

VIPA System SLIO

PS-CM || Manual

HB300 | PS-CM || en | 17-16

PS 007-1ABxx, CM 001-1BAxx



VIPA GmbH
Ohmstr. 4
91074 Herzogenaurach
Telephone: 09132-744-0
Fax: 09132-744-1864
Email: info@vipa.com
Internet: www.vipa.com

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1 General

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Tel.: +49 9132 744 -0

Fax.: +49 9132 744-1864

E-Mail: info@vipa.de

<http://www.vipa.com>



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EMail: documentation@vipa.de

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VIPA GmbH, Ohmstraße 4, 91074 Herzogenaurach, Germany
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1.2 About this manual

Target audience

The manual is targeted at users who have a background in automation technology.

Structure of the manual

The manual consists of chapters. Every chapter provides a self-contained description of a specific topic.

Guide to the document

The following guides are available in the manual:

- An overall table of contents at the beginning of the manual
- References with page numbers

Availability

The manual is available in:

- printed form, on paper
- in electronic form as PDF-file (Adobe Acrobat Reader)

Icons Headings

Important passages in the text are highlighted by following icons and headings:

**DANGER!**

Immediate or likely danger. Personal injury is possible.

**CAUTION!**

Damages to property is likely if these warnings are not heeded.



Supplementary information and useful tips.

1.2.1 Safety information

Applications conforming with specifications

The system is constructed and produced for:

- communication and process control
- general control and automation tasks
- industrial applications
- operation within the environmental conditions specified in the technical data
- installation into a cubicle



DANGER!

This device is not certified for applications in

- in explosive environments (EX-zone)

Documentation

The manual must be available to all personnel in the

- project design department
- installation department
- commissioning
- operation



CAUTION!

The following conditions must be met before using or commissioning the components described in this manual:

- Hardware modifications to the process control system should only be carried out when the system has been disconnected from power!
- Installation and hardware modifications only by properly trained personnel.
- The national rules and regulations of the respective country must be satisfied (installation, safety, EMC ...)

Disposal

National rules and regulations apply to the disposal of the unit!

2 Basics and mounting

2.1 Safety information for users

Handling of electrostatic sensitive modules

VIPA modules make use of highly integrated components in MOS-Technology. These components are extremely sensitive to over-voltages that can occur during electrostatic discharges. The following symbol is attached to modules that can be destroyed by electrostatic discharges.



The Symbol is located on the module, the module rack or on packing material and it indicates the presence of electrostatic sensitive equipment. It is possible that electrostatic sensitive equipment is destroyed by energies and voltages that are far less than the human threshold of perception. These voltages can occur where persons do not discharge themselves before handling electrostatic sensitive modules and they can damage components thereby, causing the module to become inoperable or unusable. Modules that have been damaged by electrostatic discharges can fail after a temperature change, mechanical shock or changes in the electrical load. Only the consequent implementation of protection devices and meticulous attention to the applicable rules and regulations for handling the respective equipment can prevent failures of electrostatic sensitive modules.

Shipping of modules

Modules must be shipped in the original packing material.

Measurements and alterations on electrostatic sensitive modules

When you are conducting measurements on electrostatic sensitive modules you should take the following precautions:

- Floating instruments must be discharged before use.
- Instruments must be grounded.

Modifying electrostatic sensitive modules you should only use soldering irons with grounded tips.



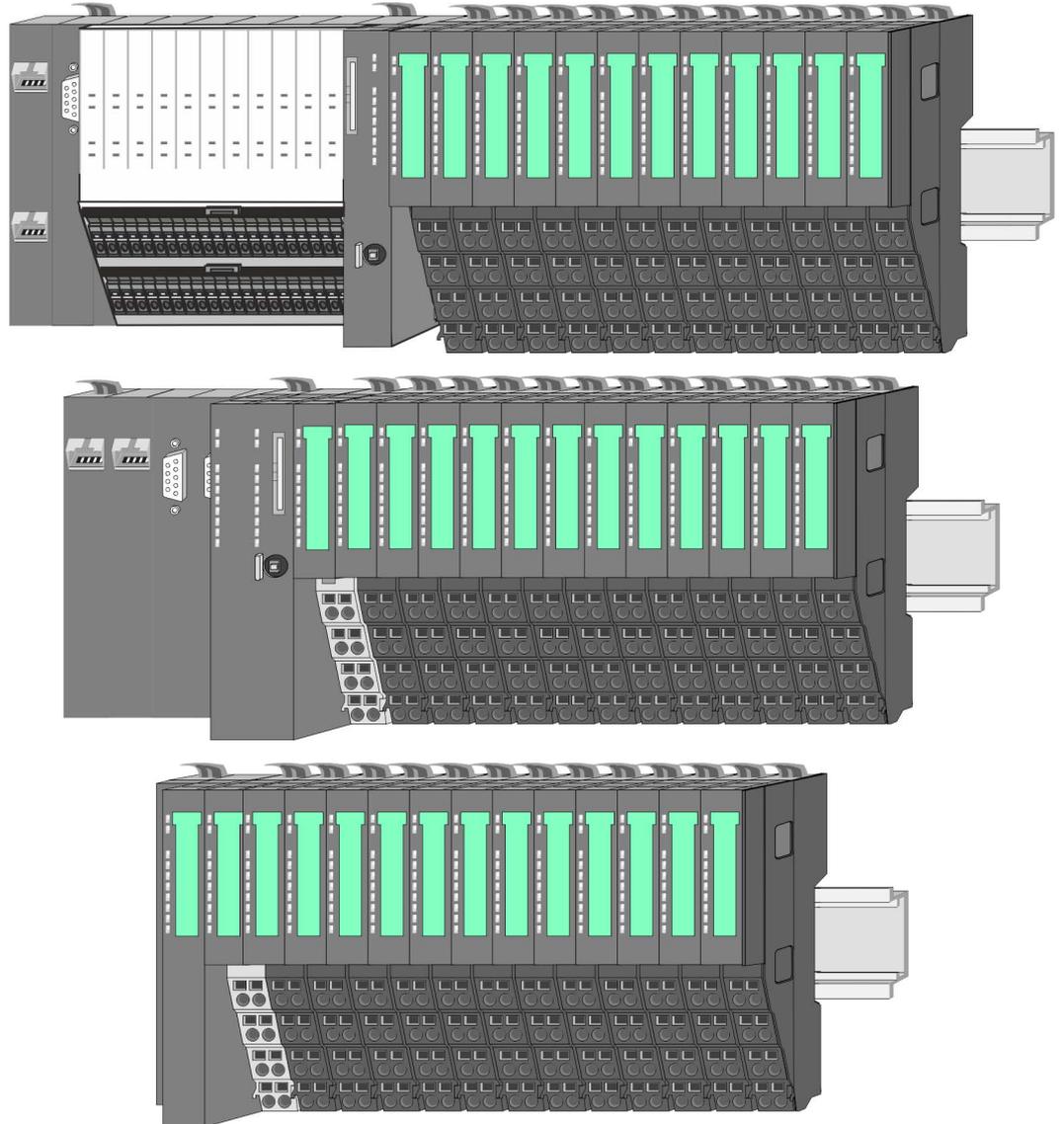
CAUTION!

Personnel and instruments should be grounded when working on electrostatic sensitive modules.

2.2 System conception

2.2.1 Overview

System SLIO is a modular automation system for assembly on a 35mm mounting rail. By means of the peripheral modules with 2, 4 or 8 channels this system may properly be adapted matching to your automation tasks. The wiring complexity is low, because the supply of the DC 24V power section is integrated to the backplane bus and defective modules may be replaced with standing wiring. By deployment of the power modules in contrasting colors within the system, further isolated areas may be defined for the DC 24V power section supply, respectively the electronic power supply may be extended with 2A.



2.2.2 Components

- CPU (head module)
- Bus coupler (head module)
- Line extension
- Periphery modules
- Accessories



CAUTION!

Only modules of VIPA may be combined. A mixed operation with third-party modules is not allowed!

CPU 01xC



With this CPU 01xC, the CPU electronic, input/output components and power supply are integrated to one casing. In addition, up to 64 periphery modules of the System SLIO can be connected to the backplane bus. As head module via the integrated power supply CPU electronic and the I/O components are power supplied as well as the electronic of the connected periphery modules. To connect the power supply of the I/O components and for DC 24V power supply of via backplane bus connected peripheral modules, the CPU has removable connectors. By installing of up to 64 periphery modules at the backplane bus, these are electrically connected, this means these are assigned to the backplane bus, the electronic modules are power supplied and each periphery module is connected to the DC 24V power section supply.

CPU 01x



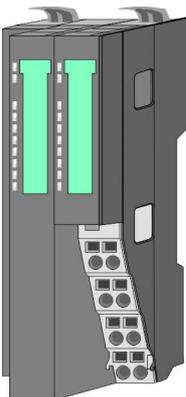
With this CPU 01x, the CPU electronic and power supply are integrated to one casing. As head module, via the integrated power module for power supply, CPU electronic and the electronic of the connected periphery modules are supplied. The DC 24 power section supply for the linked periphery modules is established via a further connection of the power module. By installing of up to 64 periphery modules at the backplane bus, these are electrically connected, this means these are assigned to the backplane bus, the electronic modules are power supplied and each periphery module is connected to the DC 24V power section supply.



CAUTION!

CPU part and power module may not be separated!
Here you may only exchange the electronic module!

Bus coupler



With a bus coupler bus interface and power module is integrated to one casing. With the bus interface you get access to a subordinated bus system. As head module, via the integrated power module for power supply, bus interface and the electronic of the connected periphery modules are supplied. The DC 24 power section supply for the linked periphery modules is established via a further connection of the power module. By installing of up to 64 periphery modules at the bus coupler, these are electrically connected, this means these are assigned to the backplane bus, the electronic modules are power supplied and each periphery module is connected to the DC 24V power section supply.

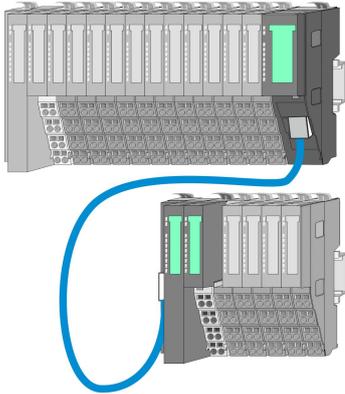


CAUTION!

Bus interface and power module may not be separated!

Here you may only exchange the electronic module!

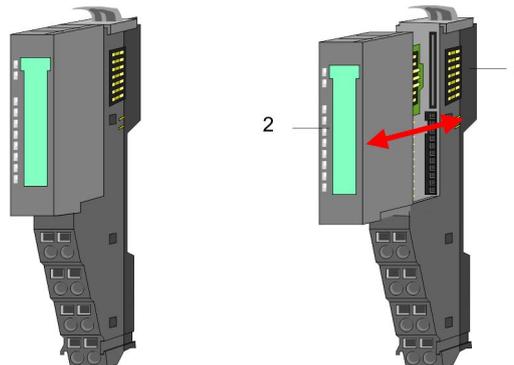
Line extension



In the System SLIO there is the possibility to place up to 64 modules in on line. By means of the line extension you can divide this line into several lines. Here you have to place a line extension master at each end of a line and the subsequent line has to start with a line extension slave. Master and slave are to be connected via a special connecting cable. In this way, you can divide a line on up to 5 lines. For each line extension the maximum number of pluggable modules at the System SLIO bus is decreased by 1. To use the line extension no special configuration is required.

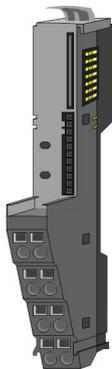
Periphery modules

Each periphery module consists of a *terminal* and an *electronic module*.

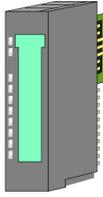


- 1 Terminal module
- 2 Electronic module

Terminal module



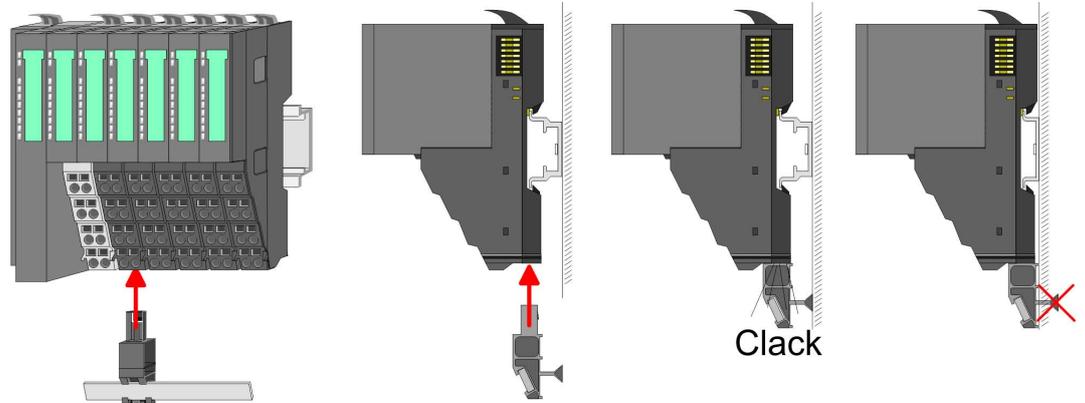
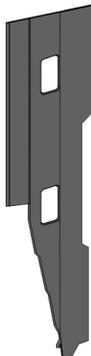
The *terminal* module serves to carry the electronic module, contains the backplane bus with power supply for the electronic, the DC 24V power section supply and the staircase-shaped terminal for wiring. Additionally the terminal module has a locking system for fixing at a mounting rail. By means of this locking system your SLIO system may be assembled outside of your switchgear cabinet to be later mounted there as whole system.

Electronic module

The functionality of a SLIO periphery module is defined by the *electronic* module, which is mounted to the terminal module by a sliding mechanism. With an error the defective module may be exchanged for a functional module with standing installation. At the front side there are LEDs for status indication. For simple wiring each module shows a corresponding connection diagram at the front and at the side.

2.2.3 Accessories**Shield bus carrier**

The shield bus carrier (order no.: 000-0AB00) serves to carry the shield bus (10mm x 3mm) to connect cable shields. Shield bus carriers, shield bus and shield fixings are not in the scope of delivery. They are only available as accessories. The shield bus carrier is mounted underneath the terminal of the terminal module. With a flat mounting rail for adaptation to a flat mounting rail you may remove the spacer of the shield bus carrier.

**Bus cover**

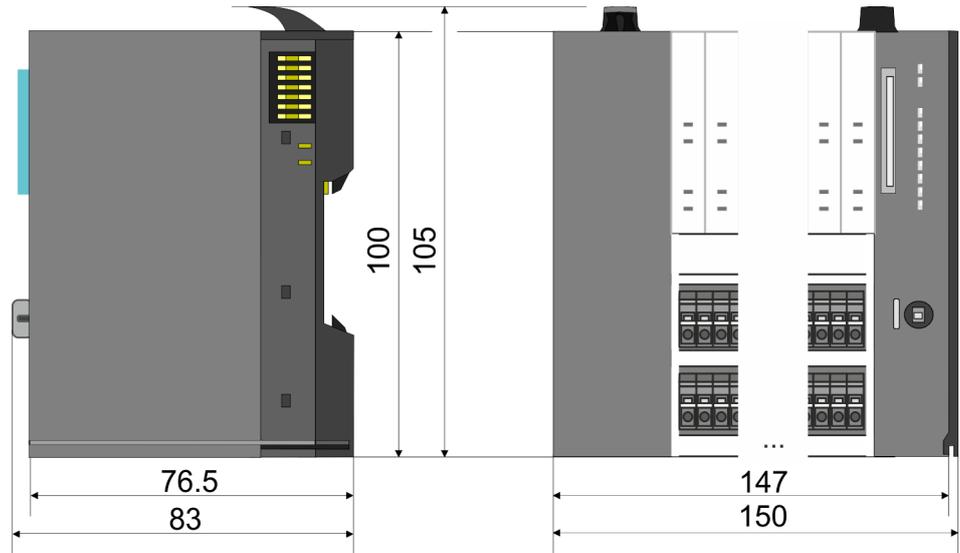
With each head module, to protect the backplane bus connectors, there is a mounted bus cover in the scope of delivery. You have to remove the bus cover of the head module before mounting a System SLIO module. For the protection of the backplane bus connector you always have to mount the bus cover at the last module of your system again. The bus cover has the order no. 000-0AA00.

Coding pins

There is the possibility to fix the assignment of electronic and terminal module. Here coding pins (order number 000-0AC00) from VIPA can be used. The coding pin consists of a coding jack and a coding plug. By combining electronic and terminal module with coding pin, the coding jack remains in the electronic module and the coding plug in the terminal module. This ensures that after replacing the electronics module just another electronic module can be plugged with the same encoding.

2.3 Dimensions

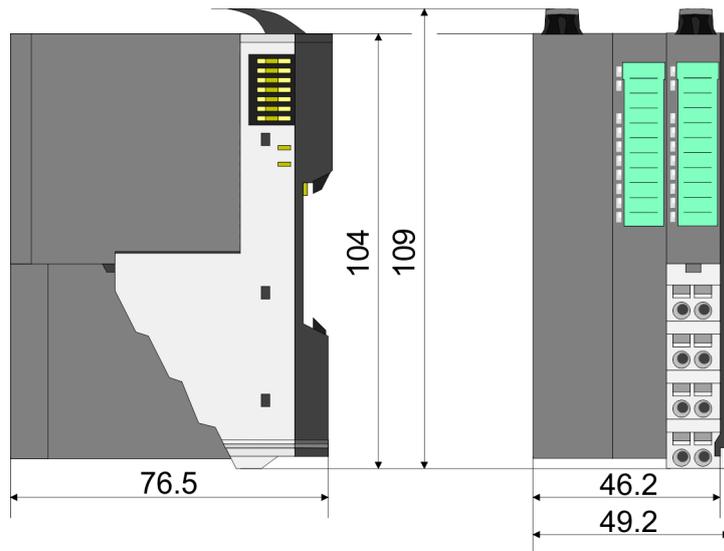
Dimensions CPU 01xC



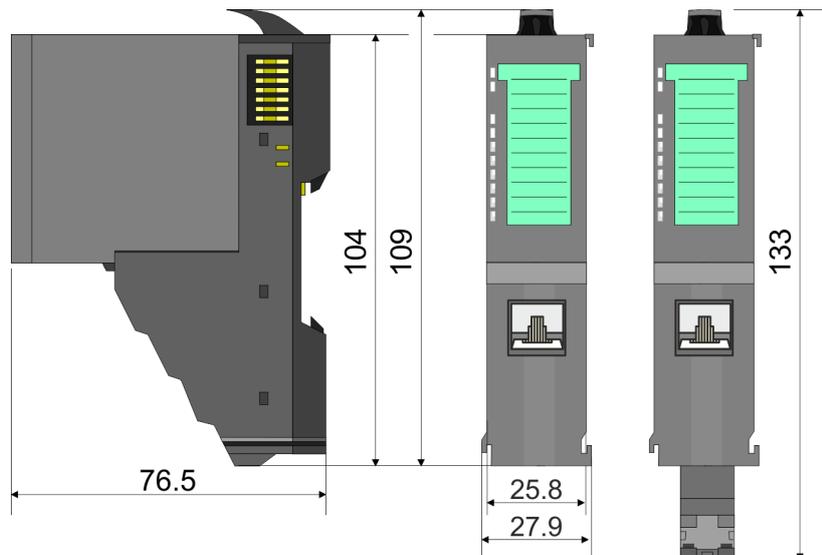
Dimensions CPU 01x



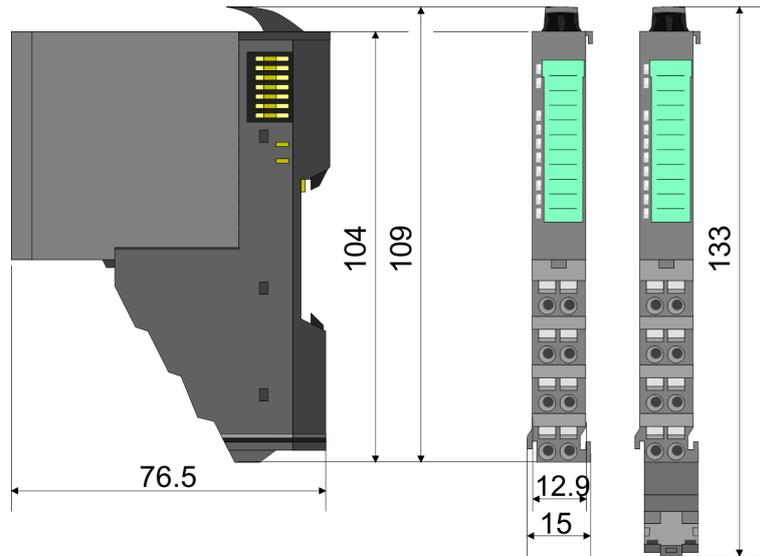
Dimensions bus coupler and line extension slave



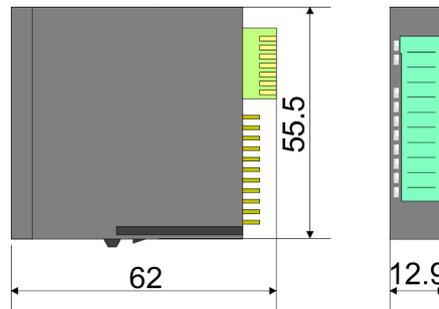
Dimensions line extension master



Dimension periphery module



Dimensions electronic module



Dimensions in mm

2.4 Mounting

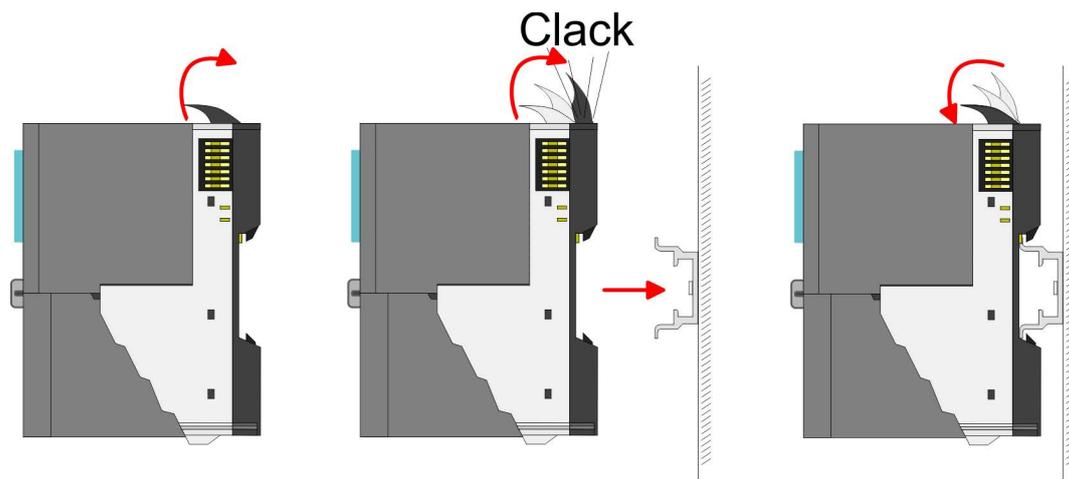


Requirements for UL compliance use

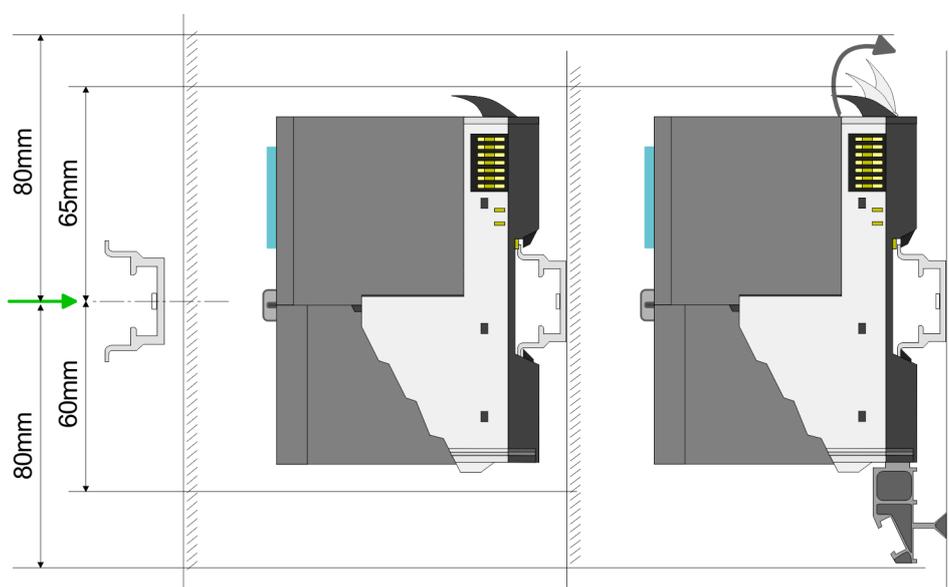
- Use for power supply exclusively SELV/PELV power supplies.
- The System SLIO must be installed and operated in a housing according to IEC 61010-1 9.3.2 c).

2.4.1 Mounting CPU 01x

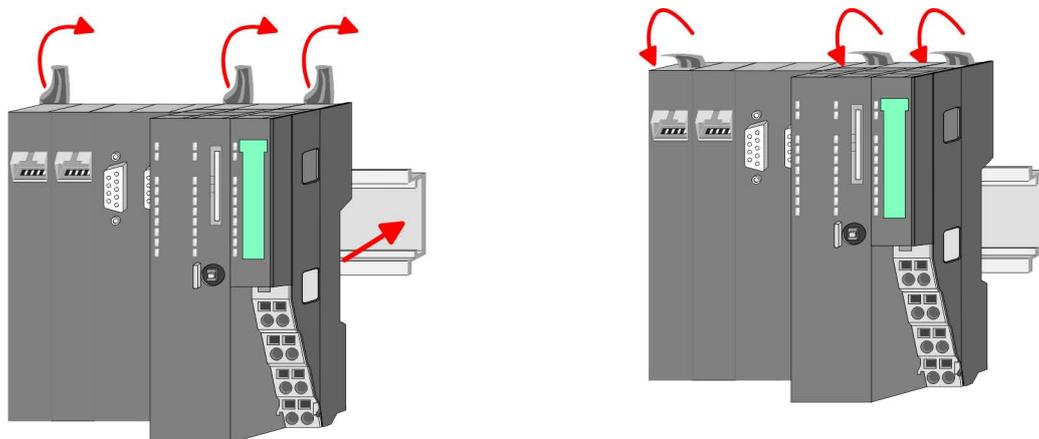
There are locking lever at the top side of the CPU. For mounting and demounting these locking lever are to be turned upwards until these engage. Place the CPU at the mounting rail. The CPU is fixed to the mounting rail by pushing downward the locking levers. The CPU is directly mounted at a mounting rail. Up to 64 modules may be mounted. The electronic and power section supply are connected via the backplane bus. Please consider here that the sum current of the electronic power supply does not exceed the maximum value of 3A. By means of the power module 007-1AB10 the current of the electronic power supply may be expanded accordingly.



Proceeding

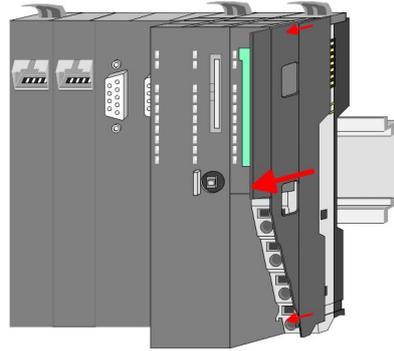


1. Mount the mounting rail! Please consider that a clearance from the middle of the mounting rail of at least 80mm above and 60mm below, respectively 80mm by deployment of shield bus carriers, exist.



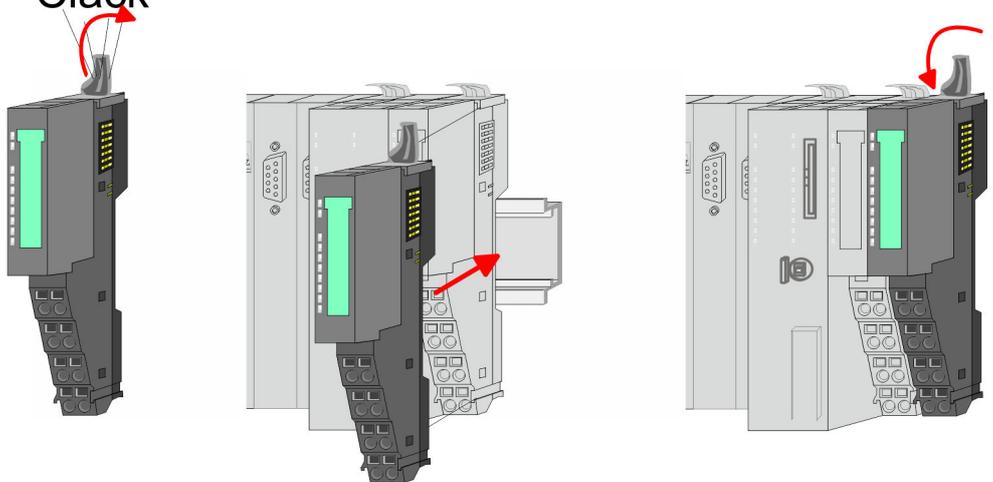
2. Turn the locking lever upwards, place the CPU at the mounting rail and turn the lever downward.

Mounting periphery modules

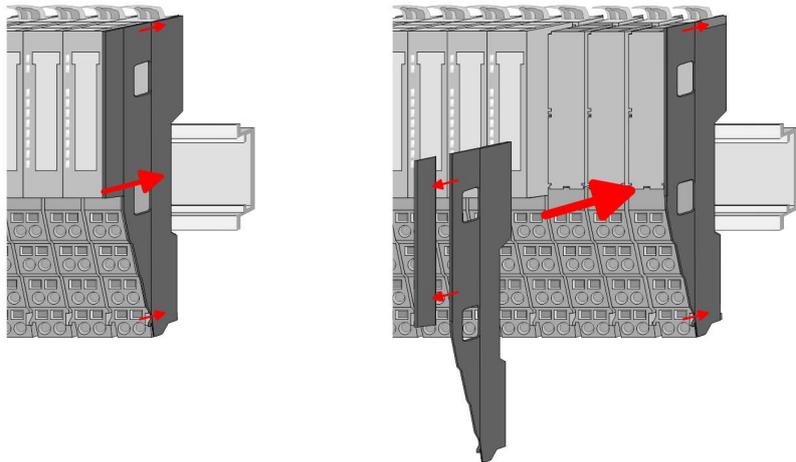


1. Before mounting the periphery modules you have to remove the bus cover at the right side of the CPU by pulling it forward. Keep the cover for later mounting.

Clack



2. Mount the periphery modules you want.



3. After mounting the whole system, to protect the backplane bus connectors at the last module you have to mount the bus cover, now. If the last module is a clamp module, for adaptation the upper part of the bus cover is to be removed.

2.5 Wiring



CAUTION!

Consider temperature for external cables!

Cables may experience temperature increase due to system heat dissipation. Thus the cabling specification must be chosen 5°C above ambient temperature!



CAUTION!

Separate insulation areas!

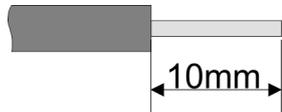
The system is specified for SELV/PELV environment. Devices, which are attached to the system must meet these specifications. Installation and cable routing other than SELV/PELV specification must be separated from the system's equipment!

2.5.1 Wiring CPU 01x

Terminal module terminals

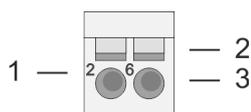
The System SLIO CPUs have a power module integrated. Terminals with spring clamp technology are used for wiring. The spring clamp technology allows quick and easy connection of your signal and supply lines.

Data

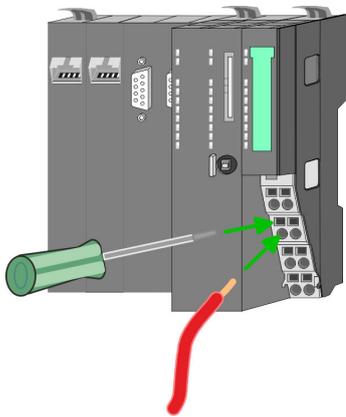
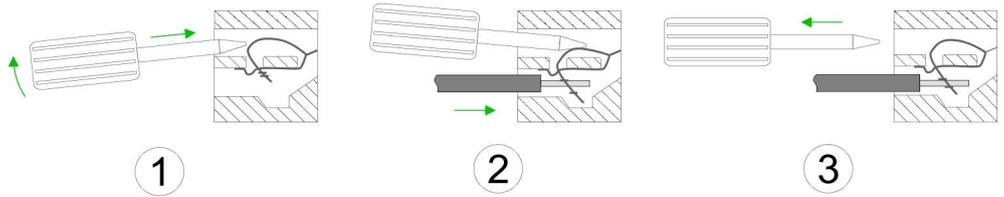


U_{max}	240V AC / 30V DC
I_{max}	10A
Cross section	0.08 ... 1.5mm ² (AWG 28 ... 16)
Stripping length	10mm

Wiring procedure

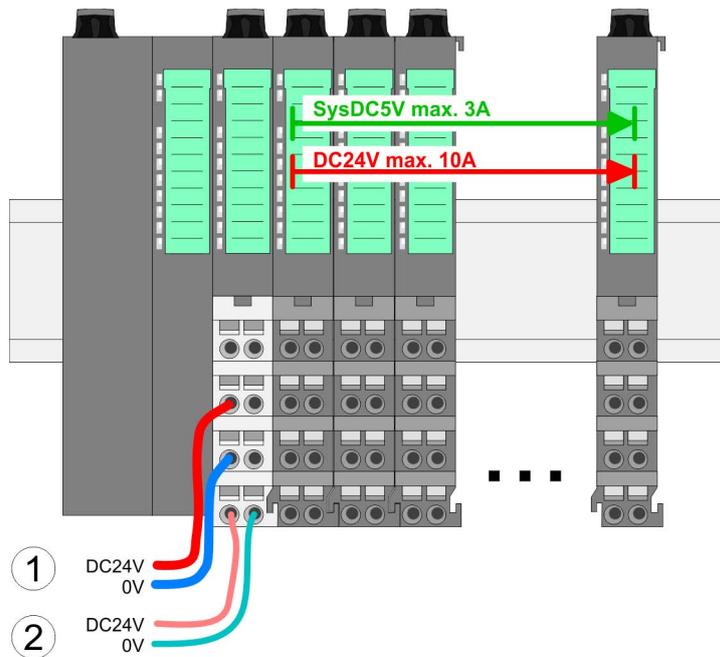


- 1 Pin number at the terminal module
- 2 Opening for screwdriver
- 3 Connection hole for wire



Standard wiring

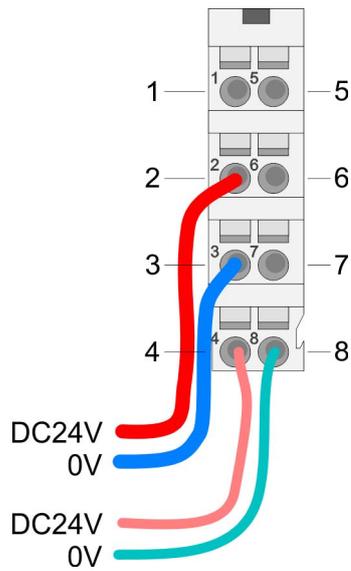
1. ➤ Insert a suited screwdriver at an angle into the square opening as shown. Press and hold the screwdriver in the opposite direction to open the contact spring.
2. ➤ Insert the stripped end of wire into the round opening. You can connect wires with a cross section of 0.08mm² up to 1.5mm².
3. ➤ By removing the screwdriver, the wire is securely fixed via the spring contact to the terminal.



- (1) DC 24V for power section supply I/O area (max. 10A)
- (2) DC 24V for electronic power supply bus coupler and I/O area

PM - Power module

For wires with a core cross-section of 0.08mm² up to 1.5mm².



Pos.	Function	Type	Description
1	---	---	not connected
2	DC 24V	I	DC 24V for power section supply
3	0V	I	GND for power section supply
4	Sys DC 24V	I	DC 24V for electronic section supply
5	---	---	not connected
6	DC 24V	I	DC 24V for power section supply
7	0V	I	GND for power section supply
8	Sys 0V	I	GND for electronic section supply

I: Input



CAUTION!

Since the power section supply is not internally protected, it is to be externally protected with a fuse, which corresponds to the maximum current. This means max. 10A is to be protected by a 10A fuse (fast) respectively by a line circuit breaker 10A characteristics Z!



The electronic power section supply is internally protected against higher voltage by fuse. The fuse is within the power module. If the fuse releases, its electronic module must be exchanged!

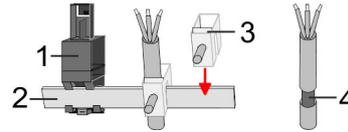
Fusing

- The power section supply is to be externally protected with a fuse, which corresponds to the maximum current. This means max. 10A is to be protected with a 10A fuse (fast) respectively by a line circuit breaker 10A characteristics Z!
- It is recommended to externally protect the electronic power supply for bus coupler and I/O area with a 2A fuse (fast) respectively by a line circuit breaker 2A characteristics Z.
- The electronic power supply for the I/O area of the power module 007-1AB10 should also be externally protected with a 1A fuse (fast) respectively by a line circuit breaker 1A characteristics Z.

State of the electronic power supply via LEDs

After PowerON of the System SLIO the LEDs RUN respectively MF get on so far as the sum current does not exceed 3A. With a sum current greater than 3A the LEDs may not be activated. Here the power module with the order number 007-1AB10 is to be placed between the peripheral modules.

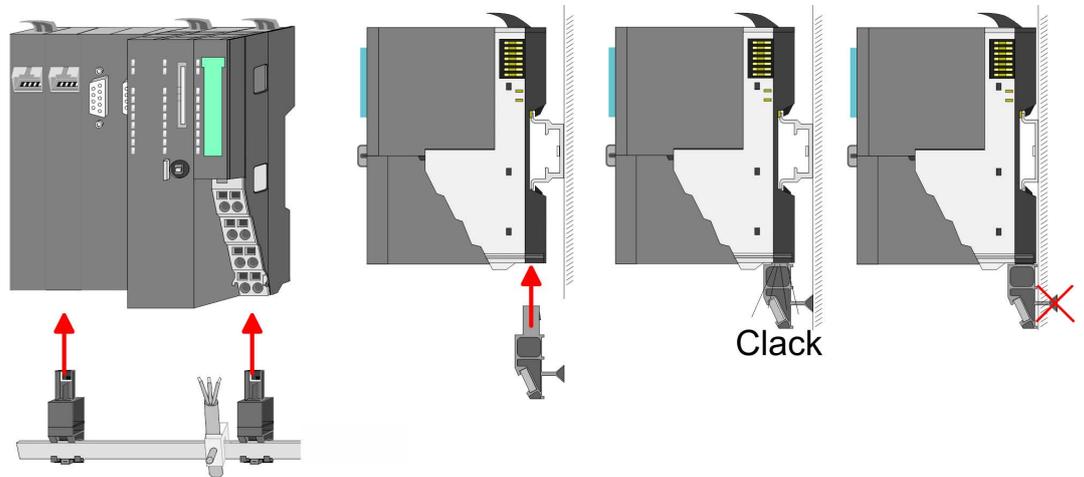
Shield attachment



- 1 Shield bus carrier
- 2 Shield bus (10mm x 3mm)
- 3 Shield clamp
- 4 Cable shield

To attach the shield the mounting of shield bus carriers are necessary. The shield bus carrier (available as accessory) serves to carry the shield bus to connect cable shields.

1. Each System SLIO module has a carrier hole for the shield bus carrier. Push the shield bus carrier, until they engage into the module. With a flat mounting rail for adaptation to a flat mounting rail you may remove the spacer of the shield bus carrier.
2. Put your shield bus into the shield bus carrier.



3. Attach the cables with the accordingly stripped cable screen and fix it by the shield clamp with the shield bus.

2.5.2 Wiring periphery modules

Terminal module terminals



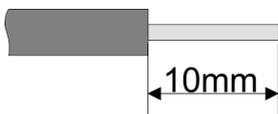
CAUTION!

Do not connect hazardous voltages!

If this is not explicitly stated in the corresponding module description, hazardous voltages are not allowed to be connected to the corresponding terminal module!

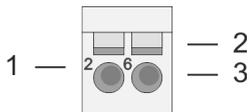
With wiring the terminal modules, terminals with spring clamp technology are used for wiring. The spring clamp technology allows quick and easy connection of your signal and supply lines. In contrast to screw terminal connections this type of connection is vibration proof.

Data

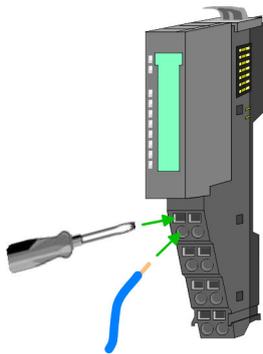
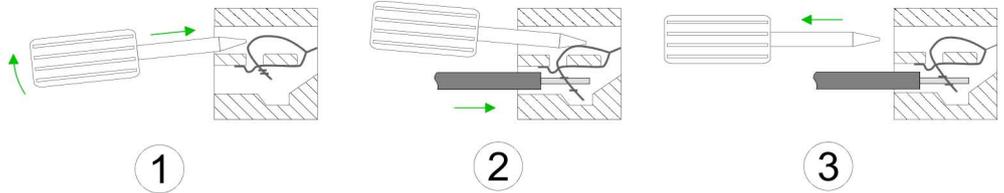


U_{max}	240V AC / 30V DC
I_{max}	10A
Cross section	0.08 ... 1.5mm ² (AWG 28 ... 16)
Stripping length	10mm

Wiring procedure

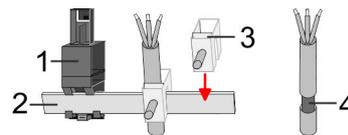


- 1 Pin number at the connector
- 2 Opening for screwdriver
- 3 Connection hole for wire



- 1. Insert a suited screwdriver at an angle into the square opening as shown. Press and hold the screwdriver in the opposite direction to open the contact spring.
- 2. Insert the stripped end of wire into the round opening. You can use wires with a cross section of 0.08mm² up to 1.5mm²
- 3. By removing the screwdriver, the wire is securely fixed via the spring contact to the terminal.

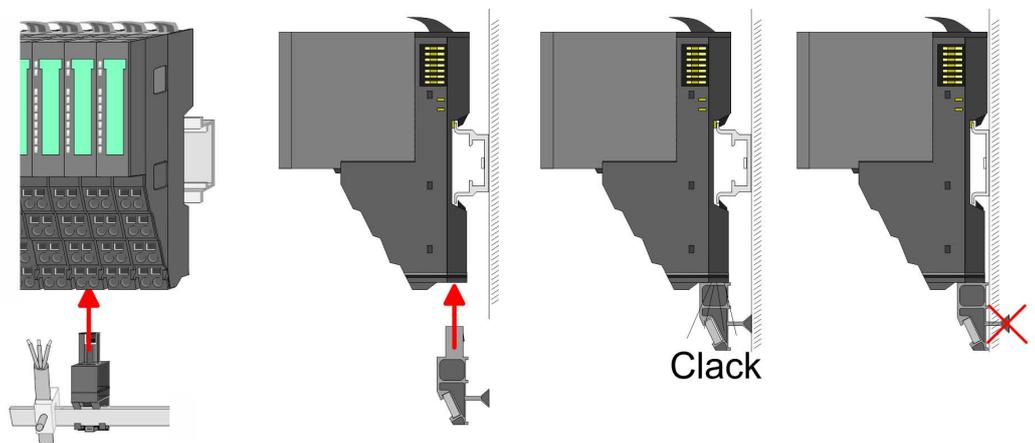
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- 3 Shield clamp
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- 1. Each System SLIO module has a carrier hole for the shield bus carrier. Push the shield bus carrier, until they engage into the module. With a flat mounting rail for adaptation to a flat mounting rail you may remove the spacer of the shield bus carrier.
- 2. Put your shield bus into the shield bus carrier.

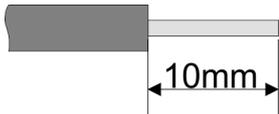


- 3. Attach the cables with the accordingly stripped cable screen and fix it by the shield clamp with the shield bus.

2.5.3 Wiring power modules

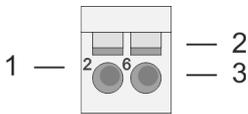
Terminal module terminals Power modules are either integrated to the head module or may be installed between the periphery modules. With power modules, terminals with spring clamp technology are used for wiring. The spring clamp technology allows quick and easy connection of your signal and supply lines. In contrast to screw terminal connections this type of connection is vibration proof.

Data

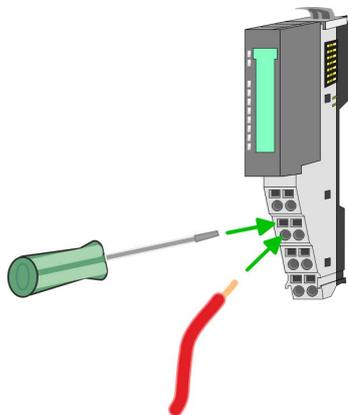
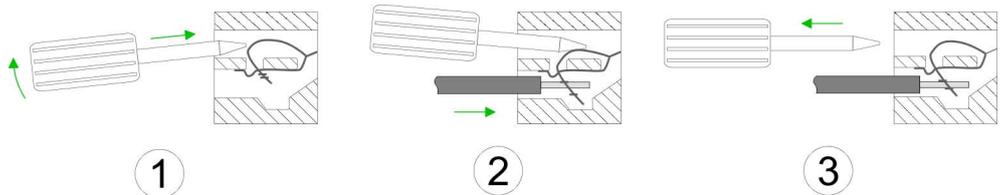


U_{max} 240V AC / 30V DC
 I_{max} 10A
 Cross section 0.08 ... 1.5mm² (AWG 28 ... 16)
 Stripping length 10mm

Wiring procedure

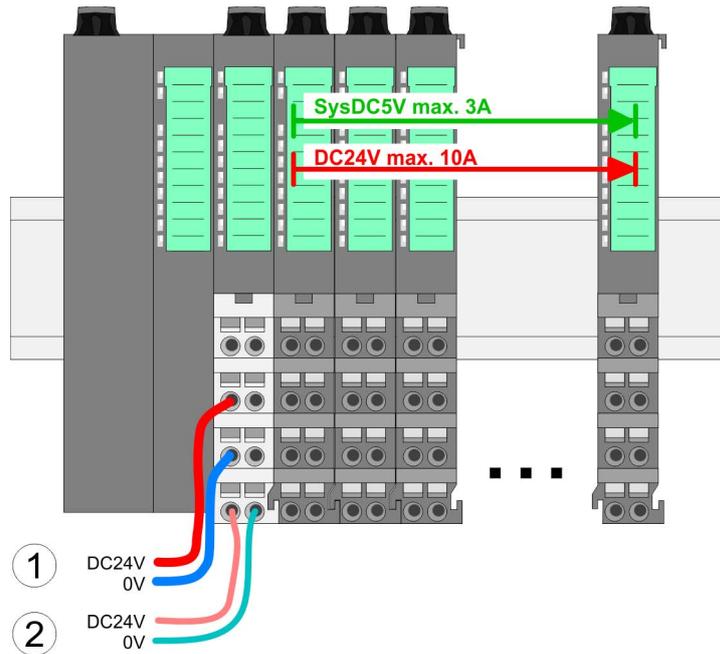


- 1 Pin number at the connector
- 2 Opening for screwdriver
- 3 Connection hole for wire



1. Insert a suited screwdriver at an angle into the square opening as shown. Press and hold the screwdriver in the opposite direction to open the contact spring.
2. Insert the stripped end of wire into the round opening. You can use wires with a cross section of 0.08mm² up to 1.5mm²
3. By removing the screwdriver, the wire is securely fixed via the spring contact to the terminal.

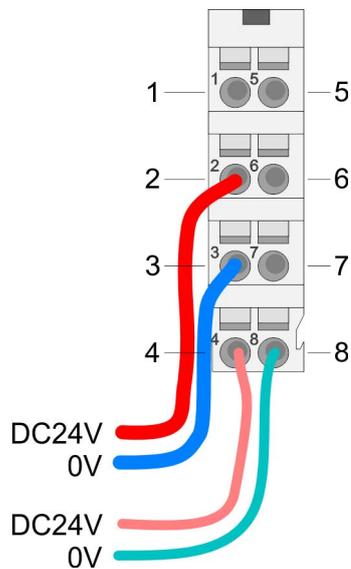
Standard wiring



- (1) DC 24V for power section supply I/O area (max. 10A)
- (2) DC 24V for electronic power supply bus coupler and I/O area

PM - Power module

For wires with a core cross-section of 0.08mm² up to 1.5mm².



Pos.	Function	Type	Description
1	---	---	not connected
2	DC 24V	I	DC 24V for power section supply
3	0V	I	GND for power section supply
4	Sys DC 24V	I	DC 24V for electronic section supply
5	---	---	not connected
6	DC 24V	I	DC 24V for power section supply
7	0V	I	GND for power section supply
8	Sys 0V	I	GND for electronic section supply

I: Input



CAUTION!

Since the power section supply is not internally protected, it is to be externally protected with a fuse, which corresponds to the maximum current. This means max. 10A is to be protected by a 10A fuse (fast) respectively by a line circuit breaker 10A characteristics Z!



The electronic power section supply is internally protected against higher voltage by fuse. The fuse is within the power module. If the fuse releases, its electronic module must be exchanged!

Fusing

- The power section supply is to be externally protected with a fuse, which corresponds to the maximum current. This means max. 10A is to be protected with a 10A fuse (fast) respectively by a line circuit breaker 10A characteristics Z!
- It is recommended to externally protect the electronic power supply for head modules and I/O area with a 2A fuse (fast) respectively by a line circuit breaker 2A characteristics Z.
- The electronic power supply for the I/O area of the power module 007-1AB10 should also be externally protected with a 1A fuse (fast) respectively by a line circuit breaker 1A characteristics Z.

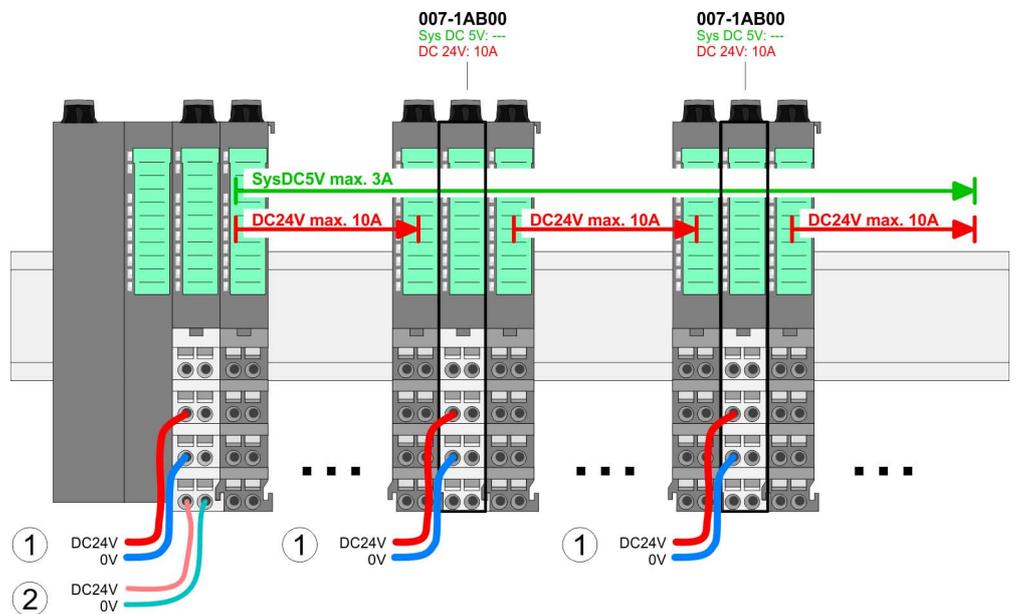
State of the electronic power supply via LEDs

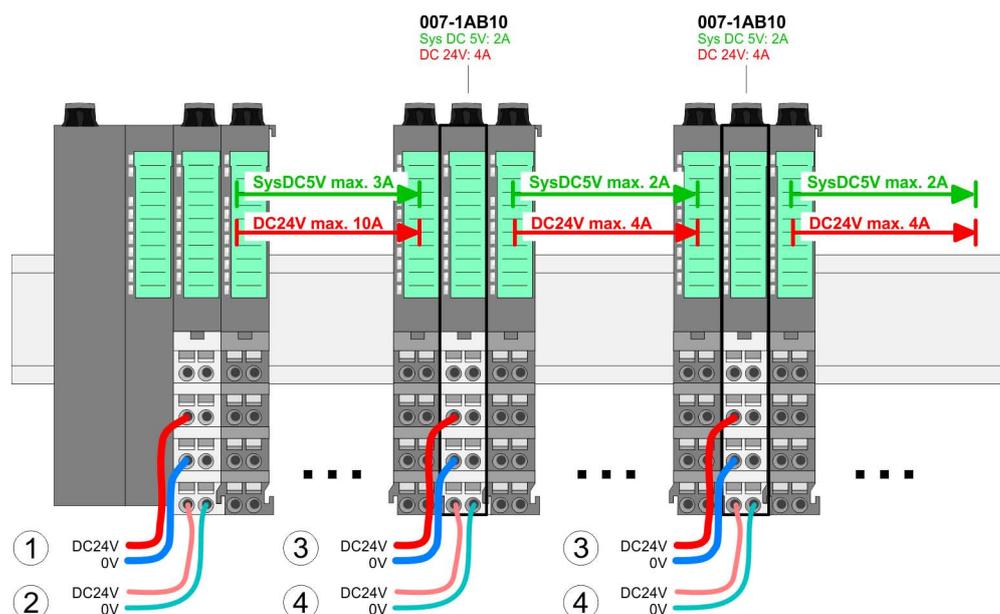
After PowerON of the System SLIO the LEDs RUN respectively MF get on so far as the sum current does not exceed 3A. With a sum current greater than 3A the LEDs may not be activated. Here the power module with the order number 007-1AB10 is to be placed between the peripheral modules.

Deployment of the power modules

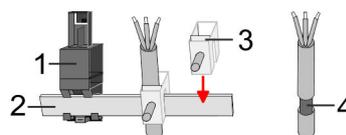
- If the 10A for the power section supply is no longer sufficient, you may use the power module from VIPA with the order number 007-1AB00. So you have also the possibility to define isolated groups.
- The power module with the order number 007-1AB10 is to be used if the 3A for the electronic power supply at the backplane bus is no longer sufficient. Additionally you get an isolated group for the DC 24V power section supply with max. 4A.
- By placing the power module 007-1AB10 at the following backplane bus modules may be placed with a sum current of max. 2A. Afterwards a power module is to be placed again. To secure the power supply, the power modules may be mixed used.

Power module 007-1AB00



Power module 007-1AB10

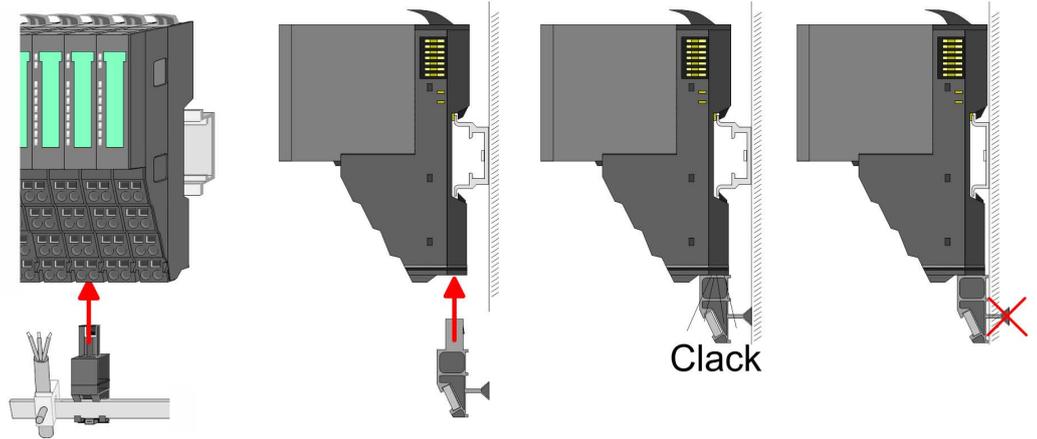
- (1) DC 24V for power section supply I/O area (max. 10A)
- (2) DC 24V for electronic power supply bus coupler and I/O area
- (3) DC 24V for power section supply I/O area (max. 4A)
- (4) DC 24V for electronic power supply I/O area

Shield attachment

- 1 Shield bus carrier
- 2 Shield bus (10mm x 3mm)
- 3 Shield clamp
- 4 Cable shield

To attach the shield the mounting of shield bus carriers are necessary. The shield bus carrier (available as accessory) serves to carry the shield bus to connect cable shields.

1. ➤ Each System SLIO module has a carrier hole for the shield bus carrier. Push the shield bus carrier, until they engage into the module. With a flat mounting rail for adaptation to a flat mounting rail you may remove the spacer of the shield bus carrier.
2. ➤ Put your shield bus into the shield bus carrier.



3. Attach the cables with the accordingly stripped cable screen and fix it by the shield clamp with the shield bus.

2.6 Demounting

2.6.1 Demounting CPU 01x

Proceeding



CAUTION!

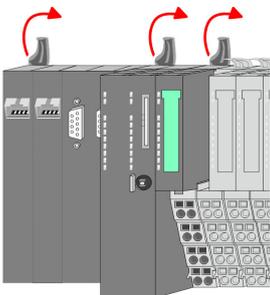
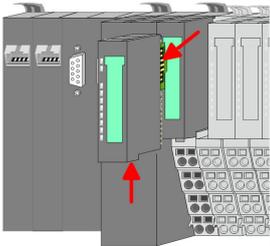
CPU part and power module may not be separated! Here you may only exchange the electronic module!

1. Power-off your system.
2. Remove if exists the wiring of the CPU.
- 3.

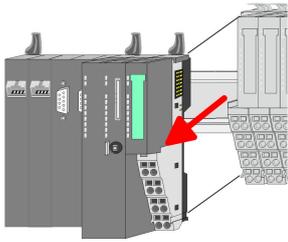


For demounting and exchange of a (head) module or a group of modules, due to mounting reasons you always have to remove the electronic module right beside. After mounting it may be plugged again.

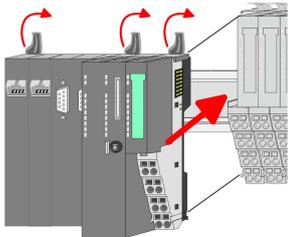
Press the unlocking lever at the lower side of the just mounted right module near the CPU and pull it forward.



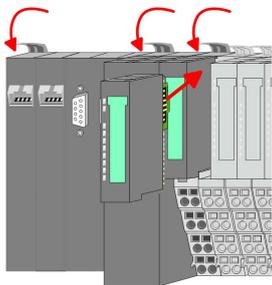
4. Turn all the locking lever of the CPU to be exchanged upwards.



5. ➤ Pull the CPU forward.
6. ➤ For mounting turn all the locking lever of the CPU to be mounted upwards.



7. ➤ To mount the CPU put it to the left periphery module and push it, guided by the stripes, to the mounting rail.
8. ➤ Turn all the locking lever downward, again.



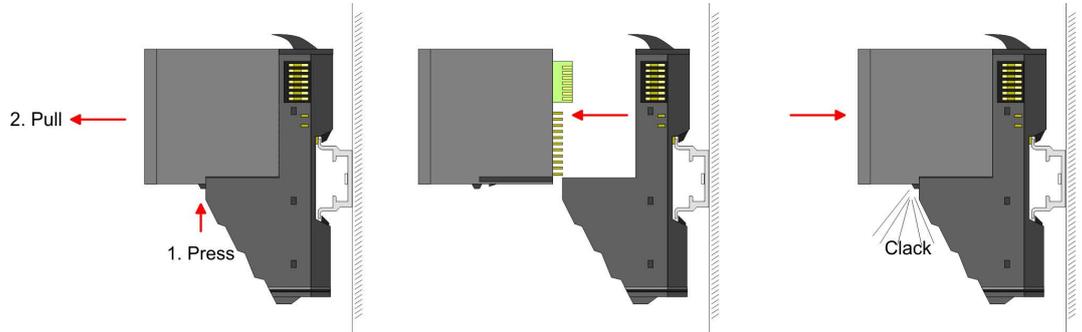
9. ➤ Plug again the electronic module, which you have removed before. For installation plug the electronic module guided by the strips at the lower side until this engages to the terminal module.
10. ➤ Wire your CPU.
 - ⇒ Now you can bring your system back into operation.

2.6.2 Demounting periphery modules

Proceeding

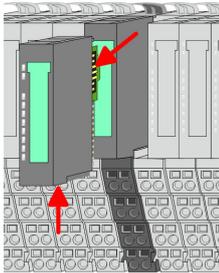
Exchange of an electronic module

1. Power-off your system.



2. For the exchange of a electronic module, the electronic module may be pulled forward after pressing the unlocking lever at the lower side of the module.
3. For installation plug the new electronic module guided by the strips at the lower side until this engages to the terminal module.
 - ⇒ Now you can bring your system back into operation.

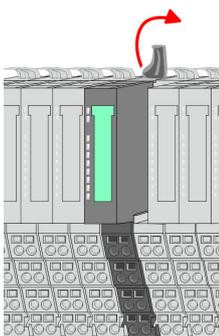
Exchange of a periphery module



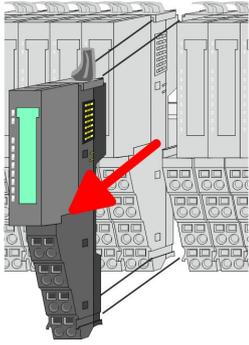
1. Power-off your system.
2. Remove if exists the wiring of the module.
- 3.

i For demounting and exchange of a (head) module or a group of modules, due to mounting reasons you always have to remove the electronic module right beside. After mounting it may be plugged again.

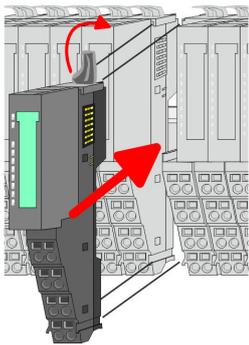
Press the unlocking lever at the lower side of the just mounted right module and pull it forward.



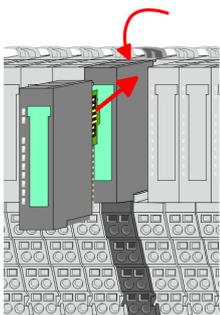
4. Turn the locking lever of the module to be exchanged upwards.



5. Pull the module.
6. For mounting turn the locking lever of the module to be mounted upwards.

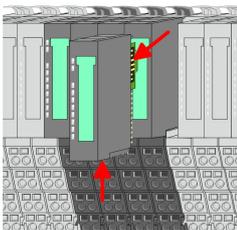


7. To mount the module put it to the gap between the both modules and push it, guided by the stripes at both sides, to the mounting rail.
8. Turn the locking lever downward, again.



9. Plug again the electronic module, which you have removed before.
10. Wire your module.
⇒ Now you can bring your system back into operation.

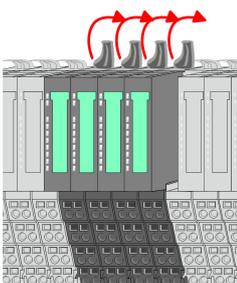
Exchange of a module group



1. Power-off your system.
2. Remove if exists the wiring of the module group.
- 3.

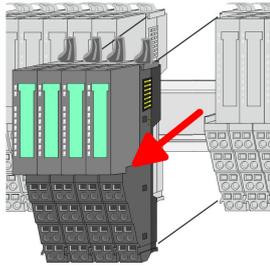
i For demounting and exchange of a (head) module or a group of modules, due to mounting reasons you always have to remove the electronic module right beside. After mounting it may be plugged again.

Press the unlocking lever at the lower side of the just mounted right module near the module group and pull it forward.

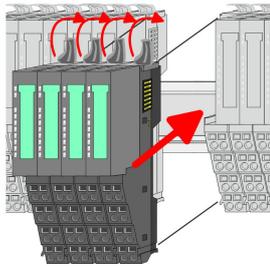


4. Turn all the locking lever of the module group to be exchanged upwards.

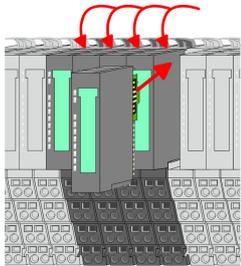
Trouble shooting - LEDs



5. ➤ Pull the module group forward.
6. ➤ For mounting turn all the locking lever of the module group to be mounted upwards.



7. ➤ To mount the module group put it to the gap between the both modules and push it, guided by the stripes at both sides, to the mounting rail.
8. ➤ Turn all the locking lever downward, again.



9. ➤ Plug again the electronic module, which you have removed before.
10. ➤ Wire your module group.
 - ⇒ Now you can bring your system back into operation.

2.7 Trouble shooting - LEDs

General

Each module has the LEDs RUN and MF on its front side. Errors or incorrect modules may be located by means of these LEDs.

In the following illustrations flashing LEDs are marked by ☼.

Sum current of the electronic power supply exceeded

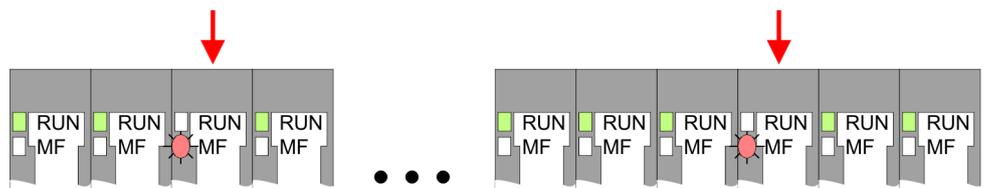


Behaviour: After PowerON the RUN LED of each module is off and the MF LED of each module is sporadically on.

Reason: The maximum current for the electronic power supply is exceeded.

Remedy: As soon as the sum current of the electronic power supply is exceeded, always place the power module 007-1AB10. ↪ Chapter 2.5.3 'Wiring power modules' on page 22

Error in configuration

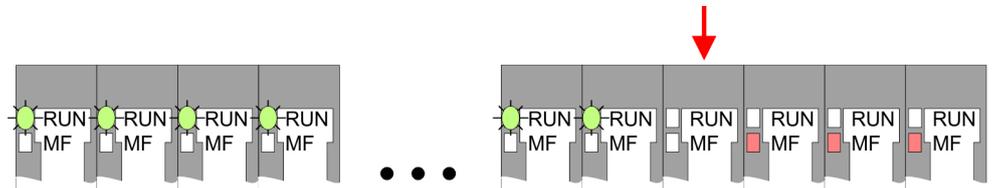


Behaviour: After PowerON the MF LED of one module respectively more modules flashes. The RUN LED remains off.

Reason: At this position a module is placed, which does not correspond to the configured module.

Remedy: Match configuration and hardware structure.

Module failure



Behaviour: After PowerON all of the RUN LEDs up to the defective module are flashing. With all following modules the MF LED is on and the RUN LED is off.

Reason: The module on the right of the flashing modules is defective.

Remedy: Replace the defective module.

2.8 Installation guidelines

General	<p>The installation guidelines contain information about the interference free deployment of a PLC system. There is the description of the ways, interference may occur in your PLC, how you can make sure the electromagnetic compatibility (EMC), and how you manage the isolation.</p>
What does EMC mean?	<p>Electromagnetic compatibility (EMC) means the ability of an electrical device, to function error free in an electromagnetic environment without being interfered respectively without interfering the environment.</p> <p>The components of VIPA are developed for the deployment in industrial environments and meets high demands on the EMC. Nevertheless you should project an EMC planning before installing the components and take conceivable interference causes into account.</p>
Possible interference causes	<p>Electromagnetic interferences may interfere your control via different ways:</p> <ul style="list-style-type: none">■ Electromagnetic fields (RF coupling)■ Magnetic fields with power frequency■ Bus system■ Power supply■ Protected earth conductor <p>Depending on the spreading medium (lead bound or lead free) and the distance to the interference cause, interferences to your control occur by means of different coupling mechanisms.</p> <p>There are:</p> <ul style="list-style-type: none">■ galvanic coupling■ capacitive coupling■ inductive coupling■ radiant coupling
Basic rules for EMC	<p>In the most times it is enough to take care of some elementary rules to guarantee the EMC. Please regard the following basic rules when installing your PLC.</p> <ul style="list-style-type: none">■ Take care of a correct area-wide grounding of the inactive metal parts when installing your components.<ul style="list-style-type: none">– Install a central connection between the ground and the protected earth conductor system.– Connect all inactive metal extensive and impedance-low.– Please try not to use aluminium parts. Aluminium is easily oxidizing and is therefore less suitable for grounding.■ When cabling, take care of the correct line routing.<ul style="list-style-type: none">– Organize your cabling in line groups (high voltage, current supply, signal and data lines).– Always lay your high voltage lines and signal respectively data lines in separate channels or bundles.– Route the signal and data lines as near as possible beside ground areas (e.g. suspension bars, metal rails, tin cabinet).

- Proof the correct fixing of the lead isolation.
 - Data lines must be laid isolated.
 - Analog lines must be laid isolated. When transmitting signals with small amplitudes the one sided laying of the isolation may be favourable.
 - Lay the line isolation extensively on an isolation/protected earth conductor rail directly after the cabinet entry and fix the isolation with cable clamps.
 - Make sure that the isolation/protected earth conductor rail is connected impedance-low with the cabinet.
 - Use metallic or metallised plug cases for isolated data lines.
- In special use cases you should appoint special EMC actions.
 - Consider to wire all inductivities with erase links.
 - Please consider luminescent lamps can influence signal lines.
- Create a homogeneous reference potential and ground all electrical operating supplies when possible.
 - Please take care for the targeted employment of the grounding actions. The grounding of the PLC serves for protection and functionality activity.
 - Connect installation parts and cabinets with your PLC in star topology with the isolation/protected earth conductor system. So you avoid ground loops.
 - If there are potential differences between installation parts and cabinets, lay sufficiently dimensioned potential compensation lines.

Isolation of conductors

Electrical, magnetically and electromagnetic interference fields are weakened by means of an isolation, one talks of absorption. Via the isolation rail, that is connected conductive with the rack, interference currents are shunt via cable isolation to the ground. Here you have to make sure, that the connection to the protected earth conductor is impedance-low, because otherwise the interference currents may appear as interference cause.

When isolating cables you have to regard the following:

- If possible, use only cables with isolation tangle.
- The hiding power of the isolation should be higher than 80%.
- Normally you should always lay the isolation of cables on both sides. Only by means of the both-sided connection of the isolation you achieve high quality interference suppression in the higher frequency area. Only as exception you may also lay the isolation one-sided. Then you only achieve the absorption of the lower frequencies. A one-sided isolation connection may be convenient, if:
 - the conduction of a potential compensating line is not possible.
 - analog signals (some mV respectively μA) are transferred.
 - foil isolations (static isolations) are used.
- With data lines always use metallic or metallised plugs for serial couplings. Fix the isolation of the data line at the plug rack. Do not lay the isolation on the PIN 1 of the plug bar!
- At stationary operation it is convenient to strip the insulated cable interruption free and lay it on the isolation/protected earth conductor line.
- To fix the isolation tangles use cable clamps out of metal. The clamps must clasp the isolation extensively and have well contact.
- Lay the isolation on an isolation rail directly after the entry of the cable in the cabinet. Lead the isolation further on to your PLC and don't lay it on there again!



CAUTION!

Please regard at installation!

At potential differences between the grounding points, there may be a compensation current via the isolation connected at both sides.

Remedy: Potential compensation line

2.9 General data

Conformity and approval		
Conformity		
CE	2014/35/EU	Low-voltage directive
	2014/30/EU	EMC directive
Approval		
UL	-	Refer to Technical data
others		
RoHS	2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment

Protection of persons and device protection		
Type of protection	-	IP20
Electrical isolation		
to the field bus	-	electrically isolated
to the process level	-	electrically isolated
Insulation resistance	-	-
Insulation voltage to reference earth		
Inputs / outputs	-	AC / DC 50V, test voltage AC 500V
Protective measures	-	against short circuit

Environmental conditions to EN 61131-2		
Climatic		
Storage / transport	EN 60068-2-14	-25...+70°C
Operation		
Horizontal installation hanging	EN 61131-2	0...+60°C
Horizontal installation lying	EN 61131-2	0...+55°C
Vertical installation	EN 61131-2	0...+50°C
Air humidity	EN 60068-2-30	RH1 (without condensation, rel. humidity 10...95%)
Pollution	EN 61131-2	Degree of pollution 2
Installation altitude max.	-	2000m
Mechanical		
Oscillation	EN 60068-2-6	1g, 9Hz ... 150Hz
Shock	EN 60068-2-27	15g, 11ms

Mounting conditions

Mounting place	-	In the control cabinet
Mounting position	-	Horizontal and vertical

EMC	Standard	Comment	
Emitted interference	EN 61000-6-4	Class A (Industrial area)	
Noise immunity zone B	EN 61000-6-2	Industrial area	
		EN 61000-4-2	ESD 8kV at air discharge (degree of severity 3), 4kV at contact discharge (degree of severity 2)
		EN 61000-4-3	HF field immunity (casing) 80MHz ... 1000MHz, 10V/m, 80% AM (1kHz) 1.4GHz ... 2.0GHz, 3V/m, 80% AM (1kHz) 2GHz ... 2.7GHz, 1V/m, 80% AM (1kHz)
		EN 61000-4-6	HF conducted 150kHz ... 80MHz, 10V, 80% AM (1kHz)
		EN 61000-4-4	Burst, degree of severity 3
	EN 61000-4-5	Surge, degree of severity 3 *	

*) Due to the high-energetic single pulses with Surge an appropriate external protective circuit with lightning protection elements like conductors for lightning and overvoltage is necessary.

3 Power modules

3.1 Safety precautions

Appropriate use

The Power modules were designed and constructed:

- to be installed on mounting rail along with System SLIO components
- for installation in a cabinet with sufficient ventilation
- for industrial applications

The following precautions apply to applications employing the System SLIO power supplies.



DANGER!

- The Power modules must be installed in protected environments that are only accessible to properly qualified maintenance staff!
- The Power modules are not certified for applications in explosive environments (EX-zone)!
- You have to disconnect the Power modules from the main power source before commencing installation or maintenance work, i.e. before you start to work on a power supply or the supply cable the main supply line must be disconnected (disconnect plugs, on permanent installations the respective fuse has to be turned off)!
- Only properly qualified electrical staff is allowed to install, connect and/or modify electrical equipment!
- To provide a sufficient level of ventilation and cooling to the power supply components whilst maintaining the compact construction it was not possible to protect the unit from incorrect handling and a proper level of fire protection. For this reason the required level of fire protection must be provided by the environment where the power supply is installed (e.g. installation in a switchboard that satisfies the fire protection rules and regulations)!
- Please adhere to the national rules and regulations of the location and/or country where the units are installed (installation, safety precautions, EMC ...).

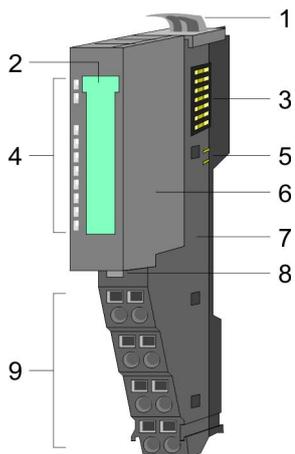
3.2 007-1AB00 - DC 24V 10A

Properties

If the 10A for the power section supply of the I/O area is no longer sufficient, you may use the power module. So you have also the possibility to define isolated groups. The power module is externally to be supplied with DC 24V.

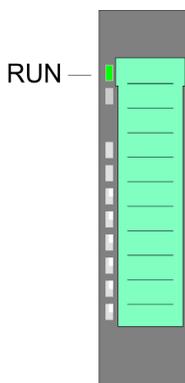
- 10A feed-in for DC 24V power section supply I/O area
- Overvoltage protection
- Polarity reversal protection

Structure



- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

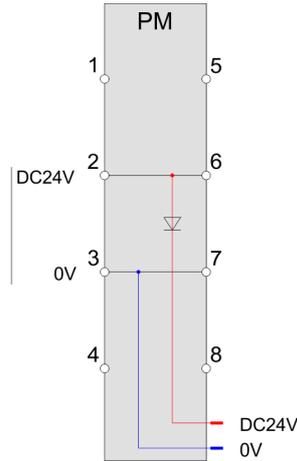
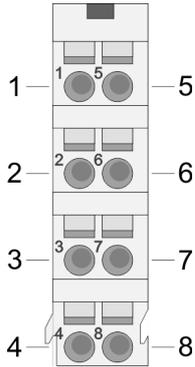
Status display



RUN	Description
<input checked="" type="checkbox"/> green	
<input checked="" type="checkbox"/>	on: Power section supply DC 24V OK
<input type="checkbox"/>	off: Power section supply DC 24V is missing

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Type	Description
1	---	---	not connected
2	DC 24V	I	Feed-in DC 24V power section supply
3	0V	I	Feed-in ground GND power section supply
4	---	---	not connected
5	---	---	not connected
6	DC 24V	O	DC 24V power section supply I/Os
7	0V	O	ground GND power section supply I/Os
8	---	---	not connected

I: Input, O: Output

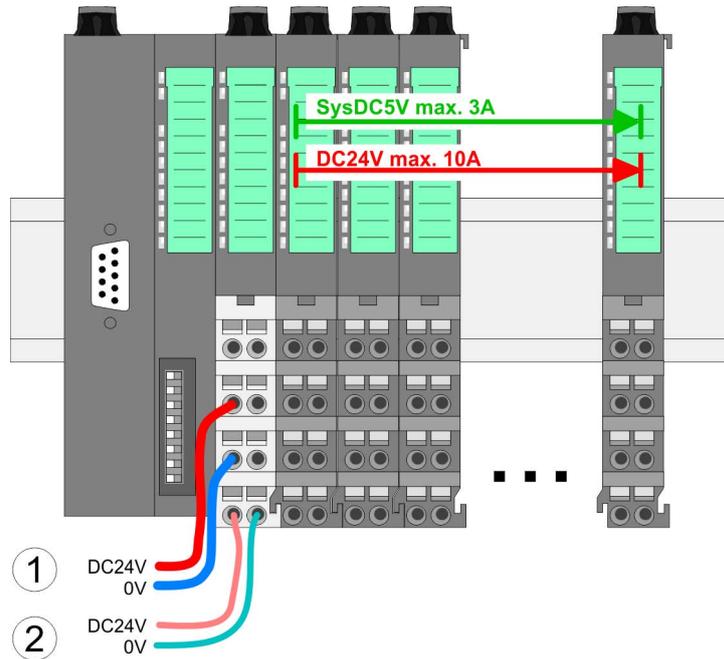


CAUTION!

Since the power section supply is not internally protected, it is to be externally protected with a fuse, which corresponds to the maximum current. This means max. 10A is to be protected by a 10A fuse (fast) respectively by a line circuit breaker 10A characteristics Z! Please consider within wiring the maximum load current of the contacts. With the System SLIO this is max. 10A.

Deployment

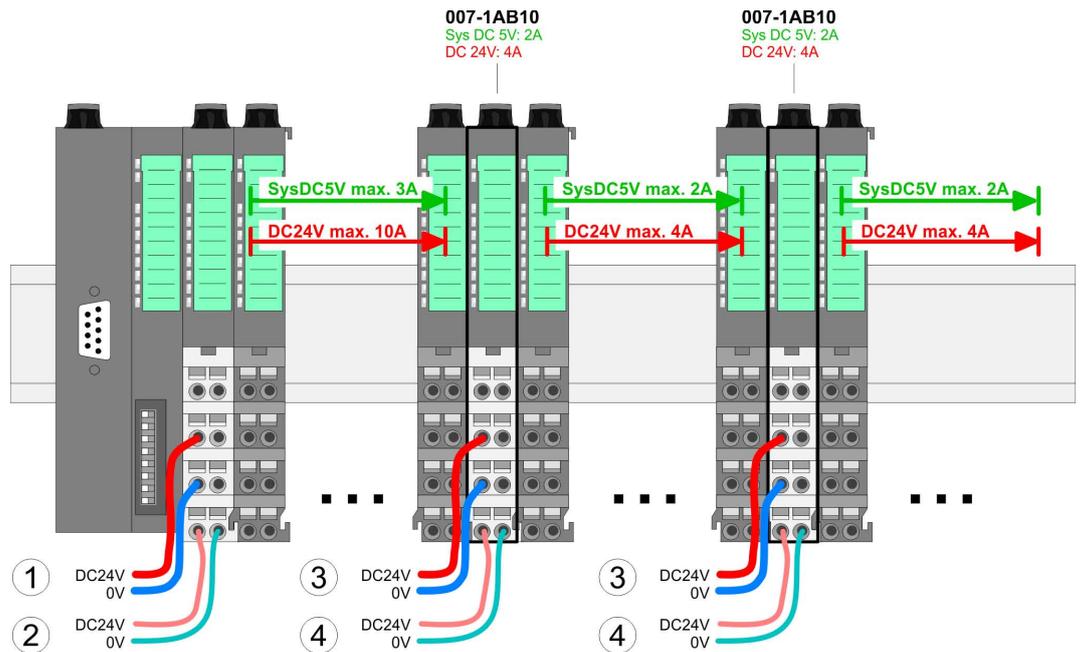
The following figure shows the standard cabling of the power supply by means of a bus coupler.



- 1 DC 24V for power section supply I/O area (max. 10A)
- 2 DC 24V for electronic power supply bus coupler and I/O area

Expansion by the power module 007-1AB00

As soon as the sum current of the power section supply exceeds 10A, the power module 007-1AB00 is to be placed. When the power module is placed, further modules may be placed besides the power module at the backplane bus, whose sum current of the power section supply does not exceed 10A. On this way the System SLIO may be expanded up to a maximum of 64 modules. Please consider that the sum current of the electronic power supply does not exceed the maximum of 3A. With a sum current greater than 3A the LEDs may not be activated. Here the power module with the order number 007-1AB10 is to be placed between the peripheral modules.



- 1 DC 24V for power section supply I/O area (max. 10A)
- 2 DC 24V for electronic power supply bus coupler and I/O area

3.2.1 Technical data

Order no.	007-1AB00
Type	PM 007 - Power module
Module ID	-
Technical data power supply	
Input voltage (rated value)	DC 24 V
Input voltage (permitted range)	DC 20.4...28.8 V
Mains frequency (rated value)	-
Mains frequency (permitted range)	-
Input current (at 120 V)	-
Input current (at 230 V)	-
Inrush current	-
Power consumption	-
Output voltage (rated value)	24 V
Output current (rated value)	10 A
Power supply parallel switchable	-
Reverse polarity protection	yes
Overvoltage protection	36 V
Ripple of output voltage (max.)	-
Efficiency	-
Power loss	-
Status information, alarms, diagnostics	
Status display	yes
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Supply voltage display	green LED
Group error display	red LED
Channel error display	none
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	60 g

Order no.	007-1AB00
Weight including accessories	-
Gross weight	-
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

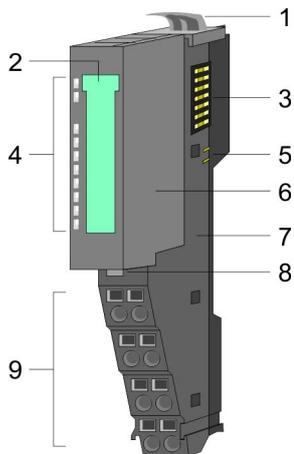
3.3 007-1AB10 - DC 24V 4A, DC 24V/5V 2A

Properties

If the 3A for the electronic power supply of the I/O area is no longer sufficient, you may use the power module. Additionally the power module serves for a new isolated group for the DC 24V power section supply with max. 4A. The power module is externally to be supplied with DC 24V.

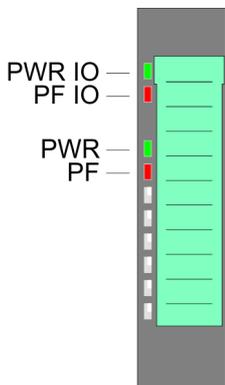
- 2A feed-in for DC 24V electronic power supply I/O area
- 4A feed-in for DC 24V power section supply I/O area
- Overvoltage protection
- Polarity reversal protection

Structure



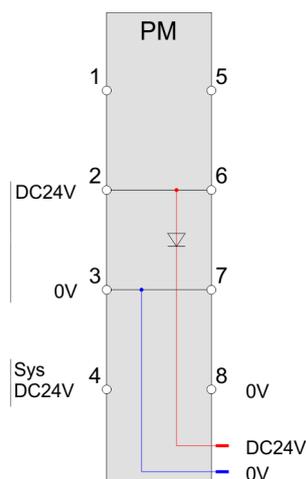
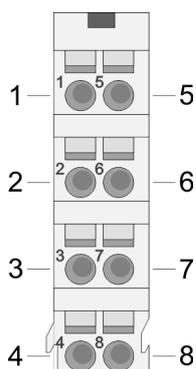
- 1 Locking lever terminal module
- 2 Labeling strip
- 3 Backplane bus
- 4 LED status indication
- 5 DC 24V power section supply
- 6 Electronic module
- 7 Terminal module
- 8 Locking lever electronic module
- 9 Terminal

Status indication



PWR IO	PF IO	PWR	PF	Description
<input checked="" type="checkbox"/> green	<input checked="" type="checkbox"/> red	<input checked="" type="checkbox"/> green	<input checked="" type="checkbox"/> red	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Both power supplies are missing
<input checked="" type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>	Power section supply OK
X	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Electronic section supply OK
X	<input checked="" type="checkbox"/>	X	X	Fuse power section supply defective (power fail)
X	X	X	<input checked="" type="checkbox"/>	Fuse electronic section supply defective
not relevant: X				

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².

Pos.	Function	Type	Description
1	---	---	not connected
2	DC 24V	I	Feed-in DC 24V power section supply
3	0V	I	Feed-in ground GND power section supply
4	Sys DC 24V	I	Feed-in DC 24V electronic power supply
5	---	---	not connected
6	DC 24V	O	DC 24V power section supply I/Os
7	0V	O	ground GND power section supply I/Os
8	0V	I	Feed-in ground GND electronic power supply

I: Input, O: Output



- Power section and electronic power section supply are internally protected against higher voltage by fuses. The fuses are within the power module. If one fuse released, its electronic module must be exchanged!
- It is recommended to externally protect the power section supply with a fast 4A fuse respectively by a line circuit breaker 4A characteristics Z and the electronic power supply with a fast 1A fuse respectively by a line circuit breaker 1A characteristics Z.
- Please consider this module has no internal buffer concerning power dips. To match to the standard EN 61131-2, a power supply unit should be used, which can avoid power dips of up to 10ms.

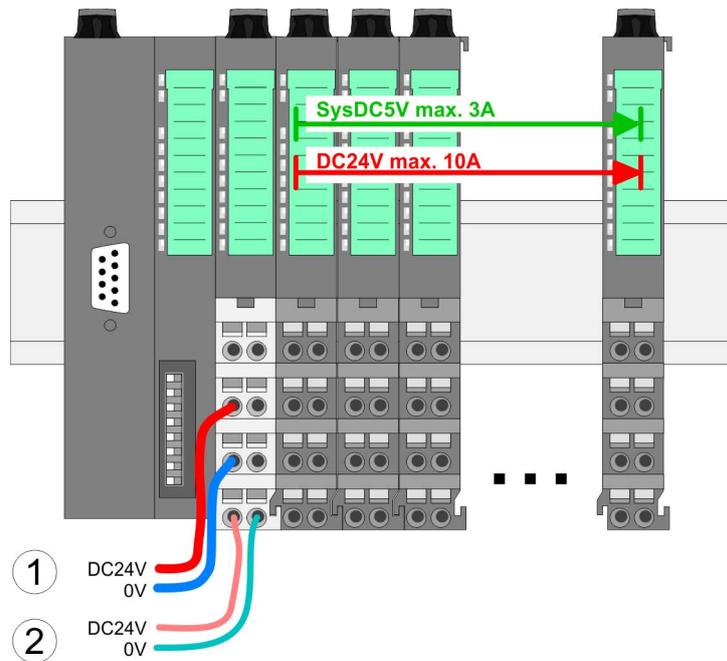


WARNING!

Please consider within wiring the maximum load current of the contacts. With the System SLIO this is max. 10A.

Deployment

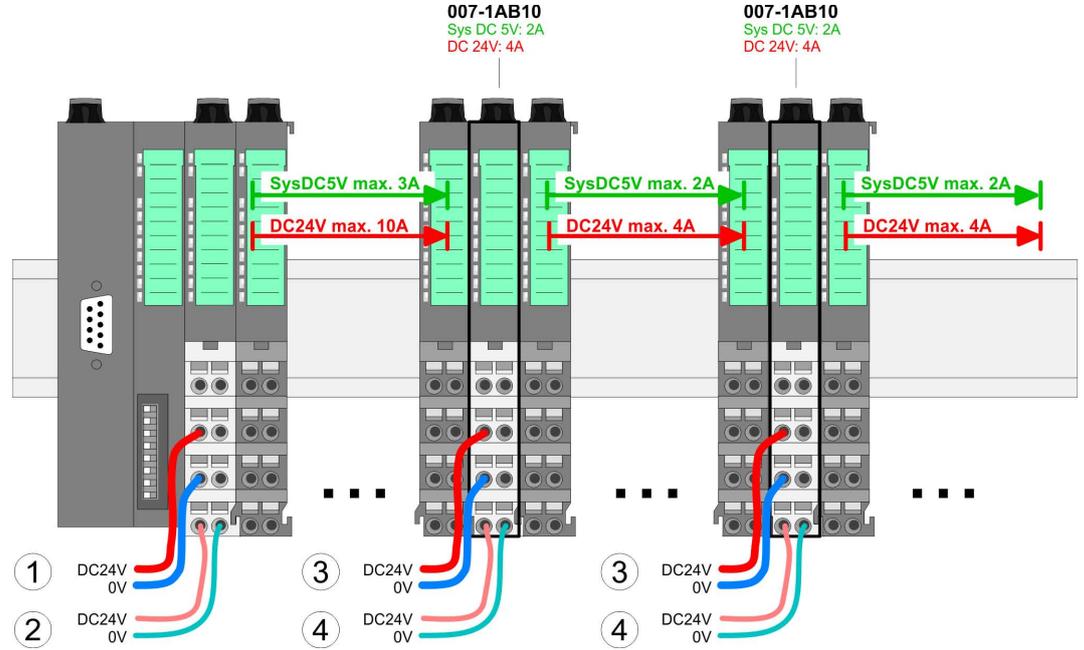
The following figure shows the standard cabling of the power supply by means of a bus coupler.



- 1 DC 24V for power section supply I/O area
- 2 DC 24V for electronic power supply bus coupler and I/O area

Expansion by the power module 007-1AB10

With a sum current greater than 3A the LEDs may not be activated. When the power module 007-1AB10 is placed, further modules may be placed besides the power module at the backplane bus, whose sum current of electronic power supply does not exceed 2A. On this way the System SLIO may be expanded up to a maximum of 64 modules. Additionally the power module serves for a new isolated group for the DC 24V power section supply with max. 4A.



- 1 DC 24V for power section supply I/O area (max. 10A)
- 2 DC 24V for electronic power supply bus coupler and I/O area
- 3 DC 24V for power section supply I/O area (max. 4A)
- 4 DC 24V for electronic power supply I/O area

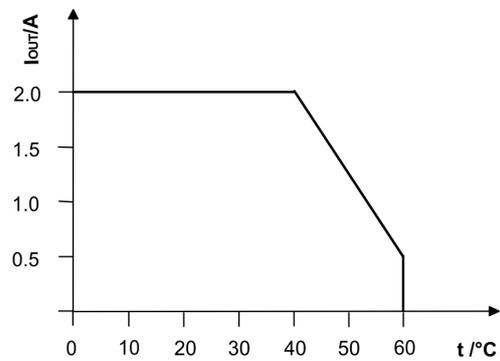
3.3.1 Technical data

Order no.	007-1AB10
Type	PM 007 - Power module
Module ID	-
Technical data power supply	
Input voltage (rated value)	DC 24 V
Input voltage (permitted range)	DC 20.4...28.8 V
Mains frequency (rated value)	-
Mains frequency (permitted range)	-
Input current (at 120 V)	-
Input current (at 230 V)	-
Inrush current	-
Power consumption	-
Output voltage (rated value)	24 V
Output current (rated value)	4 A
Power supply parallel switchable	-
Reverse polarity protection	yes
Overvoltage protection	36 V
Ripple of output voltage (max.)	-
Efficiency	89 %
Power loss	1.4 W
Status information, alarms, diagnostics	
Status display	yes
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Supply voltage display	green LED
Group error display	red LED
Channel error display	none
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 76.5 mm
Net weight	75 g

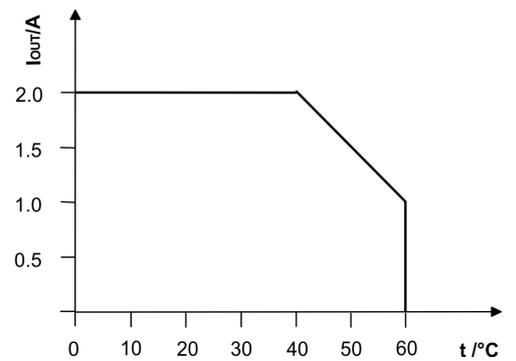
Order no.	007-1AB10
Weight including accessories	-
Gross weight	-
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes

Derating diagrams electronic power supply

Convection



Air circulation 0.5m/s



4 Clamp modules

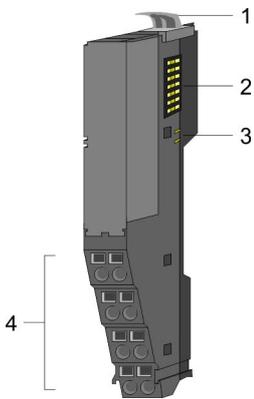
4.1 001-1BA00 - 8xDC 24V clamps

Properties

This clamp module is a "potential distributor module". The DC 24V of the power section supply may be accessed by 8 clamp connectors of the terminal. The backplane bus is looped through the module. So this module has no module ID, but influences the maximum number of modules to be connected.

- 8 clamp connectors DC 24V power section supply
- Clamp current max. 10A
- Backplane bus looped through
- Isolation 500Veff (field voltage to the bus)

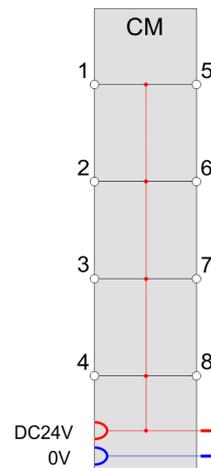
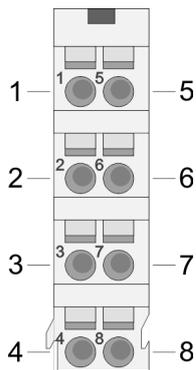
Structure



- 1 Locking lever terminal module
- 2 Backplane bus
- 3 DC 24V power section supply
- 4 Terminal

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Type	Description
1	DC 24V	O	DC 24V power section supply
2	DC 24V	O	DC 24V power section supply
3	DC 24V	O	DC 24V power section supply
4	DC 24V	O	DC 24V power section supply
5	DC 24V	O	DC 24V power section supply
6	DC 24V	O	DC 24V power section supply
7	DC 24V	O	DC 24V power section supply
8	DC 24V	O	DC 24V power section supply

O: Output

4.1.1 Technical data

Order no.	001-1BA00
Type	CM 001 - Potential distributor module
Module ID	-
Clamp parameter	
Terminal voltage max.	DC 30 V
Terminal current max.	10 A
Total current per module, max.	10 A
Isolated group	
Number of clamps	2*4
Color of clamps	grey
Binding of potential	Field voltage DC 24V
Potential group current, max.	10 A
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 52.5 mm
Net weight	50 g
Weight including accessories	-
Gross weight	-
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	-

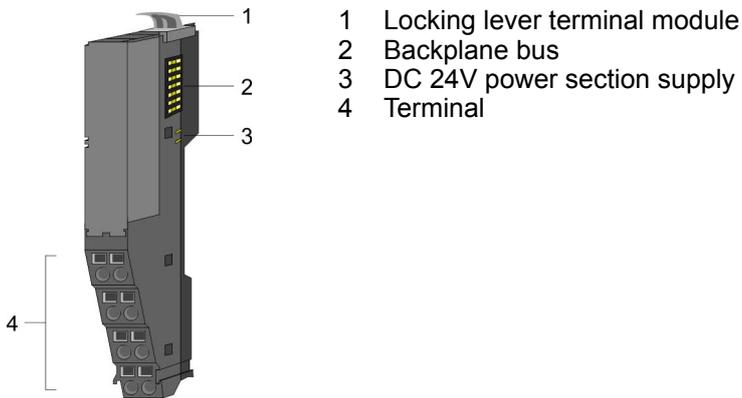
4.2 001-1BA10 - 8xDC 0V clamps

Properties

This clamp module is a "potential distributor module". The ground GND of the DC 24V power section supply may be accessed by 8 clamp connectors of the terminal. The backplane bus is looped through the module. So this module has no module ID, but influences the maximum number of modules to be connected.

- 8 clamp connectors ground GND power section supply
- Clamp current max. 10A
- Backplane bus looped through
- Isolation 500Veff (field voltage to the bus)

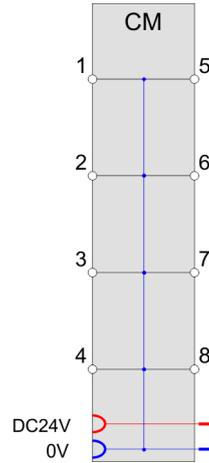
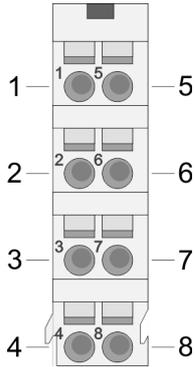
Structure



001-1BA10 - 8xDC 0V clamps

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Type	Description
1	DC 0V	O	Ground GND power section supply
2	DC 0V	O	Ground GND power section supply
3	DC 0V	O	Ground GND power section supply
4	DC 0V	O	Ground GND power section supply
5	DC 0V	O	Ground GND power section supply
6	DC 0V	O	Ground GND power section supply
7	DC 0V	O	Ground GND power section supply
8	DC 0V	O	Ground GND power section supply

O: Output

4.2.1 Technical data

Order no.	001-1BA10
Type	CM 001 - Potential distributor module
Module ID	-
Clamp parameter	
Terminal voltage max.	DC 0 V
Terminal current max.	10 A
Total current per module, max.	10 A
Isolated group	
Number of clamps	2*4
Color of clamps	grey
Binding of potential	Field voltage DC 0V
Potential group current, max.	10 A
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 mm x 109 mm x 52.5 mm
Net weight	50 g
Weight including accessories	-
Gross weight	-
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	-

001-1BA20 - 4xDC 24V and 4xDC 0V clamps

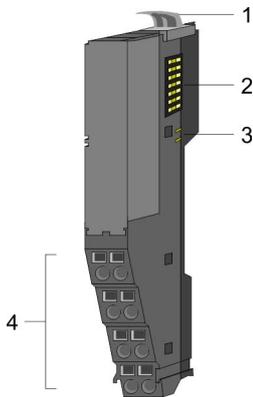
4.3 001-1BA20 - 4xDC 24V and 4xDC 0V clamps

Properties

This clamp module is a "potential distributor module". The DC 24V respectively ground GND of the power section supply may be accessed by 4 clamp connectors each of the terminal. The backplane bus is looped through the module. So this module has no module ID, but influences the maximum number of modules to be connected.

- 4 clamp connectors DC 24V power section supply
- 4 clamp connectors ground GND power section supply.
- Clamp current max. 10A
- Backplane bus looped through
- Isolation 500Veff (field voltage to the bus)

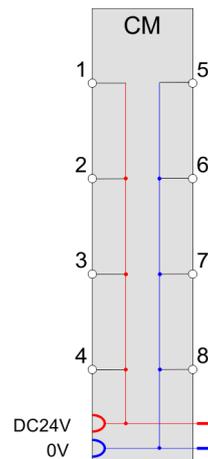
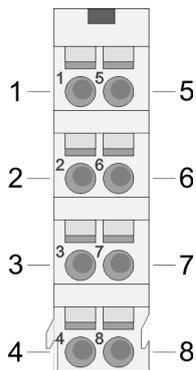
Structure



- 1 Locking lever terminal module
- 2 Backplane bus
- 3 DC 24V power section supply
- 4 Terminal

Pin assignment

For wires with a cross section of 0.08mm² up to 1.5mm².



Pos.	Function	Type	Description
1	DC 24V	O	DC 24V power section supply
2	DC 24V	O	DC 24V power section supply
3	DC 24V	O	DC 24V power section supply
4	DC 24V	O	DC 24V power section supply
5	DC 0V	O	Ground GND power section supply
6	DC 0V	O	Ground GND power section supply
7	DC 0V	O	Ground GND power section supply
8	DC 0V	O	Ground GND power section supply

O: Output

4.3.1 Technical data

Order no.	001-1BA20
Type	CM 001 - Potential distributor module
Module ID	-
Clamp parameter	
Terminal voltage max.	DC 30 V
Terminal current max.	10 A
Total current per module, max.	10 A
Isolated group	
Number of clamps	4
Binding of potential	Field voltage DC 24V
Potential group current, max.	10 A
Isolated group	
Number of clamps	4
Binding of potential	Field voltage DC 0V
Potential group current, max.	10 A
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	12.9 x 109 x 52.5 mm
Weight	50 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	-