figure 5 Typical connection of sensors

A 3-wire termination

B 2-wire termination

The numbers above the module illustration indicate the connector slots.

## Programming Data/Configuration Data

### Local Bus (INTERBUS)

|                         |   |
|-------------------------|---|
| ID code                 | BE <sub>hex</sub> (190 <sub>dec</sub> ) |
| Length code             | 01 <sub>hex</sub>                       |
| Process data channel    | 16 bits                                 |
| Input address area      | 1 word                                  |
| Output address area     | 0 words                                 |
| Parameter channel (PCP) | 0 words                                 |
| Register length (bus)   | 1 word                                  |

### Other Bus Systems



For the programming data/configuration data of other bus systems, please refer to the corresponding electronic device data sheet (e.g., GSD, EDS).



## Process Data



For the assignment of the illustrated (byte.bit) view to your **INTERBUS** control or computer system, please refer to the DB GB IBS SYS ADDRESS data sheet.

For the assignment of the illustrated (byte.bit) view to control systems of **other bus systems**, please refer to the AH IB IL 24 DI/DO ADDRESS document.

### Assignment of the Terminal Points to the IN Process Data



The following table applies to the IB IL 24 DI 16-PAC and IB IL 24 DI 16-2MBD-PAC with the original connector set and when using the IB IL DI/DO 16-PLSET or IB IL DI 16-PLSET/ICP connector sets (see also Figure 2 on page 5, detail B).

|                   |                         |        |     |     |     |     |     |     |     |        |     |     |     |     |     |     |     |
|-------------------|-------------------------|--------|-----|-----|-----|-----|-----|-----|-----|--------|-----|-----|-----|-----|-----|-----|-----|
| (Word.bit) view   | Word                    | Word 0 |     |     |     |     |     |     |     |        |     |     |     |     |     |     |     |
|                   | Bit                     | 15     | 14  | 13  | 12  | 11  | 10  | 9   | 8   | 7      | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
| (Byte.bit) view   | Byte                    | Byte 0 |     |     |     |     |     |     |     | Byte 1 |     |     |     |     |     |     |     |
|                   | Bit                     | 7      | 6   | 5   | 4   | 3   | 2   | 1   | 0   | 7      | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
| Module            | Slot                    | 4      |     |     |     | 3   |     |     |     | 2      |     |     |     | 1   |     |     |     |
|                   | Terminal point (signal) | 8.4    | 7.4 | 8.1 | 7.1 | 6.4 | 5.4 | 6.1 | 5.1 | 4.4    | 3.4 | 4.1 | 3.1 | 2.4 | 1.4 | 2.1 | 1.1 |
|                   | Terminal point (+24 V)  | 8.5    | 7.5 | 8.2 | 7.2 | 6.5 | 5.5 | 6.2 | 5.2 | 4.5    | 3.5 | 4.2 | 3.2 | 2.5 | 1.5 | 2.2 | 1.2 |
|                   | Terminal point (GND)    | 8.6    | 7.6 | 8.3 | 7.3 | 6.6 | 5.6 | 6.3 | 5.3 | 4.6    | 3.6 | 4.3 | 3.3 | 2.6 | 1.6 | 2.3 | 1.3 |
| Status indication | Slot                    | 4      |     |     |     | 3   |     |     |     | 2      |     |     |     | 1   |     |     |     |
|                   | LED                     | 4      | 3   | 2   | 1   | 4   | 3   | 2   | 1   | 4      | 3   | 2   | 1   | 4   | 3   | 2   | 1   |



The following table applies to the IB IL 24 DI 16-PAC/SN and IB IL 24 DI 16-2MBD-PAC/SN with the original connector set and when using the B IL SCN-12 or IB IL SCN-12-ICP connectors (see also Figure 2 on page 5, detail A).

|                   |                         |        |     |     |     |     |     |     |     |        |     |     |     |     |     |     |     |
|-------------------|-------------------------|--------|-----|-----|-----|-----|-----|-----|-----|--------|-----|-----|-----|-----|-----|-----|-----|
| (Word.bit) view   | Word                    | Word 0 |     |     |     |     |     |     |     |        |     |     |     |     |     |     |     |
|                   | Bit                     | 15     | 14  | 13  | 12  | 11  | 10  | 9   | 8   | 7      | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
| (Byte.bit) view   | Byte                    | Byte 0 |     |     |     |     |     |     |     | Byte 1 |     |     |     |     |     |     |     |
|                   | Bit                     | 7      | 6   | 5   | 4   | 3   | 2   | 1   | 0   | 7      | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
| Module            | Slot                    | 4      |     |     |     | 3   |     |     |     | 2      |     |     |     | 1   |     |     |     |
|                   | Terminal point (signal) | 2.4    | 1.4 | 2.1 | 1.1 | 2.4 | 1.4 | 2.1 | 1.1 | 2.4    | 1.4 | 2.1 | 1.1 | 2.4 | 1.4 | 2.1 | 1.1 |
|                   | Terminal point (+24 V)  | 2.5    | 1.5 | 2.2 | 1.2 | 2.5 | 1.5 | 2.2 | 1.2 | 2.5    | 1.5 | 2.2 | 1.2 | 2.5 | 1.5 | 2.2 | 1.2 |
|                   | Terminal point (GND)    | 2.6    | 1.6 | 2.3 | 1.3 | 2.6 | 1.6 | 2.3 | 1.3 | 2.6    | 1.6 | 2.3 | 1.3 | 2.6 | 1.6 | 2.3 | 1.3 |
| Status indication | Slot                    | 4      |     |     |     | 3   |     |     |     | 2      |     |     |     | 1   |     |     |     |
|                   | LED                     | 4      | 3   | 2   | 1   | 4   | 3   | 2   | 1   | 4      | 3   | 2   | 1   | 4   | 3   | 2   | 1   |