YASKAWA

System SLIO

IM | 06x-1xA0x | Manual

HB300 | IM | 06x-1xA0x | en | 24-02

Interface module Line extension - IM 06x

YASKAWA Europe GmbH
Philipp-Reis-Str. 6
65795 Hattersheim
Germany
Tel.: +49 6196 569-300
Fax: +49 6196 569-398
Email: info@yaskawa.eu
Internet: www.yaskawa.eu.com

06x-1xA00_000_IM 06x,5,EN -

Table of contents

1 General

1.1 Copyright © YASKAWA Europe GmbH

EC conformity declaration

Hereby, YASKAWA Europe GmbH declares that the products and systems are in compliance with the essential requirements and other relevant provisions. Conformity is indicated by the CE marking affixed to the product.

Conformity Information

For more information regarding CE marking and Declaration of Conformity (DoC), please contact your local representative of YASKAWA Europe GmbH.

General terms of use

Every effort has been made to ensure that the information contained in this document was complete and accurate at the time of publishing. We cannot guarantee that the information is free of errors, and we reserve the right to change the information at any time. There is no obligation to inform the customer about any changes. The customer is requested to actively keep his documents up to date. The customer is always responsible for the deployment of the products with the associated documentation, taking into account the applicable directives and standards.
This documentation describes all hardware and software units and functions known today. It is possible that units are described that do not exist at the customer. The exact scope of delivery is described in the respective purchase contract.

Document support

Contact your local representative of YASKAWA Europe GmbH if you have errors or questions regarding the content of this document. You can reach YASKAWA Europe GmbH via the following contact:

Email: Documentation.HER@yaskawa.eu

Technical support

Contact your local representative of YASKAWA Europe GmbH if you encounter problems or have questions regarding the product. If such a location is not available, you can reach the Yaskawa customer service via the following contact:

YASKAWA Europe GmbH,
European Headquarters, Philipp-Reis-Str. 6, 65795 Hattersheim, Germany
Tel.: +49 6196 569 500 (hotline)
Email: support@yaskawa.eu

1.2 About this manual

Objective and contents

This manual describes the line extensions IM 060 and IM 061 of the System SLIO.

- It describes the structure, configuration and application.
- The manual is written for users with basic knowledge of automation technology.
- The manual consists of chapters. Each chapter describes a completed topic.
- The following guides are available in the manual:
  - An overall table of contents at the beginning of the manual.
  - References with pages numbers.

Validity of the documentation

Product	Description	Order no.	as of version:
IM 060	Line extension master - version 1	060-1AA00	HW: 01
IM 060	Line extension master - version 2	060-1AA01	HW: 01
IM 061	Line extension slave - version 1	061-1BA00	HW: 01
IM 061	Line extension - version 2	061-1BA01	HW: 01

The following designations are used in the manual:

- Line extension 06x-1xA00 is designated as *'version 1'*.
- Line extension 06x-1xA01 is designated as *'version 2'*.

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.

1.3 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)

Disposal

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

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 ...)

2 Basics and mounting

2.1 Safety notes for the user

DANGER

Protection against dangerous voltages

- When using System SLIO modules, the user must be protected from touching hazardous voltage.
- You must therefore create an insulation concept for your system that includes safe separation of the potential areas of ELV and hazardous voltage.
- Here, observe the insulation voltages between the potential areas specified for the System SLIO modules and take suitable measures, such as using PELV/SELV power supplies for System SLIO modules.

Handling of electrostatic sensitive modules

The modules are equipped with highly integrated components in MOS technology. These components are highly sensitive to over-voltages that occur, e.g. with electrostatic discharge. The following symbol is used to identify these hazardous modules:

The symbol is located on modules, module racks or on packaging and thus indicates electrostatic sensitive modules. Electrostatic sensitive modules can be destroyed by energies and voltages that are far below the limits of human perception. If a person who is not electrically discharged handles electrostatic sensitive modules, voltages can occur and damage components and thus impair the functionality of the modules or render the modules unusable. Modules damaged in this way are in most cases not immediately recognized as faulty. The error can only appear after a long period of operation. Components damaged by static discharge can show temporary faults when exposed to temperature changes, vibrations or load changes. Only the consistent use of protective devices and responsible observance of the handling rules can effectively prevent malfunctions and failures on electrostatic sensitive modules.

Shipping of modules

Please always use the original packaging for shipping.

Measurement and modification of electrostatic sensitive modules

For measurements on electrostatic sensitive modules the following must be observed:

- Floating measuring instruments must be discharged before use.
- Measuring instruments used must be grounded.

When modifying electrostatic sensitive modules, ensure that a grounded soldering iron is used.

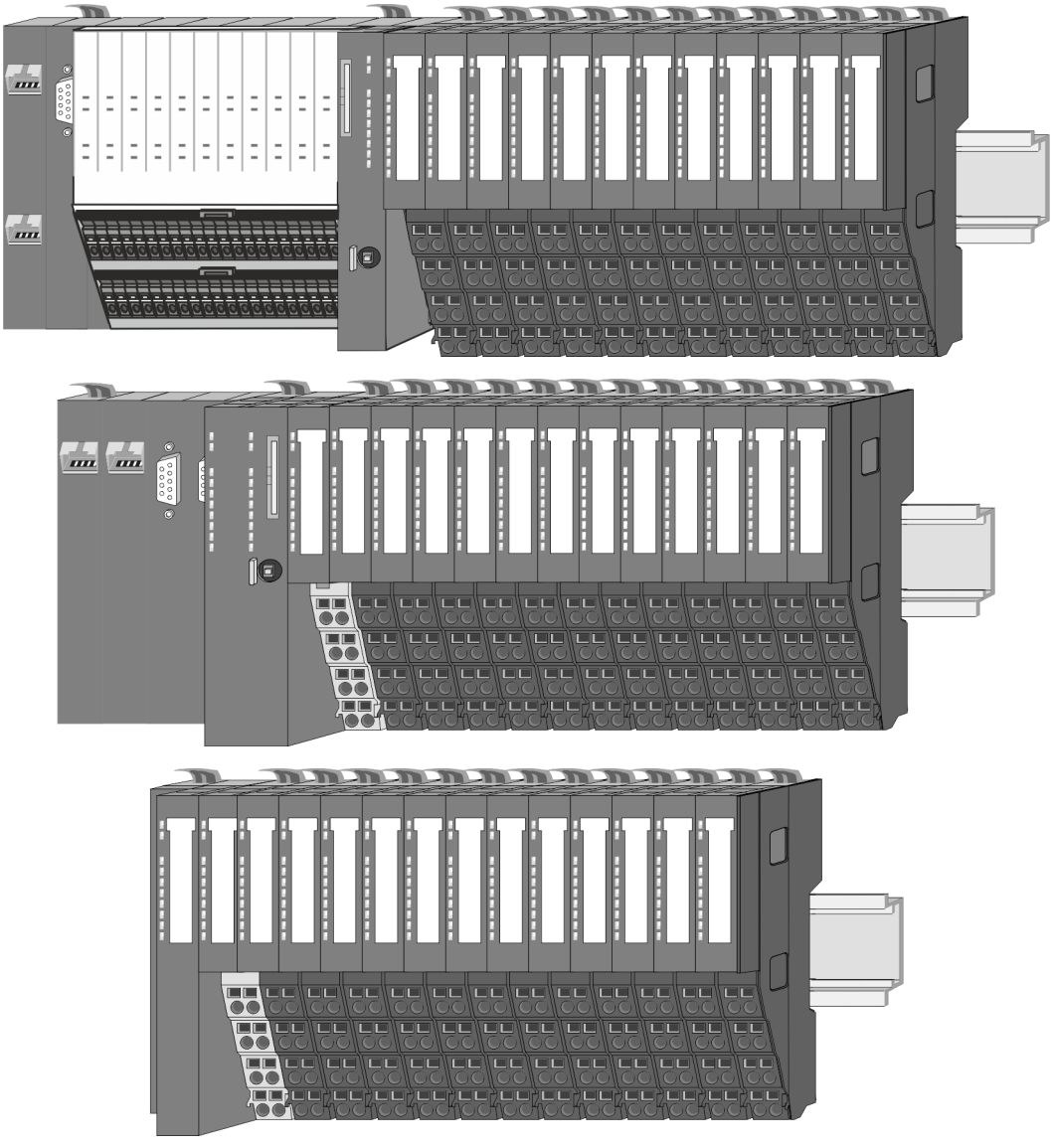
CAUTION

When working with and on electrostatic sensitive modules, make sure that personnel and equipment are adequately grounded.

2.2 System conception

2.2.1 Overview

The System SLIO is a modular automation system for assembly on a 35mm mounting rail. By means of the periphery modules with 2, 4, 8 and 16 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 supply 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.



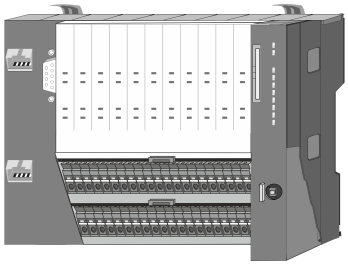
2.2.2 Components

- CPU (head module)
- Bus coupler (head module)
- Line extension
- 8x periphery modules
- 16x periphery modules
- Power modules
- Accessories

CAUTION

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

CPU 01xC



With the CPU 01xC 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 module for power supply CPU electronic and the I/O components are supplied as well as the electronic of the periphery modules, which are connected via backplane bus. To connect the power supply of the I/O components and for DC 24V power section supply of via backplane bus connected periphery 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

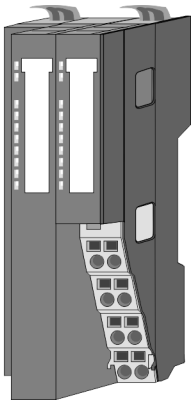
With this CPU 01x, CPU electronic and power supply are integrated to one casing. As head module, via the integrated power module for power supply, CPU electronic and the electronic of the connected periphery modules are supplied. The DC 24V power section supply for the linked periphery modules is established 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



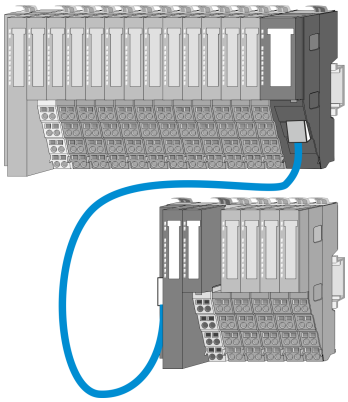
With a bus coupler bus interface and power module is integrated to one casing. With the bus interface you get access to a subordinated bus system. As head module, via the integrated power module for power supply, bus interface and the electronic of the connected periphery modules are supplied. The DC 24V 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!

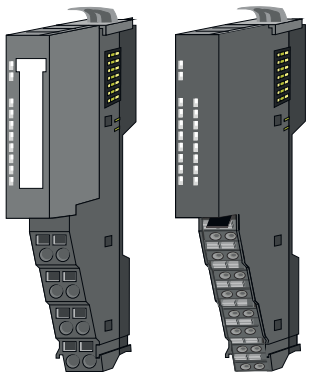
Line extension



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. Depending on the line extension, the max. number of pluggable modules at the System SLIO bus is decreased accordingly. To use the line extension no special configuration is required.

Please note that some modules do not support line extensions due to the system. For more information, please refer to the compatibility list. This can be found in the 'Download Center' of www.yaskawa.eu.com under 'System SLIO Compatibility list'.

Periphery modules

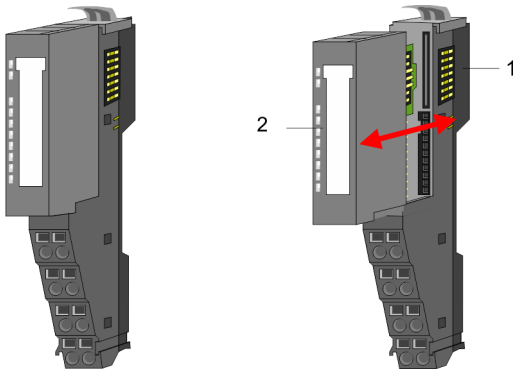


The periphery modules are available in the following 2 versions, whereby of each the electronic part can be replaced with standing wiring:

- 8x periphery module for a maximum of 8 channels.
- 16x periphery module for a maximum of 16 channels.

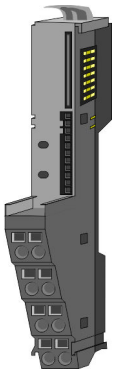
8x periphery modules

Each 8x periphery module consists of a *terminal* and an *electronic module*.



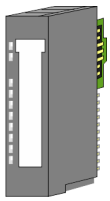
1 Terminal module
2 Electronic module

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 system may be assembled outside of your switchgear cabinet to be later mounted there as whole system.

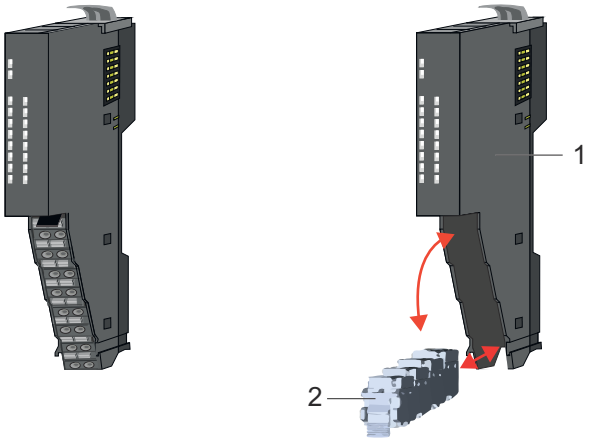
Electronic module



The functionality of a periphery module is defined by the *electronic module*, which is mounted to the terminal module by a sliding mechanism. With an error the defective electronic 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 corresponding connection information at the front and at the side.

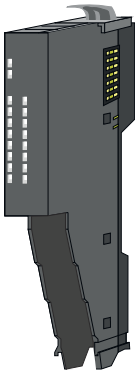
16x periphery modules

Each 16x periphery module consists of an *electronic unit* and a *terminal block*.



1 Electronic unit
2 Terminal block

Electronic unit

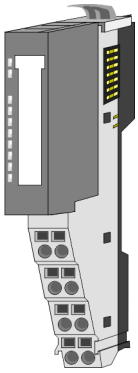


The functionality of a 16x periphery module is defined via the terminal block, which is connected to the *electronic unit* via a secure flap mechanism. In the case of an error you can exchange the defective electronic unit for a functional unit with standing wiring. At the front side there are LEDs for status indication. For easy wiring each electronic unit shows corresponding connection information at the side. The electronic unit provides the slot for the terminal block for the wiring and contains the backplane bus with power supply for the electronic and the connection to the DC 24V power section supply. Additionally the electronic unit has a locking system for fixing it at a mounting rail. By means of this locking system your system may be assembled outside of your switchgear cabinet to be later mounted there as whole system.

Terminal block

The *terminal block* provides the electrical interface for the signalling and supplies lines of the module. When mounting the terminal block, it is attached to the bottom of the electronic unit and turned towards the electronic unit until it clicks into place. With the wiring a "push-in" spring-clip technique is used. This allows a quick and easy connection of your signal and supply lines. The clamping off takes place by means of a screwdriver.

Power module



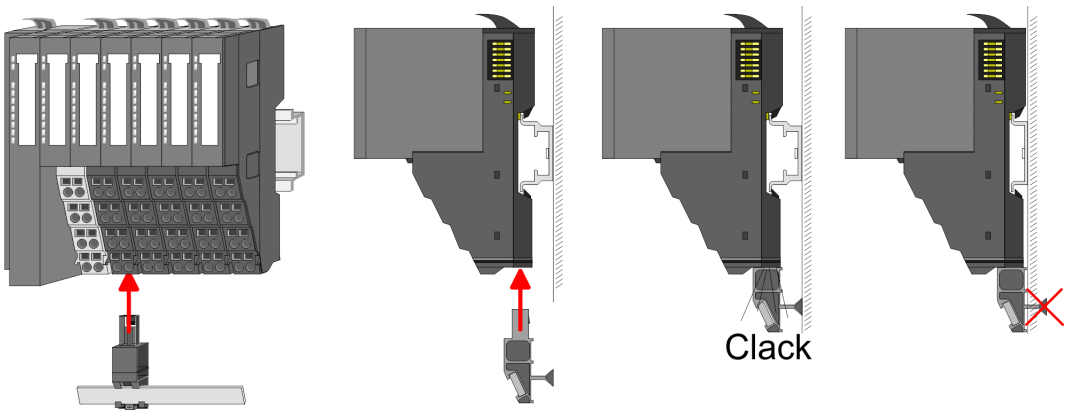
In the System SLIO the power supply is established by power modules. These are either integrated to the head module or may be installed between the periphery modules. Depending on the power module isolated areas of the DC 24V power section supply may be defined respectively the electronic power supply may be extended with 2A. For better recognition the colour of the power modules are contrasting to the periphery modules.

2.2.3 Accessories

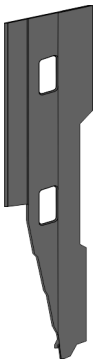
Shield bus carrier

Please note that a shield bus carrier cannot be mounted on a 16x periphery module!

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

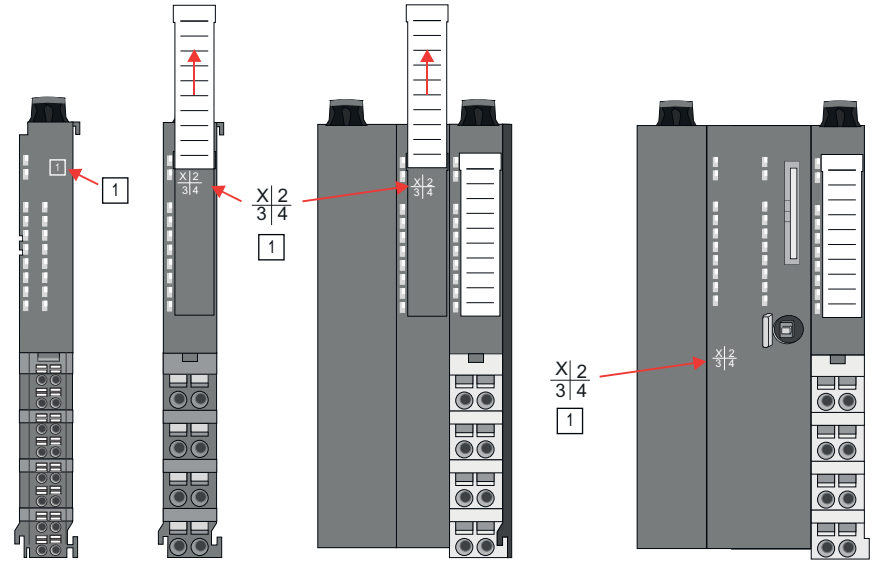
Please note that a coding pin cannot be installed on a 16x periphery module! Here you have to make sure that the associated terminal block is plugged again when the electronics unit is replaced.

There is the possibility to fix the assignment of electronic and terminal module. Here coding pins (order number 000-0AC00) 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 electronic module just another electronic module can be plugged with the same encoding.

2.2.4 Hardware revision

Hardware revision on the front

- The hardware revision is printed on every System SLIO module.
- Since a System SLIO 8x periphery module consists of a terminal and electronic module, you will find a hardware revision printed on each of them.
- Authoritative for the hardware revision of a System SLIO module is the hardware revision of the electronic module. This is located under the labeling strip of the corresponding electronic module.
- Depending on the module type, there are the following 2 variants e.g. to indicate hardware revision 1:
  - With current labelling there is a 1 on the front.
  - With earlier labelling, the 1 is marked with *'X'* on a number grid.

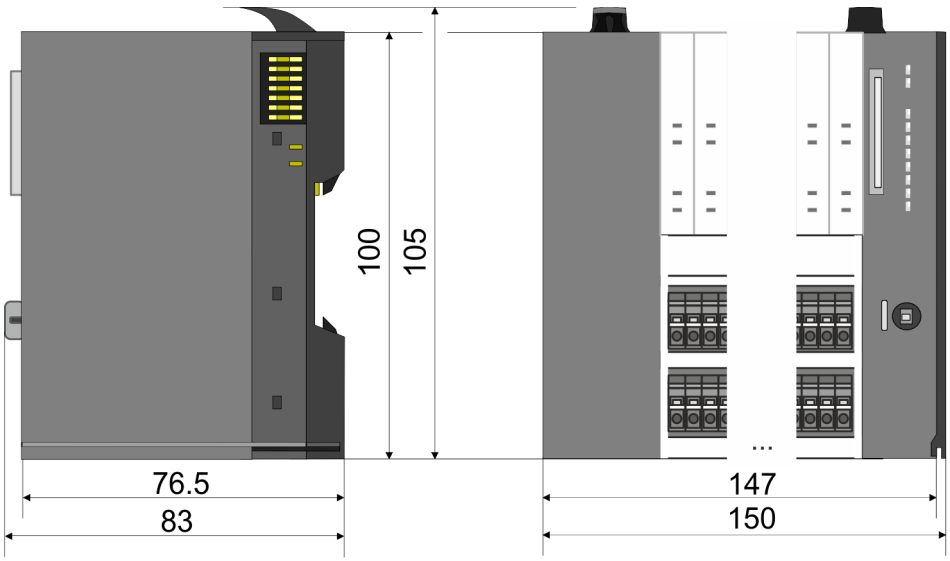


Hardware revision via web server

On the CPUs and some bus couplers, you can check the hardware revision *'HW Revision'* via the integrated web server.

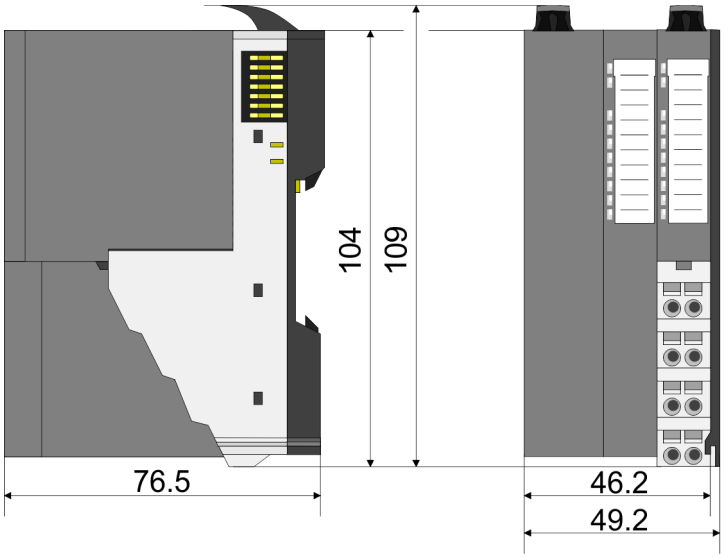
2.3 Dimensions

Dimensions CPU 01xC

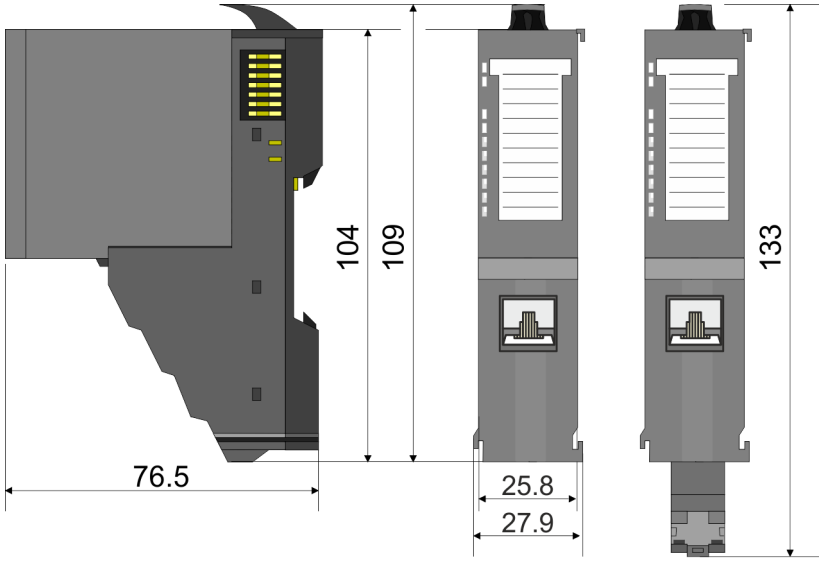


Dimensions CPU 01x

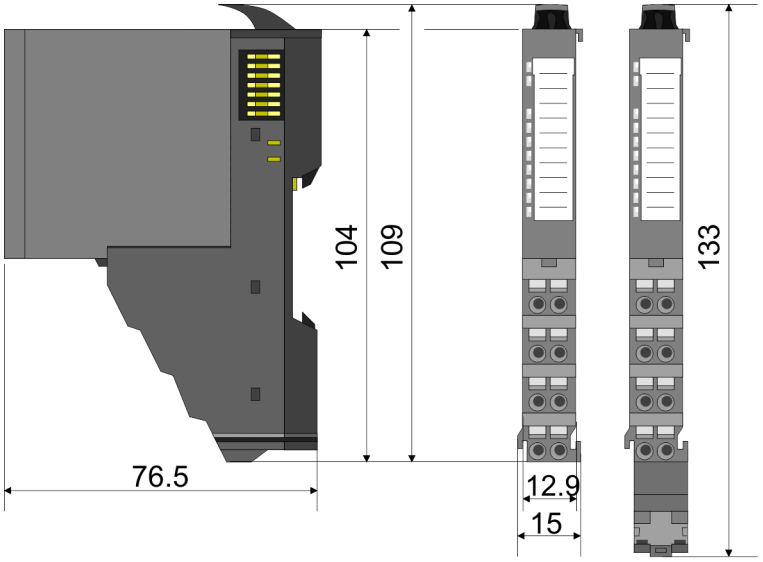
Dimensions bus coupler and line extension slave



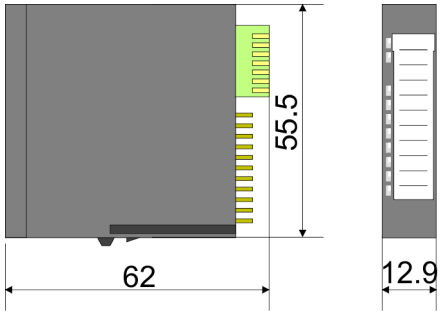
Dimensions line extension master



Dimension periphery module



Dimensions electronic module



Dimensions in mm

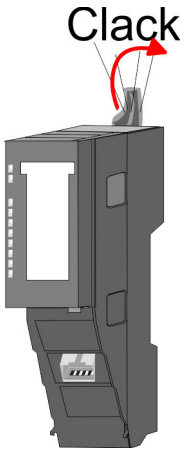
2.4 Mounting line extension

- *By means of the line extension 1 line of modules can be divided to maximum 5 lines.*
- *For each line extension the maximum number of pluggable modules at the System SLIO bus is decreased:*
  - *with 06x-1xA00 by 1 module.*
  - *with 06x-1xA01 by 2 modules.*
- *The line extension master is to be placed at the end of the line.*
- *After the master the line has to start with a line extension slave.*
- *Line extension modules are not considered in the listing of the integrated web page of the coupler or CPU respectively the allocation of the slots.*
- *The usage of additional power modules within a line is allowed.*
- *To use the line extension no special configuration is required.*

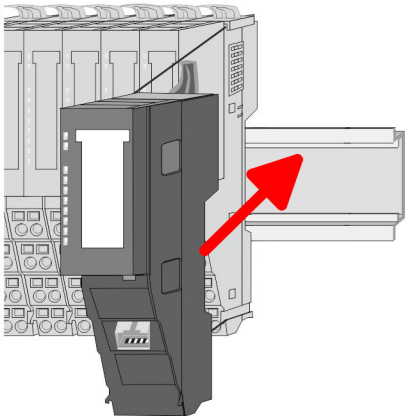
2.4.1 Mounting line extension master

Proceeding

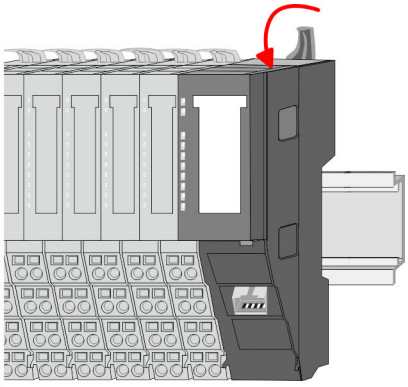
1. There is a locking lever at the top side of the line extension master. For mounting and demounting this locking lever is to be turned upwards until this engages. Turn the locking lever upwards.



2. For mounting place the line extension master to the module installed before in the line and push the line extension master to the mounting rail guided by the strips at the upper and lower side of the module.



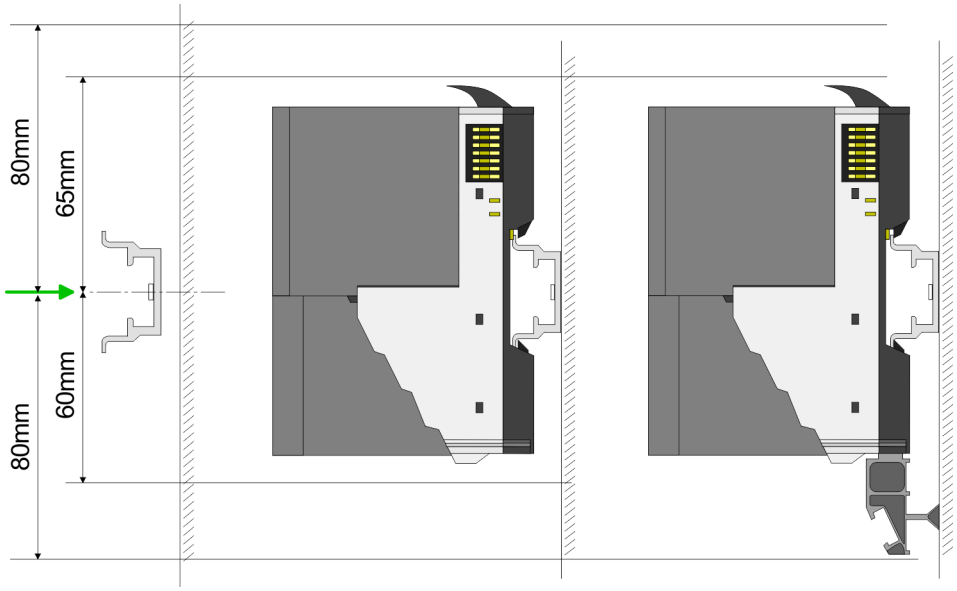
3. Turn the locking lever of the line extension master downward, again.



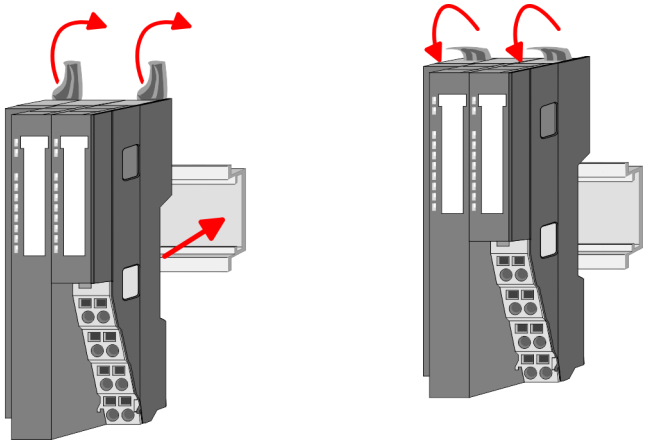
2.4.2 Mounting line extension slave

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.

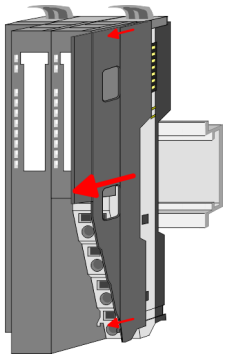


2. There is a locking lever at the top side of the line extension slave. For mounting and demounting these locking lever are to be turned upwards until these engage. Turn the locking lever upwards, place the line extension slave at the mounting rail and turn the lever downward.

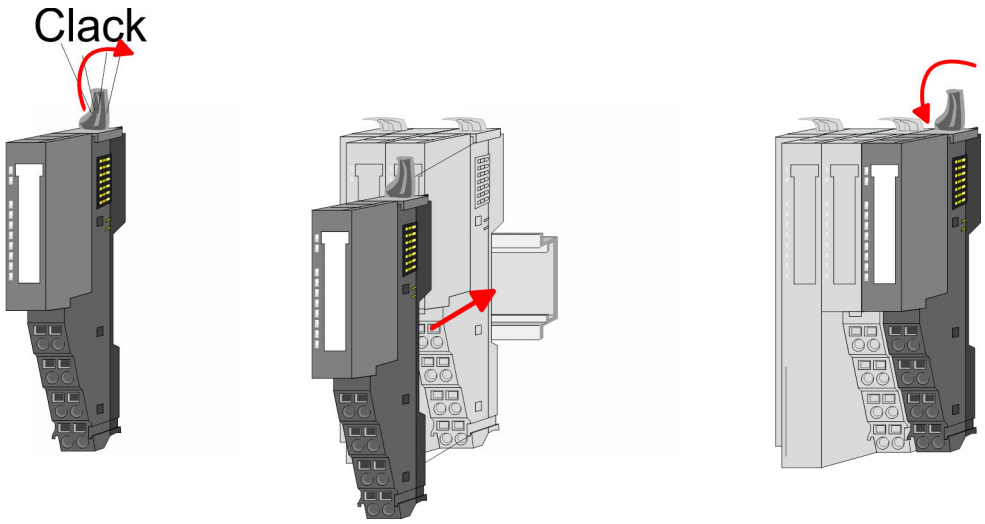


Mounting of the periphery modules

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



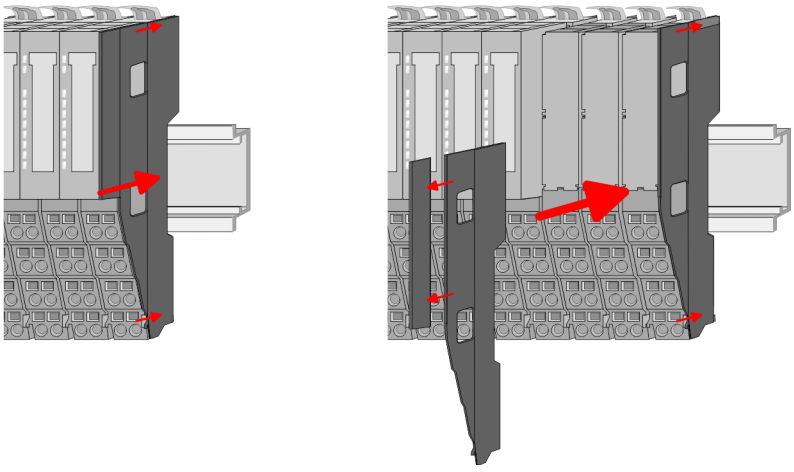
2. Mount the periphery modules you want.



➡ 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.

3. For more line extensions ➦ *'Mounting line extension master'...page 18*

4. 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 line extension

2.5.1 Wiring line extension master

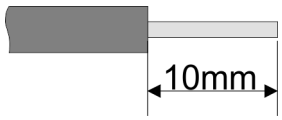
Since the line extension master is supplied via the power section supply of the backplane bus, an additional wiring is not required.

2.5.2 Wiring line extension slave

Terminal module terminals

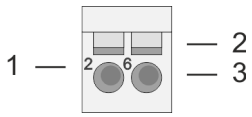
Der line extension slave has an integrated power module. Terminals with spring clamp technology are used for wiring. The spring clamp technology allows quick and easy connection of your signal and supply lines. In contrast to screw terminal connections this type of connection is vibration proof.

Data

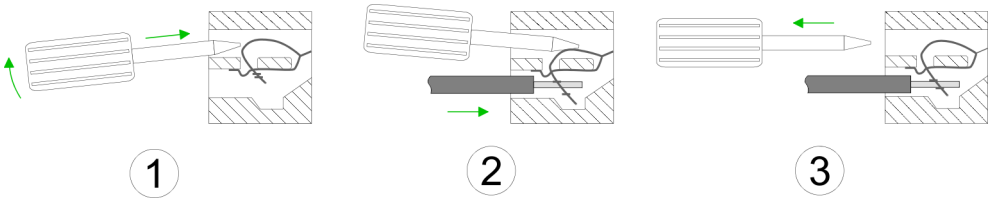


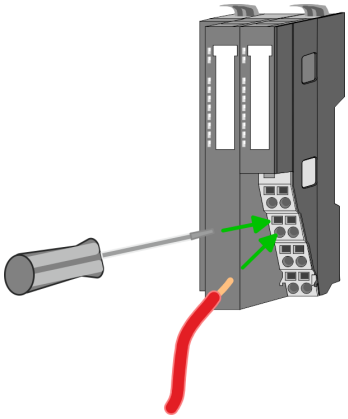
U_{max}	30V DC
I_{max}	10A
Cross section	0.08 ... 1.5mm² (AWG 28 ... 16)
Stripping length	10mm

Wiring procedure



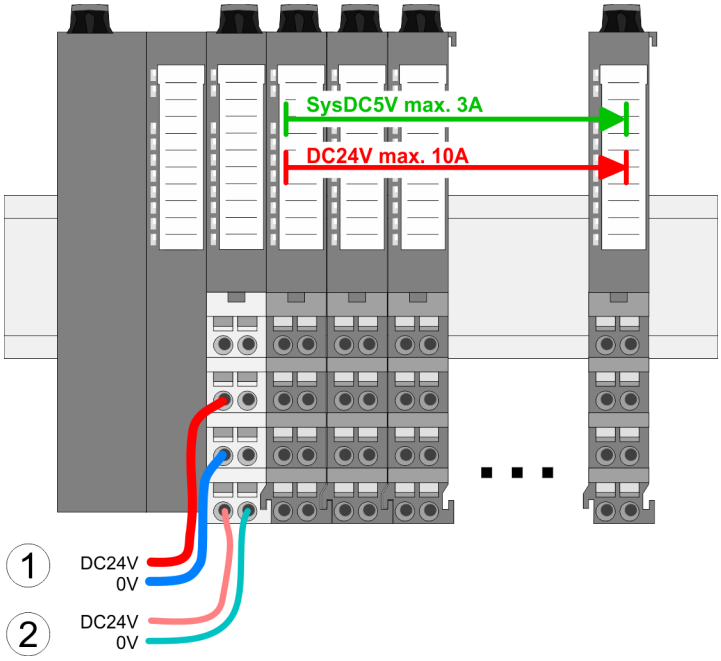
1 Pin no. at the connector
2 Opening for screwdriver
3 Connection hole for wire





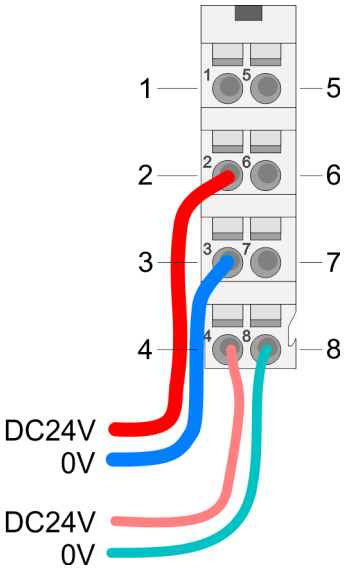
1. Insert a suited screwdriver at an angel into the square opening as shown. Press and hold the screwdriver in the opposite direction to open the contact spring.
2. Insert the stripped end of wire into the round opening. You can use wires with a cross section of 0.08mm² up to 1.5mm².
3. By removing the 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 section supply line extension slave 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 power 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 power 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 line extension slave 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.

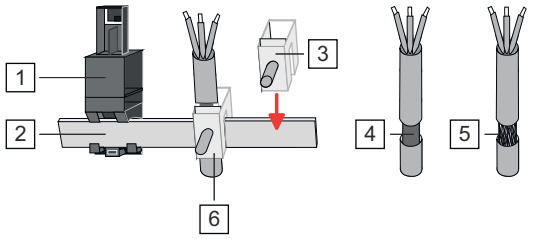
State of the electronic power supply via LEDs

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.

2.5.2.1 Shielding

Overview

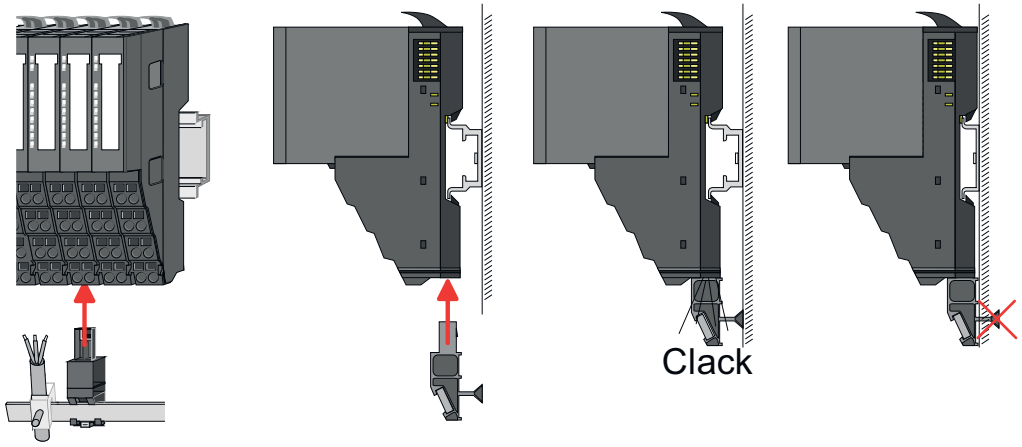
Shielding is required for interference-free signal transmission. This weakens electrical, magnetic or electromagnetic interference fields. To attach the shield the mounting of shield bus carriers are necessary. The shield bus carrier (available as accessory) serves to carry the shield bus to connect cable shields. ➦ *'Installation guidelines'...page 32*



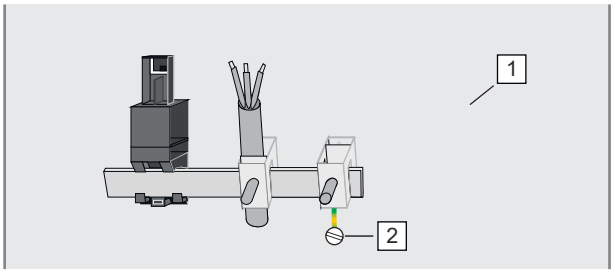
1 Shield bus carrier
2 Shield bus (10mm x 3mm)
3 Shield clamp
4 Cable shield with metal foil
5 Cable shield with wire mesh (close-meshed)
6 Cable shield mounted with shield clamp

Shield attachment

1. Each System SLIO 8x periphery 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.
4. The shield bus must always be earthed. Keep all cable connections as short as possible. To earth the shield bus, connect a PE conductor to the shield bus via a shield clamp and screw it to the base plate as close as possible and with low impedance.



1 Base plate
2 PE conductor screwed to base plate

2.5.3 Line extension - connection cable

Cabling

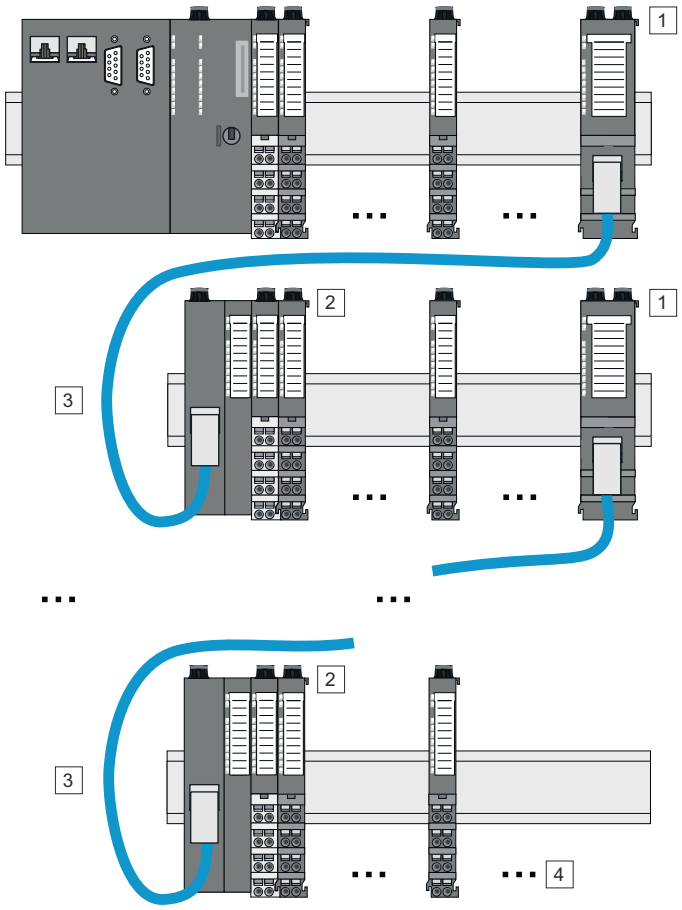
CAUTION

When 06x-1xA00 used - version 1:

- Please use connection cables from Yaskawa for connection. The use of normal Ethernet cable can cause damage!
- The connection cable must not exceed the maximum length of 2m.
- The connection cable between master and slave may be plugged or removed only when the modules are powered off.

When 06x-1xA01 used - version 2:

- The use of connection cables from Yaskawa is recommended. You can also use Ethernet cables with the specification S/STP CAT6a or S/FTP CAT6a.
- The connection cable must not exceed the maximum length of 10m.
- The connection cable between master and slave may be plugged or removed only when the modules are powered off.

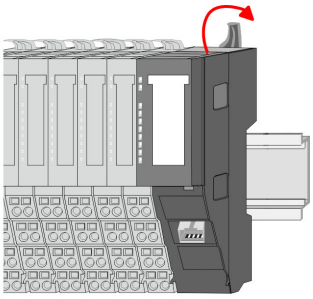


1 Line extension master
2 Line extension slave
3 Connection cable
4 Depending on the line extension used, the max. number of pluggable modules on the System SLIO bus is reduced accordingly.

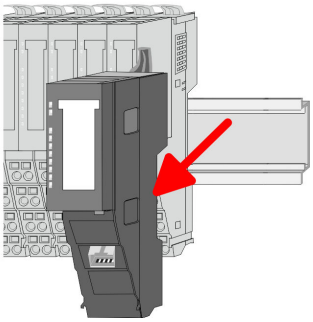
2.6 Demounting line extension

2.6.1 Demounting line extension master

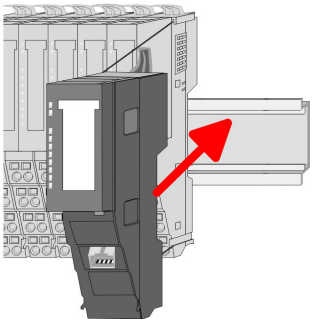
Proceeding



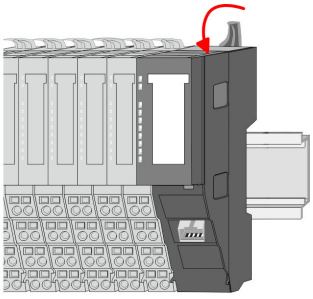
1. Power-off your system.
2. Remove if exists the connection cable at line extension master.
3. Turn the locking lever of the line extension master to be exchanged upwards.



4. Pull the line extension master forward.



5. For mounting turn the locking lever of the line extension master upward until it engages.
6. For mounting place the line extension master to the module installed before in the line and push the line extension master to the mounting rail guided by the strips at the upper and lower side of the module.



7. Turn the locking lever of the line extension master downward, again.
8. Plug again the connection cable.

➥ Now you can bring your system back into operation.

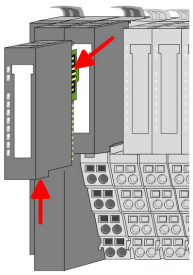
2.6.2 Demounting line extension slave

Proceeding

CAUTION

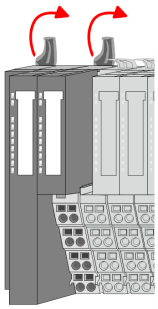
Line extension interface and power module of the line extension slave may not be separated! Here you may only exchange the electronic module!

1. Power-off your system.
2. Remove if exists the connection cable at line extension slave.
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.*

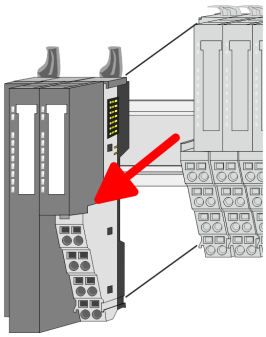


Press the unlocking lever at the lower side of the just mounted right module near the line extension slave and pull it forward.

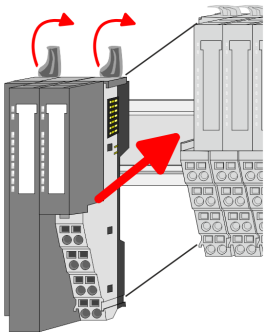
4. Turn all the locking lever of the line extension slave to be exchanged upwards.

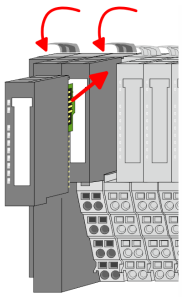


5. Pull the line extension slave forward.



6. For mounting turn all the locking lever of the line extension slave to be exchanged upwards.
7. To mount the line extension slave put it to the left periphery module and push the line extension slave, 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.
10. Plug again the connection cable.
    ➥ Now you can bring your system back into operation.

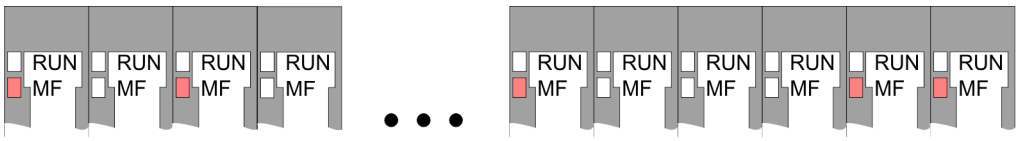
2.7 Trouble shooting - LEDs

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

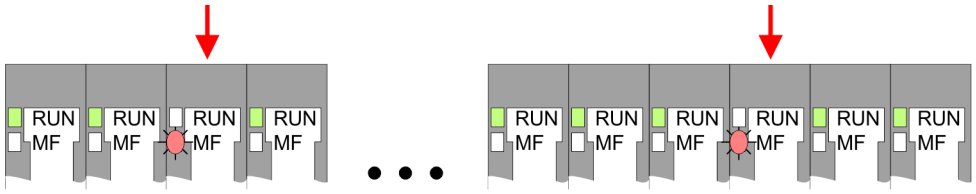


Behavior: After PowerON the RUN LED of each module is off and the MF LED of each module is sporadically on.

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.

Error in configuration

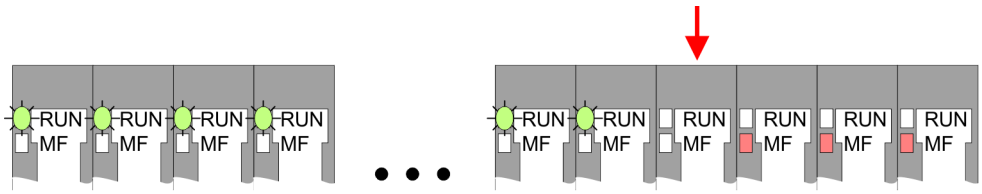


Behavior: After PowerON the MF LED of one module respectively more modules flashes. The RUN LED remains off.

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

Remedy: Match configuration and hardware structure.

Module failure



Behavior: 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 Industrial security and installation guidelines

2.8.1 Industrial security in information technology

Latest version

This chapter can also be found as a guide *'Industrial IT Security'* in the *'Download Center'* of www.yaskawa.eu.com

Hazards

The topic of data security and access protection has become increasingly important in the industrial environment. The increased networking of entire industrial systems to the network levels within the company together with the functions of remote maintenance have all served to increase vulnerability. Hazards can arise from:

- Internal manipulation such as technical errors, operating and program errors and deliberate program or data manipulation.
- External manipulation such as software viruses, worms and trojans.
- Human carelessness such as password phishing.

Precautions

The most important precautions to prevent manipulation and loss of data security in the industrial environment are:

- Encrypting the data traffic by means of certificates.
- Filtering and inspection of the traffic by means of VPN - "Virtual Private Networks".
- Identification of the user by "Authentication" via save channels.
- Segmenting in protected automation cells, so that only devices in the same group can exchange data.
- Deactivation of unnecessary hardware and software.

Further Information

You can find more information about the measures on the following websites:

- Federal Office for Information Technology ➦ *www.bsi.bund.de*
- Cybersecurity & Infrastructure Security Agency ➦ *us-cert.cisa.gov*
- VDI / VDE Society for Measurement and Automation Technology ➦ *www.vdi.de*

2.8.1.1 Protection of hardware and applications

Precautions

- Do not integrate any components or systems into public networks.
  - Use VPN "Virtual Private Networks" for use in public networks. This allows you to control and filter the data traffic accordingly.
- Always keep your system up-to-date.
  - Always use the latest firmware version for all devices.
  - Update your user software regularly.
- Protect your systems with a firewall.
  - The firewall protects your infrastructure internally and externally.
  - This allows you to segment your network and isolate entire areas.
- Secure access to your plants via user accounts.
  - If possible, use a central user management system.
  - Create a user account for each user for whom authorization is essential.
  - Always keep user accounts up-to-date and deactivate unused user accounts.
- Secure access to your plants via secure passwords.
  - Change the password of a standard login after the first start.
  - Use strong passwords consisting of upper/lower case, numbers and special characters. The use of a password generator or manager is recommended.
  - Change the passwords according to the rules and guidelines that apply to your application.
- Deactivate inactive communication ports respectively protocols.
  - Only the communication ports that are used for communication should be activated.
  - Only the communication protocols that are used for communication should be activated.
- Consider possible defence strategies when planning and securing the system.
  - The isolation of components alone is not sufficient for comprehensive protection. An overall concept is to be drawn up here, which also provides defensive measures in the event of a cyber attack.
  - Periodically carry out threat assessments. Among others, a comparison is made here between the protective measures taken and those required.
- Limit the use of external storage media.
  - Via external storage media such as USB memory sticks or SD memory cards, malware can get directly into a system while bypassing a firewall.
  - External storage media or their slots must be protected against unauthorized physical access, e.g. by using a lockable control cabinet.
  - Make sure that only authorized persons have access.
  - When disposing of storage media, make sure that they are safely destroyed.
- Use secure access paths such as HTTPS or VPN for remote access to your plant.
- Enable security-related event logging in accordance with the applicable security policy and legal requirements for data protection.

2.8.1.2 Protection of PC-based software

Precautions

Since PC-based software is used for programming, configuration and monitoring, it can also be used to manipulate entire systems or individual components. Particular caution is required here!

- Use user accounts on your PC systems.
  - If possible, use a central user management system.
  - Create a user account for each user for whom authorization is essential.
  - Always keep user accounts up-to-date and deactivate unused user accounts.
- Protect your PC systems with secure passwords.
  - Change the password of a standard login after the first start.
  - Use strong passwords consisting of upper/lower case, numbers and special characters. The use of a password generator or manager is recommended.
  - Change the passwords according to the rules and guidelines that apply to your application.
- Enable security-related event logging in accordance with the applicable security policy and legal requirements for data protection.
- Protect your PC systems by security software.
  - Install virus scanners on your PC systems to identify viruses, trojans and other malware.
  - Install software that can detect phishing attacks and actively prevent them.
- Always keep your software up-to-date.
  - Update your operating system regularly.
  - Update your software regularly.
- Make regular backups and store the media at a safe place.
- Regularly restart your PC systems. Only boot from storage media that are protected against manipulation.
- Use encryption systems on your storage media.
- Perform security assessments regularly to reduce the risk of manipulation.
- Use only data and software from approved sources.
- Uninstall software which is not used.
- Disable unused services.
- Activate a password-protected screen lock on your PC systems.
- Always lock your PC systems as soon as you leave your PC workstation.
- Do not click any links that come from unknown sources. If necessary ask, e.g. on e-mails.
- Use secure access paths such as HTTPS or VPN for remote access to your PC system.

2.8.2 Installation guidelines

General

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.

What does EMC mean?

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.

The components 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.

Possible interference causes

Electromagnetic interferences may interfere your control via different ways:

- Electromagnetic fields (RF coupling)
- Magnetic fields with power frequency
- Bus system
- Power supply
- Protected earth conductor

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.

There are:

- galvanic coupling
- capacitive coupling
- inductive coupling
- radiant coupling

Basic rules for EMC

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.

- Take care of a correct area-wide grounding of the inactive metal parts when installing your components.
  - 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.
  - 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 shielded.
  - Analog lines must be shielded. When transmitting signals with small amplitudes the one sided laying of the isolation may be favourable.
  - Cables for frequency inverters, servo and stepper motors must be shielded.
  - 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.

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 for the System SLIO

Conformity and approval		
Conformity		
CE	2014/35/EU	Low Voltage Directive
	2014/30/EU	EMC Directive
RoHS (EU)	2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment
UKCA	2016 No. 1101	Electrical Equipment (Safety) Regulations
	2016 No. 1091	Electromagnetic Compatibility Regulations
RoHS (UK)	2012 No. 3032	Use of Certain Hazardous Substances
Approval		
UL	-	Refer to Technical data

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		
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 ... 6GHz, 3V/m, 80% AM (1kHz)
		EN 61000-4-6	HF conducted 150kHz … 80MHz, 10V, 80% AM (1kHz)
		EN 61000-4-4	Burst
		EN 61000-4-5	Surge[1]

1) 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.

2.9.1 Use in difficult operating conditions

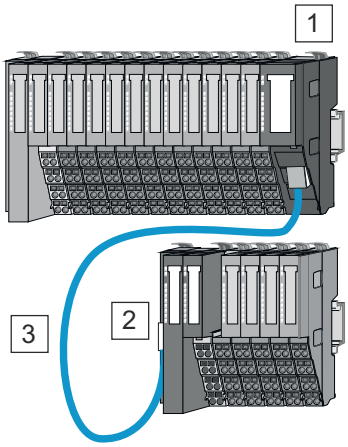
Without additional protective measures, the products must not be used in locations with difficult operating conditions; e.g. due to:

- *dust generation*
- *chemically active substances (corrosive vapors or gases)*
- *strong electric or magnetic fields*

3 Deployment

3.1 Properties

Line extension 06x-1xA00 - version 1



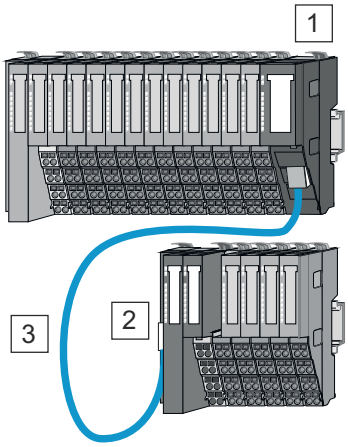
Properties 060-1AA00 Line extension master 1:

- Placement at the end of a line
- Possibility to connect a line extension slave 061-1BA00.
- No additional configuration required.
- Status indication via LEDs.

Properties 061-1BA00 Line extension slave 2:

- Placement at the beginning of a line.
- Connection to line extension master 060-1AA00 via connection cable 3 from Yaskawa with a maximum length of 2m.
- For each line extension the max. number of pluggable modules is decreased by 1.
- Integrated power supply for power and electronic supply.
- No additional configuration required.
- Status indication via LEDs.

Line extension 06x-1xA01 - version 2



Properties 060-1AA01 Line extension master 1:

- Placement at the end of a line.
- Possibility to connect a line extension slave 061-1BA01.
- No additional configuration required.
- Status indication via LEDs.

Properties 061-1BA01 Line extension slave 2:

- Placement at the beginning of a line.
- Connection to line extension master 060-1AA01 via connection cable 3 from Yaskawa with a maximum length of 10m.
- For each line extension the max. number of pluggable modules is decreased by 2.
- Integrated power supply for power and electronic supply.
- No additional configuration required.
- Status indication via LEDs.

Ordering data

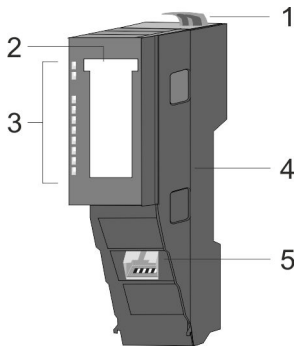
Type	Order number	Description
IM 060	060-1AA00	Line extension master - version 1
	060-1AA01	Line extension master - version 2
IM 061	061-1BA00	Line extension slave - version 1
	061-1BA01	Line extension slave - version 2
Connection cable	950-0KD30	Connection cable 2m length
	950-0KD40[1]	Connection cable 5m length
	950-0KD50[1]	Connection cable 10m length

1) Not suitable for 06x-1xA00.

3.2 Structure

3.2.1 Line extension master

060-1AA0x



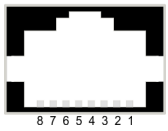
1 Locking lever
2 Labeling strip line extension
3 LED status indication line extension
4 Bus cover
5 X1: Line extension

3.2.1.1 Interface

X1: Line extension

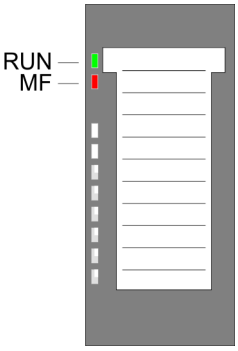
The connection of a line extension slave happens via this interface.

X1



3.2.1.2 LEDs

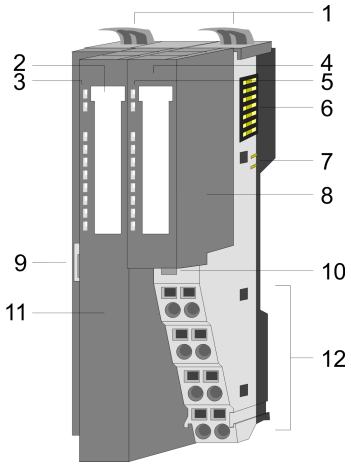
Line extension master



RUN ■ green	MF ■ red	Description
■	□	Bus communication is OK. Module status is OK.
■	■	Bus communication is OK. Module status reports an error.
□	■	Bus communication is not possible. Module status reports an error.
□	□	Error at bus power supply.
X	2Hz	Error in configuration ➦ *'Trouble shooting - LEDs'...page 29*
not relevant: X		

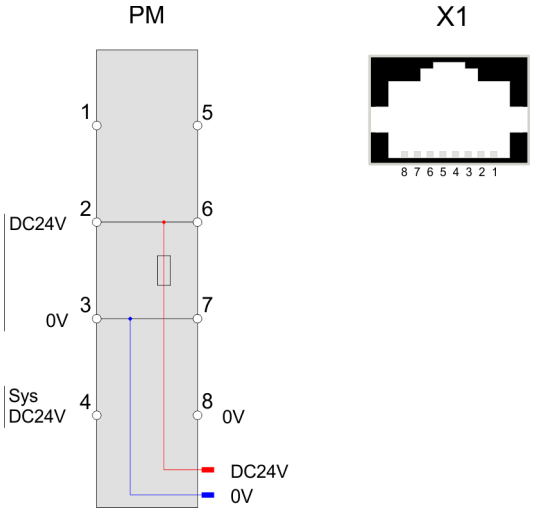
3.2.2 Line extension slave

061-1BA0x

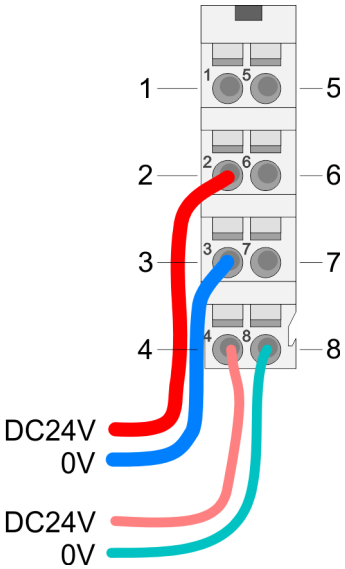


1 Locking lever terminal module
2 Labeling strip line extension
3 LED status indication line extension
4 Labelling strip power module
5 LED status indication power module
6 Backplane bus
7 DC 24V power section supply
8 Power module
9 X1: Line extension
10 Unlocking lever power module
11 Line extension slave
12 Terminal power module

3.2.2.1 Interfaces



PM - Power module



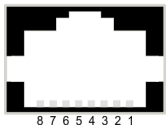
For wires with a core cross-section of 0.08mm² up to 1.5mm².

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 power 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 power supply

I: Input

X1: Line extension

X1



The connection of a superordinate line extension master happens via this interface.

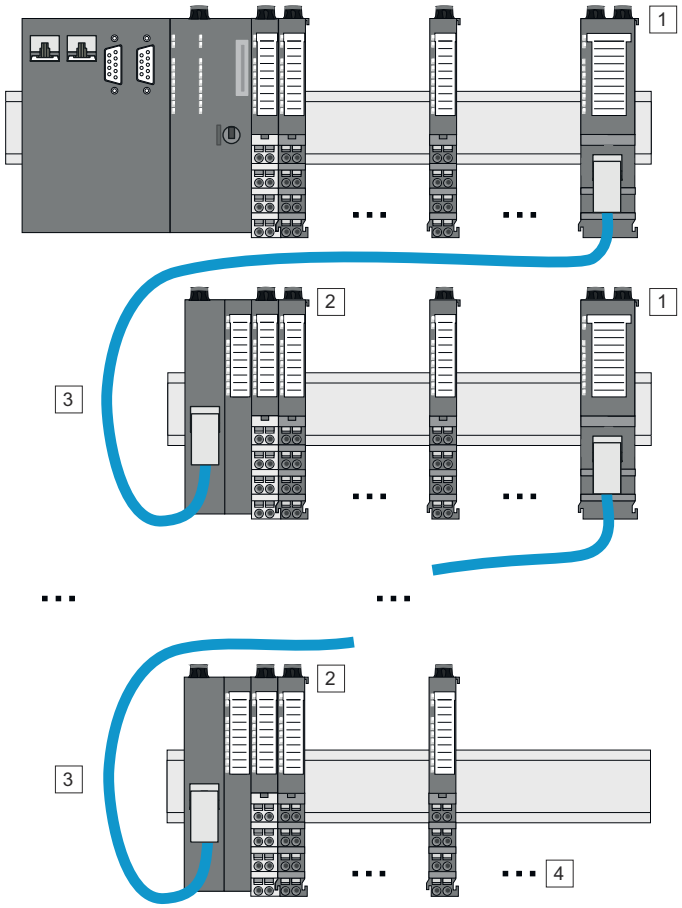
CAUTION

When 06x-1xA00 used - version 1:

- Please use connection cables from Yaskawa for connection. The use of normal Ethernet cable can cause damage!
- The connection cable must not exceed the maximum length of 2m.
- The connection cable between master and slave may be plugged or removed only when the modules are powered off.

When 06x-1xA01 used - version 2:

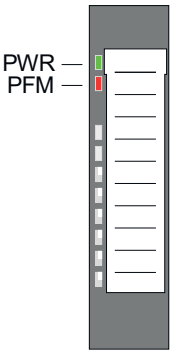
- The use of connection cables from Yaskawa is recommended. You can also use Ethernet cables with the specification S/STP CAT6a or S/FTP CAT6a.
- The connection cable must not exceed the maximum length of 10m.
- The connection cable between master and slave may be plugged or removed only when the modules are powered off.



1 Line extension master
2 Line extension slave
3 Connection cable
4 Depending on the line extension used, the max. number of pluggable modules on the System SLIO bus is reduced accordingly.

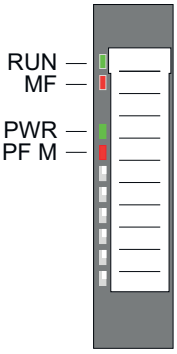
3.2.2.2 LEDs

Line extension slave 061-1BA00 - version 1



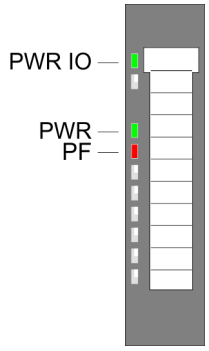
PWR green	PF M red	Description
■	□	The line extension slave is power supplied.
□	■	The power supply of the line extension slave is faulty.

Line extension slave 061-1BA01 - version 2



RUN green	MF red	PWR green	PF M red	Description
■	□	X	X	Bus communication is OK. Module status is OK.
■	■	X	X	Bus communication is OK. Module status reports an error.
□	■	X	X	Bus communication is not possible. Module status reports an error.
□	□	X	X	Error at bus power supply.
X	2Hz	X	X	Error in configuration ➦ *'Trouble shooting - LEDs'...page 29*.
X	X	■	□	Power supply line extension slave is OK.
□	X	■	■	Power supply line extension master reports an error.
not relevant: X				

LEDs power module



PWR IO green	PWR green	PF red	Description
■	X	□	Power section supply OK.
X	■	□	Electronic section supply OK.
X	■	■	Fuse electronic section supply defective.
not relevant: X			

3.3 Mounting and wiring

Please note!

For the mounting of a line extension, there are certain rules that must be observed:

CAUTION

When 06x-1xA00 used - version 1:

- Please use connection cables from Yaskawa for connection. The use of normal Ethernet cable can cause damage!
- The connection cable must not exceed the maximum length of 2m.
- The connection cable between master and slave may be plugged or removed only when the modules are powered off.

When 06x-1xA01 used - version 2:

- The use of connection cables from Yaskawa is recommended. You can also use Ethernet cables with the specification S/STP CAT6a or S/FTP CAT6a.
- The connection cable must not exceed the maximum length of 10m.
- The connection cable between master and slave may be plugged or removed only when the modules are powered off.

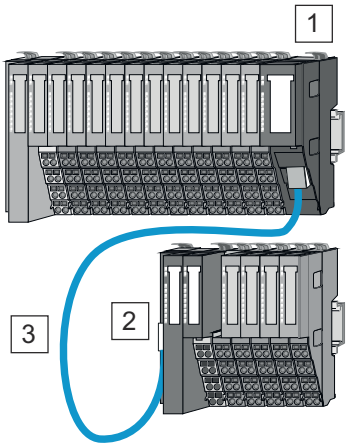
- *By means of the line extension 1 line of modules can be divided to maximum 5 lines.*
- *For each line extension the maximum number of pluggable modules at the System SLIO bus is decreased:*
  - *with 06x-1xA00 by 1 module.*
  - *with 06x-1xA01 by 2 modules.*
- *The line extension master is to be placed at the end of the line.*
- *After the master the line has to start with a line extension slave.*
- *Line extension modules are not considered in the listing of the integrated web page of the coupler or CPU respectively the allocation of the slots.*
- *The usage of additional power modules within a line is allowed.*
- *To use the line extension no special configuration is required.*

➥ *'Mounting line extension'...page 17*

➥ *'Wiring line extension'...page 21*

3.4 Deployment 06x-1xA00 - version 1

Line extension 06x-1xA00



The line extension may only consist of the following components:

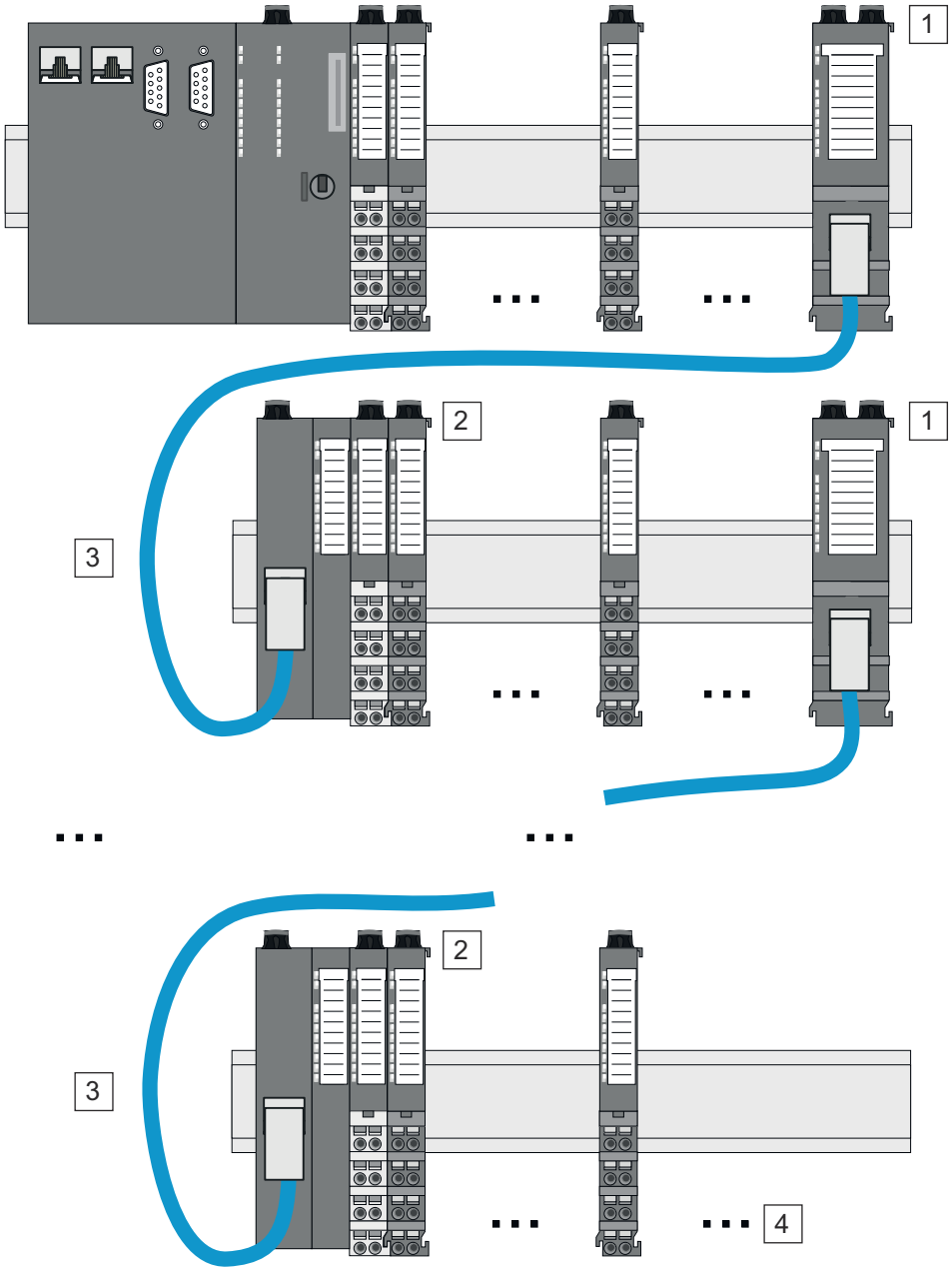
- Line extension master 1: 060-1AA00
- Line extension slave 2: 061-1BA00
- Connection cable 3 from Yaskawa:
  - 950-0KD30: RJ45, length 2m

Please note that mixing master and slave between version 1 and version 2 is not permitted and will lead to malfunctions!

The 06x-1xA00 is supported by the following System SLIO modules

System SLIO component	Order number	from version
CPU 013C	013-CCF0R00	HW: 01
CPU 014	014-CEF0R00	FW: V1.2.20
	014-CEF0R01	HW: 01
CPU 015	015-CEFPR00	FW: V1.2.20
	015-CEFPR01	HW: 01
	015-CEFNR00	HW: 01
CPU 017	017-CEFPR00	HW: 01
PROFIBUS DP slave	053-1DP00	HW: 06
EtherCAT slave	053-1EC01	HW: 01
PROFINET IO slave	053-1PN00	HW: 04
EtherNet/IP slave	053-1IP00	FW: V2.0.12
Modbus/TCP slave	053-1MT00	HW: 03

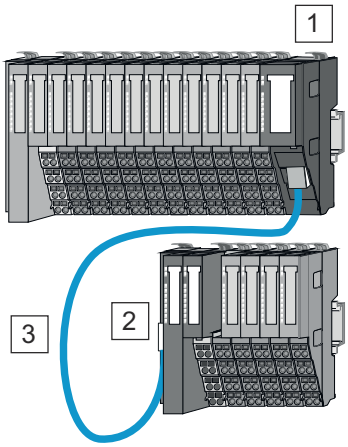
Line extension cabling



1 Line extension master 060-1AA00
2 Line extension slave 061-1BA00
3 Connection cable from Yaskawa with a maximum length of 2m.
4 For each line extension the max. number of pluggable modules is decreased by 1.

3.5 Deployment 06x-1xA01 - version 2

Line extension 06x-1xA01



The line extension may only consist of the following components:

- Line extension master 1: 060-1AA01
- Line extension slave 2: 061-1BA01
- Connection cable 3 from Yaskawa:
  - 950-0KD30: RJ45, length 2m
  - 950-0KD40: RJ45, length 5m
  - 950-0KD50: RJ45, length 10m

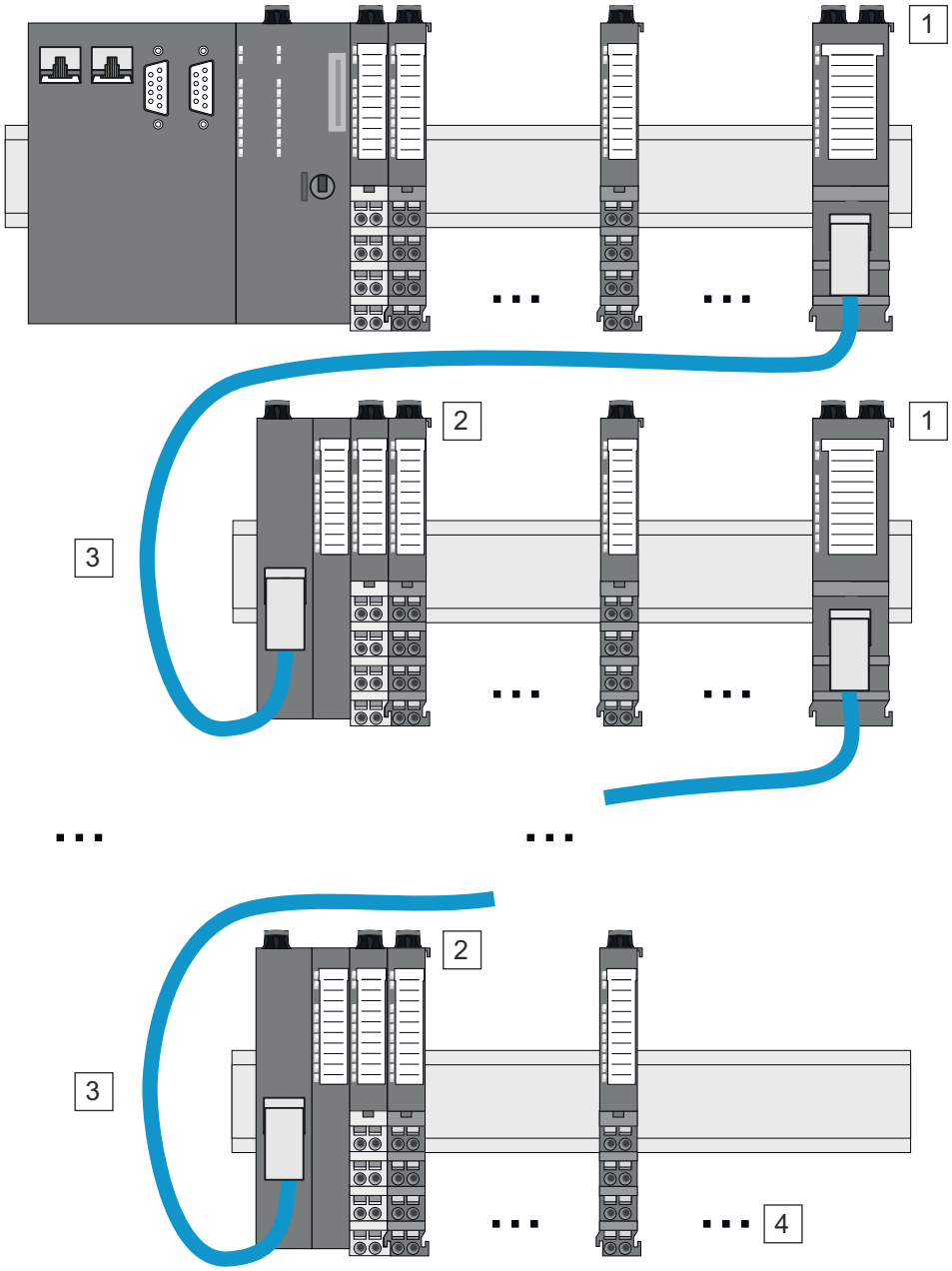
Please note that mixing master and slave between version 1 and version 2 is not permitted and will lead to malfunctions!

The line extension 06x-1xA01 supports isochronous mode and time synchronization functions such as synchronized time stamps in ETS and counter modules. When using synchronization functions, please note that due to delays on the backplane bus, the maximum number of modules is limited to 32 and you may only extend your system with one line extension!

The 06x-1xA01 is supported by the following modules and components:

System SLIO component	Order number	from version
CPU 013C	013-CCF0R00	HW: 01
CPU 014	014-CEF0R01	HW: 02
CPU 015	015-CEFPR01	HW: 02
	015-CEFNR00	HW: 03
CPU 017	017-CEFPR00	HW: 02
CPU 019	019-CEFPM00	HW: 01
EtherCAT slave	053-1EC01	HW: 01
EtherNet/IP slave	053-1IP01	HW: 01
MECHATROLINK-IV coupler	053-1ML40	HW: 01
Modbus/TCP slave	053-1MT01	HW: 01
PROFIBUS DP slave	053-1DP00	HW: 06
PROFINET IO slave	053-1PN01	HW: 01

Line extension cabling



1 Line extension master 060-1AA01
2 Line extension slave 061-1BA01
3 Connection cable from Yaskawa with a maximum length of 10m.
4 For each line extension the max. number of pluggable modules is decreased by 2.

3.6 Technical data

3.6.1 060-1AA00 Line extension master - version 1

Order no.	060-1AA00
Type	IM 060 - Line extension master
Module ID	8080 8080
Technical data power supply	
Power supply (rated value)	DC 5 V
Power supply (permitted range)	-
Reverse polarity protection	-
Current consumption (no-load operation)	50 mA
Current consumption (rated value)	-
Inrush current	-
I^2t	-
Max. current drain at backplane bus	-
Max. current drain load supply	-
Power loss	0.25 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	yes
Service Indicator	none
Group error display	yes
Channel error display	none
Hardware configuration	
Racks, max.	4
Modules per rack, max.	total max. 64 minus number line extensions
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	SLIO
Type of interface	-
Connector	RJ45
Topology	-
Electrically isolated	-

Order no.	060-1AA00
Number of participants, max.	-
Node addresses	-
Transmission speed, min.	-
Transmission speed, max.	-
Address range inputs, max.	-
Address range outputs, max.	-
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	25.8 mm x 109 mm x 76.5 mm
Net weight	53 g
Weight including accessories	53 g
Gross weight	68 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes
UKCA certification	yes
ChinaRoHS certification	yes

3.6.2 060-1AA01 Line extension master - version 2

Order no.	060-1AA01
Type	IM 060 - Line extension master
Module ID	8081 8080
Technical data power supply	
Power supply (rated value)	DC 5 V
Power supply (permitted range)	-
Reverse polarity protection	-
Current consumption (no-load operation)	-
Current consumption (rated value)	40 mA
Inrush current	-
I^2t	-
Max. current drain at backplane bus	-
Max. current drain load supply	-
Power loss	0.2 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	yes
Service Indicator	none
Group error display	yes
Channel error display	none
Hardware configuration	
Racks, max.	5
Modules per rack, max.	total max. 64 minus 2x number line extensions
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	SLIO
Type of interface	-
Connector	RJ45
Topology	-
Electrically isolated	-
Number of participants, max.	-

Order no.	060-1AA01
Node addresses	-
Transmission speed, min.	-
Transmission speed, max.	-
Address range inputs, max.	-
Address range outputs, max.	-
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	25.8 mm x 109 mm x 76.5 mm
Net weight	53 g
Weight including accessories	53 g
Gross weight	68 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-40 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes
UKCA certification	yes
ChinaRoHS certification	yes

3.6.3 061-1BA00 Line extension slave - version 1

Order no.	061-1BA00
Type	IM 061 - Line extension slave
Module ID	-
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	10 mA
Current consumption (rated value)	0.95 A
Inrush current	3.9 A
I^2t	0.14 A^2s
Max. current drain at backplane bus	2 A
Max. current drain load supply	10 A
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	yes
Service Indicator	none
Group error display	yes
Channel error display	none
Hardware configuration	
Racks, max.	4
Modules per rack, max.	total max. 64 minus number line extensions
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	SLIO
Type of interface	-
Connector	RJ45
Topology	-
Electrically isolated	-
Number of participants, max.	-

Order no.	061-1BA00
Node addresses	-
Transmission speed, min.	-
Transmission speed, max.	-
Address range inputs, max.	-
Address range outputs, max.	-
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	48.5 mm x 109 mm x 76.5 mm
Net weight	155 g
Weight including accessories	155 g
Gross weight	172.5 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes
UKCA certification	yes
ChinaRoHS certification	yes

3.6.4 061-1BA00 Line extension slave - version 2

Order no.	061-1BA01
Type	IM 061 - Line extension slave
Module ID	8082 8080
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	40 mA
Current consumption (rated value)	0.75 A
Inrush current	4.2 A
I^2t	0.12 A^2s
Max. current drain at backplane bus	3 A
Max. current drain load supply	10 A
Power loss	2.8 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	yes
Service Indicator	none
Group error display	yes
Channel error display	none
Hardware configuration	
Racks, max.	5
Modules per rack, max.	total max. 64 minus 2x number line extensions
Number of digital modules, max.	-
Number of analog modules, max.	-
Communication	
Fieldbus	SLIO
Type of interface	-
Connector	RJ45
Topology	-
Electrically isolated	-
Number of participants, max.	-

Order no.	061-1BA01
Node addresses	-
Transmission speed, min.	-
Transmission speed, max.	-
Address range inputs, max.	-
Address range outputs, max.	-
Number of TxPDOs, max.	-
Number of RxPDOs, max.	-
Housing	
Material	PPE / PPE GF10
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	48.5 mm x 109 mm x 76.5 mm
Net weight	155 g
Weight including accessories	155 g
Gross weight	170 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-40 °C to 70 °C
Certifications	
UL certification	yes
KC certification	yes
UKCA certification	yes
ChinaRoHS certification	yes