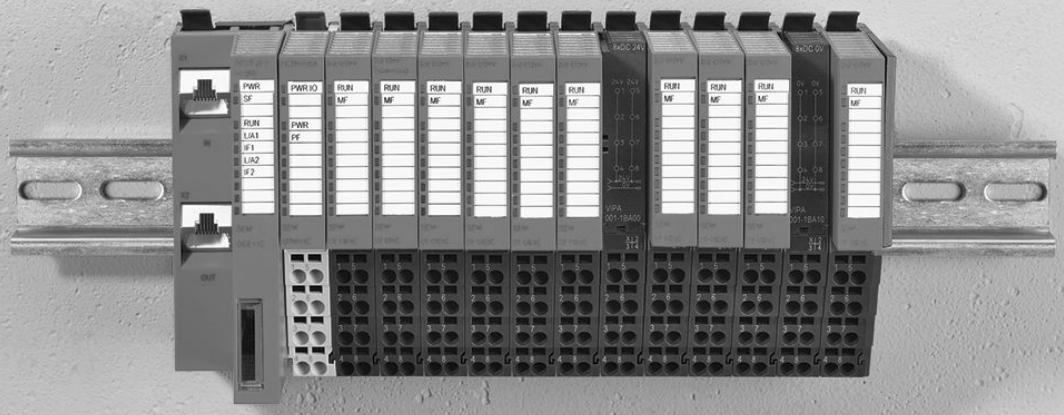
SEW EURODRIVE

Manual



MOVI-PLC® I/O System C

Edition 11/2014

21276595/EN

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1 General information

1.1 About this documentation

The manual is part of the product and contains important information on operation and service. The manual is written for all employees who assemble, install, start up, and service the product.

The manual must be accessible and legible. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the manual carefully and understood it. If you are unclear about any of the information in this documentation or require further information, please contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

The following table shows the grading and meaning of the signal words for safety notes.

Signal word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent hazard	Severe or fatal injuries.
⚠ **WARNING**	Possible dangerous situation	Severe or fatal injuries
⚠ **CAUTION**	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the drive system or its environment.
INFORMATION	Useful information or tip: Simplifies handling of the drive system.	

1.2.2 Structure of section-specific warning instructions

Section-specific warning instructions do not apply to a specific action, but to several actions pertaining to the one area. The hazard symbols used either indicate a general hazard or a specific hazard.

Section-specific warning messages are structured as follows:

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent hazard.

Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard

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Hazard symbol	Meaning
	Warning of dangerous electrical voltage
	DANGER! HOT SURFACES
	Warning of risk of crushing
	Warning of suspended load
	Warning of automatic restart

1.2.3 Structure of embedded warning instructions

Embedded warning notes are included in the instructions directly just before the description of the dangerous action.

Embedded warning instructions are structured as follows:

- ⚠ **SIGNAL WORD** Type and source of hazard.

  Possible consequence(s) if disregarded.

  – Measure(s) to prevent hazard.

1.3 Rights to claim under warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the MOVI-PLC® documentation. Therefore, read the manual before you start operating the device.

Make sure that the manual is available to persons responsible for the plant and its operation, as well as to persons who work independently on the device. You must also ensure that the documentation is legible.

1.4 Exclusion of liability

You must comply with the information contained in the MOVI-PLC® documentation to ensure safe operation of the MOVI-PLC® controller and to achieve the specified product and performance characteristics. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

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1.5 Other applicable documentation

- Installation and startup only by electrical specialists observing the relevant accident prevention regulations and the following documents:
  - DHE41B/DHF41B/DHR41B controller (advanced) manual
  - DHE21B/DHF21B/DHR21B controller (standard) manual
  - UHX71B controller (performance class power) manual
  - MOVI-PLC® programming in the PLC Editor system manual
  - MultiMotion for MOVI-PLC®
  - MOVIFIT® FDC decentralized drive controller operating instructions
- Read the publications carefully before commencing installation and startup of the MOVI-PLC® I/O system C.
- As a prerequisite to fault-free operation and fulfillment of warranty claims, you must adhere to the information in the documentation.

1.6 Product names and trademarks

All product names included in this documentation are trademarks or registered trademarks of the respective titleholders.

1.7 Copyright notice

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2 Safety notes

2.1 General

The following basic safety notes are intended to prevent injury to persons and damage to property. The user must ensure that the basic safety notes are read and observed.

Ensure that persons responsible for the machinery and its operation as well as persons who work independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation or if you require further information, please contact SEW-EURODRIVE.

The following safety notes refer to the use of the software. Also observe the supplementary safety notes in this documentation and in the documentation for the connected units from SEW-EURODRIVE.

This document does not replace the detailed documentation for the connected units. This documentation assumes that the user has access to and is familiar with the documentation for all connected units from SEW-EURODRIVE.

Never install or operate damaged products. Report any damage to the shipping company immediately.

Depending on the degree of protection, units may have live, uninsulated, and sometimes moving or rotating parts, as well as hot surfaces during operation.

Removing required covers without authorization, improper use or incorrect installation and operation may result in severe injury to persons, or damage to machinery. Consult the documentation for further information.

2.2 Target group

Work with the software in this solution may only be performed by adequately qualified personnel. Qualified personnel in this context are persons who have the following qualifications:

- Appropriate training in their relevant field.
- Knowledge of this documentation and other applicable documentation.
- SEW-EURODRIVE recommends additional product training for products that are operated using this software.

All mechanical work on connected units is to be performed exclusively by adequately qualified personnel. Qualified personnel in the context of this documentation are persons familiar with the design, mechanical installation, troubleshooting and servicing of the product, who possess the following qualifications:

- Training in mechanical engineering, e.g. as a mechanic or mechatronics technician (final examinations must have been passed).
- Knowledge of this documentation and other applicable documentation.

All electrical work on connected units is to be performed exclusively by adequately qualified electricians. Qualified electricians in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting and servicing of the product, who possess the following qualifications:

- Training in electrical engineering, e.g. as an electrician or mechatronics technician (final examinations must have been passed).
- Knowledge of this documentation and other applicable documentation.

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- Knowledge of the relevant safety regulations and laws.
- Knowledge of all other standards, directives and laws named in this documentation.

The above-mentioned persons must have the express authorization of the company to operate, program, configure, label and ground units, systems and circuits in accordance with the standards of safety technology.

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately.

2.3 Designated use

2.3.1 MOVI-PLC® I/O system C

The MOVI-PLC® I/O system C must only be used for the MOVI-PLC® controller. The MOVI-PLC® I/O system C is an I/O system with a modular structure for installation on a 35 mm mounting rail. You can adapt this system precisely to your automation tasks with the 2,4 and 8-channel peripheral modules.

2.3.2 Power supply module OPM11C

The power supply module OPM11C has been designed and produced:

- For installation together with MOVI-PLC® I/O system C components on a mounting rail
- For installation in a control cabinet with sufficient ventilation
- For industrial use

2.4 Safety notes for bus systems

You are now in possession of a communication system that lets you adapt, within a wide range, the MOVI-PLC®controller, MOVI-PLC® I/O system C and the controlled inverters to your specific system. As with all bus systems, there is a danger of invisible, external (as far as the inverter is concerned) modifications to the parameters which give rise to changes in the unit behavior. This may result in unexpected (not uncontrolled) system behavior.

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2.5 Safety notes for the power supply module OPM11C

- The power supply module must only be installed in areas that are only accessible to service engineers.
- The power supply module is not permitted to be used in potentially explosive atmospheres (EX zone).
- It is imperative that the power supply module is enabled prior to commencing installation and maintenance work:
  - Disconnect the supply voltage before working on the voltage supply or on the incoming cable.
  - Pull out the power plug.
  - Switch off the associated fuse if permanently connected.
- Connections and changes may only be carried out by trained electrical specialists.
- It is not possible to guarantee sufficient cooling of contact and fire protection due to the compact design. For this reason, fire protection is to be ensured by means of the environment of the power supply installed, e.g. through installation in a control cabinet which complies with fire safety regulations.
- Adhere to national regulations and guidelines in the respective country of use (installation, preventive measures, EMC, etc.).

2.6 Safety functions

The MOVI-PLC® controller and the MOVI-PLC® I/O system C must not perform any safety functions. Use only those components in safety applications that were explicitly delivered in this design by SEW-EURODRIVE.

2.7 Transport

Inspect the shipment for transport damage as soon as you receive the delivery. Inform the shipping company immediately of any damage. If necessary, put startup on hold. Note the following points regarding transport:

- Ensure that the unit is not subjected to mechanical impact during transportation.
- Observe the notes on the climatic conditions in the "Technical data" chapter.

2.8 Storage

Observe the notes on storage temperature in chapter "Technical data".

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2.9 Installation / assembly

Ensure that the unit is installed and cooled according to the regulations in the related documentation.

Protect the unit from excessive strain. Especially during transportation and handling, do not allow the components to be deformed or insulation spaces altered. Electrical components must not be mechanically impaired or irreparably damaged.

The following applications are prohibited unless explicitly permitted:

- Use in potentially explosive atmospheres,
- Use in environments exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.
- Use in applications that are subject to mechanical vibration and shock loads in excess of the requirements in EN 61800-5-1.

Observe the notes in the "Mechanical Installation" chapter.

2.10 Electrical connection

Observe the applicable national accident prevention regulations when working on a live unit.

Perform electrical installation according to the pertinent regulations (e.g. cable cross-sections, fusing, protective contactor connection). The documentation contains additional notes.

Preventive measures and protection devices must meet the applicable regulations (e.g. EN 60204-1 or EN 61800-5-1).

2.11 Startup / operation

Do not deactivate the monitoring and protection devices, even during the test run.

When in doubt, switch off the unit whenever changes occur compared with normal operation (e.g. increased temperatures, noise, oscillation). Determine the cause of the fault and, if necessary, contact SEW-EURODRIVE.

Where required, systems in which such units are installed must be equipped with additional monitoring and protection devices in accordance with the respective applicable safety regulations, e.g. the law governing technical equipment, accident prevention regulations, etc.

Additional preventive measures may be necessary for applications with increased hazard potential. You must check the functionality of protection devices each time you change the configuration.

Connections that are not being used must be covered with the supplied protection caps during operation.

The fact that the operation LED and other display elements are no longer illuminated does not indicate that the unit has been disconnected from the supply system.

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2.12 Inspection/maintenance

INFORMATION

Only SEW-EURODRIVE is authorized to carry out repairs.

2.13 Disposal

Observe the applicable national regulations.

Dispose of the following materials separately in accordance with the country-specific regulations in force:

- Electronics scrap
- Plastic
- Sheet metal
- Copper

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3 System description

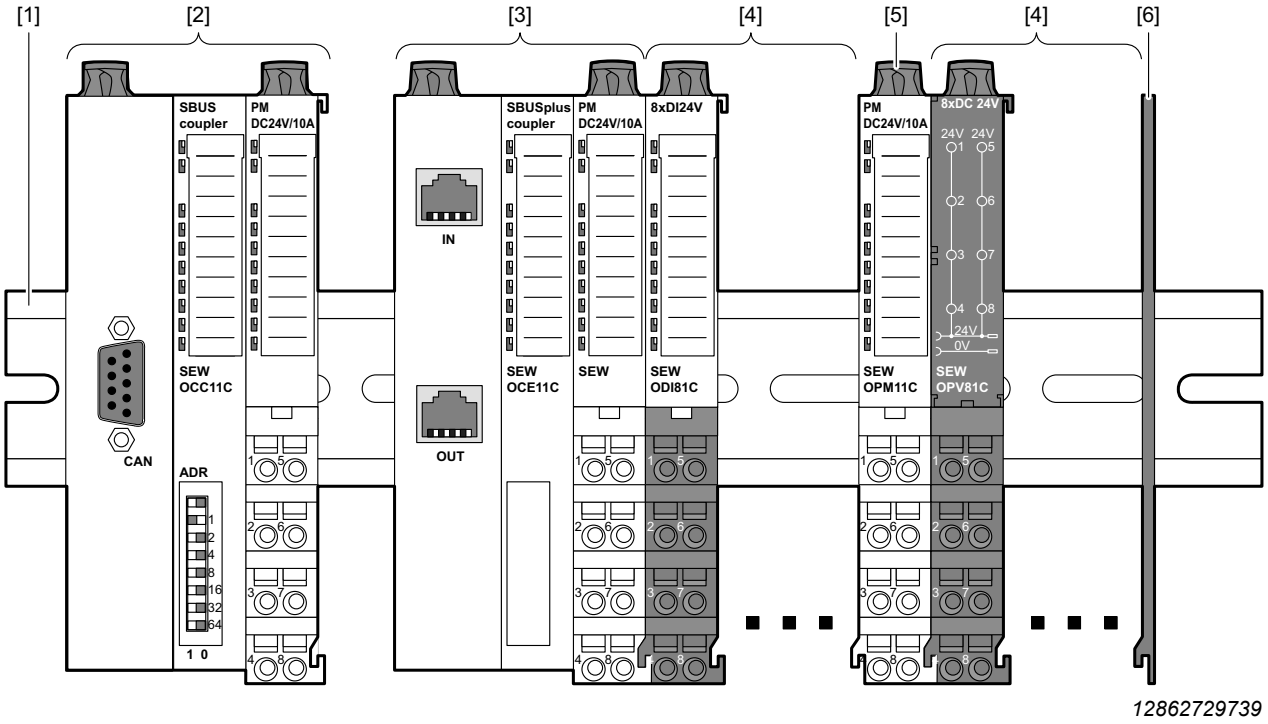
3.1 MOVI-PLC® I/O system C

The MOVI-PLC® I/O system C is an automation system with a modular structure for installation on a 35 mm mounting rail.

The modular MOVI-PLC® I/O system C extends the interfaces of the MOVI-PLC® controller.

A MOVI-PLC® I/O system C contains a bus coupler (CAN bus coupler or EtherCAT® bus coupler) to which up to 64 I/O modules can be connected via the backplane bus. The bus couplers communicate with the MOVI-PLC® controller via system buses. Up to 64 MOVI-PLC® I/O systems can be connected depending on the controller type. This means the MOVI-PLC® controller can automatically access a large number of inputs and outputs.

You can adapt this system precisely to your automation tasks using the 2, 4 and 8-channel peripheral modules. The DC 24 V voltage supply is integrated in the backplane bus. This means that you can exchange defective electronics modules when the wiring is upright. You can define further potential areas inside the system for the DC 24 V voltage supply using the differently colored power supply modules.



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[1] 35 mm mounting rail
[2] CAN bus coupler OCC11C
[3] EtherCAT® bus coupler OCE11C
[4] Peripheral modules
[5] Power supply module OPM11C
[6] Bus cover

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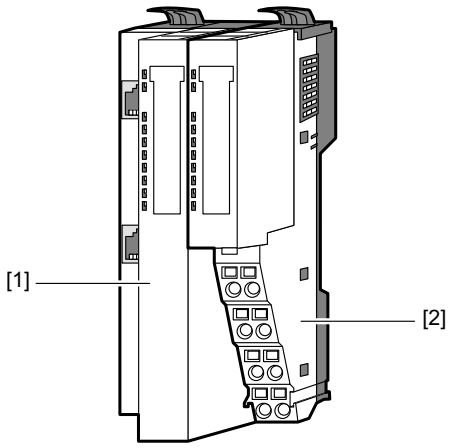
3.2 Components

The MOVI-PLC® I/O system C consists of the following components:

- Bus coupler
- Peripheral modules
- Power supply modules
- Accessories

3.2.1 Bus coupler



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[1] Bus interface
[2] Power supply module

The bus coupler is comprised of a bus interface [1] and a power supply module [2], which are integrated into a housing.

Up to 64 peripheral modules can be installed on the bus coupler. They are connected to each other via the backplane bus and are supplied with voltage in this way.

The bus interface offers a connection to a higher level bus system. The bus interface and the electronics of the connected peripheral modules are supplied with voltage (DC 24 V electronics supply) via the power supply module.

The DC 24 V voltage supply for the connected peripheral modules is by means of a further connection on the power supply module.

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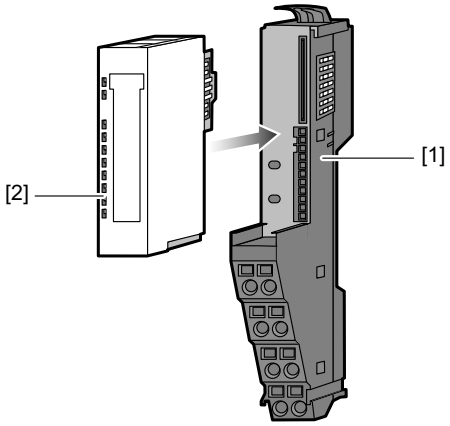
3.2.2 Peripheral modules



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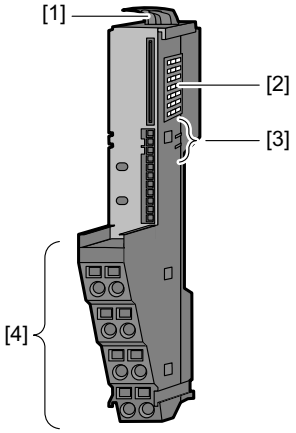
[1] Base module
[2] Electronics module

Each peripheral module is comprised of a base module [1] and an electronics module [2].

Base module



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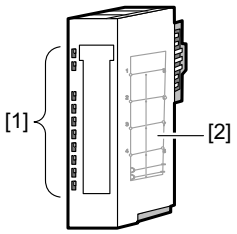
[1] Locking lever
[2] Backplane bus
[3] DC 24 V voltage supply
[4] Terminal block for the wiring

The base module serves as the holder for the electronics module and contains the following components:

- Backplane bus with voltage supply for the electronics [2]
- Connection to the DC 24 V voltage supply [3]
- Staircase-shaped terminal block for the wiring [4]
- Locking lever for attaching the module to a mounting rail [1]

With this locking system, you can set up your MOVI-PLC® I/O system C outside of your control cabinet and subsequently install it in the control cabinet as a complete system. For installation and disassembly, lift up the locking lever until it audibly locks in place.

Electronics module



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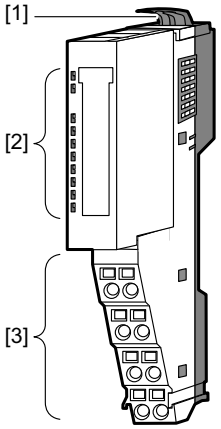
[1] Status LEDs
[2] Wiring diagram

The functionality of a peripheral module is defined via the electronics module. The electronics module is connected to the base module by a secure sliding mechanism.

In the event of an error, you can exchange the defective electronics module for a fully functional module. The wiring is not changed by this. Only modules, which may be combined, can be installed via an integrated factory coding of the electronics modules.

Status LEDs for the status display are located on the front. For easy wiring you can find appropriate wiring diagrams on the side of each electronics module.

3.2.3 Power supply module



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[1] Locking lever
[2] Status LEDs
[3] Terminal block for wiring

Power supply modules provide the voltage supply in the MOVI-PLC® I/O system C. These are either integrated in the bus coupler or they can be installed between the peripheral modules. You can define potential groups of the DC 24 V voltage supply for each power supply module. The power supply modules are of a different color to the peripheral modules so they can be identified more easily.

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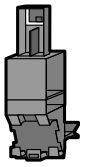
3.2.4 Shield bus carrier



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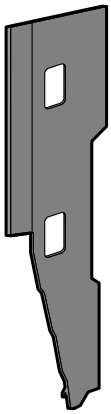
The shield bus carrier is used to pick up shield buses (10 mm x 3 mm) for the connection of cable shields.

The shield bus carrier is connected to the base module below the terminal block. You must remove the spacer on the shield bus carrier for flat mounting rails.

Shield bus carrier, shield bus and cable shield fastening parts are not included in the scope of delivery. They are only available as accessories.

3.2.5 Bus cover



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A bus cover is included in the scope of delivery for each bus coupler in order to protect the bus contacts. You must remove the bus cover on the bus coupler prior to installation. Always install the bus cover on the outermost module in order to protect the bus contacts.

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3.3 Scope of delivery

3.3.1 Bus coupler

Type	Part number
OCC11C SBus (CAN bus)	28212029
OCE11C SBus^{PLUS} (EtherCAT®)	28212037

3.3.2 Terminal modules

Type	Part number
OPV81C	28211847
OPV82C	28211855
OPV41C	28211863

3.3.3 Power supply module

Type	Part number
OPM11C	28211871

3.3.4 Digital input modules

Type	Part number
ODI24C	28211898
ODI42C	28211901
ODI43C	28211928
ODI81C	28211936

3.3.5 Digital output module

Type	Part number
ODO81C	28211944

3.3.6 Analog input modules

Type	Part number
OAI41C	28211960
OAI42C	28211952
OAI44C	28211979
OAI45C	28211987

3.3.7 Analog output modules

Type	Part number
OAO41C	28211995

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Type	Part number
OAO42C	28212002

3.3.8 RS422/485 interface

Type	Part number
ORS11C	28212010

3.4 Accessories

3.4.1 Shield bus carrier

Type	Part number
OZS11C	28212053

3.4.2 Bus cover

Type	Part number
OZB11C	28212045

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4 Mechanical installation

4.1 Safety notes

NOTICE

Plugging in or removing a live I/O module.

Damage to the I/O module.

- Switch off the voltage supply before you plug in or remove an I/O module.

4.2 Mounting position

You can install a maximum of 64 I/O modules vertically or horizontally. You can also add terminal modules.

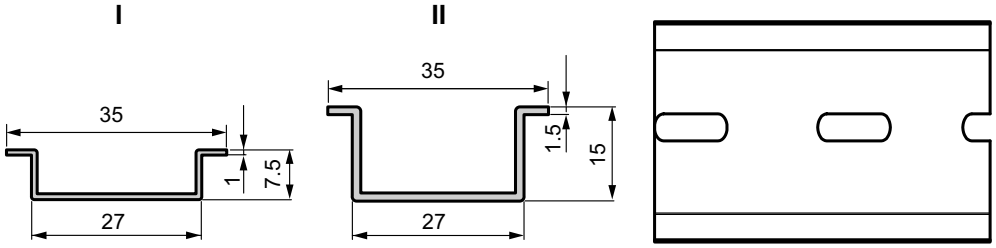
Observe the permitted ambient temperatures:

- Vertical installation: Ambient temperature of 0 °C to +60 °C
- Horizontal installation: Ambient temperature of 0 °C to +60 °C

4.3 Dimension drawings

Mounting rail

You can use the following 35 mm standard profile rail for installation.



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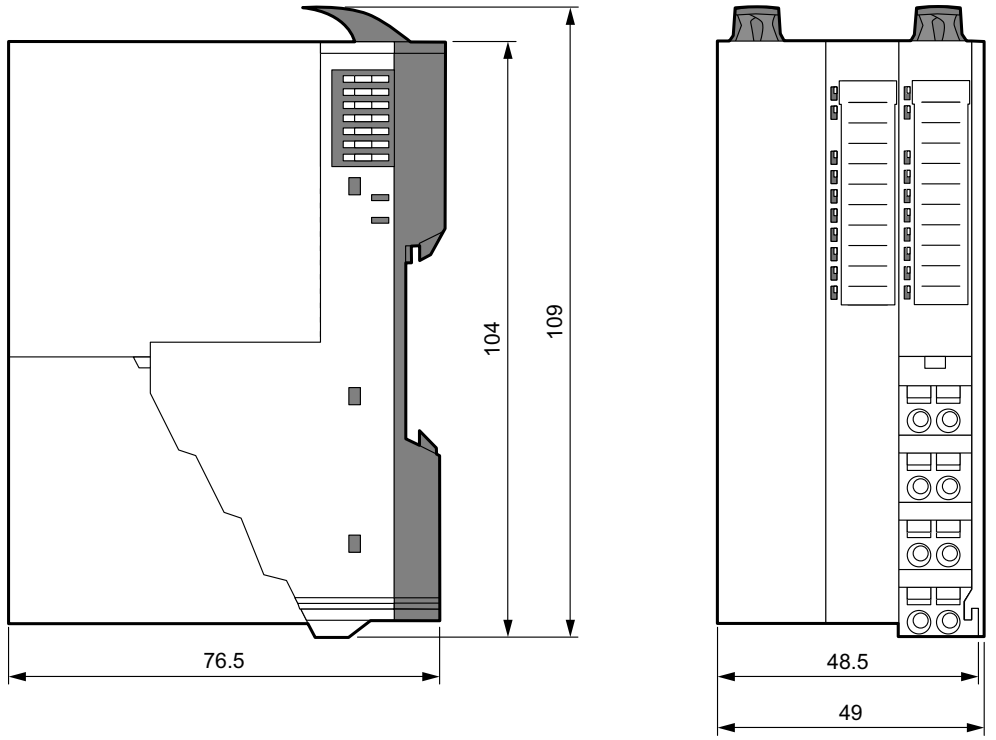
Bus coupler



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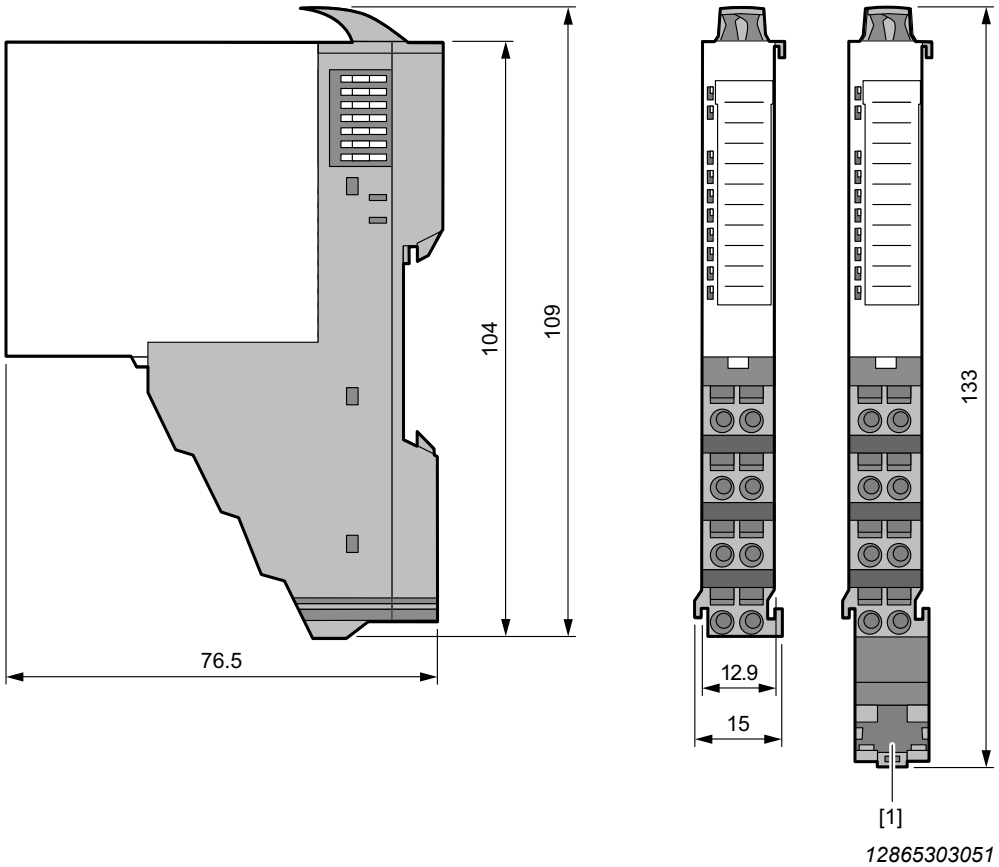
Peripheral module



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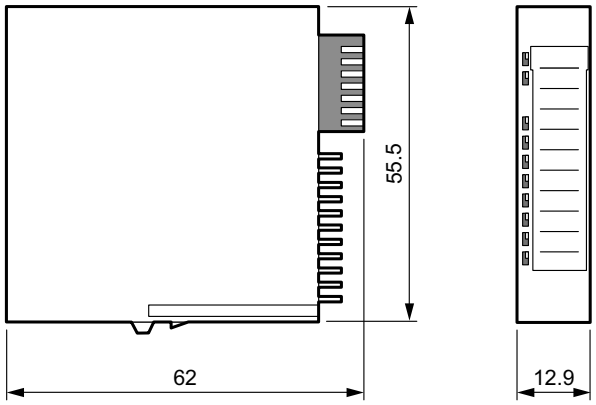
[1] With shield bus carrier

Electronics module



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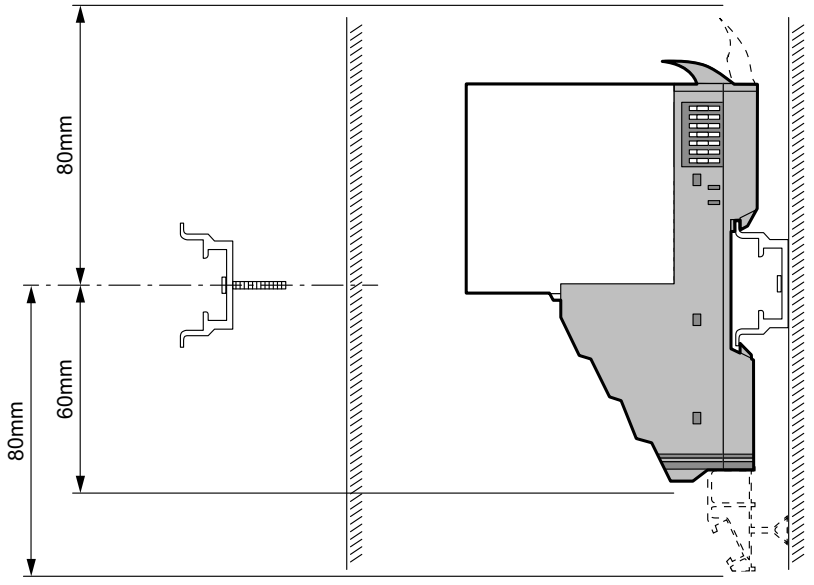
4.4 Installation clearance

Maintain the following distances from the center of the mounting rail for the installation of components:

- From the top: at least 80 mm
- From the bottom: at least 60 mm
- From the bottom (when using the shield bus carrier): at least 80 mm



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4.5 Assembly

NOTICE

Plugging in or removing a live I/O module.

Damage to the I/O module.

- Switch off the voltage supply before you plug in or remove an I/O module.

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NOTICE

Total current of the electronics supply

Damage to the I/O module.

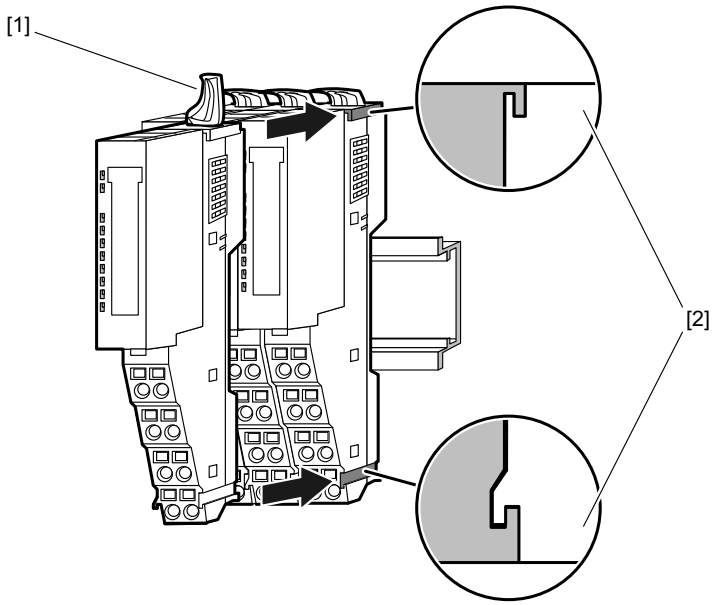
- Ensure that the total current of the electronics supply does not exceed the maximum value of 3 A (current consumption of the electronics modules, see technical data).

Principle of installation

The modules can either be installed individually or as a block on the mounting rail.

Note the following installation notes:

- Each locking lever [1] must be opened.
- The modules are installed on the mounting rail via the guide rails [2].



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[1] Locking lever
[2] Guide rails

Installing the mounting rail

Proceed as follows:

1. Adhere to the following installation clearances from the center of the mounting rail:
   - From the top: at least 80 mm
   - From the bottom: at least 60 mm
   - From the bottom (when using the shield bus carrier): at least 80 mm
2. Install the mounting rail.

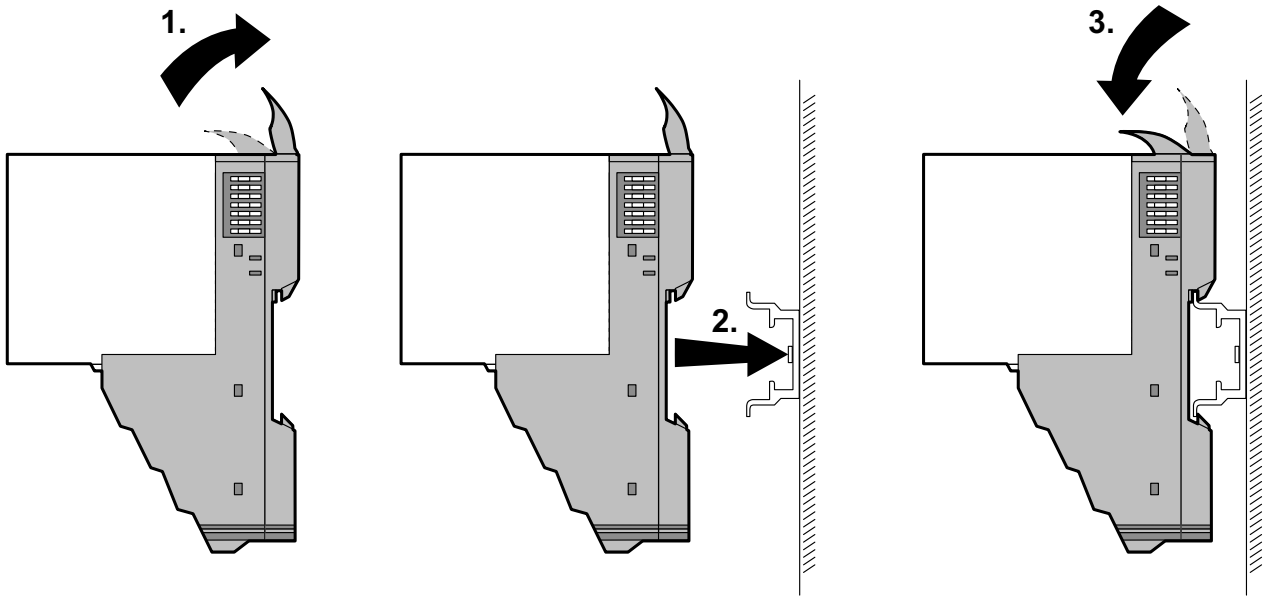
Installing the module

Proceed as follows:

✓ The mounting rail has been installed.

1. Start with the bus coupler at the left and plug in the required I/O modules and terminal modules to the right of the bus coupler.

2. Lift up the locking lever of the base module until it audibly locks in place (see the following figure, step 1).
3. Insert the module to be installed into the previously installed module (see the following figure, step 2).
4. Push the module over the guide rails onto the mounting rail.
5. Pull down the locking lever to secure the module on the mounting rail (see the following figure, step 3).



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⇨ The module has been installed.

4.5.1 Installing the bus coupler

Proceed as follows:

✓ The mounting rail has been installed.

1. Start with the installation of the bus coupler on the left side of the mounting rail.
2. Lift up the two locking levers of the bus coupler (see the following figure, step 1).
3. Insert the bus coupler into the mounting rail (see the following figure, step 2).
4. Pull down the locking lever to secure the bus coupler on the mounting rail (see the following figure, step 3).

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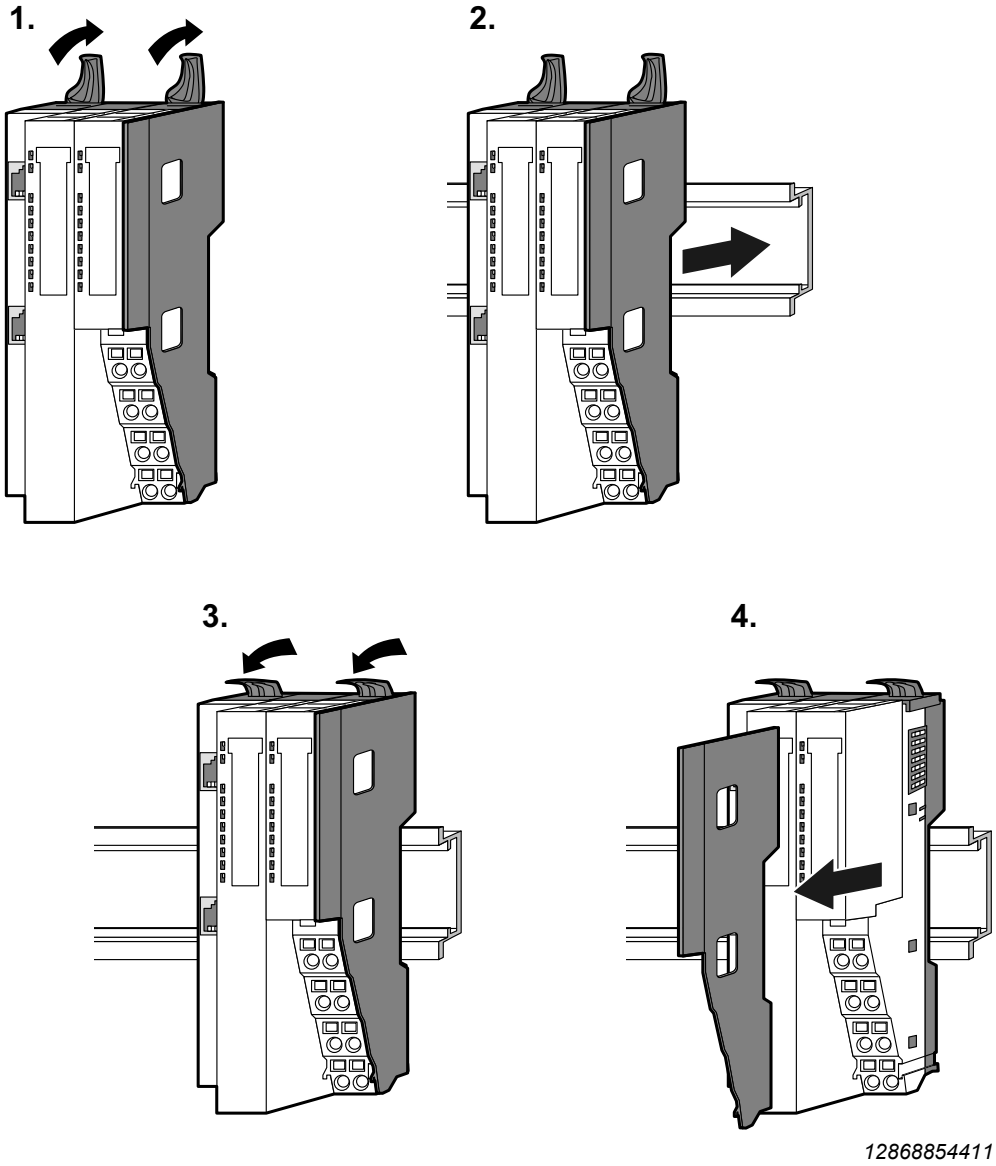
5. Prior to installation of the peripheral modules, remove the bus cover from the right side of the bus coupler by pulling it forward (see the following figure, step 4).
6. Keep the bus cover for subsequent installation.



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⇨ The bus coupler has been installed.

4.5.2 Installing the peripheral modules

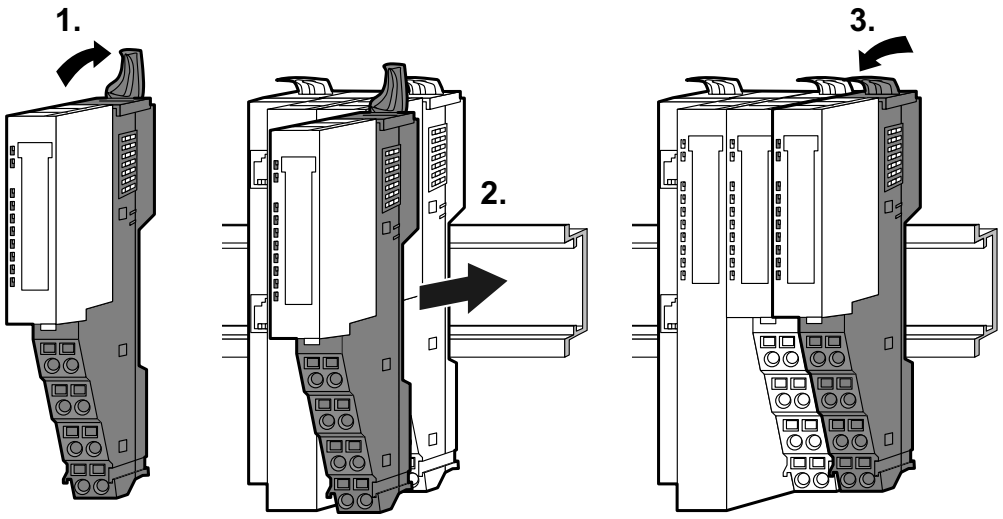
Proceed as follows:

✓ The bus coupler has been installed.

✓ The bus cover on the right side of the bus coupler has been removed.

1. Lift up the locking lever of the base module until it audibly locks in place (see the following figure, step 1).
2. Insert the module to be installed into the previously installed module.
3. Push the module over the guide rails onto the mounting rail (see the following figure, step 2).

4. Pull down the locking lever to secure the module on the mounting rail (see the following figure, step 3).
5. Install the other modules in the same way.



12868859787

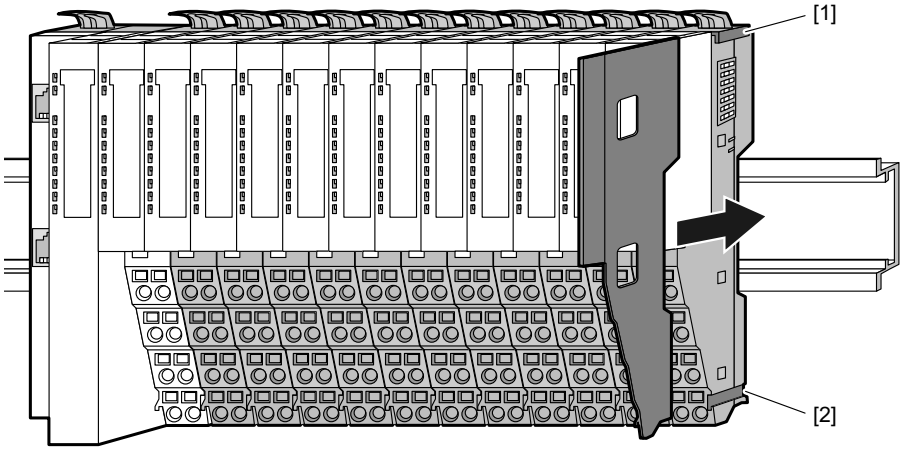
⇨ The peripheral modules have been installed.

4.5.3 Installing the bus cover

Proceed as follows:

✓ Your complete system has been installed.

1. In order to protect the bus contacts, push the bus cover across the guide rails on to the outermost module.



12868863883

[1] Guide rail top
[2] Guide rail bottom

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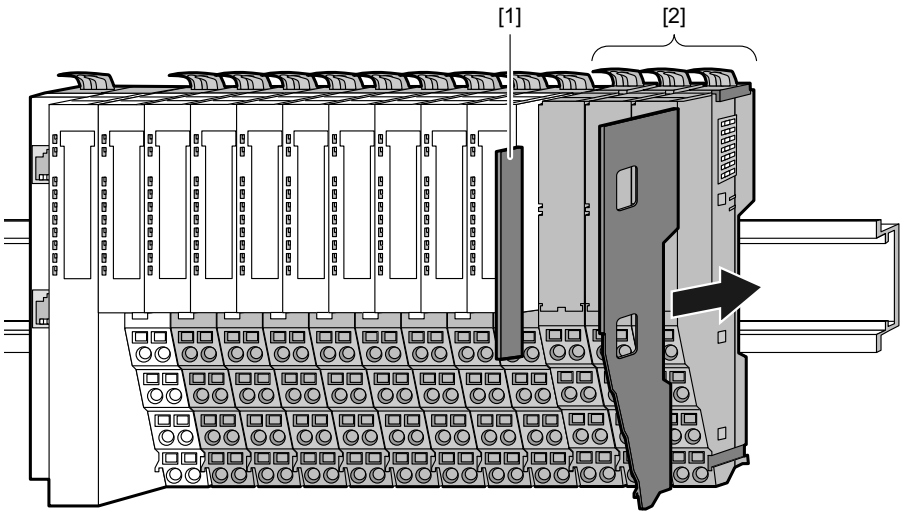
2. If the outermost module is a terminal module, you must remove the upper part of the bus cover [1].



12868868619

[1] Upper part of the bus cover
[2] Terminal modules

⇨ The bus cover has been installed.

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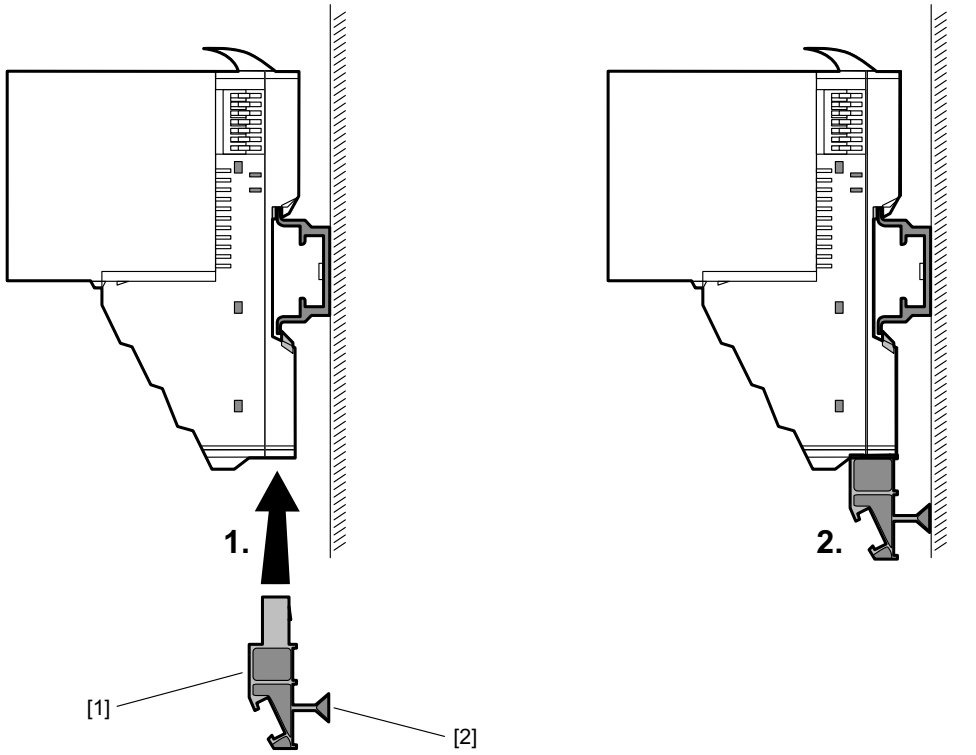
4.5.4 Installing the shield bus carrier

Proceed as follows:

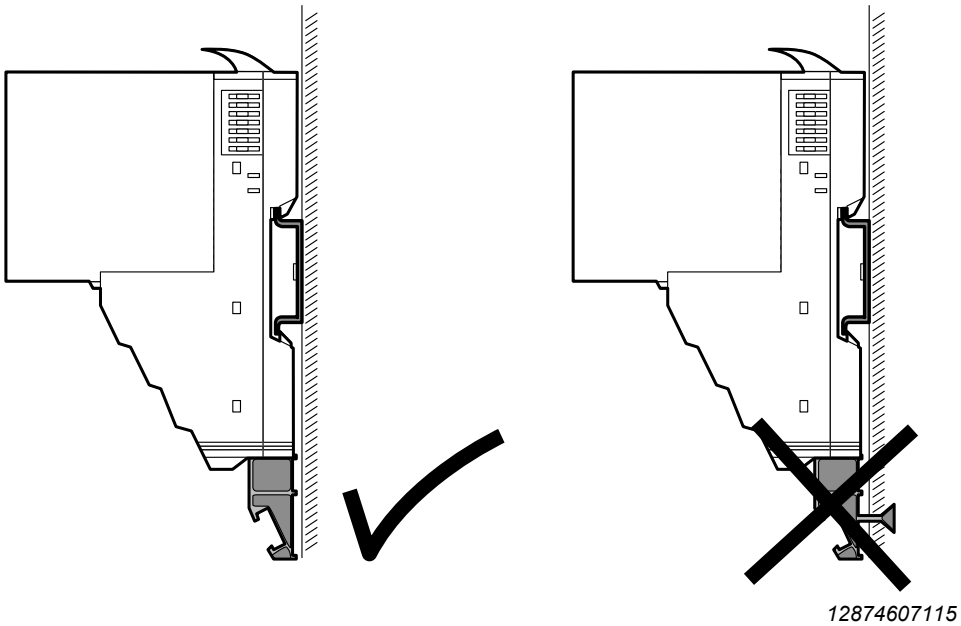
1. Insert the shield bus carrier [1] into the base module below the terminal block until it audibly locks in place.



12874604043

[1] Shield bus carrier
[2] Spacers

2. For flat mounting rails, remove the spacer [2] from the shield bus carrier.



12874607115

⇨ The shield bus carrier has been installed.

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4.6 Disassembly

NOTICE

Plugging in or removing a live I/O module.

Damage to the I/O module.

- Switch off the voltage supply before you plug in or remove an I/O module.

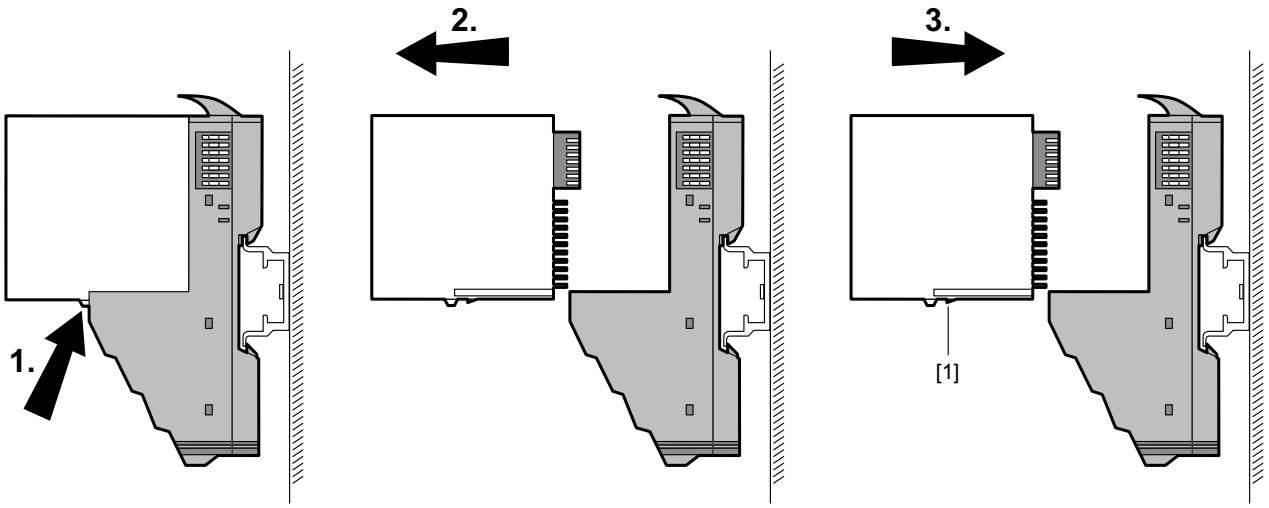
For disassembly and for the exchange of a module, a bus coupler or a module group, you must always remove the electronics module located to the right of it for technical reasons relating to installation. You can re-insert this once installation has been completed.

4.6.1 Exchanging the electronics module

Proceed as follows:

1. Press the releasing device on the bottom of the electronics module (see the following figure, step 1).
2. Remove the electronics module to be exchanged by pulling it forward (see the following figure, step 2).

   ⇨ The electronics module has been disassembled.
3. Push the new electronics module into the guide rail until it audibly locks into place on the base module (see the following illustration, step 3).



12874613131

[1] Releasing device

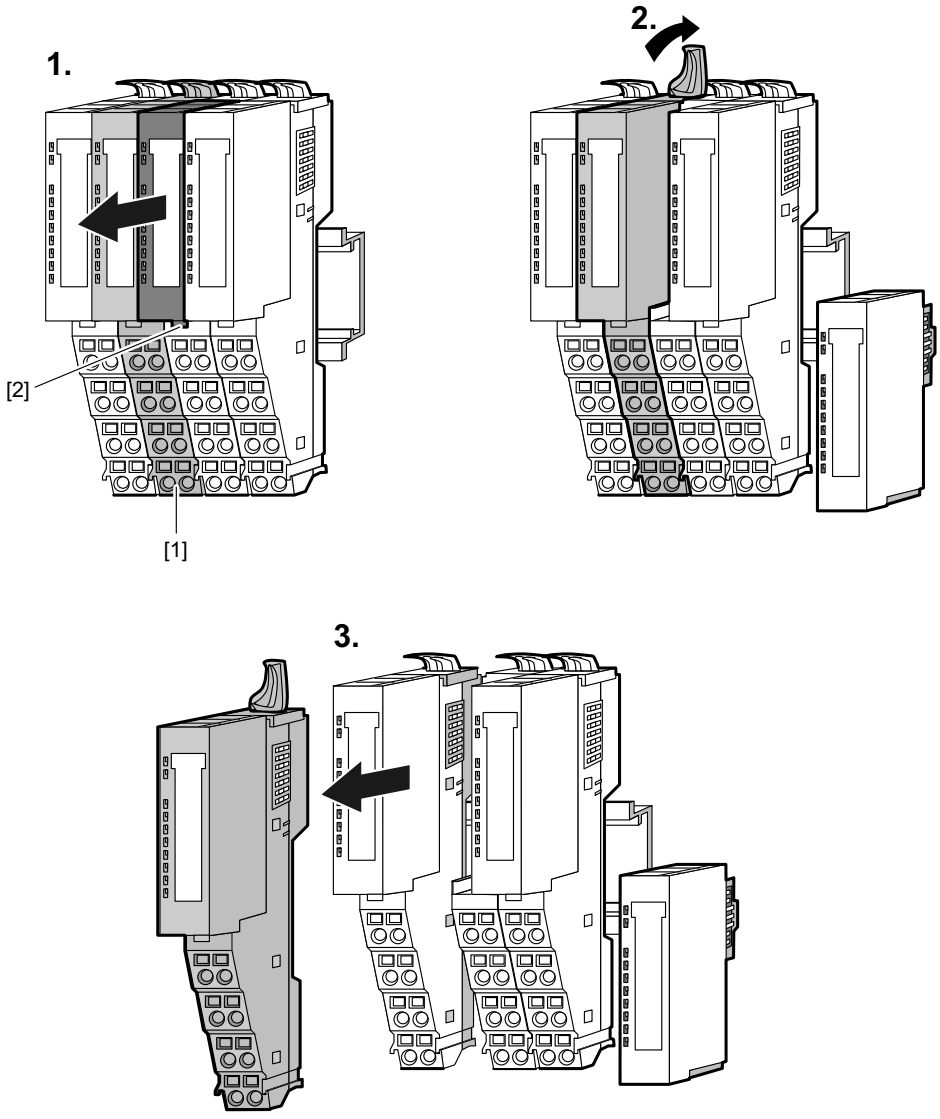
⇨ The electronics module has been exchanged

4.6.2 Exchanging the module

Proceed as follows:

1. If present, remove the wiring on the module (see chapter "Wiring").
2. Press the releasing device on the bottom of the electronics module installed to the right of it and remove the electronics module by pulling it forward (see the following figure, step 1).

3. Lift up the locking lever of the module to be exchanged until it audibly locks in place (see the following figure, step 2).
4. Remove the module to be exchanged by pulling it forward (see the following figure, step 3).



12876192651

[1] The module to be exchanged
[2] Releasing device

⇨ The module has been disassembled.

5. Lift up the locking lever of the new module until it audibly locks in place (see the following figure, step 4).
6. Insert the new module into the gap between the two modules (see the following figure, step 5).
7. Push the new module over the guide rails onto the mounting rail.

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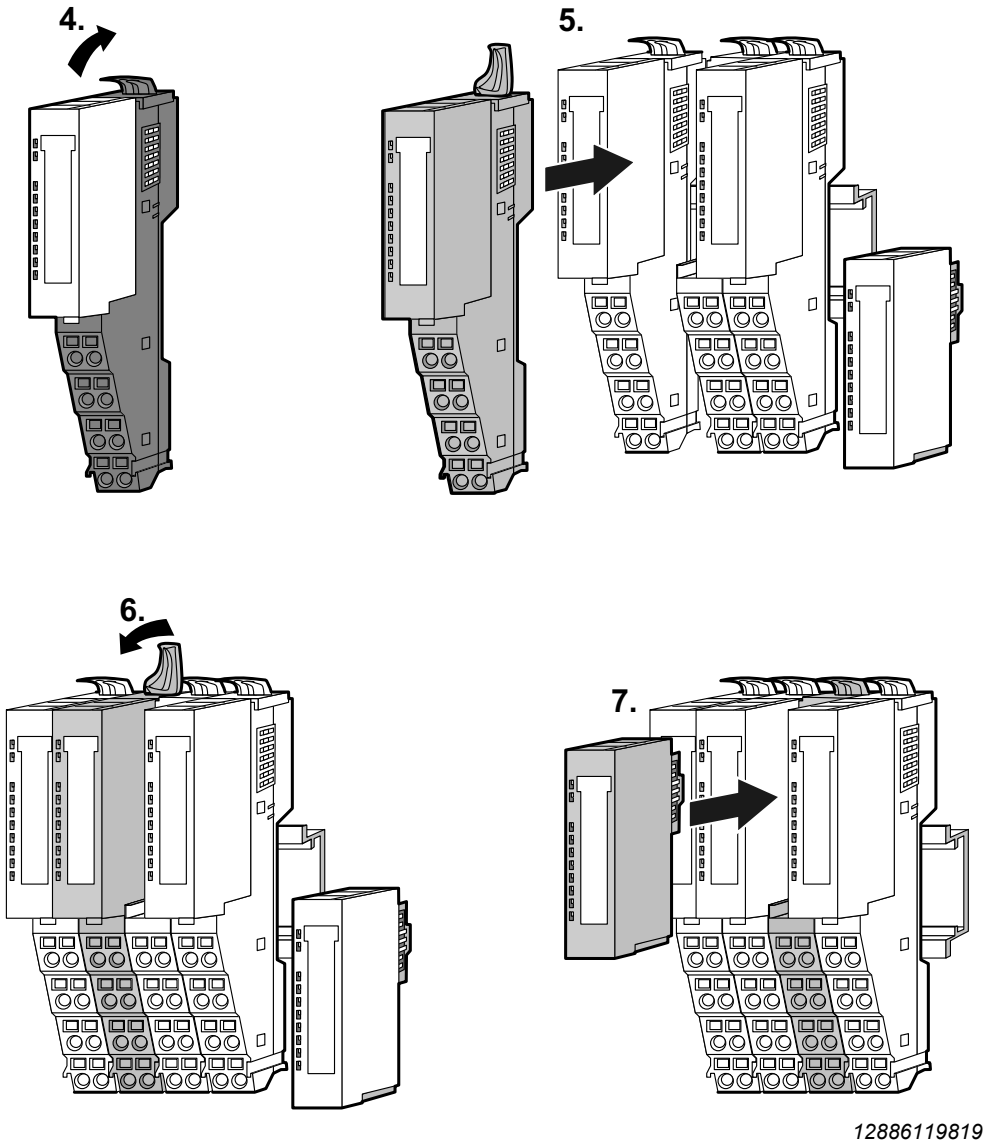
8. Pull down the locking lever to secure the new module on the mounting rail (see the following figure, step 6).
9. Push the electronics module, which was removed previously, along the guide rails until it audibly locks into place on the base module (see the following illustration, step 7).



12886119819

⇨ The module has been exchanged.

4.6.3 Exchanging the bus coupler

NOTICE

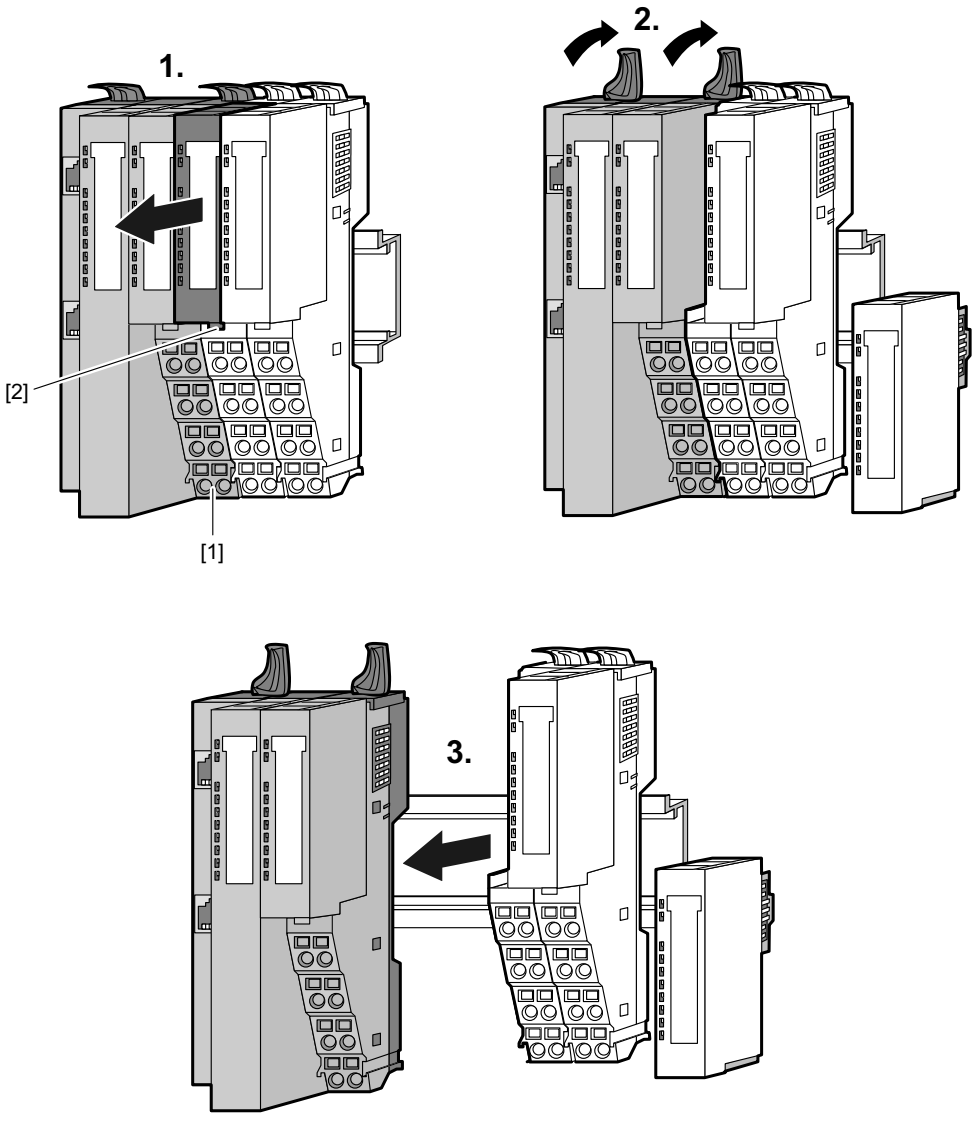
Disconnecting the bus interface and power supply module of the bus coupler.

Damage to the bus coupler.

- Never disconnect the bus interface and the power supply module of the bus coupler from each other.
- In this regard, you may only exchange the electronics module.

Proceed as follows:

1. If present, remove the wiring on the bus coupler (see chapter "Wiring").
2. Press the releasing device on the bottom of the electronics module installed to the right of the bus coupler and remove the electronics module by pulling it forward (see the following figure, step 1).
3. Lift up all locking levers of the bus coupler to be exchanged until they audibly lock in place (see the following figure, step 2).
4. Remove the bus coupler to be exchanged by pulling it forward (see the following figure, step 3).



12888441355

[1] The bus coupler to be exchanged
[2] Releasing device

⇨ The bus coupler has been disassembled.

5. Lift up all locking levers of the new bus coupler until they audibly lock in place (see the following figure, step 4).
6. Insert the new bus coupler into the left module and push it over the guide rails onto the mounting rail (see the following figure, step 5).

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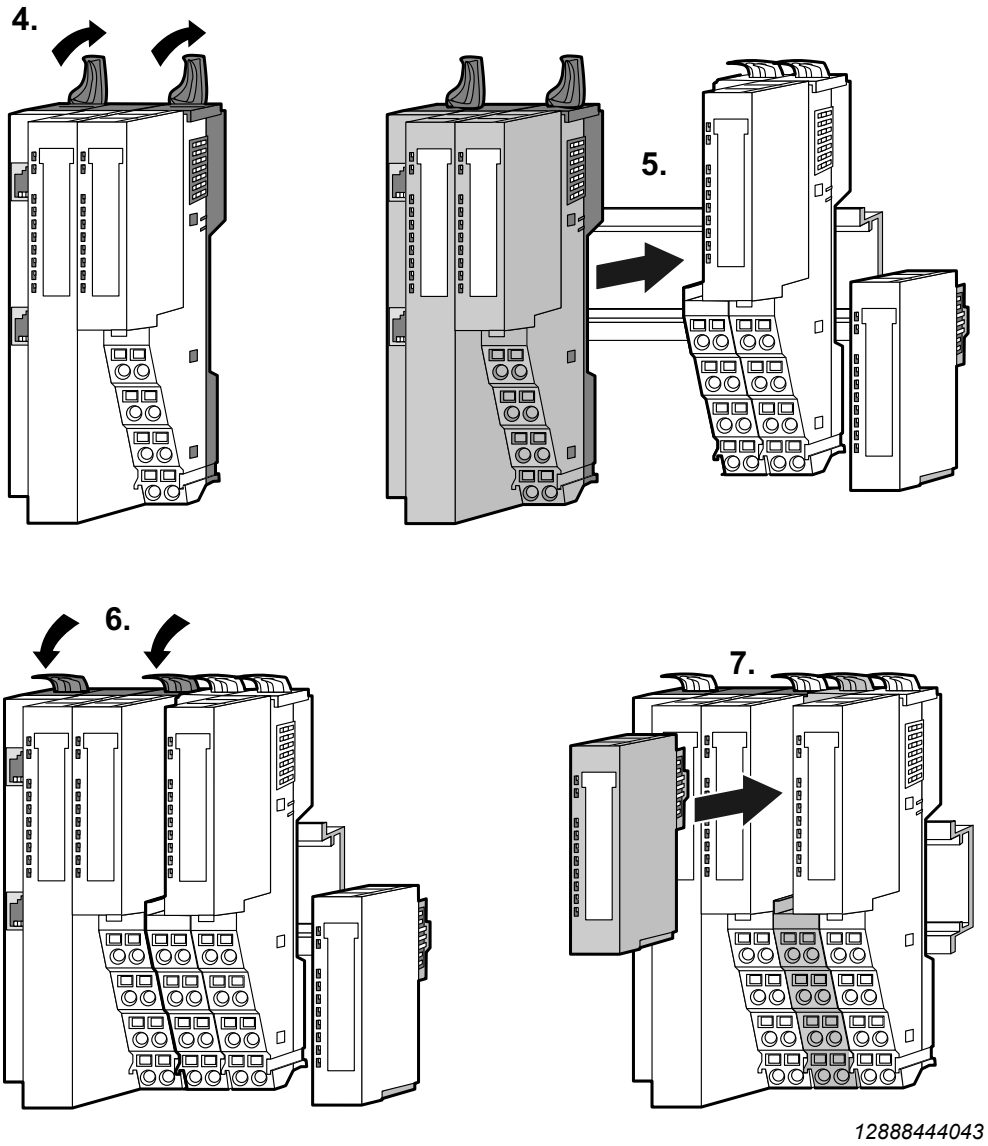
7. Pull down the locking lever to secure the bus coupler on the mounting rail (see the following figure, step 6).
8. Push the electronics module, which was removed previously, along the guide rail until it audibly locks into place on the base module (see the following illustration, step 7).



12888444043

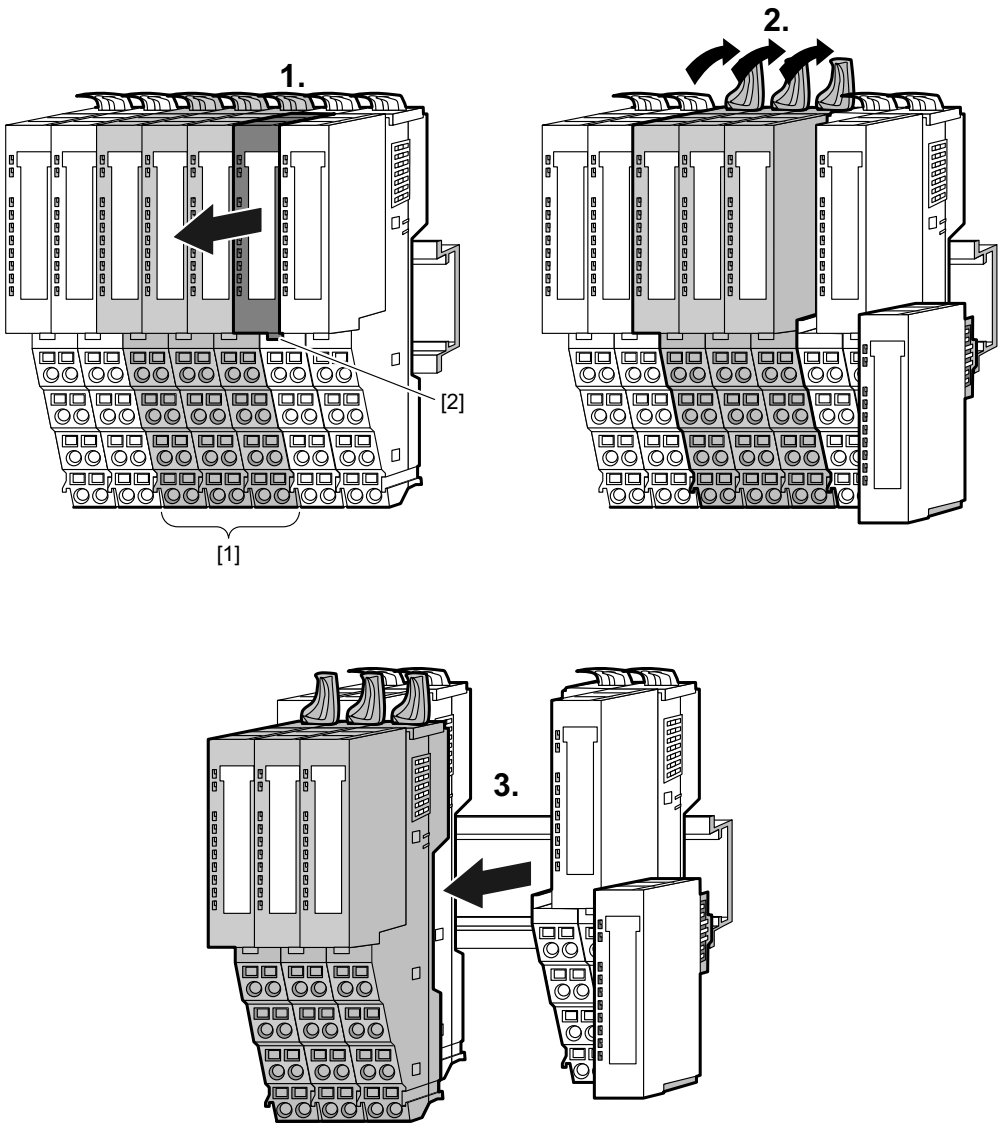
⇨ The bus coupler has been exchanged.

4.6.4 Exchanging the module group

Proceed as follows:

1. If present, remove the wiring on the module group (see chapter "Wiring").
2. Press the releasing device on the bottom of the electronics module installed to the right of the module group and remove the electronics module by pulling it forward (see the following figure, step 1).
3. Lift up all locking levers of the module group to be exchanged until they audibly lock in place (see the following figure, step 2).

4. Remove the module group to be exchanged by pulling it forward (see the following figure, step 3).



12888450187

[1] The module group to be exchanged
[2] Releasing device

⇨ The module group has been disassembled.

5. Lift up all locking levers of the new module group until they audibly lock in place (see the following figure, step 4).
6. Insert the new module group into the gap between the two modules.
7. Push the new module group over the guide rails onto the mounting rail (see the following figure, step 5).

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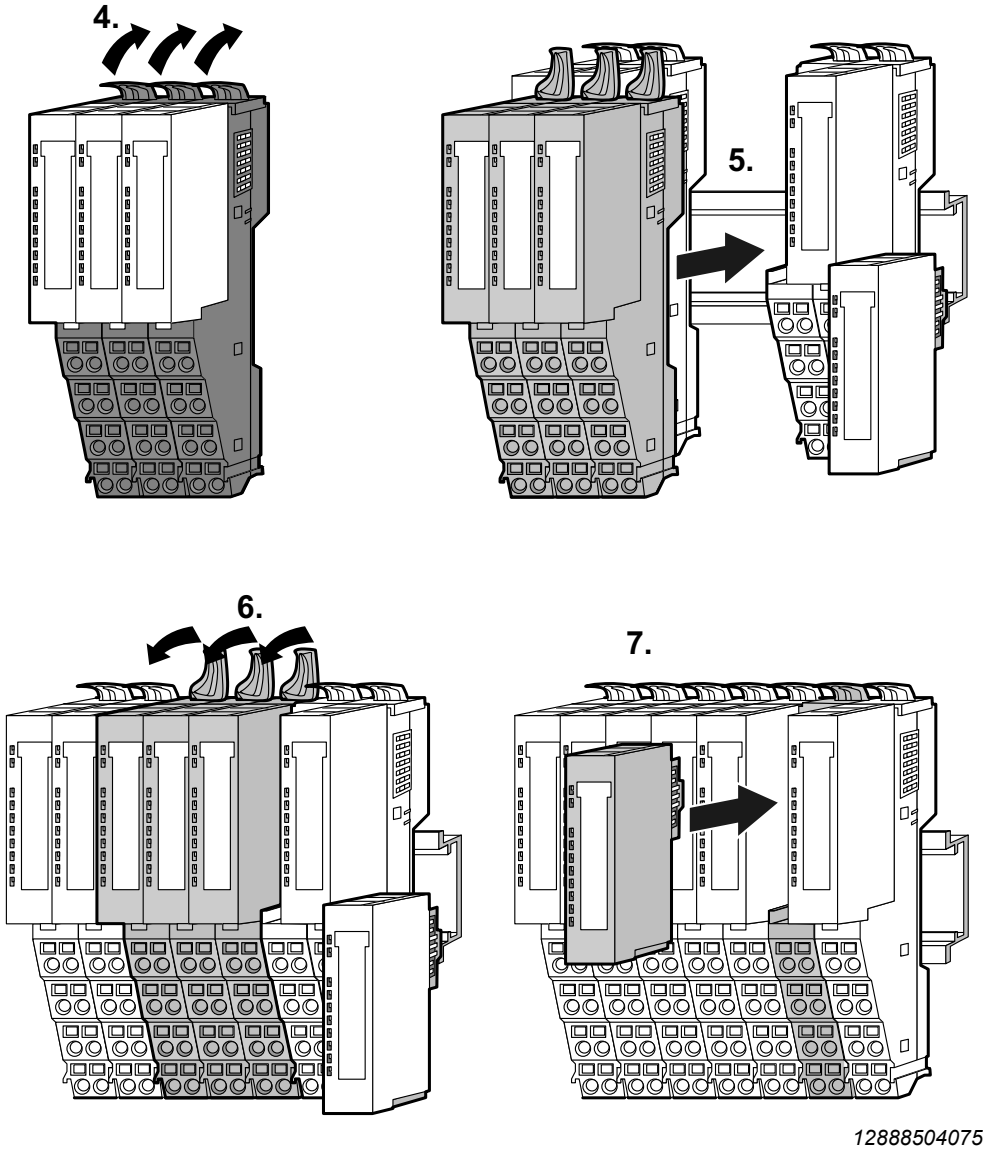
8. Pull down the locking lever to secure the new module group on the mounting rail (see the following figure, step 6).
9. Push the electronics module, which was removed previously, along the guide rail until it audibly locks into place on the base module (see the following illustration, step 7).



12888504075

⇨ The module group has been exchanged.

5 Electrical installation

5.1 EMC-compliant installation

Electromagnetic compatibility (EMC) is understood as the ability of an electrical unit to function without errors in a given electromagnetic environment without being influenced by the environment or without influencing the environment in an impermissible manner.

Possible interference

Electromagnetic interference may interfere with your controller in different ways:

- Electromagnetic fields
- I/O signal lines
- Bus system

Ensuring EMC

Adhere to the following rules to ensure EMC:

- When installing the modules, ensure that any inactive metal components are grounded via a proper large-surface earth.
  - Provide a wide area metal-on-metal contact between the unit housing and ground.
  - Establish a central connection between ground and the earthing/PE system.
  - If possible, do not use any aluminum components.
- Ensure that wiring is routed properly during installation.
  - Route power cables (power current, power supply) and signal cables in separate cable ducts.
  - Route signal cables as close as possible to ground surfaces (e.g. frames, metal rails, sheet metal, etc.).
- Ensure that the shielding of lines is grounded and routed properly.
  - Signal lines must always be shielded.
  - Signal lines with analog signals must always be shielded. If low-amplitude signals are transferred, it may be advantageous to connect the shield on one side of the cable only.
  - Attach the shields of cables in the control cabinet over a large surface area to the ground rail/PE rail. Secure the line shields using cable clamps.
  - Ensure that the ground rail/PE rail has a low-impedance connection to the control cabinet.
  - Use metallic or metallized plug connector housings for shielded signal lines.
- Use incandescent lamps for illumination inside control cabinets. Do not use fluorescent lamps.
- Use special EMC measures for special applications.
- Consider using quenching circuits for inductances.
- Create a single reference potential and ground all electrical equipment wherever possible.
  - Ensure that earthing measures are implemented effectively.
  - Provide a star-shaped connection between system components and control cabinets of the MOVI-PLC® I/O system C and the earthing/protection system. In this way, you avoid ground loops.

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– Where potential differences exist, you must install sufficiently large equipotential bonding conductors between the different parts of the system and control cabinets.

5.2 Shielding of lines

Electrical, magnetic or electromagnetic interference fields are weakened and damped by shielding. Interference currents on cable shields are diverted to ground via the shield bus connected conductively to the housing. Ensure that the connection to the protective earth is low-impedance as the interference currents themselves will otherwise become the interference source.

Observe the following points when shielding lines:

- Only use lines with braided shield.

  The coverage of the braided shield must exceed 80%.
- Always ground the line shields at both ends of cables. High frequency interference can only be suppressed by grounding cables on both ends.
- Apply the shield to one side only in exceptional cases. In such cases, you will only achieve damping of low frequencies. A shield connection on one side can be more favorable in the following cases:
  - An equipotential bonding cable cannot be routed.
  - Analog signals (some mV or µA) are transmitted.
  - Foil shields (static shields) are used.
- Always use metallic or metallized connectors for signal lines for serial links. Connect the shield of the signal line to the connector housing. Do not connect the shield to pin 1 of the plug strip of the I/O module.
- For stationary operation, we recommend that you strip the insulation from the shielded cable interruption-free and attach the shield to the shield/protective ground rail.
- Connect braided shields by means of metallic cable clamps. The cable glands must have a good electrical and large surface contact with the shield.
- Attach the shield of a cable to the grounding rail directly where the cable enters the control cabinet. Do not attach the shield to the I/O system.

INFORMATION

- Where potential differences exist between earthing connection, it is possible to establish a compensating current flow where the shield of a cable is connected at both ends.
- Make sure you supply adequate equipotential bonding in accordance with relevant VDE regulations in such a case.

5.3 Wiring

Terminals with spring-clip technique are used for wiring purposes. The spring-clip technique simplifies the wiring of signal and voltage supply cables. Unlike screw terminal connections, spring-clip wiring is vibration proof.

You can connect the following lines to the modules:

- U_{Max}: AC 240 V/DC 30 V

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- I_{Max}: AC/DC 10 A
- Line cross section: 0.08 mm^2 – 1.5 mm^2
- Stripping length: 10 mm

NOTICE

Improper procedure when connecting the lines.

Destruction of the spring terminal.

- Make sure that you **only insert the screw driver into the rectangular opening** of the plug connector.
- Insert the **stripped line only into the round opening** of the plug connector.

INFORMATION

The connector assignment of the individual modules is explained in the sections on the respective modules.

INFORMATION

First connect the voltage supply lines, next the signal lines.

Wiring the modules

Proceed as follows:

1. Insert a suitable screw driver at an angle into the rectangular opening of the plug connector (see following figure, step 1).
2. Press and hold the screw driver in the opposite direction to open the contact spring (see following figure, step 2).

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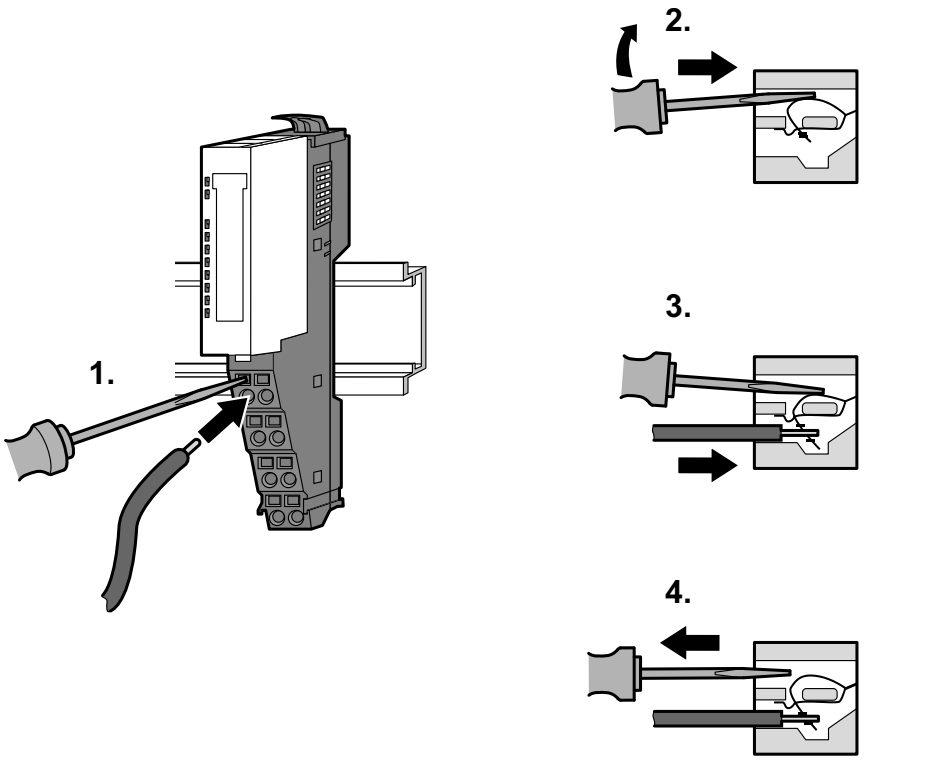
3. Guide the stripped line through the round opening of the plug connector (see the following figure, step 3).
4. Remove the screwdriver (see the following figure, step 4).



12888597387

⇨ The line is now clipped securely to the terminal via a spring contact.

5.3.1 Standard wiring

NOTICE

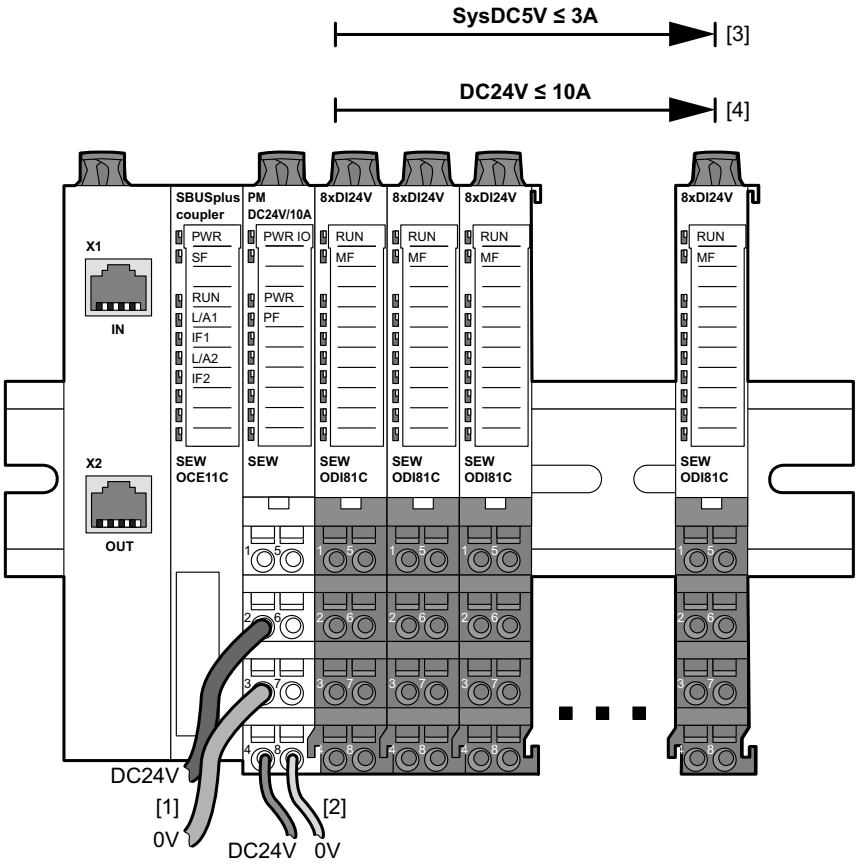
External fusing of the voltage supply is necessary.

Risk of damage to the I/O modules

- As the voltage supply does not have any internal fusing, secure it externally with a fuse appropriate to the maximum current, i.e. max. 10 A with a 10 A fuse (fast-acting) or a miniature circuit breaker 10 A characteristic Z.
- Adhere to the maximum current loads of the contacts when carrying out the wiring: This is max. 10 A for the MOVI-PLC® I/O system C
- It is recommended to secure the electronics supply for the bus coupler and I/O levels externally. To this end, use a 2 A fuse (fast-acting) or a miniature circuit breaker 2 A characteristic Z.

INFORMATION

The electronics supply is protected internally against too high a voltage by a fuse. The fuse is in the power supply module. The electronics module must be exchanged if the fuse has triggered.



12888512395

[1] DC 24 V voltage supply for I/O levels (max. DC 10 A)
[2] DC 24 V electronics supply for bus coupler and I/O levels
[3] Sys DC 5 V electronics supply (max. DC 3 A)
[4] DC 24 V voltage supply (max. DC 10 A)

5.3.2 Status of the electronics supply

The RUN and/or MF LED lights up on each module after the voltage supply of the MOVI-PLC® I/O system C has been switched on as long as the total current for the electronics supply does not exceed 3 A. The LEDs are no longer controlled if the total current is greater than 3 A.

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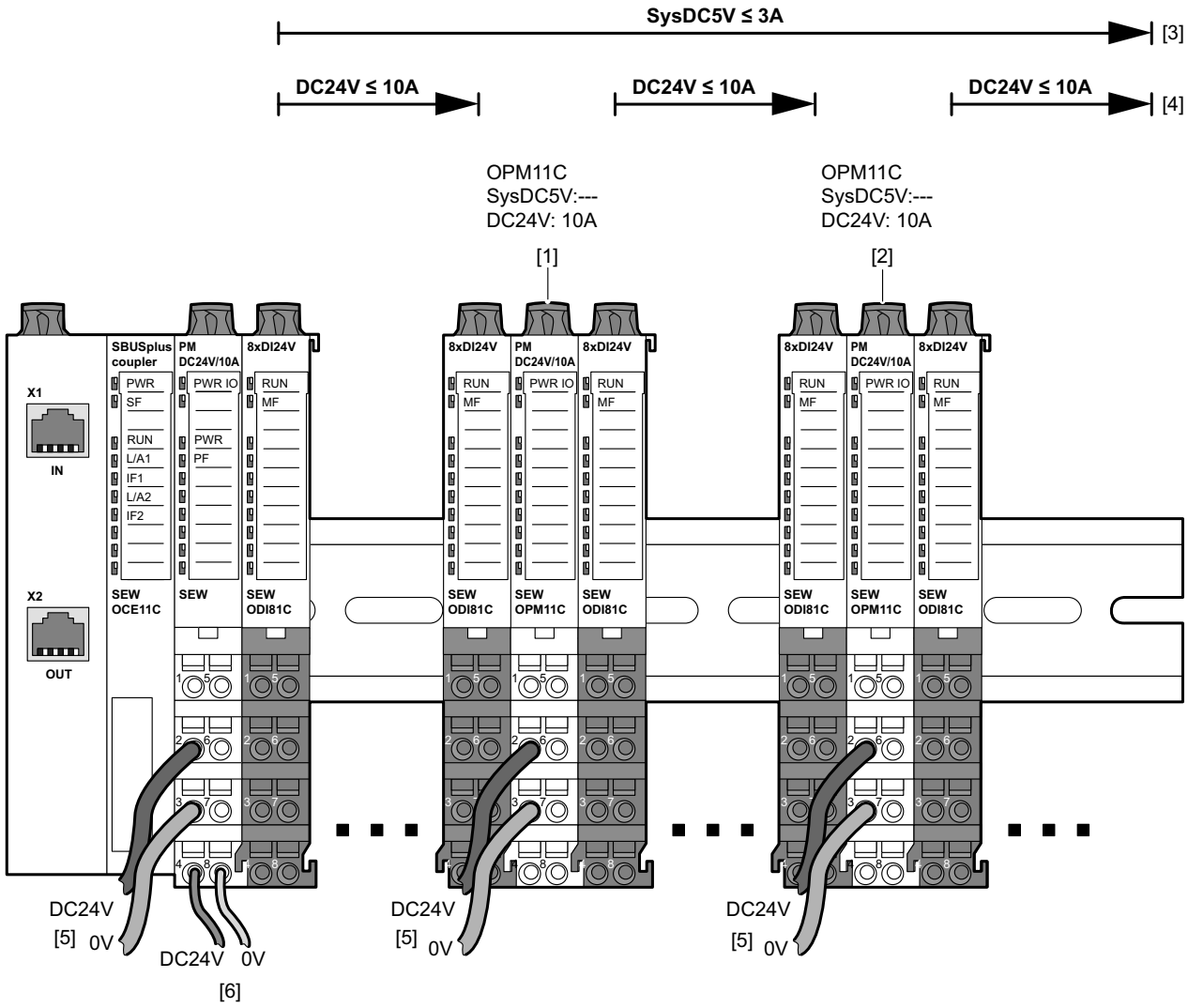
5.3.3 Power supply module OPM11C

If the 10 A for the voltage supply is no longer sufficient, use the power supply module OPM11C. This allows you to form potential groups.



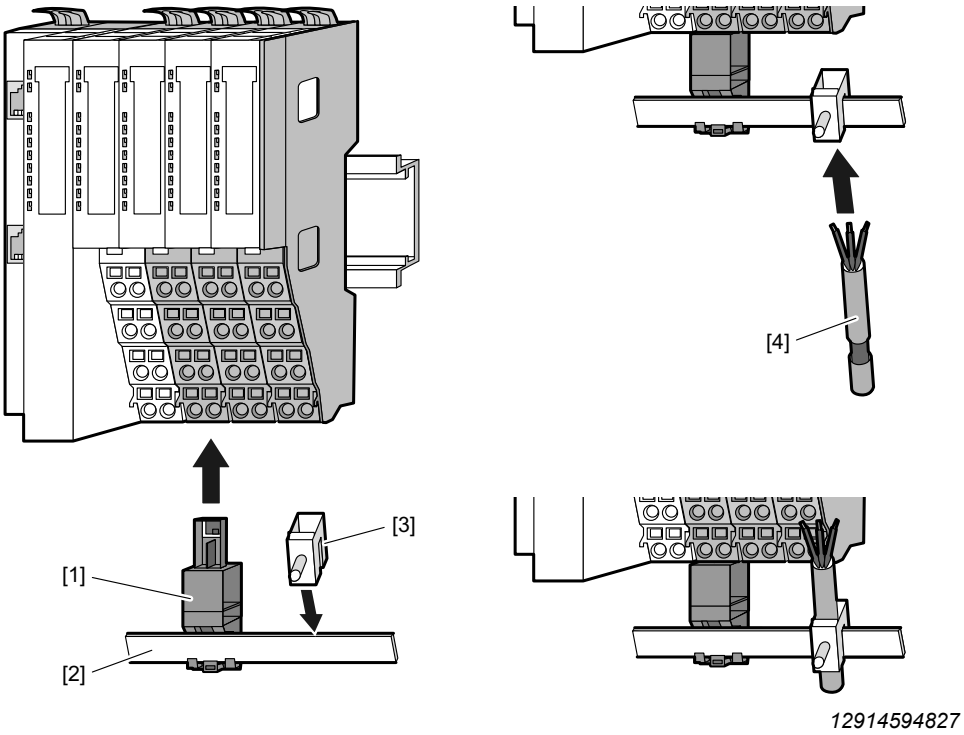
12891783563

[1] Power supply module OPM11C
[2] Power supply module OPM11C
[3] Total current of the electronics supply (max. DC 3 A)
[4] Total current of the voltage supply (max. DC 10 A)
[5] DC 24 V voltage supply for I/O levels (max. DC 10 A)
[6] DC 24 V electronics supply for bus coupler and I/O levels

5.3.4 Connecting the cable shield

Proceed as follows:

1. Install the shield bus carrier (see chapter "Installing the shield bus carrier").
2. Assemble the shield bus.
3. Lay the cable with the appropriately stripped cable shield.
4. Connect the cable to the shield bus via the shield connecting terminal.



12914594827

[1]	Shield bus carrier	[3]	Shield connecting terminal
[2]	Shield bus (10 x 3 mm)	[4]	Cable shield

⇨ The cable shield has been connected.

6 Unit structure and technical data

6.1 General technical data

Conformity and approval		
//////////////////		
CE	2006/95/EC	Low Voltage Directive
	2004/108/EC	EMC Directive
Approval		
UL	UL 508	Approval for the USA and Canada
Other		
RoHS	---	Products are lead-free
Personal protection and unit protection		
Degree of protection	---	IP20
Electrical isolation		
To the fieldbus	---	Galvanically isolated
To the process level	---	Galvanically isolated
Insulation strength	EN 61131-2	---
Insulation voltage to reference ground		
inputs / outputs	---	AC/DC 50 V, for test voltage AC 500 V
Preventive measures	---	Against short circuit
Ambient conditions according to EN 61131-2		
Climatic		
Storage/transportation	EN 60068-2-14	−25 °C to +70 °C
Operation		
Horizontal installation	EN 61131-2	0 °C to +60 °C
Vertical installation	EN 61131-2	0 °C to +60 °C
Humidity	EN 60068-2-30	RH1 (without condensation, relative humidity 10% – 95%)
Dirt	EN 61131-2	Degree of pollution 2
Mechanical		
oscillation	EN 60068-2-6	1 g, 9 Hz – 150 Hz
Shock	EN 60068-2-27	15 g, 11 ms
Installation conditions		
Installation location	---	In control cabinet
Mounting position	---	Horizontal and vertical

EMC	Standard	Comments
Interference emission	EN 61000-6-4	Class A (industrial environment)

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Interference immunity Zone B	EN 61000-6-2	Industrial environment
	EN 61000-4-2	ESD 8 KV for discharge through air (test level 3) 4 KV for contact discharge (test level 2)
	EN 61000-4-3	HF radiation (housing) 80 MHz – 1000 MHz, 10 V/m, 80% AM (1 kHz) 1.4 GHz – 2.0 GHz, 3 V/m, 80% AM (1 kHz) 2 GHz – 2.7 GHz, 1 V/m, 80% AM (1 kHz)
	EN 61000-4-6	HF conducted 150 MHz – 80 MHz, 10 V, 80% AM (1 kHz)
	EN 61000-4-4	Burst (test level 3)
	EN 61000-4-5	Surge, installation class 3[1)]

1) With surge, an appropriate external connection with lightening protection elements such as lighting arresters and surge arresters is required due to the high energy pulse.

6.2 Bus coupler

In this chapter you will find the description of the bus coupler of the MOVI-PLC® I/O system C.

The following overview shows the permitted combinations of bus coupler with the SEW controllers.

	DHx41B	DHx21B	UHX71B
OCC11C (SBus)	X	X	
OCE11C (SBus[PLUS])	X		X

6.2.1 CAN bus coupler OCC11C

The CAN bus coupler OCC11C connects the MOVI-PLC® I/O system C with the MOVI-PLC® controller via the SEW-EURODRIVE system bus.

The CAN bus coupler has the following properties:

- 10 Rx and 10 TxPDOs
- 1 SDO
- Support of all transmission rates
- PDO linking
- PDO mapping: Variable
- Specification of the SBus address via DIP switch

Part number

28212029

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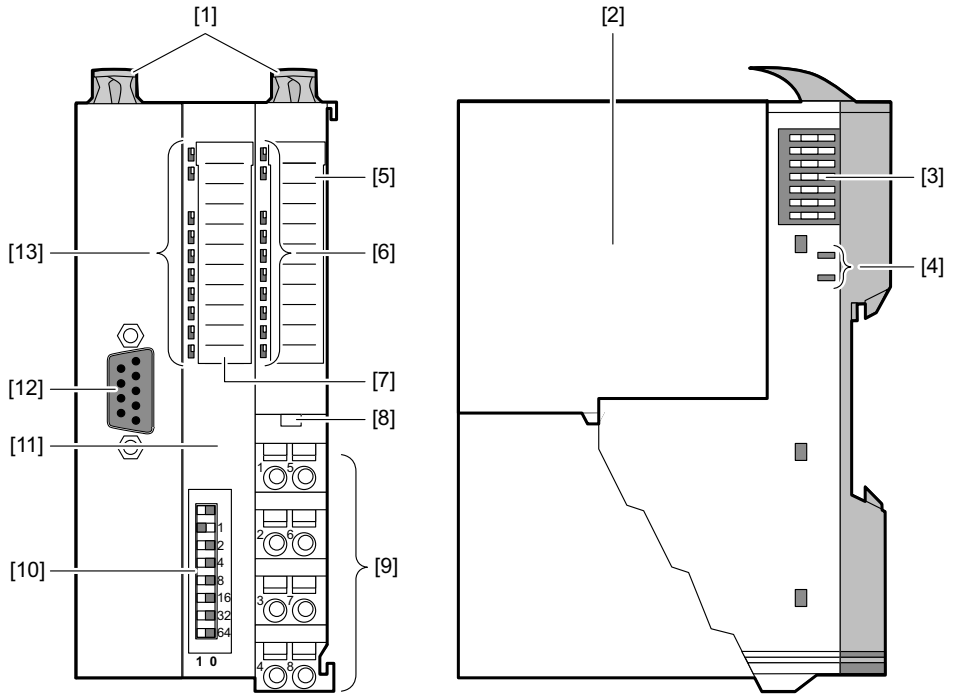
Structure

The following figure shows the structure of the CAN bus coupler OCC11C.



[1] Base module locking lever
[2] Power supply module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Power supply module label
[6] Status LEDs power supply module
[7] Bus interface label
[8] Releasing device for the power supply module
[9] Connecting terminals
[10] DIP switch
[11] Bus interface
[12] CAN plug connector bus interface
[13] Status LEDs bus interface

Status LEDs

The CAN bus coupler has the following status LEDs:

Bus interface

Overview	LED	Color	State	Meaning
 12915098891	PWR	Green	Lights up	The bus interface is supplied with voltage.
	SF	Red	Lights up	Station error; structure does not correspond to the project planning.
	BA	Green	Lights up	Operating mode: Operational (ready for data exchange).
			Flashes 2 Hz	Operating mode: Pre-operational.
	IF	Red	Lights up	An internal error has occurred.

Different states are displayed both when switched on and during operation through the combination of the status LEDs and their current operating modes.

LED	State	Meaning
PWR	Off	There is no voltage being applied or the power supply module is defective.
SF	Off	
BA	Off	
IF	Off	
PWR	Lights up	The bus interface is supplied with voltage.
SF	---	
BA	---	
IF	---	
PWR	Lights up	Initialization phase
SF	---	
BA	Off	
IF	---	
PWR	Lights up	Operating mode: Pre-operational.
SF	---	
BA	Flashes 2 Hz	
IF	---	
PWR	Lights up	Operating mode: Operational.
SF	---	
BA	Lights up	
IF	---	
PWR	Lights up	Setting of the transmission rate is active. Set the transmission rate within the next 10 s using the DIP switch.
SF	Flashes 2 Hz	
BA	Flashes 2 Hz	
IF	Flashes 2 Hz	
PWR	Lights up	Setting of the module ID is active. Set a module ID (address) within the next 10 s using the DIP switch.
SF	Flashes 2 Hz	
BA	Flashes 2 Hz	
IF	Off	
PWR	Lights up	Error in the set transmission rate. Re-set the transmission rate.
SF	Flashes 2 Hz	
BA	Off	
IF	Flashes 2 Hz	
PWR	Lights up	Error in the set module ID. Re-set the module ID.
SF	Lights up	
BA	Off	
IF	Flashes 2 Hz	

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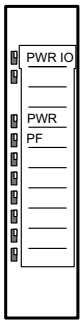
LED	State	Meaning
PWR	Lights up	Internal error on the CAN bus coupler.
SF	Off	
BA	Off	
IF	Flashes 2 Hz	
PWR	Lights up	Error on the MOVI-PLC® I/O system C bus. Check your modules.
SF	Lights up	
BA	---	
IF	Lights up	
PWR	Lights up	Operating mode: Pre-operational with internal error on one MOVI-PLC® I/O system C module.
SF	Lights up	
BA	Flashes 2 Hz	
IF	Flashes 2 Hz	
PWR	Lights up	Operating mode: Pre-operational with configuration error on the MOVI-PLC® I/O system C bus (see index 0x2F02 and 0x2010).
SF	Lights up	
BA	Flashes 2 Hz	
IF	Off	
PWR	Lights up	Error in project planning or there are diagnostics pending.
SF	Lights up	
BA	---	
IF	Off	

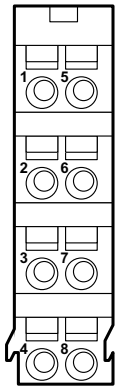
Power supply module

Overview	LED	Color	State	Meaning
 *12915247883*	PWR IO	Green	Lights up	Voltage supply OK.
	PWR	Green	Lights up	Electronics supply OK.
	PM	Red	Lights up	Fuse for electronics supply defective.

Connections

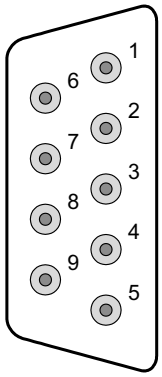
The CAN bus coupler OCC11C has the following connections:

Connecting terminals

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	---	---	Not assigned
	2	DC 24 V	E[1)]	DC 24 V voltage supply
	3	0 V	E	Reference potential for DC 24 V voltage supply
	4	Sys DC 24 V	E	DC 24 V electronics supply
	5	---	---	Not assigned
	6	DC 24 V	E	DC 24 V voltage supply
	7	0 V	E	Reference potential for DC 24 V voltage supply
	8	Sys 0 V	E	Reference potential for DC 24 V electronics supply

1) E = input

9-pole CAN plug connector

Overview	PIN	Assignment
 *12915450251*	1	Not assigned
	2	CAN low
	3	CAN ground
	4	Not assigned
	5	Not assigned
	6	Not assigned
	7	CAN high
	8	Not assigned
	9	Not assigned

Bus connection

INFORMATION

- The CAN bus is connected via a shielded three-wire line.
- In systems with more than two stations, all stations are wired in parallel. To this end, the bus cable must be looped through without interruption.
- In order to avoid reflections and transmission problems, the bus cable must always be connected to the line ends with a terminating resistor of 120 Ω.

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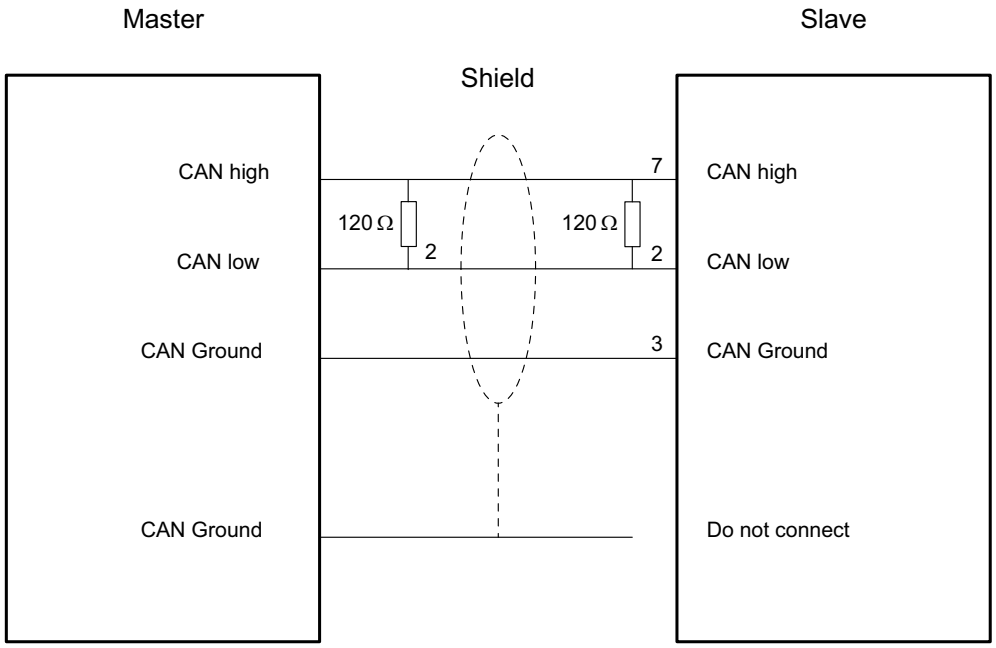
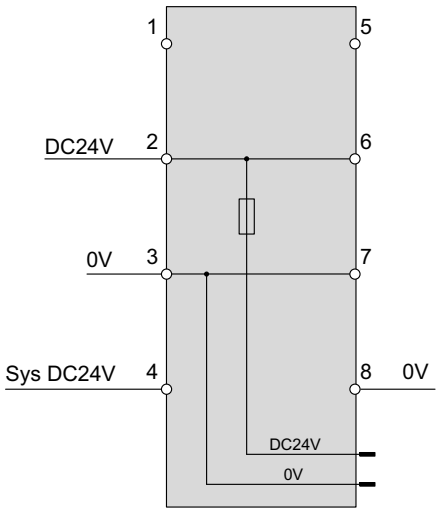


12916652171

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12918624139

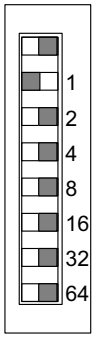
Transmission rate and module ID (address)

Use this DIP switch to set the transmission rate and the module ID. The set values are permanently saved in an EEPROM and can be changed at any time. In delivery state, the bus coupler has a transmission rate of 500 kbit/s.

Resetting the transmission rate and module ID (address) to factory setting

Proceed as follows:

1. Switch off the voltage supply of the bus coupler.
2. Set the address 0 using the DIP switch (see the following table).

Overview	DIP switch	Transmission rate kbit/s								
		1000	800	500	250	125	100	50	20	10
 *12918656907*	---	---	---	---	---	---	---	---	---	---
	1	0	0	1	0	1	0	1	0	1
	2	0	0	0	1	1	0	0	1	1
	4	0	0	0	0	0	1	1	1	1
	8	0	0	0	0	0	0	0	0	0
	16	0	0	0	0	0	0	0	0	0
	32	0	0	0	0	0	0	0	0	0
	64	0	0	0	0	0	0	0	0	0
		25	50	100	250	500	600	1000	2500	5000
		Guaranteed max. bus length in m								

3. Switch on the voltage supply of the bus coupler.
   ⇨ The status LEDs "SF", "BA" and "IF" flash.
4. You can program the transmission rate and the module ID within 10 seconds via the DIP switches.

If you do not make any setting within 20 seconds, the following values are set:

- Transmission rate: 1 Mbit/s
- Module ID: 0 (not permitted)

To change these values, re-set the transmission rate and the module ID.

Setting the transmission rate

Proceed as follows:

✓ The status LEDs "SF", "BA" and "IF" flash.

5. Set the transmission rate within 10 seconds via the DIP switches.

⇨ The module ID set will be saved in the EEPROM after 10 seconds have elapsed.

⇨ The status LED "IF" goes out.

Setting the module ID

INFORMATION

Each module ID must only be assigned once on the bus.

- Set the module ID before switching on the bus coupler.

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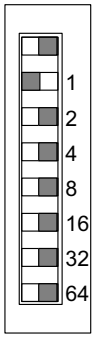
Overview	DIP switch	Example	
		State	Address
	---	---	1+2+32=35 Address:35
	1	1	
	2	1	
	4	0	
	8	0	
	16	0	
	32	1	
	64	0	

Proceed as follows:

✓ The status LEDs "SF" and "BA" flash.

6. Set the module ID in the range of 1 – 125 within a further 10 seconds via the DIP switches.

⇨ The module ID set will be saved after 10 seconds have elapsed.

⇨ The bus coupler then changes over to normal operation ("pre-operational" state) with the previously set values.

Setting the transmission rate via SDO-Write

You can reprogram the CAN transmission rate to the object "0x2001" via an SDO-Write. This value is adopted as the CAN transmission rate after a bus coupler reset. This allows you to program all of the bus couplers of a plant to a new CAN transmission rate from a central CAN terminal. The reprogrammed transmission rate is adopted by the bus couplers after a RESET of the plant.

Technical data

Type	OCC11C
Part number	28212029
Module ID	---
Current supply	
Supply voltage (nominal value)	DC 24 V
Supply voltage (permitted range)	DC 20.4 – 28.8 V
Polarity reversal protection	Possible
Current consumption (no-load operation)	DC 90 mA
Current consumption (nominal value)	DC 0.95 A
Inrush current	DC 3.9 A
I^2t	0.14 A^2s
Max. output current at the backplane bus	DC 3 A
Max. output current	DC 10 A
Power loss	3 W

Status, alarm, diagnostics	
Status display	Yes
Alarms	Yes, parameters can be set
Process alarm	No
Diagnostics interrupt	Yes, parameters can be set
Diagnostic function	Yes, parameters can be set
Diagnostic information can be read out	Possible
Supply voltage display	Green LED
Maintenance indicator	---
Fault display for group fault	Red LED
Channel error display	None
Expansion	
Max. number of bus couplers per I/O system	1
Max. number of assemblies per bus coupler	64
Max. number of digital assemblies per bus coupler	54
Max. number of analog assemblies per bus coupler	16
Communication	
Fieldbus	CANopen
Physics	CAN
Connection	9-pole D-sub connector
Topology	Linear bus with bus termination at both ends
Electrically isolated	Possible
Max. number of participants	127
Station address	1 – 127
Min. transmission speed	10 kbit/s
Max. transmission speed	1 Mbit/s
Max. address range for inputs	80 byte
Max. address range for outputs	80 byte
Max. number of TxPDOs	10
Max. number of RxPDOs	10
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W x H x D)	48.5 x 109 x 76.5 mm

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Weight	155 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

6.2.2 EtherCAT® bus coupler OCE11C

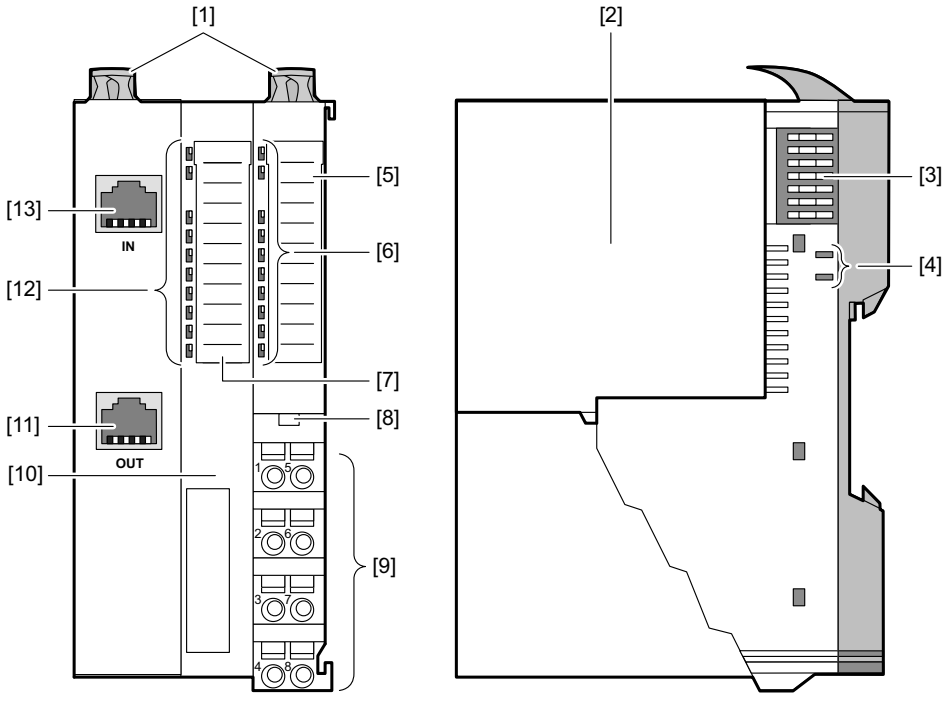
The EtherCAT® bus coupler OCE11C connects the MOVI-PLC® I/O system C with the MOVI-PLC® controller via the SEW-EURODRIVE system bus^{PLUS} .

Part number

28212037

Structure

The following figure shows the structure of the EtherCAT® bus coupler OCE11C.



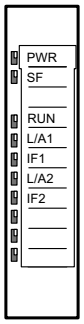
12919180811

[1] Base module locking lever
[2] Power supply module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Power supply module label
[6] Status LEDs power supply module
[7] Bus interface label
[8] Releasing device for the power supply module
[9] Connecting terminals
[10] Bus interface
[11] RJ45 bushing bus interface "OUT"
[12] Status LEDs bus interface
[13] RJ45 bushing bus interface "IN"

Status LEDs

The EtherCAT® bus coupler OCE11C has the following status LEDs.

Bus interface

Overview	LED	Color	State	Meaning
 *12915178123*	PW	Green	Lights up	The bus interface is supplied with voltage.
	SF	Red	Flashes 1 flash/s	Error when changing status e. g. when pulling out a module.
			Flashes 2 flash/s	Error during EtherCAT® timeout (watchdog) e.g. failure of the EtherCAT® master.
			Flashes 2 Hz	Error in the configuration.
	RUN	Green	Off	Bus coupler in initialization state
			Lights up	Bus coupler in operational state
			Flashes 2 Hz	Bus coupler in pre-operational state
			Flashes 1 flash/s	Bus coupler in safe operational state
	L/A1	Green	Off	No communication with the previous EtherCAT® participant
			Lights up	Previous EtherCAT® participant is connected.
	IF1	Red	Lights up	Error while communicating with previous participants.
	L/A2	Green	Off	No communication with the subsequent EtherCAT® participant.
			Lights up	Subsequent EtherCAT® participant is connected.
	IF	Red	Lights up	Error while communicating with the following participants.

Power supply module

Overview	LED	Color	State	Meaning
 *12915247883*	PWR IO	Green	Lights up	Voltage supply OK.
	PWR	Green	Lights up	Electronics supply OK.
	PM	Red	Lights up	Fuse for electronics supply defective.

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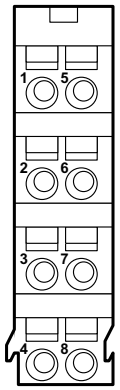
Connections

The EtherCAT® bus coupler OCE11C has the following connections.

Connecting terminals

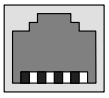
Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	---	---	Not assigned
	2	DC 24 V	E[1)]	DC 24 V voltage supply
	3	0 V	E	Reference potential for DC 24 V voltage supply
	4	Sys DC 24 V	E	DC 24 V electronics supply
	5	---	---	Not assigned
	6	DC 24 V	E	DC 24 V voltage supply
	7	0 V	E	Reference potential for DC 24 V voltage supply
	8	Sys 0 V	E	Reference potential for DC 24 V electronics supply

1) E = input

8-pole RJ45 plug connector ("IN" and "OUT")

The EtherCAT® bus coupler is integrated in the EtherCAT® network at the "IN" RJ45 plug connector. The "OUT" RJ45 plug connector serves as the connection for further EtherCAT® units in the same phase winding.

The RJ45 plug connectors are assigned as follows:

Overview	PIN	Assignment
 8.....1	1	Transmit +
	2	Transmit −
	3	Receive +
	4	Not assigned
	5	Not assigned
	6	Receive −
	7	Not assigned
	8	Not assigned

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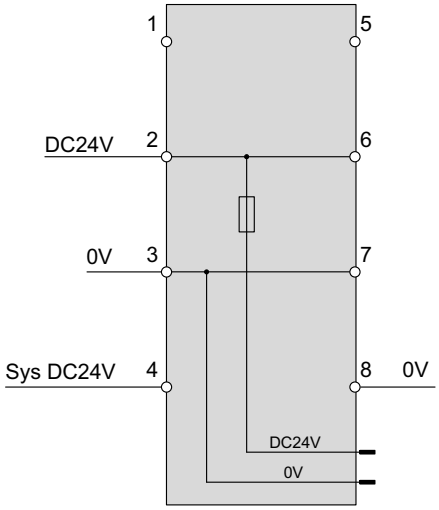
Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².

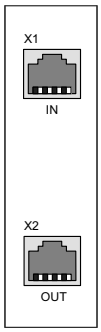


12918624139

Topology

EtherCAT® uses Ethernet as the transmission medium. Only EtherCAT® components may be used in an Ethernet network.

An EtherCAT® network is always comprised of one master and any number of EtherCAT® slaves. Every EtherCAT® slave has one "IN" and one "OUT" connection.

Overview	Socket	Type	Assignment
 *12915452939*	X1	IN	The incoming EtherCAT® cable from the master must be inserted into the "IN" connection.
	X2	OUT	The following participant is connected to the "OUT" connection. The "OUT" connection remains free for the last participant.

Please note the following information for the connection:

- Use the standard CAT5 cable for the connection.
- The maximum line length between 2 participants is 100 m.
- It is not possible to use hubs and switches.

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Technical data

Type	OCE11C
Part number	28212037
Module ID	---
Current supply	
Supply voltage (nominal value)	DC 24 V
Supply voltage (permitted range)	DC 20.4 – 28.8 V
Polarity reversal protection	Possible
Current consumption (no-load operation)	DC 95 mA
Current consumption (nominal value)	DC 0.95 A
Inrush current	DC 3.9 A
I^2t	0.14 A^2s
Max. output current at the backplane bus	DC 3 A
Max. output current	DC 10 A
Power loss	3 W
Status, alarm, diagnostics	
Status display	Yes
Alarms	Yes, parameters can be set
Process alarm	Yes, parameters can be set
Diagnostics interrupt	Yes, parameters can be set
Diagnostic function	Yes, parameters can be set
Diagnostic information can be read out	Possible
Supply voltage display	Green LED
Maintenance indicator	---
Fault display for group fault	Red SF LED
Channel error display	None
Expansion	
Max. number of bus couplers per I/O system	1
Max. number of assemblies per bus coupler	64
Max. number of digital assemblies per bus coupler	54
Max. number of analog assemblies per bus coupler	54
Communication	
Fieldbus	EtherCAT®
Physics	Ethernet 100 Mbit
Connection	2 x RJ45
Topology	Line structure with branches and spur lines

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Electrically isolated	Possible
Max. number of participants	65535
Station address	---
Min. transmission speed	100 Mbit/s
Max. transmission speed	100 Mbit/s
Max. address range for inputs	1 KB
Max. address range for outputs	1 KB
Max. number of TxPDOs	---
Max. number of RxPDOs	---
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W x H x D)	48.5 x 109 x 76.5 mm
Weight	155 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

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Diagnostic data

Index	Sub-index	Name	Type	Attr.	Default value	Meaning
0x5005	0x00	Diagnostic Data	Unsigned8	ro	18	
	0x01	Slot	Unsigned8	rw	0	In read access you will find the EtherCAT® slot of the module from which the diagnostics listed below originate. You can query the diagnostics data of any module by writing an EtherCAT® slot.
	0x02	1)	Unsigned8	ro	0	Diagnostic data set of the respective module (see module description)
	0x03	1)	Unsigned8	ro	0	
	0x04	1)	Unsigned8	ro	0	
	0x05	1)	Unsigned8	ro	0	
	0x06	1)	Unsigned8	ro	0	
	0x07	1)	Unsigned8	ro	0	
	0x08	1)	Unsigned8	ro	0	
	0x09	1)	Unsigned8	ro	0	
	0x0A	1)	Unsigned8	ro	0	
	0x0B	1)	Unsigned8	ro	0	
	0x0C	1)	Unsigned8	ro	0	
	0x0D	1)	Unsigned8	ro	0	
	0x0E	1)	Unsigned8	ro	0	
	0x0F	1)	Unsigned8	ro	0	
	0x10	1)	Unsigned8	ro	0	
	0x11	1)	Unsigned8	ro	0	
	0x12	1)	Unsigned32	ro	0	

1) Variable depending on the module (see diagnostic data of the respective module).

Parameter-setting data

This object gives you access to the parameter of a module. The EtherCAT® slot is addressed via the index.

You can access the corresponding parameters via subindexes. The assignment of the subindex can be found in the corresponding module description.

Power supply modules and terminal modules are not detected by the EtherCAT® bus coupler and are therefore not accounted for in the listing and assignment of slots.

Index	Sub-index	Name	Type	Attr.	Default value	Meaning
0x3100 ... 0x313F	0x00	Parame-ters	Unsigned8	ro	Number of param-eters	Access to the module parameters. Only param-eterizable modules are mapped.
	0x01	Param1		rw		Module parameterization data
	0x02	Param2		rw		See module description
	...	...				

The following applies if the module has parameters:

- Index 0x3100: Access to EtherCAT® slot 0
- Index 0x3101: Access to EtherCAT® slot 1
- ...
- Index 0x313F: Access to EtherCAT® slot 64

Example

In the following example, you have access via index 0x3102 to the parameters of the module at the physical slot 4.

	1	2	3	4
Module	DI	CM[1)]	DO	AI
Index	0x3100[2)]	---	0x3101[2)]	0x3102
EtherCAT® slot	0	---	1	2

1) CM = terminal module

2) This entry is not performed as the module does not have any parameters.

6.3 Power supply module OPM11C

You can use the power supply module OPM11C if the 10 A for the voltage supply of the I/O levels is no longer sufficient. This allows you to form potential groups. Connect the power supply module OPM11C to an external DC 24 V voltage supply.

The power supply module OPM11C has the following properties:

- 10 A supply for DC 24 V voltage supply of the I/O levels
- Overvoltage protection
- Polarity reversal protection

6.3.1 Part number

28211871

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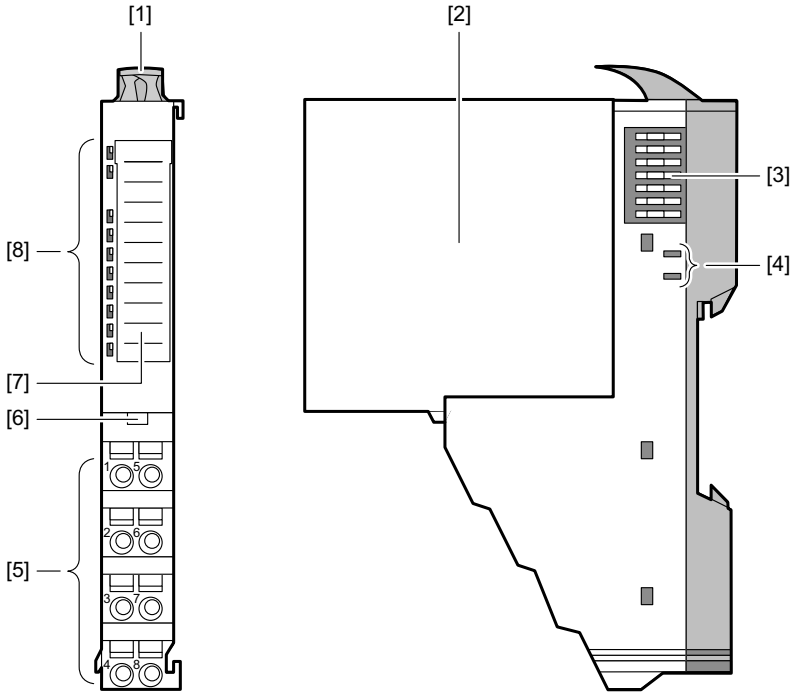
6.3.2 Structure

The following figure shows the structure of the power supply module OPM11C.



12920505099

[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

6.3.3 Status LED

The power supply module OPM11C has the following status LEDs:

Overview	LED	Color	State	Meaning
 12915180555	PWR IO	Green	Lights up	DC 24 V OK

6.3.4 Connecting terminals

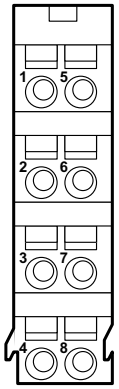
NOTICE

External fusing of the voltage supply is necessary.

Risk of damage to the modules

- As the voltage supply does not have any internal fusing, secure it externally with a fuse appropriate to the maximum current, i.e. max. 10 A with a 10 A fuse (fast-acting) or a miniature circuit breaker 10 A characteristic Z.
- Adhere to the maximum current loads of the contacts when carrying out the wiring: This is max. 10 A for the MOVI-PLC® I/O system C

The following table shows the terminal assignment of the power supply module OPM11C.

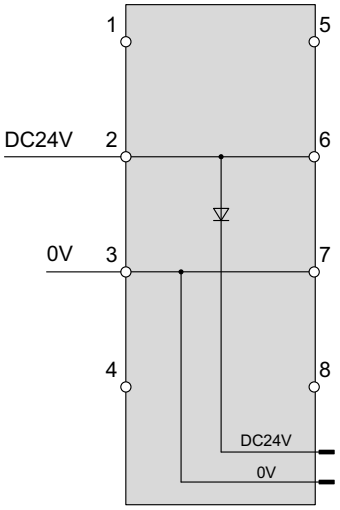
Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	---	---	Not assigned
	2	DC 24 V	E[1)]	External DC 24 V voltage supply
	3	0 V	E	Reference potential for external DC 24 V voltage supply
	4	---	---	Not assigned
	5	---	---	Not assigned
	6	DC 24 V	A[2)]	DC 24 V voltage supply I/O levels
	7	DC 0 V	A	Reference potential for DC 24 V voltage supply I/O levels
	8	---	---	Not assigned

1) E = input

2) A = output

6.3.5 Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12918638731

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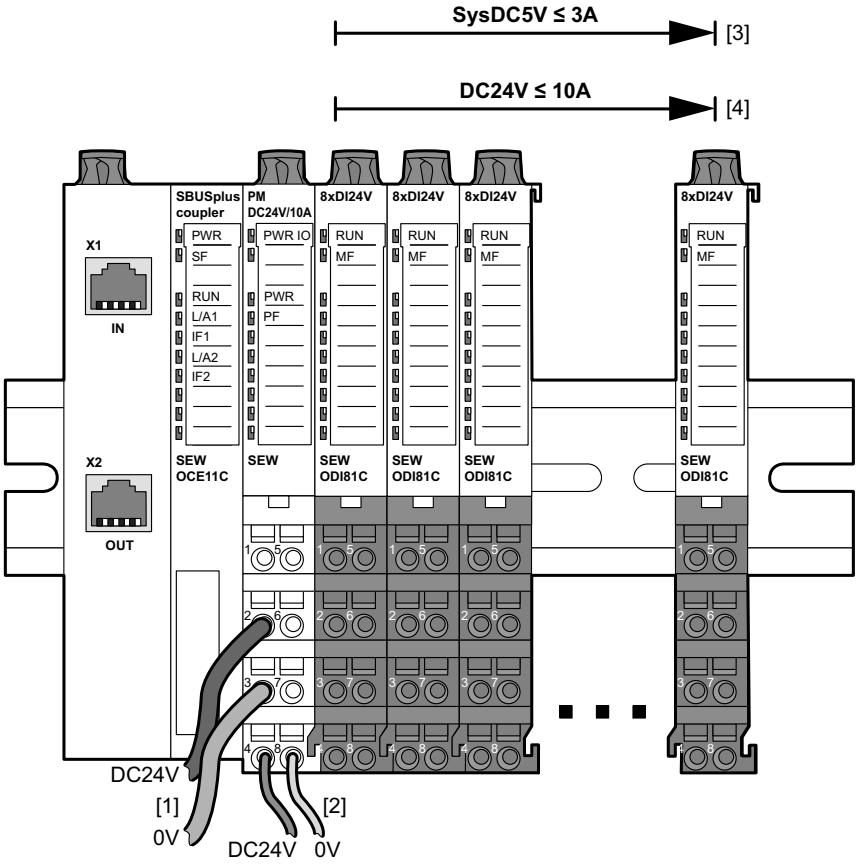
6.3.6 Wiring

The following figure shows the wiring of the voltage supply in connection with a bus coupler.



12888512395

[1] DC 24 V voltage supply for I/O levels (max. DC 10 A)
[2] DC 24 V electronics supply for bus coupler and I/O levels
[3] Sys DC 5 V electronics supply (max. DC 3 A)
[4] DC 24 V voltage supply (max. DC 10 A)

6.3.7 Extension of the MOVI-PLC® I/O system C

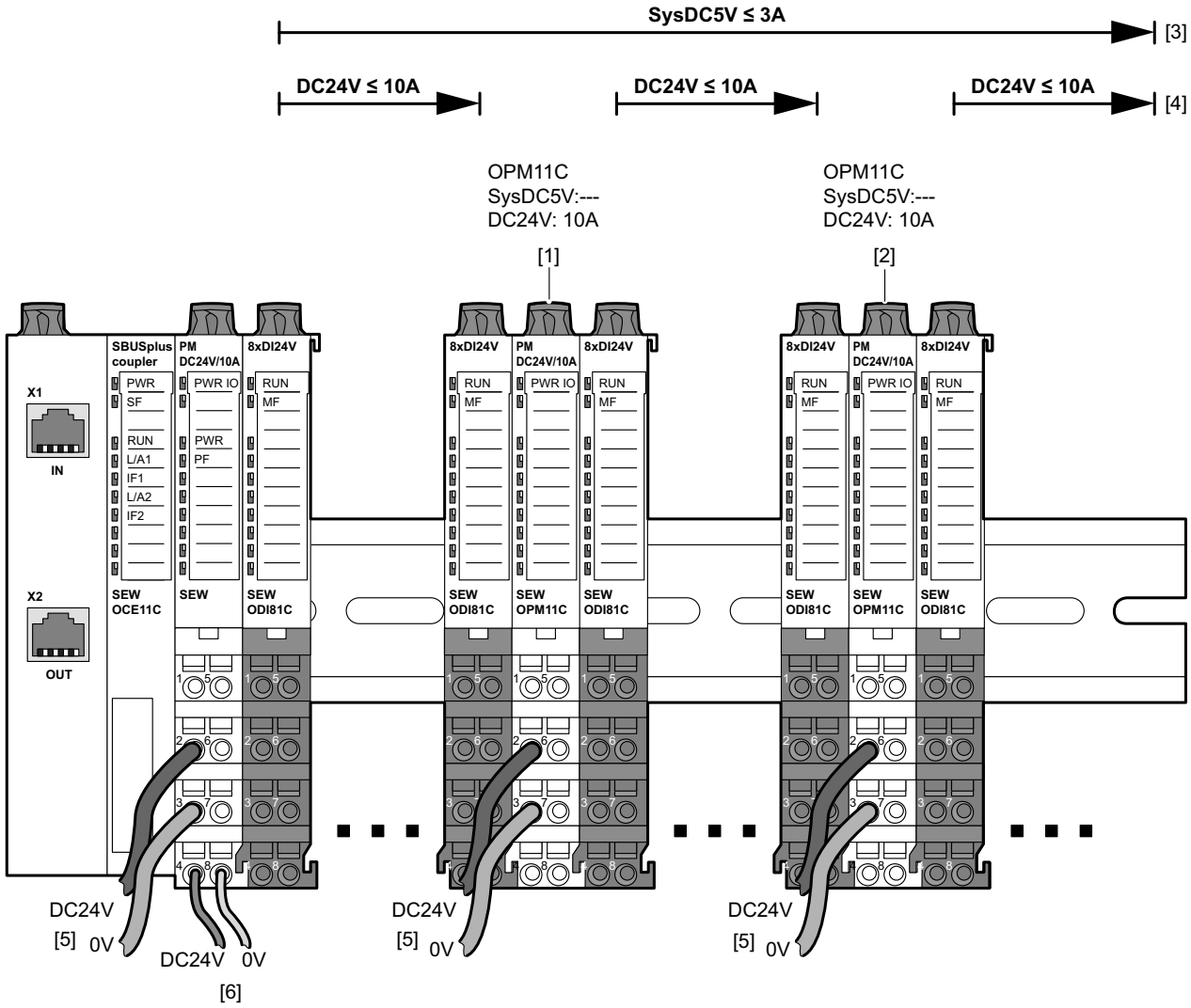
You may place the power supply module as soon as the total current of the voltage supply exceeds 10 A.

Extending the I/O system through the power supply module OPM11C

Proceed as follows:

1. Install the power supply module (see chapter "Installing peripheral modules").
2. Install further modules, for which the voltage supply does not exceed a max. total current of 10 A, on the subsequent backplane bus (see the following figure).
3. In this way, you can expand the MOVI-PLC® I/O system C by a maximum of 64 modules.
4. Ensure that the total current for the electronics supply does not exceed the maximum value of 3 A. The LEDs are no longer controlled if the total current is greater than 3 A.

⇨ The MOVI-PLC® I/O system C is expanded by the power supply module.



12891783563

[1] Power supply module OPM11C
[2] Power supply module OPM11C
[3] Total current of the electronics supply (max. DC 3 A)
[4] Total current of the voltage supply (max. DC 10 A)
[5] DC 24 V voltage supply for I/O levels (max. DC 10 A)
[6] DC 24 V electronics supply for bus coupler and I/O levels

6.3.8 Technical data

Type	OPM11C
Part number	28211871
Module ID	---
Current supply	
Input voltage (nominal value)	DC 24 V
Input voltage (permitted range)	DC 20.4 – 28.8 V
Line frequency (nominal value)	---
Line frequency (permitted range)	---

Input current (at 120 V)	---
Input current (at 230 V)	---
Inrush current	---
Power consumption	---
Output voltage (nominal value)	DC 24 V
Output current (nominal value)	DC 10 A
Power supply switchable in parallel	---
Polarity reversal protection	Yes
Overvoltage protection	DC 36 V
Max. residual ripple of the output voltage	---
Efficiency	---
Power loss	---
Status, alarm, diagnostics	
Status display	Yes
Alarms	No
Process alarm	No
Diagnostics interrupt	No
Diagnostic function	No
Diagnostic information can be read out	None
Supply voltage display	Green LED
Fault display for group fault	Red LED
Channel error display	None
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

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6.4 Terminal modules

In this chapter you will find the description of the terminal modules of the MOVI-PLC® I/O system C.

6.4.1 Terminal module OPV81C

The terminal module OPV81C is a "potential distributor". The module does not have a module ID. It is however included in the calculation of the max. number of modules.

The terminal module OPV81C has the following properties:

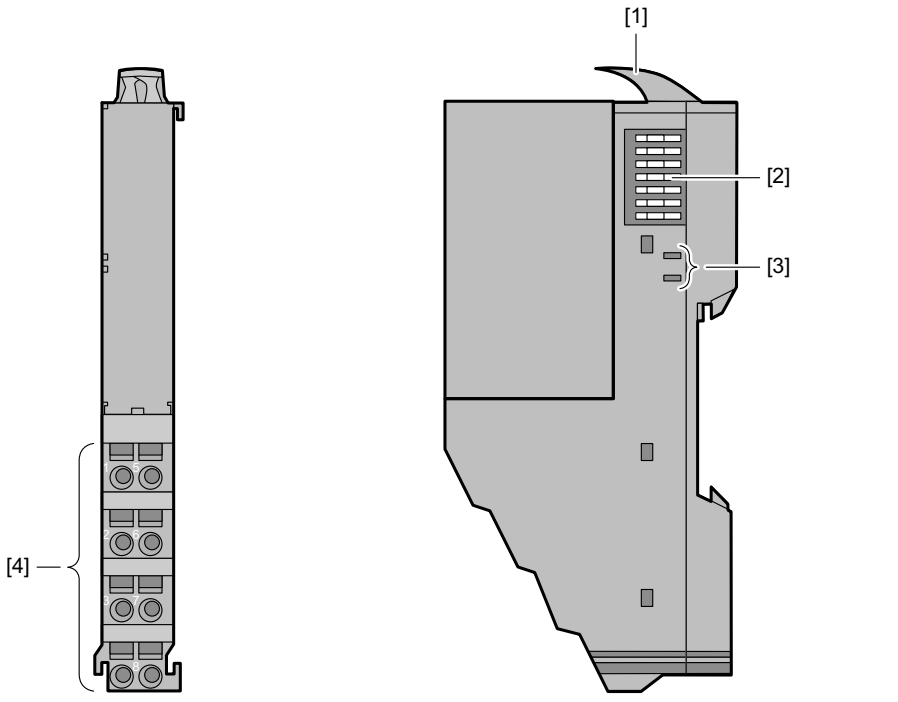
- Access to the DC 24 V voltage supply is via 8 terminals
- Maximum terminal current DC 10 A
- Backplane bus looped through
- Electrical isolation 500 V_{eff} (field voltage to the bus)

Part number

28211847

Structure

The following figure shows the structure of the terminal module.



12914999563

[1] Locking lever
[2] Backplane bus
[3] DC 24 V voltage supply
[4] Connecting terminals

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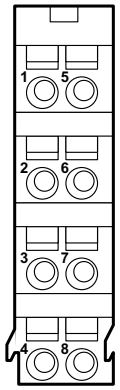
Connecting terminals

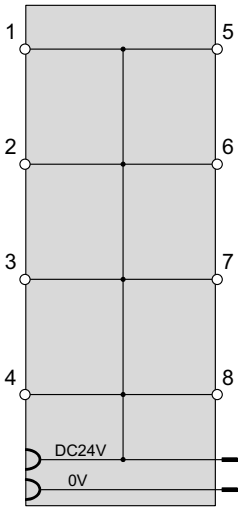
The following table shows the terminal assignment of the terminal module OPV81C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	DC 24 V	A[1)]	DC 24 V voltage supply
	2	DC 24 V	A	DC 24 V voltage supply
	3	DC 24 V	A	DC 24 V voltage supply
	4	DC 24 V	A	DC 24 V voltage supply
	5	DC 24 V	A	DC 24 V voltage supply
	6	DC 24 V	A	DC 24 V voltage supply
	7	DC 24 V	A	DC 24 V voltage supply
	8	DC 24 V	A	DC 24 V voltage supply

1) A = output

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12918643595

Technical data

Type	OPV81C
Part number	28211847
Module ID	---
Terminal parameters	
Max. terminal voltage	DC 30 V
Max. terminal current	DC 10 A
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 52.5 mm
Weight	50 g

Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

6.4.2 Terminal module OPV82C

The terminal module OPV82C is a "potential distributor". The module does not have a module ID. It is however included in the calculation of the max. number of modules.

The terminal module OPV82C has the following properties:

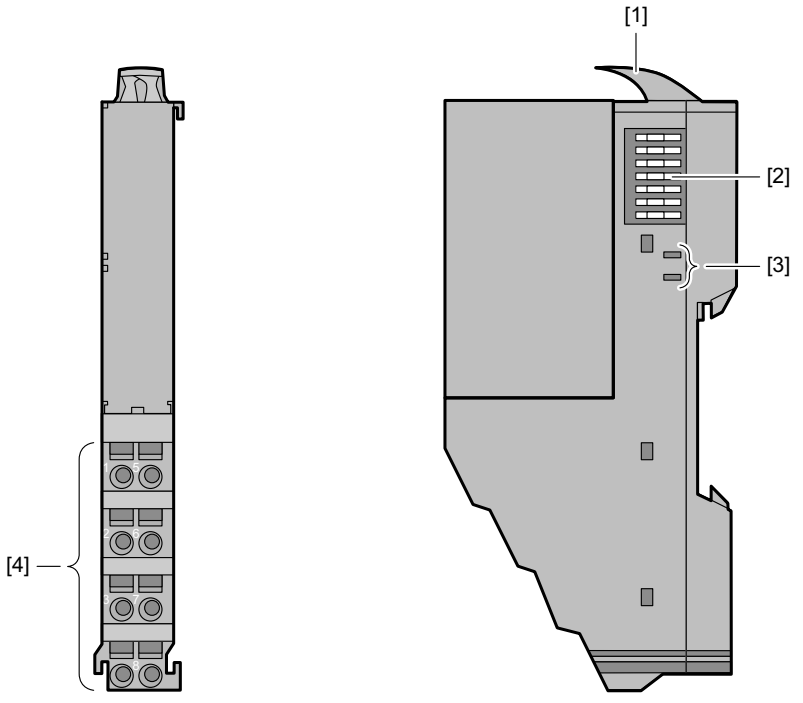
- Access to the reference potential for the DC 24 V voltage supply is via 8 terminals
- Maximum terminal current DC 10 A
- Backplane bus looped through
- Electrical isolation 500 V_{eff} (field voltage to the bus)

Part number

28211855

Structure

The following figure shows the structure of the terminal module.



12914999563

[1] Locking lever
[2] Backplane bus
[3] DC 24 V voltage supply
[4] Connecting terminals

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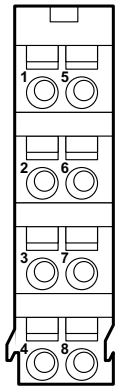
Connecting terminals

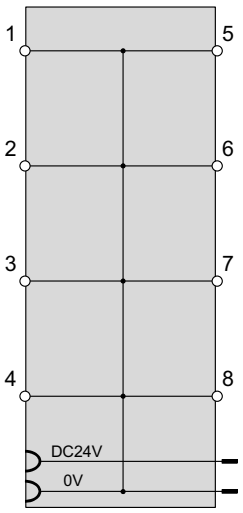
The following table shows the terminal assignment of the terminal module OPV82C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	DC 0 V	A[1)]	Reference potential for DC 24 V voltage supply
	2	DC 0 V	A	Reference potential for DC 24 V voltage supply
	3	DC 0 V	A	Reference potential for DC 24 V voltage supply
	4	DC 0 V	A	Reference potential for DC 24 V voltage supply
	5	DC 0 V	A	Reference potential for DC 24 V voltage supply
	6	DC 0 V	A	Reference potential for DC 24 V voltage supply
	7	DC 0 V	A	Reference potential for DC 24 V voltage supply
	8	DC 0 V	A	Reference potential for DC 24 V voltage supply

1) A = output

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12918646027

Technical data

Type	OPV82C
Part number	28211855
Module ID	---
Terminal parameters	
Max. terminal voltage	DC 0 V

Max. terminal current	DC 10 A
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 52.5 mm
Weight	50 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

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6.4.3 Terminal module OPV41C

The terminal module OPV41C is a "potential distributor". The module does not have a module ID. It is however included in the calculation of the max. number of modules.

The terminal module OPV41C has the following properties:

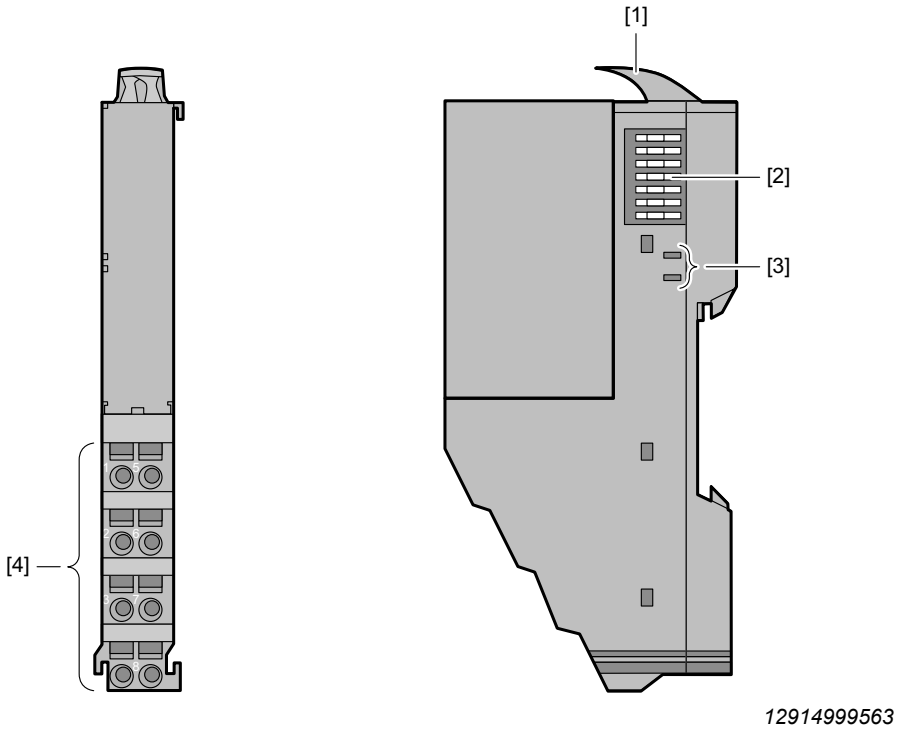
- Access to the DC 24 V voltage supply is via 4 terminals
- Access to the reference potential for the DC 24 V voltage supply is via 4 terminals
- Maximum terminal current DC 10 A
- Backplane bus looped through
- Electrical isolation 500 V_{eff} (field voltage to the bus)

Part number

28211863

Structure

The following figure shows the structure of the terminal module.

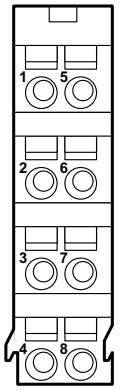


12914999563

[1] Locking lever
[2] Backplane bus
[3] DC 24 V voltage supply
[4] Connecting terminals

Connecting terminals

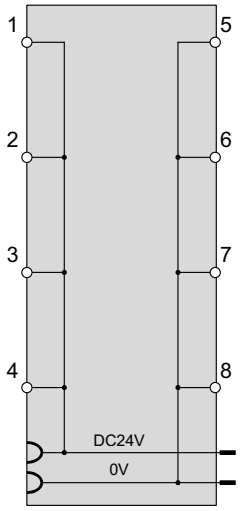
The following table shows the terminal assignment of the terminal module OPV41C:

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	DC 24 V	A[1)]	DC 24 V voltage supply
	2	DC 24 V	A	DC 24 V voltage supply
	3	DC 24 V	A	DC 24 V voltage supply
	4	DC 24 V	A	DC 24 V voltage supply
	5	DC 0 V	A	Reference potential for DC 24 V voltage supply
	6	DC 0 V	A	Reference potential for DC 24 V voltage supply
	7	DC 0 V	A	Reference potential for DC 24 V voltage supply
	8	DC 0 V	A	Reference potential for DC 24 V voltage supply

1) A = output

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12918641163

Technical data

Type	OPV41C
Part number	28211863
Module ID	---
Terminal parameters	
Max. terminal voltage	DC 30 V
Max. terminal current	DC 10 A
Mechanical data	

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Dimensions (W×H×D)	12.9 × 109 × 52.5 mm
Weight	50 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

6.5 Digital input and output modules

In this chapter you will find the description of the digital input and output modules of the MOVI-PLC® I/O system C.

6.5.1 Digital input module ODI24C

The digital input module ODI24C records the binary control signals from the process level and transports them, galvanically isolated, to the higher level bus system. It has 2 channels that display their state via LEDs.

For the parameterized ETS function (ETS = edge time stamp), the current time value of the MOVI-PLC® I/O system C µs ticker[1] at the corresponding edge (rising/falling) is stored together with the state of the inputs in the process image. 15 (60 bytes) ETS entries can be recorded successively in the process image.

The digital input module ODI24C has the following properties:

- 2 digital outputs, electrically isolated from the backplane bus
- Parameterizable ETS function for 15 ETS entries (of 4 bytes each)
- Suitable for switches and proximity switches
- Status display of the channels by LEDs even when the electronics supply is deactivated

INFORMATION

Note that the ETS modules can only be operated on the bus coupler OCE11C.

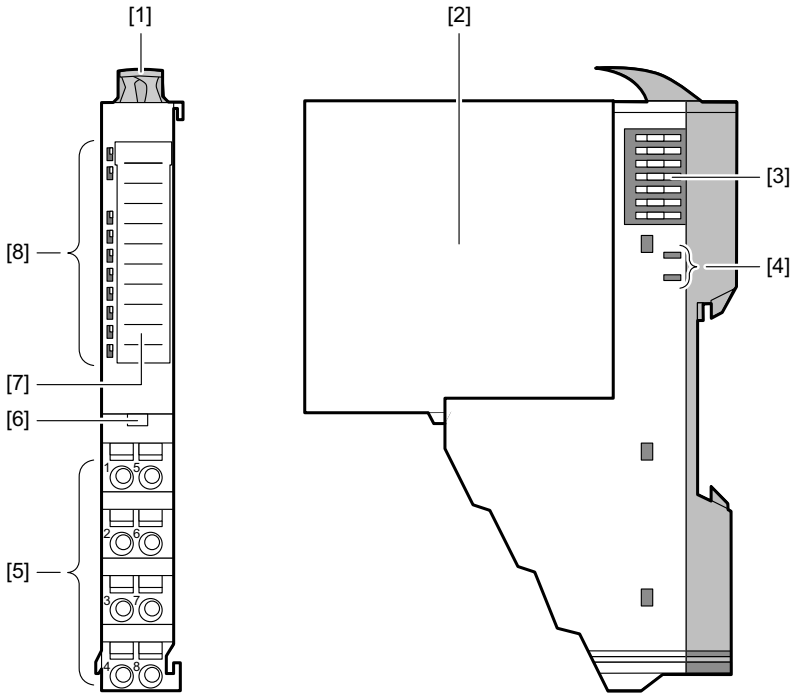
1) µs ticker = a 32-bit timer, which is located in the MOVI-PLC® I/O system C module.

Part number

28211898

Structure

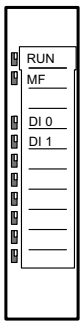
The following figure shows the structure of the module.



[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

Status LEDs

The digital input module ODI24C has the following status LEDs.

Overview	LED	Color	State	Meaning
 12926483851	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	DI x	Green	Lights up	Digital input controlled.

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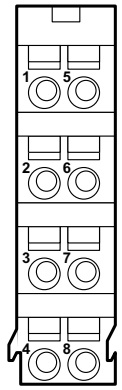
Connecting terminals

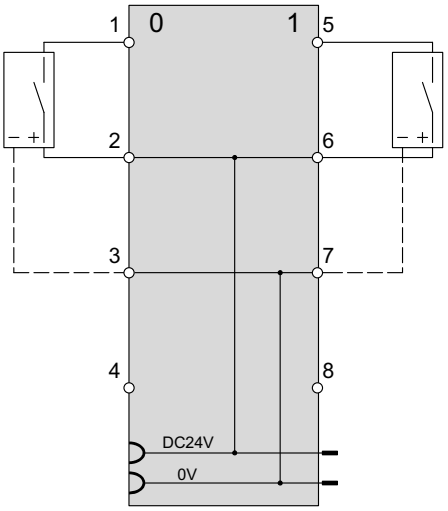
The following table shows the terminal assignment of the digital input module ODI24C.

Overview	Terminal	Function	Type	Assignment
	1	DI 0	E[1)]	Digital input DI 0
	2	DC 24 V	A[2)]	DC 24 V voltage supply for encoder
	3	0 V	A	Reference potential for DC 24 V voltage supply for encoder
	4	---	---	Not assigned
	5	DI 1	E	Digital input DI 1
	6	DC 24 V	A	DC 24 V voltage supply for encoder
	7	0 V	A	Reference potential for DC 24 V voltage supply for encoder
12915186699	8	---	---	Not assigned

1) E = input
2) A = output

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12918626571

Input/output range

For the parameterized ETS function (ETS = edge time stamp), the current time value of the MOVI-PLC® I/O system C µs ticker at the corresponding edge is stored together with the state of the inputs and a sequential number in the process image as an ETS entry.

- In the output range: The module does not use any bytes.
- 60 bytes in the input range: The module has space for 15 ETS entries. This means that each ETS entry uses 4 bytes.

Status of the inputs

Address	Bytes	Function
0	1	Status of the inputs
1	1	Sequential number
2	2	µs ticker

Status of the inputs

This is where the state of the inputs after the edge change is saved. The input byte has the following bit assignment:

- Bit 0: DI 0
- Bit 1: DI 1
- Bit 2 – 7: 0 (fix)

Sequential number

The RN (Running Number) is a sequential number from 0 – 127 which starts with 1. The RN expresses the temporal course of the edges.

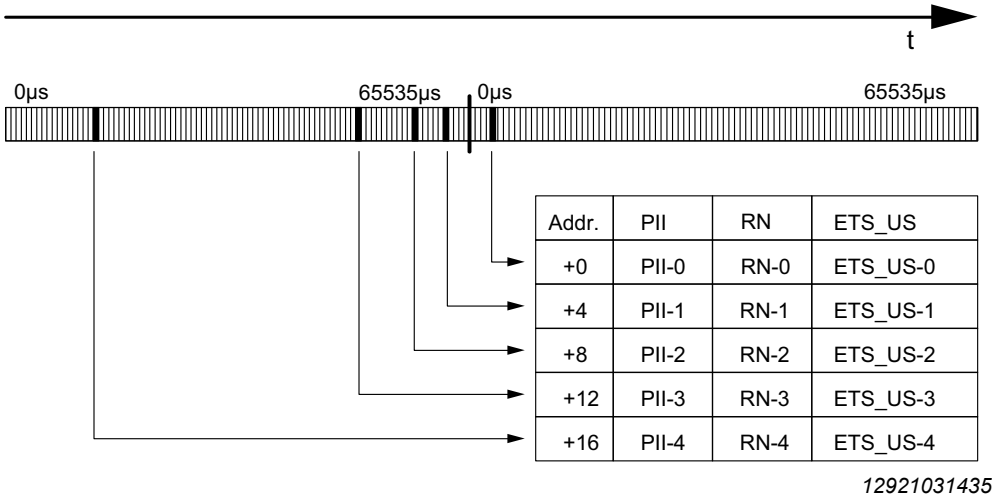
µs ticker

A 32-bit timer (µs ticker) is located in the MOVI-PLC® I/O system C module which is started when the line voltage is switched on and begins at 0 again after 232 – 1 µs. ETS_US (US = µs) always contains the low word of the µs ticker (0 – 65535 µs).

ETS functionality

For the corresponding edge, the time value of the timer ETS_US (US = µs) is stored together with the state of the inputs PII and a sequential RN as an ETS entry in the process image.

You will subsequently see how the ETS entries can be stored in chronological order in the input range.



12921031435

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Technical data

Type	ODI24C
Part number	28211898
Module ID	0F01 47C1
Current supply	
Current consumption from backplane bus	DC 85 mA
Power loss	0.9 W
Digital inputs	
Number of inputs	2
Cable length shielded	1000 m
Cable length unshielded	600 m
Rated load voltage	DC 24 V
Current consumption from load voltage L+ (without load)	DC 10 mA
Nominal value	DC 20.4 – 28.8 V
Input voltage for signal "0"	DC 0 – 5 V
Input voltage for signal "1"	DC 15 – 28.8 V
Input voltage hysteresis	---
Frequency range	---
Input resistance	---
Input current for signal "1"	DC 3 mA
Connection of 2-wire BERO	Possible
Max. permitted BERO no-load current	DC 0.5 mA
Input delay from "0" to "1"	Parameters can be set 2 µs – 3 ms
Input delay from "1" to "0"	Parameters can be set 2 µs – 3 ms
Number of simultaneously usable inputs horizontal installation	2
Number of simultaneously usable inputs vertical installation	2
Input characteristic	IEC 61131, type 1
Input data size	60 byte
Status, alarm, diagnostics	
Status display	Green LED per channel
Alarms	No
Process alarm	No
Diagnostics interrupt	No
Diagnostic function	No
Diagnostic information can be read out	Possible

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Module status	Green LED
Module error display	Red LED
Channel error display	None
Electrical isolation	
Between the channels	---
Between the channels in groups of	---
Between channels and backplane bus	Possible
Insulation checked with	DC 500 V
Safety	
Safety protocol	---
Safety requirements	---
Safe station address	---
Watchdog time	---
Dual-channel system	---
Test pulse outputs	---
Data sizes	
Input bytes	60
Output bytes	0
Parameter bytes	10
Diagnostic bytes	20
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

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6.5.2 Digital input module ODI42C

The digital input module ODI42C records the binary control signals from the process level and transports them, galvanically isolated, to the higher level bus system. It has 4 fast digital input channels that display their state via LEDs.

The digital input module ODI42C has the following properties:

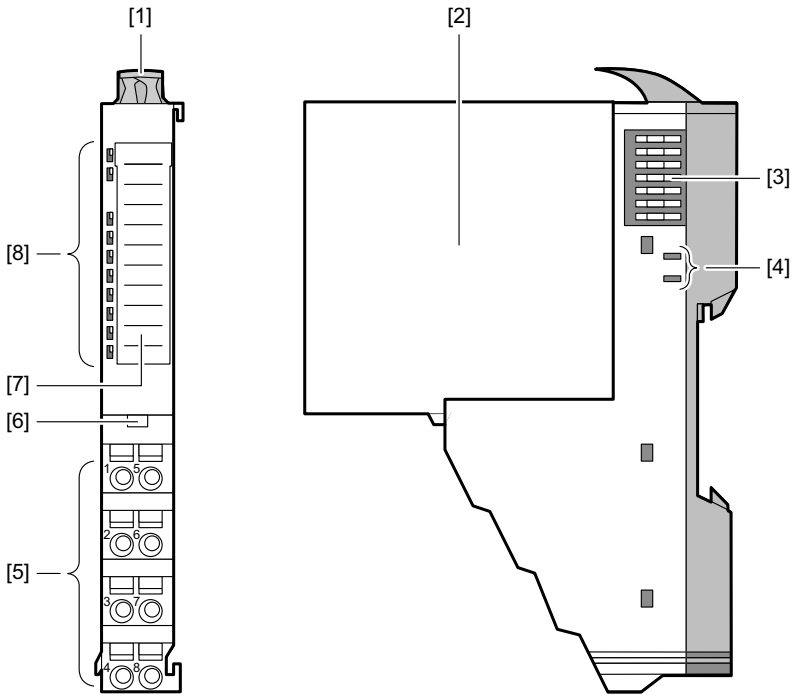
- 4 fast digital inputs, electrically isolated from the backplane bus
- Suitable for switches and proximity switches
- Status display of the channels by LEDs even when the electronics supply is deactivated
- Parameterizable input filters
- Alarm and diagnostic function

Part number

28211901

Structure

The following figure shows the structure of the module.

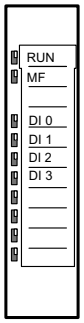


12920505099

[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

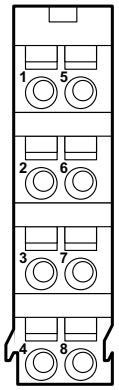
Status LEDs

The digital input module ODI42C has the following status LEDs.

Overview	LED	Color	State	Meaning
 *12926853899*	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	DI x	Green	Lights up	Digital input controlled.

Connecting terminals

The following table shows the terminal assignment of the digital input module ODI42C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	DI 0	E[1)]	Digital input DI 0
	2	DC 24 V	A[2)]	DC 24 V voltage supply for encoder
	3	0 V	A	Reference potential for DC 24 V voltage supply for encoder
	4	DI 2	E	Digital input DI 2
	5	DI 1	E	Digital input DI 1
	6	DC 24 V	A	DC 24 V voltage supply for encoder
	7	0 V	A	Reference potential for DC 24 V voltage supply for encoder
	8	DI 3	E	Digital input DI 3

1) E = input
2) A = output

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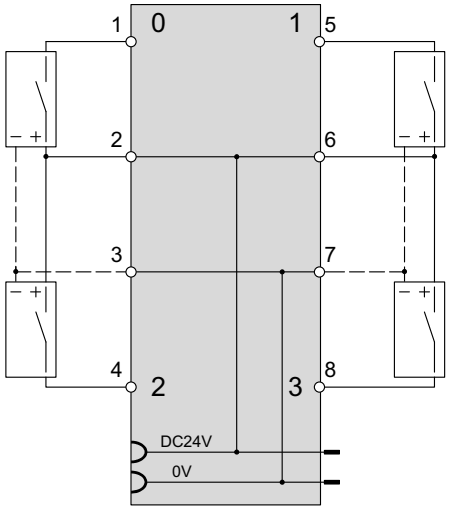
Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12918629003

Input/output range

- In the output range: The module does not use any bytes.
- The following assignment applies in the input area:

Address	Byte	Function
0	1	Status of the inputs: • Bit 0: DI 0 • Bit 1: DI 1 • Bit 2: DI 2 • Bit 3: DI 3 • Bit 4 – 7: Reserved

Technical data

Type	ODI42C
Part number	28211901
Module ID	0009 1F04
External power supply	
Current consumption from backplane bus	DC 95 mA
Power loss	DC 0.95 W
Digital inputs	
Number of inputs	4
Cable length shielded	1000 m
Cable length unshielded	600 m
Rated load voltage	DC 20.4 – 28.8 V

Current consumption from load voltage L+ (without load)	DC 15 mA
Nominal value	DC 20.4 – 28.8 V
Input voltage for signal "0"	DC 0 – 5 V
Input voltage for signal "1"	DC 15 – 28.8 V
Input voltage hysteresis	---
Frequency range	---
Input resistance	---
Input current for signal "1"	DC 3 mA
Connection of 2-wire BERO	Possible
Max. permitted BERO no-load current	DC 0.5 mA
Input delay from "0" to "1"	Parameters can be set 2 µs – 3 ms
Input delay from "1" to "0"	Parameters can be set 2 µs – 3 ms
Number of simultaneously usable inputs horizontal installation	4
Number of simultaneously usable inputs vertical installation	4
Input characteristic	IEC 61131, type 1
Input data size	4 Bit
Status, alarm, diagnostics	
Status display	Green LED per channel
Alarms	Yes, parameters can be set
Process alarm	Yes, parameters can be set
Diagnostics interrupt	Yes, parameters can be set
Diagnostic function	Yes
Diagnostic information can be read out	Possible
Module status	Green LED
Module error display	Red LED
Channel error display	None
Electrical isolation	
Between the channels	---
Between the channels in groups of	---
Between channels and backplane bus	Possible
Insulation checked with	DC 500 V
Safety	
Safety protocol	---
Safety requirements	---
Safe station address	---

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Watchdog time	---
Dual-channel system	---
Test pulse outputs	---
Data sizes	
Input bytes	1
Output bytes	0
Parameter bytes	11
Diagnostic bytes	20
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

Parameter-setting data

INFORMATION

Further information on parameterization can be found in the chapter "MOVI-PLC® library and modules".

Bytes	Function	Default	IX[1)]	SX[2)]
1	Diagnostics interrupt	00h	3100h	01h
1	Input delay DI 0	02h	3101h	02h
1	Input delay DI 1	02h	3102h	03h
1	Input delay DI 2	02h	3103h	04h
1	Input delay DI 3	02h	3104h	05h

1) IX = Index for access via CANopen.

2) SX = Subindex for access via EtherCAT® (access via index = 5005h).

Diagnostics interrupt

Bytes	Bit 0 – 7	Possible values
0	Diagnostics interrupt	00h: Block 40h: Enable

This is where you can activate or deactivate the diagnostic function.

Input delay

Bytes	Function	Possible values
0	Input delay DI x	00h: 1 µs 02h: 3 µs 04h: 10 µs 07h: 86 µs 09h: 342 µs 0Ch: 2731 µs

You can preset a filter for the appropriate channel by specifying the input delay. This allows you, for example, to filter signal peaks for unclean input signals.

Diagnostics and alarm

Trigger	Process alarm	Diagnostics interrupt	Parameterizable
Edge 0 – 1 DI x	x	---	x
Edge 1 – 0 DI x	x	---	x
Diagnostics buffer	---	x	---

Diagnostic data

You can activate a diagnostic alarm for the module via the parameterization. Diagnostics data for "incoming diagnostic alarm" is provided by the module when the diagnostic alarm is triggered. As soon as the reasons for the triggering of a diagnostic alarm are no longer present, you will automatically receive an "outgoing diagnostic alarm". The MF LED of the module lights up within this period of time (1st "incoming diagnostic alarm").

Bytes	Function	Default	IX[1)]	SX[2)]
1	Diagnostics	00h	2F01h	02h
1	Module information	1Fh		03h
1	Reserved	00h		04h
1	Diagnostics	00h		05h
1	Channel type	70h		06h
1	Number of status bits per channel	00h		07h
1	Number of module channels	04h		08h
1	Channel error	00h		09h
8	Reserved	00h		0Ah – 11h
4	µs ticker	00h		12h

1) IX = Index for access via CANopen.

2) SX = Subindex for access via EtherCAT® (access via index = 5005h).

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Diagnostics

Bytes	Bit 0 – 7
0	Bit 0: Set at assembly fault Bit 1: Reserved Bit 2: Set at external error Bit 3: Set at channel errors present Bit 5 – 7: Reserved

Module information

Bytes	Bit 0 – 7
0	Bit 0 – 3: Module class (1111b: digital assembly) Bit 4: Channel information available Bit 5 – 7: Reserved

Reserved

Bytes	Bit 0 – 7
0	Reserved

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 2: Reserved Bit 3: Set at internal diagnostics buffer Bit 4 – 5: Reserved Bit 6: Process alarm lost Bit 7: Reserved

Channel type

Bytes	Bit 0 – 7
0	Bit 0 – 6: Channel type (70h: digital input) Bit 7: Reserved

Status bits

Bytes	Bit 0 – 7
0	Number of status bits that the module outputs per channel (here 00h)

Channels

Bytes	Bit 0 – 7
0	Number of channels of a module (here 04h)

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Channel error

Bytes	Bit 0 – 7
0	Bit 0: Edge lost at DI 0 Bit 1: Edge lost at DI 1 Bit 2: Edge lost at DI 2 Bit 3: Edge lost at DI 3 Bit 4 – 7: Reserved

Reserved

Bytes	Bit 0 – 7
0	Reserved

µs ticker

Bytes	Bit 0 – 7
0 – 3	Value of the µs ticker should diagnostics occur

A 32-bit timer (µs ticker) is located in the MOVI-PLC® I/O system C module which is started when the line voltage is switched on and begins at 0 again after 232-1 µs.

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6.5.3 Digital input module ODI43C

The digital input module ODI43C records the binary control signals from the process level and transports them, galvanically isolated, to the higher level bus system. It has 4 channels that display their state via LEDs.

The digital input module ODI43C has the following properties:

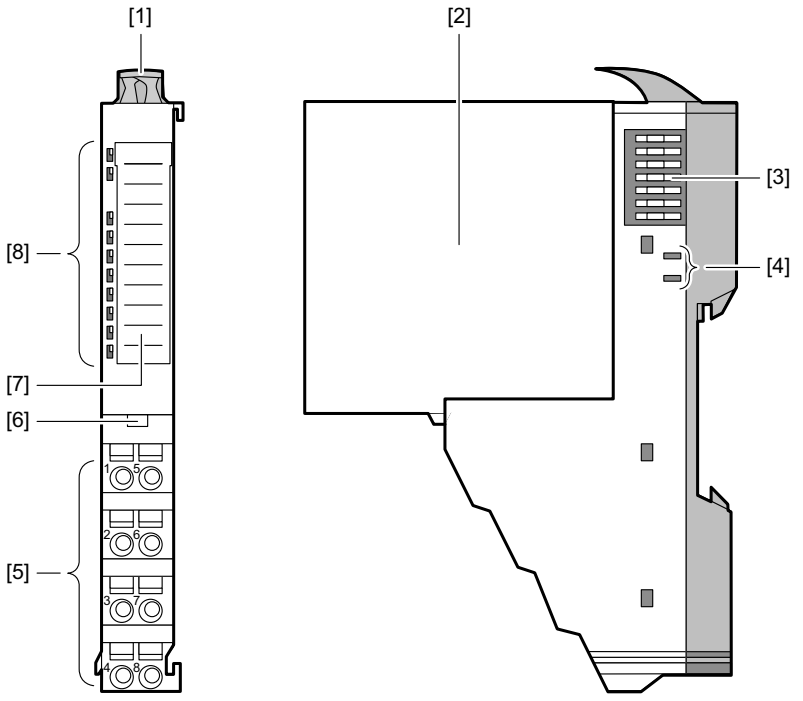
- 4 digital inputs in 3-conductor connection
- Electrically isolated from the backplane bus
- Suitable for switches and proximity switches
- Status display of the channels by LEDs even when the electronics supply is deactivated

Part number

28211928

Structure

The following figure shows the structure of the module.

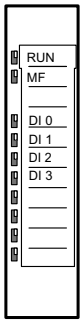


12920505099

[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

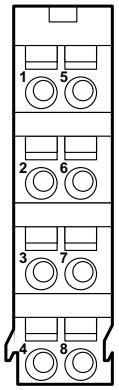
Status LEDs

The digital input module ODI43C has the following status LEDs.

Overview	LED	Color	State	Meaning
 *12926853899*	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	DI x	Green	Lights up	Digital input controlled.

Connecting terminals

The following table shows the terminal assignment of the digital input module ODI43C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	DI 0	E[1)]	Digital input DI 0
	2	DC 24 V	A[2)]	DC 24 V voltage supply for encoder
	3	0 V	A	Reference potential for DC 24 V voltage supply for encoder
	4	DI 2	E	Digital input DI 2
	5	DI 1	E	Digital input DI 1
	6	DC 24 V	A	DC 24 V voltage supply for encoder
	7	0 V	A	Reference potential for DC 24 V voltage supply for encoder
	8	DI 3	E	Digital input DI 3

1) E = input
2) A = output

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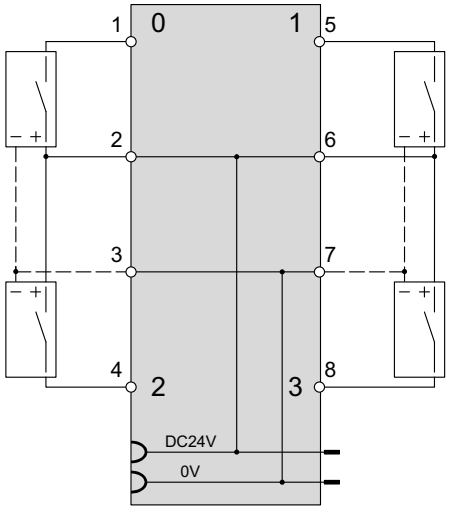
Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12918631435

Input/output range

The input and output range is displayed in the corresponding address range.

- In the output range: The module does not use any bytes.
- The following assignment applies in the input area:

Address	Byte	Function
0	1	Status of the inputs: • Bit 0: DI 0 • Bit 1: DI 1 • Bit 2: DI 2 • Bit 3: DI 3 • Bit 4 – 7: Reserved

Technical data

Type	ODI43C
Part number	28211198
Module ID	0008 9F84
External power supply	
Current consumption from backplane bus	DC 55 mA
Power loss	0.6 W
Digital inputs	
Number of inputs	4
Cable length shielded	1000 m
Cable length unshielded	600 m
Rated load voltage	---

Current consumption from load voltage L+ (without load)	---
Nominal value	DC 20.4 – 28.8 V
Input voltage for signal "0"	DC 0 – 5 V
Input voltage for signal "1"	DC 15 – 28.8 V
Input voltage hysteresis	---
Frequency range	---
Input resistance	---
Input current for signal "1"	DC 3 mA
Connection of 2-wire BERO	Possible
Max. permitted BERO no-load current	DC 0.5 mA
Input delay from "0" to "1"	3 ms
Input delay from "1" to "0"	3 ms
Number of simultaneously usable inputs horizontal installation	4
Number of simultaneously usable inputs vertical installation	4
Input characteristic	IEC 61131, type 1
Input data size	4 Bit
Status, alarm, diagnostics	
Status display	Green LED per channel
Alarms	No
Process alarm	No
Diagnostics interrupt	No
Diagnostic function	No
Diagnostic information can be read out	None
Module status	Green LED
Module error display	Red LED
Channel error display	None
Electrical isolation	
Between the channels	---
Between the channels in groups of	---
Between channels and backplane bus	Possible
Insulation checked with	DC 500 V
Safety	
Safety protocol	---
Safety requirements	---
Secure node address	---
Watchdog time	---
Dual-channel system	---

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Test pulse outputs	---
Data sizes	
Input bytes	1
Output bytes	0
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

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6.5.4 Digital input module ODI81C

The digital input module ODI81C records the binary control signals from the process level and transports them, galvanically isolated, to the higher level bus system. It has 8 channels that display their state via LEDs.

The digital input module ODI81C has the following properties:

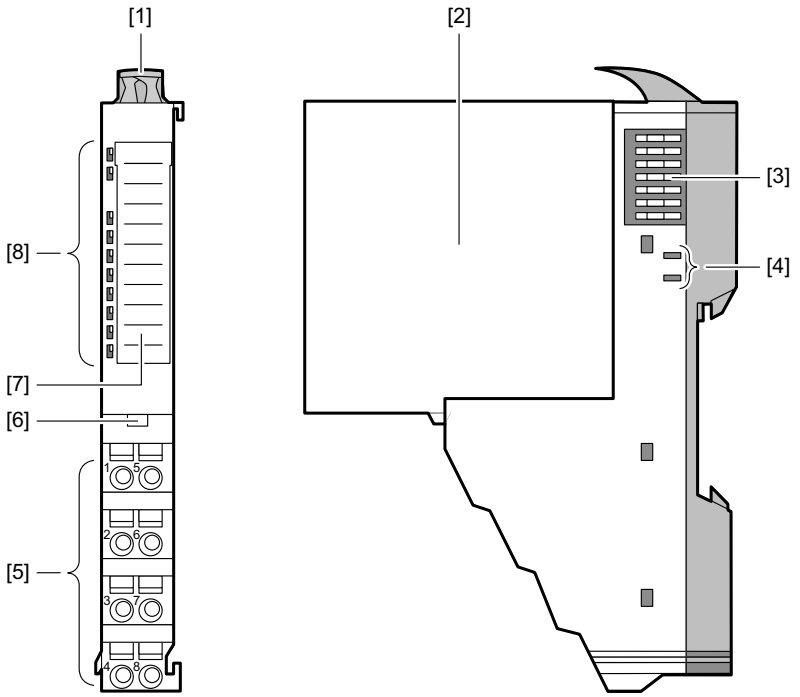
- 8 digital outputs, electrically isolated from the backplane bus
- Suitable for switches and proximity switches
- Status display of the channels by LEDs even when the electronics supply is deactivated

Part number

28211936

Structure

The following figure shows the structure of the module.



12920505099

[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

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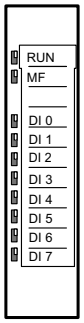
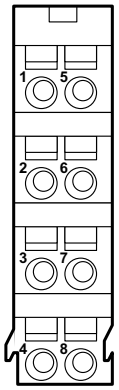
Status LEDs

The digital input module ODI81C has the following status LEDs.

Overview	LED	Color	State	Meaning
 *12926856331*	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	DI x	Green	Lights up	Digital input controlled.

Connecting terminals

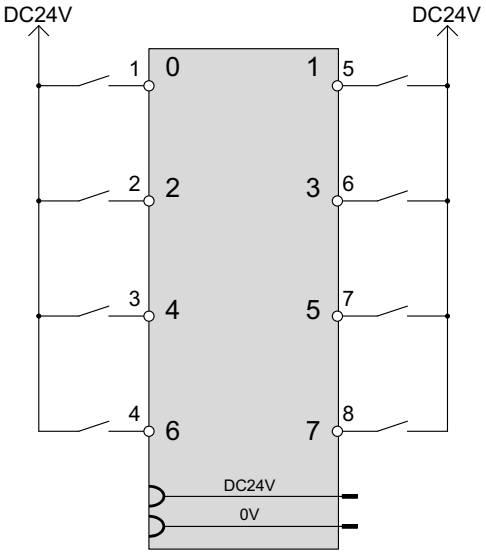
The following table shows the terminal assignment of the digital input module ODI81C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	DI 0	E[1)]	Digital input DI 0
	2	DI 2	E	Digital input DI 2
	3	DI 4	E	Digital input DI 4
	4	DI 6	E	Digital input DI 6
	5	DI 1	E	Digital input DI 1
	6	DI 3	E	Digital input DI 3
	7	DI 5	E	Digital input DI 5
	8	DI 7	E	Digital input DI 7

1) E = input

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12918633867

Input/output range

- In the output range: The module does not use any bytes.
- The following assignment applies in the input area:

Address	Name	Byte	Function
0	PII	1	Status of the inputs: • Bit 0: DI 0 • Bit 1: DI 1 • Bit 2: DI 2 • Bit 3: DI 3 • Bit 4: DI 4 • Bit 5: DI 5 • Bit 6: DI 6 • Bit 7: DI 7

Technical data

Type	ODI81C
Part number	28211936
Module ID	0005 9FC1
Current supply	
Current consumption from backplane bus	DC 60 mA
Power loss	0.9 W
Digital inputs	
Number of inputs	8

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Cable length shielded	1000 m
Cable length unshielded	600 m
Rated load voltage	---
Current consumption from load voltage L+ (without load)	---
Nominal value	DC 20.4 – 28.8 V
Input voltage for signal "0"	DC 0 – 5 V
Input voltage for signal "1"	DC 15 – 28.8 V
Input voltage hysteresis	---
Frequency range	---
Input resistance	---
Input current for signal "1"	DC 3 mA
Connection of 2-wire BERO is possible	Possible
Max. permitted BERO no-load current	0.5 mA
Input delay from "0" to "1"	3 ms
Input delay from "1" to "0"	3 ms
Number of simultaneously usable inputs horizontal installation	8
Number of simultaneously usable inputs vertical installation	8
Input characteristic	IEC 61131, type 1
Input data size	8 Bit
Status, alarm, diagnostics	
Status display	Green LED per channel
Alarms	No
Process alarm	No
Diagnostics interrupt	No
Diagnostic function	No
Diagnostic information can be read out	None
Module status	Green LED
Module error display	Red LED
Channel error display	None
Electrical isolation	
Between the channels	---
Between the channels in groups of	---
Between channels and backplane bus	Possible
Insulation checked with	DC 500 V
Safety	
Safety protocol	---
Safety requirements	---

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Safe station address	---
Watchdog time	---
Dual-channel system	---
Test pulse outputs	---
Data sizes	
Input bytes	1
Output bytes	0
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

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6.5.5 Digital output module ODO81C

The digital output module ODO81C records the binary control signals from the higher level bus system and transports them to the process levels via the outputs. It has 8 channels that display their state via LEDs.

The digital output module ODO81C has the following properties:

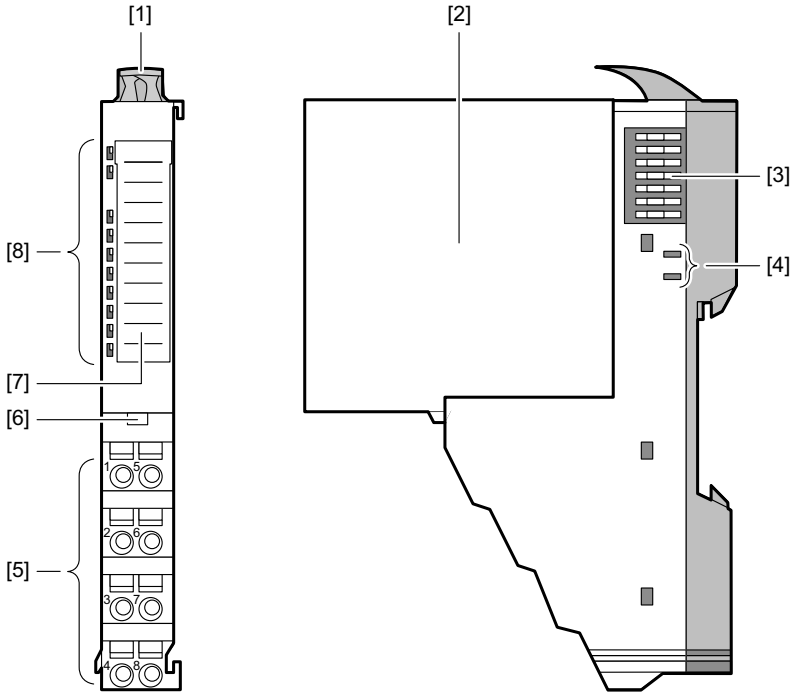
- 8 digital outputs, electrically isolated from the backplane bus
- Status display of channels via LEDs

Part number

28211944

Structure

The following figure shows the structure of the module.

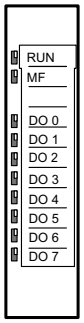


12920505099

[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

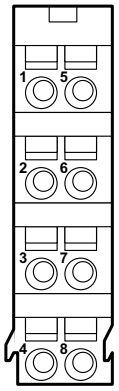
Status LEDs

The digital output module ODO81C has the following status LEDs:

Overview	LED	Color	State	Meaning
 *12926858763*	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	DO x	Green	Lights up	Digital output controlled.

Connecting terminals

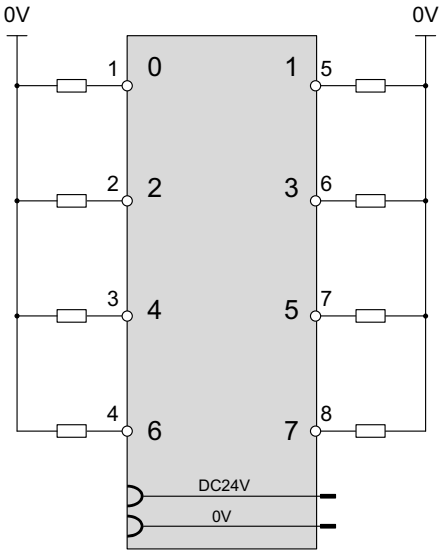
The following table shows the terminal assignment of the digital output module ODO81C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	DO 0	A[1)]	Digital output DO 0
	2	DO 2	A	Digital output DO 2
	3	DO 4	A	Digital output DO 4
	4	DO 6	A	Digital output DO 6
	5	DO 1	A	Digital output DO 1
	6	DO 3	A	Digital output DO 3
	7	DO 5	A	Digital output DO 5
	8	DO 7	A	Digital output DO 7

1) A = output

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12918636299

Input/output range

- In the input range: The module does not use any bytes.
- The following assignment applies in the output range:

Address	Name	Byte	Function
0	PIQ	1	Status of the outputs: • Bit 0: DO 0 • Bit 1: DO 1 • Bit 2: DO 2 • Bit 3: DO 3 • Bit 4: DO 4 • Bit 5: DO 5 • Bit 6: DO 6 • Bit 7: DO 7

Technical data

Type	ODO81C
Part number	28211944
Module ID	0106 AFC8
Current supply	
Current consumption from backplane bus	DC 65 mA
Power loss	0.7 W
Digital inputs	
Number of inputs	8

Cable length shielded	1000 m
Cable length unshielded	600 m
Rated load voltage	DC 20.4 – 28.8 V
Current consumption from load voltage L+ (without load)	DC 15 mA
Total current per group, horizontal installation, 40 °C	DC 4 A
Total current per group, horizontal installation, 60 °C	DC 4 A
Total current per group, vertical installation	DC 4 A
Output current at "1" signal, nominal value	DC 0.5 A
Output delay from "0" to "1"	30 µs
Output delay from "1" to "0"	175 µs
Minimum load current	---
Lamp load	10 W
Parallel connection of outputs for redundant control	Not possible
Parallel connection of outputs for increased power	Not possible
Control of a binary input	Possible
Max. switching frequency for ohmic load	1000 Hz
Max. switching frequency for inductive load	0.5 Hz
Max. switching frequency for lamp load	10 Hz
Limit (internal) for the inductive interrupting voltage	L+ (−52 V)
Short circuit protection of the output.	Yes, electronic
Response threshold of the protection	DC 1 A
Number of switching cycles of the relay outputs	---
Switching capacity of the relay contacts	---
Output data size	8 Bit
Status, alarm, diagnostics	
Status display	Green LED per channel
Alarms	No
Process alarm	No
Diagnostics interrupt	No
Diagnostic function	No
Diagnostic information can be read out	None
Module status	Green LED
Module error display	Red SF LED
Channel error display	None
Electrical isolation	
Between the channels	---
Between the channels in groups of	---

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Between channels and backplane bus	Possible
Insulation checked with	DC 500 V
Safety	
Safety protocol	---
Safety requirements	---
Safe station address	---
Watchdog time	---
Dual-channel system	---
Test pulse outputs	---
Data sizes	
Input bytes	1
Output bytes	0
Parameter bytes	0
Diagnostic bytes	0
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

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6.6 Analog input modules

In this chapter you will find the description of the analog input modules of the MOVI-PLC® I/O system C.

6.6.1 General

Lines for analog signals

- Only use shielded lines for the analog signals in order to prevent interference.
- Ground the shield of the analog lines at both ends.
- If potential differences arise between the line ends, an earth-loop current may flow which can interfere with the analog signals. In this case, ground the shield at only one end of the line.

Connection of the measuring transmitter

NOTICE

Note the polarity for the connection of the measuring transmitter.

Risk of damage to the modules

- Always adhere to the correct polarity for the connection of the measuring transmitter.
- Short circuit unused inputs by connecting the positive connection and the channel ground of the respective channel to each other.

Depending on the module, you can connect the following measuring transmitter to the analog input modules:

- Current transmitter
- Voltage transmitter
- Resistance transmitter
- Temperature transmitter

Parameterization

The parameterization is done by means of function blocks. The relevant data set number can be found in the corresponding module description.

Diagnostic function

The modules are diagnosable. You can call up the following error messages via diagnostics:

- Errors in parameter settings
- Measuring range overrun or underrun
- Wire break

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Display of analog values

The analog values are processed exclusively in binary form. The analog module converts each process signal into a digital form and passes this on as a word.

Resolution	Analog value															
	High byte (byte 0)								Low byte (byte 1)							
Bit no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Value	VZ	214	213	212	211	210	29	28	27	26	25	24	23	22	21	20
12 bit + SB[1)]	VZ	Measured value												0	0	0
15 Bit + SB	VZ	Measured value														

1) SB = sign bit

At a resolution of 12 bits plus sign bit, the non-used less significant digits (3 bits) are written with "0".

The following applies for the sign bit:

- Bit 15 = "0" → positive value
- Bit 15 = "1" → negative value

Error behavior

As soon as a measured value exceeds the override range or is below the underride range, the following value is output:

- Measured value > override range: 32767 (7FFFh)
- Measured value < underride range: −32768 (8000h)

In the event of an invalid parameter setting, the measured value 32767 (7FFFh) is output.

6.6.2 Analog input module OAI42C

The analog input module OAI42C has 4 inputs. Their functions can be parameterized individually. The channels on the module are electrically isolated from the backplane bus. The channels are also electrically isolated from the DC 24 V voltage supply by means of a DC/DC converter.

The analog input module OAI42C has the following properties:

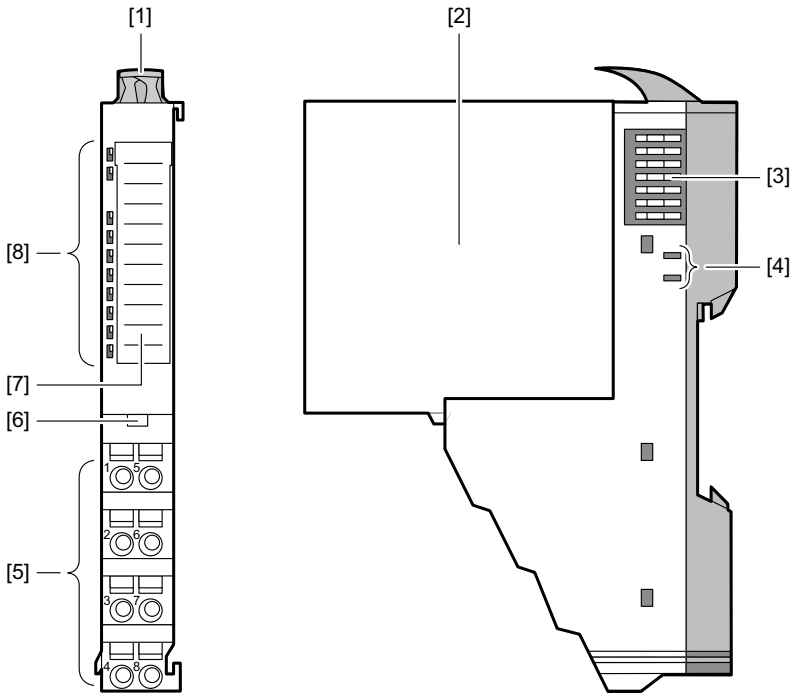
- 4 analog inputs
- Suitable for encoders with 0 mA – 20 mA; 4 mA – 20 mA with external supply
- 16-bit resolution

Part number

28211952

Structure

The following figure shows the structure of the module.



12920505099

[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

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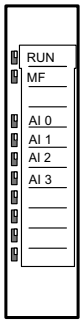
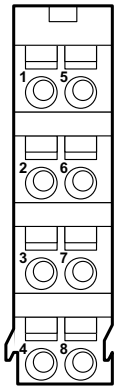
Status LEDs

The analog input module OAI42C has the following status LEDs:

Overview	LED	Color	State	Meaning
 *12926488203*	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	AI x	Red	Lights up	Error channel x: • Signal outside the measuring range • Error in the parameterization

Connecting terminals

The following table shows the terminal assignment of the analog input module OAI42C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	+AI 0	E[1)]	+ channel 0
	2	−AI 0	E	Reference potential for channel 0
	3	+AI 2	---	+ channel 2
	4	−AI 2	---	Reference potential for channel 2
	5	+AI 1	E	+ channel 1
	6	−AI 1	E	Reference potential for channel 1
	7	+AI 3	---	+ channel 3
	8	−AI 3	---	Reference potential for channel 3

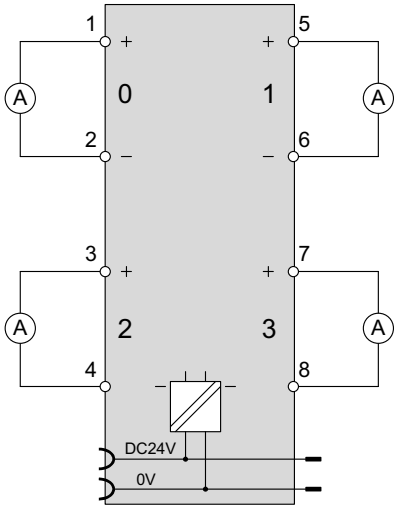
1) E = input

INFORMATION

An external voltage supply is to be looped into the measuring line when using 2-wire measuring transducers.

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12917050379

Input/output range

- In the output range: The module does not use any bytes.
- The following assignment applies in the input area:

Address	Name	Bytes	Function
0	AI 0	2	Analog value channel 0
2	AI 1	2	Analog value channel 1
4	AI 2	2	Analog value channel 2
6	AI 3	2	Analog value channel 3

Technical data

Type	OAI42C
Part number	28211952
Module ID	0411 1544
Current consumption/power loss	
Current consumption from backplane bus	DC 60 mA
Power loss	0.7 W
Analog inputs	
Number of inputs	4
Cable length shielded	200 m
Rated load voltage	DC 24 V
Current consumption from load voltage L+ (without load)	DC 20 mA
Voltage inputs	---
Min. input resistance for voltage range	---
Input voltage ranges	---

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Operational limit for voltage ranges	---
Operational limit for voltage ranges with SFU	---
Basic error limit for voltage ranges	---
Basic error limit for voltage ranges with SFU	---
Current inputs	Possible
Max. input resistance in the current range	60 Ω
Input current ranges	DC 0 – 20 mA /4 – 20 mA
Operational limit for current ranges	±0.2 %
Operational limit for current ranges with SFU	---
Basic error limit for current ranges	±0.1 %
Basic error limit for current ranges with SFU	---
Resistance inputs	---
Resistance ranges	---
Operational limit for resistance ranges	---
Basic error limit for resistance ranges	---
Resistance thermometer inputs	---
Resistance thermometer ranges	---
Operational limit for resistance thermometer ranges	---
Operational limit for resistance ranges with SFU	---
Basic error limit for resistance thermometer ranges	---
Operational limit for resistance ranges with SFU	---
Thermocouple inputs	---
Thermocouple ranges	---
Operational limit for thermocouple ranges	---
Operational limit for thermocouple ranges with SFU	---
Basic error limit for thermocouple ranges	---
Basic error limit for thermocouple ranges with SFU	---
Parameters can be set for temperature compensation	---
Temperature compensation external	---
Temperature compensation internal	---
Resolution	16 bit
Measuring principle	Successive approximation
Basic conversion time	480 µs for all channels
Interference voltage suppression for frequency	>80 dB (U_{cm} < 4 V)
Status, alarm, diagnostics	
Status display	Yes
Alarms	Yes, parameters can be set

Process alarm	Yes, parameters can be set
Diagnostics interrupt	Yes, parameters can be set
Diagnostic function	Yes
Diagnostic information can be read out	Possible
Module status	Green LED
Module error display	Red LED
Channel error display	Red LED per channel
Electrical isolation	
Between the channels	---
Between the channels in groups of	---
Between channels and backplane bus	Possible
Between channels and voltage supply	Possible
Max. potential difference between circuits	---
Max. potential difference between inputs	DC 4 V
Max. potential difference between M_{ana} (analog input mass) and M_{intern} (internal mass)	---
Max. potential difference between inputs and M_{ana} (mass analog input)	---
Max. potential difference between inputs and M_{intern} (internal mass)	DC 75 V/AC 60 V
Max. potential difference between M_{intern} (internal mass) and outputs	---
Insulation checked with	DC 500 V
Data sizes	
Input bytes	4
Output bytes	0
Parameter bytes	32
Diagnostic bytes	20
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	In preparation

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Parameter-setting data

INFORMATION

Further information on parameterization can be found in the chapter "MOVI-PLC® library and modules".

The following table shows the parameterization data of the module.

Bytes	Function	Default	IX[1]	SX[2]
1	Diagnostics	00h	3100h	01h
1	Reserved	00h	3101h	02h
1	Interference frequency suppression	00h	3103h	04h
1	Function number channel 0	31h	3104h	05h
1	Reserved	00h	3105h	06h
1	Function number channel 1	31h	310Ah	09h
1	Reserved	00h	310Bh	0Ah
1	Function number channel 2	31h	3110h	0Dh
1	Reserved	00h	3111h	0Eh
1	Function number channel 3	31h	3116h	11h
1	Reserved	00h	3117h	12h

1) IX = Index for access via CANopen.
2) SX = Subindex for access via EtherCAT®.

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 5: Reserved Bit 6: Diagnostic alarm (1: enabled) Bit 7: Reserved

Interference frequency suppression

Bytes	Bit 0 – 7		
0	Bit 0, 1: Interference frequency suppression channel 0 Bit 2, 3: Interference frequency suppression channel 1 Bit 4, 5: Interference frequency suppression channel 2 Bit 6, 7: Interference frequency suppression channel 3		
	Bit 6	Bit 7	Meaning
	0	0	Deactivated
	1	0	60 Hz
	0	1	50 Hz
	For example 10101010: Interference frequency suppression for all channels is 50 Hz		

Function number channel x

All of the measuring ranges, which are supported by the analog module, and their associated function number are listed below. The corresponding channel is deactivated by specifying FFh. Using the formulas listed here, you can convert a determined value (digital value: decimal or hex) into an analog value assigned to the measuring range and vice versa.

Measuring range (Function No.)	Current (I)	Decimal (D)	Hex	Area	Conversion
0 mA – 20 mA (31h)	23.52 mA	32511	7EFFh	Override	$D = 27648 \times \frac{I}{20}$ $I = D \times \frac{20}{27648}$
	20 mA	27648	6C00h	Nominal range	
	10 mA	13824	3600h		
	0 mA	0	0000h		
	-3.52 mA	-4864	ED00h	Underride	

Measuring range (Function No.)	Current (I)	Decimal (D)	Hex	Area	Conversion
4 mA – 20 mA (30h)	22.81 mA	32511	7EFFh	Override	$D = 27648 \times \frac{I - 4}{16}$ $I = D \times \frac{16}{27648} + 4$
	20 mA	27648	6C00h	Nominal range	
	12 mA	13824	3600h		
	4 mA	0	0000h		
	1.19 mA	-4864	ED00h	Underride	

Diagnostic data

You can activate a diagnostic alarm for the module via the parameterization. Diagnostics data for "incoming diagnostic alarm" is provided by the module when the diagnostic alarm is triggered. As soon as the reasons for the triggering of a diagnostic alarm are no longer present, you will automatically receive an "outgoing diagnostic alarm". The MF LED of the module lights up within this period of time (1st "incoming diagnostic alarm").

The following errors are recorded in the diagnostics data:

- Project planning error/invalid parameter setting
- Measuring range exceedance
- Measuring range underrange
- Supply voltage is missing

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Bytes	Function	Default	IX[1)]	SX[2)]
1	Diagnostics	00h	2F01h	02h
1	Module information	15h		03h
1	Reserved	00h		04h
1	Diagnostics	00h		05h
1	Channel type	71h		06h
1	Number of status bits per channel	08h		07h
1	Number of module channels	04h		08h
1	Channel error	00h		09h
1	Channel-specific error channel 0	00h		0Ah
1	Channel-specific error channel 1	00h		0Bh
1	Channel-specific error channel 2	00h		0Ch
1	Channel-specific error channel 3	00h		0Dh
4	Reserved	00h		0Eh – 11h
4	µs ticker	00h		12h

1) IX = Index for access via SBus (CANopen): Access is via IX 2F01h. You can also access the first 4 bytes via IX 2F00h.
2) SX = Subindex for access via SBusPLUS (EtherCAT®).

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0: Set at assembly fault
	Bit 1: Set at internal error
	Bit 2: Set at external error
	Bit 3: Set at channel errors present
	Bit 4: Set at missing external supply voltage
	Bit 5, 6: Reserved
	Bit 7: Set at invalid parameter setting

Module information

Bytes	Bit 0 – 7
0	Bit 0 – 3: Module class (0101 analog module)
	Bit 4: Set at channel information present
	Bit 5 – 7: Reserved

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 2: Reserved Bit 3: Set at internal diagnostics buffer Bit 4: Set at internal communication error Bit 5: Reserved Bit 6: Set at process alarm lost Bit 7: Reserved

Channel type

Bytes	Bit 0 – 7
0	Bit 0 – 6: Channel type (71h: analog input) Bit 7: Reserved

Status bits

Bytes	Bit 0 – 7
0	Number of status bits of the module per channel (here 08h)

Channels

Bytes	Bit 0 – 7
0	Number of channels of a module (here 04h)

Channel error

Bytes	Bit 0 – 7
0	Bit 0: Set at error channel group 0 Bit 1: Set at error channel group 1 Bit 2: Set at error channel group 2 Bit 3: Set at error channel group 3 Bit 4 – 7: Reserved

Channel-specific error

Bytes	Bit 0 – 7
0	Channel-specific error channel x: Bit 0: Set at project planning error/invalid parameter setting Bit 1 – 4: Reserved Bit 5: Set at process alarm lost Bit 6: Set at measuring range underrange Bit 7: Set at measuring range exceedance

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Reserved

Bytes	Bit 0 – 7
0	Reserved

µs ticker

Bytes	Bit 0 – 7
0 – 3	Value of the µs ticker should diagnostics occur

A 32-bit timer (µs ticker) is located in the MOVI-PLC® I/O system C module which is started when the line voltage is switched on and begins at 0 again after 232-1 µs.

6.6.3 Analog input module OAI41C

The analog input module OAI41C has 4 inputs. The functions of these inputs can be parameterized. The channels on the module are electrically isolated from the backplane bus. The channels are also electrically isolated from the DC 24 V voltage supply by means of a DC/DC converter.

The analog input module OAI41C has the following properties:

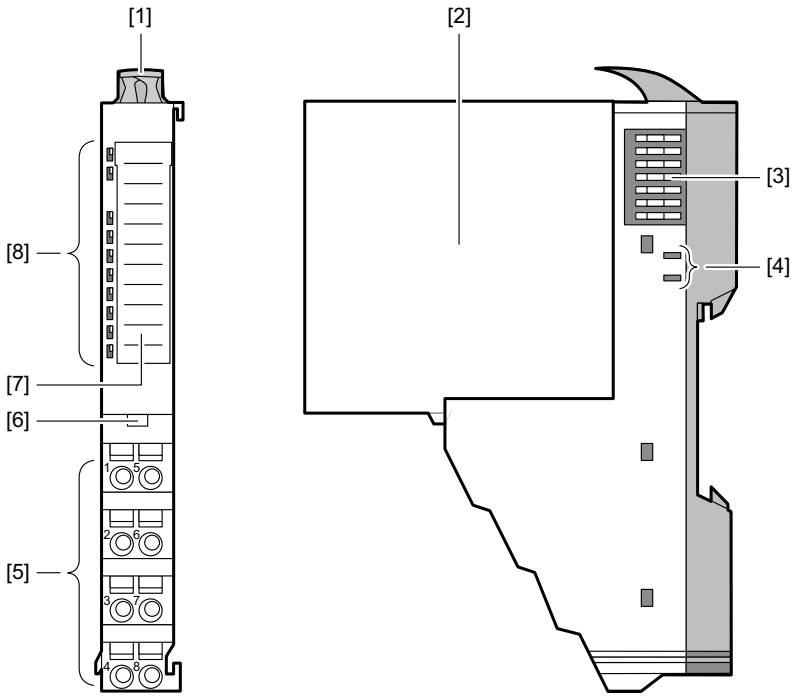
- 4 analog inputs
- Suitable for encoders with ±10 V, 0 V – 10 V
- 16-bit resolution

Part number

28211960

Structure

The following figure shows the structure of the module.



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[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

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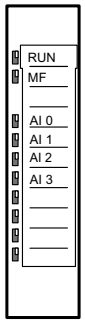
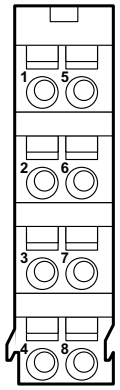
Status LEDs

The analog input module OAI41C has the following status LEDs:

Overview	LED	Color	State	Meaning
 *12926488203*	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	AI x	Red	Lights up	Error channel x: • Signal outside the measuring range • Error in the parameterization

Connecting terminals

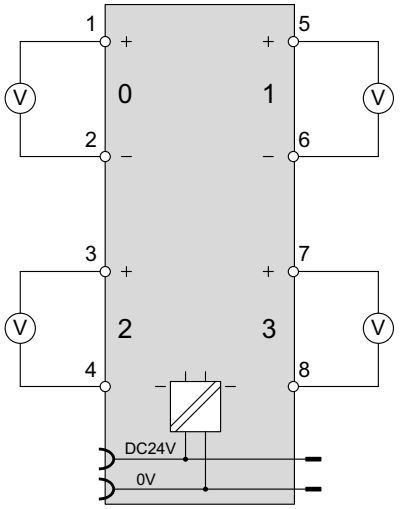
The following table shows the terminal assignment of the analog input module OAI41C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	+AI 0	E[1)]	+ channel 0
	2	−AI 0	E	Reference potential for channel 0
	3	+AI 2	E	+ channel 2
	4	−AI 2	E	Reference potential for channel 2
	5	+AI 1	E	+ channel 1
	6	−AI 1	E	Reference potential for channel 1
	7	+AI 3	E	+ channel 3
	8	−AI 3	E	Reference potential for channel 3

1) E = input

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



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Input/output range

- In the output range: The module does not use any bytes.
- The following assignment applies in the input area:

Address	Name	Bytes	Function	IX[1)]	SX[2)]
0	AI 0	2	Analog value channel 0	6401h/s	01h
2	AI 1	2	Analog value channel 1	6401h/s+1	02h
4	AI 2	2	Analog value channel 2	6401h/s+2	03h
6	AI 3	2	Analog value channel 3	6401h/s+3	04h

1) IX = Index for access via CANopen.

2) SX = Subindex for access via EtherCAT®.

Technical data

Type	OAI41C
Part number	28211960
Module ID	040E 1544
Current consumption/power loss	
Current consumption from backplane bus	DC 60 mA
Power loss	0.9 W
Analog inputs	
Number of inputs	4
Cable length shielded	200 m
Rated load voltage	DC 24 V

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Current consumption from load voltage L+ (without load)	DC 25 mA
Voltage inputs	Possible
Min. input resistance for voltage range	200 kΩ
Input voltage ranges	−10 V to +10 V
Operational limit for voltage ranges	±0.2 %
Operational limit for voltage ranges with SFU	---
Basic error limit for voltage ranges	±0.1 %
Basic error limit for voltage ranges with SFU	---
Current inputs	---
Max. input resistance in the current range	---
Input current ranges	---
Operational limit for current ranges	---
Operational limit for current ranges with SFU	---
Basic error limit for current ranges	---
Basic error limit for current ranges with SFU	---
Resistance inputs	---
Resistance ranges	---
Operational limit for resistance ranges	---
Basic error limit for resistance ranges	---
Resistance thermometer inputs	---
Resistance thermometer ranges	---
Operational limit for resistance thermometer ranges	---
Operational limit for resistance ranges with SFU	---
Basic error limit for resistance thermometer ranges	---
Operational limit for resistance ranges with SFU	---
Thermocouple inputs	---
Thermocouple ranges	---
Operational limit for thermocouple ranges	---
Operational limit for thermocouple ranges with SFU	---
Basic error limit for thermocouple ranges	---
Basic error limit for thermocouple ranges with SFU	---
Parameters can be set for temperature compensation	---
Temperature compensation external	---
Temperature compensation internal	---
Resolution	16 bit
Measuring principle	Successive approximation
Basic conversion time	480 µs for all channels

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Interference voltage suppression for frequency	>80 dB at 50 Hz (U_{cm} < 9 V)
Status, alarm, diagnostics	
Status display	Yes
Alarms	Yes, parameters can be set
Process alarm	Yes, parameters can be set
Diagnostics interrupt	Yes, parameters can be set
Diagnostic function	Yes
Diagnostic information can be read out	Possible
Module status	Green LED
Module error display	Red LED
Channel error display	Red LED per channel
Electrical isolation	
Between the channels	---
Between the channels in groups of	---
Between channels and backplane bus	Possible
Between channels and voltage supply	Possible
Max. potential difference between circuits	---
Max. potential difference between inputs	DC 9 V
Max. potential difference between M_{ana} (analog input mass) and M_{intern} (internal mass)	---
Max. potential difference between inputs and M_{ana} (mass analog input)	---
Max. potential difference between inputs and M_{intern} (internal mass)	DC 75 V/AC 60 V
Potential difference between M_{intern} (internal mass) and outputs	---
Insulation checked with	DC 500 V
Data sizes	
Input bytes	8
Output bytes	0
Parameter bytes	32
Diagnostic bytes	20
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	

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Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	In preparation

Parameter-setting data

INFORMATION

Further information on parameterization can be found in the chapter "MOVI-PLC® library and modules".

The following table shows the parameterization data of the module.

Bytes	Function	Default	IX[1)]	SX[2)]
1	Diagnostics	00h	3100h	01h
1	Reserved	00h	3101h	02h
1	Limit value monitoring	00h	3102h	03h
1	Interference frequency suppression	00h	3103h	04h
1	Function number channel 0	12h	3104h	05h
1	Reserved	00h	3105h	06h
1	Function number channel 1	12h	310Ah	09h
1	Reserved	00h	310Bh	0Ah
1	Function number channel 2	12h	3110h	0Dh
1	Reserved	00h	3111h	0Eh
1	Function number channel 3	12h	3116h	11h
1	Reserved	00h	3117h	12h

1) IX = Index for access via CANopen.
2) SX = Subindex for access via EtherCAT®.

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 5: Reserved Bit 6: Diagnostic alarm (1: enabled) Bit 7: Reserved

Limit value monitoring

Bytes	Bit 0 – 7
0	Bit 0: Limit value monitoring channel 0 (1: on) Bit 1: Limit value monitoring channel 1 (1: on) Bit 2: Limit value monitoring channel 2 (1: on) Bit 3: Limit value monitoring channel 3 (1: on) Bit 4 – 7: Reserved

Interference frequency suppression

Bytes	Bit 0 – 7		
0	Bit 0, 1: Interference frequency suppression channel 0 Bit 2, 3: Interference frequency suppression channel 1 Bit 4, 5: Interference frequency suppression channel 2 Bit 6, 7: Interference frequency suppression channel 3		
	Bit 6	Bit 7	Meaning
	0	0	Deactivated
	1	0	60 Hz
	0	1	50 Hz
	e.g. 10101010: Interference frequency suppression for all channels is 50 Hz		

Function number channel x

All of the measuring ranges, which are supported by the analog module, and their associated function number are listed below. The corresponding channel is deactivated by specifying FFh. Using the formulas listed here, you can convert a determined value (digital value: decimal or hex) into an analog value assigned to the measuring range and vice versa.

Measuring range (Function No.)	Voltage (U)	Decimal (D)	Hex	Area	Conversion
±10 V	11.76	32511	7EFFh	Override	$D = 27648 \times \frac{U}{10}$ $U = D \times \frac{10}{27648}$
(12h)	10 V	27648	6C00h	Nominal range	
	5 V	13824	3600h		
	0 V	0	0000h		
	−5 V	13824	CA00h		
	−10 V	−27648	9400h		
	−11.76	−32512	8100h	Underride	

Measuring range (Function No.)	Voltage (U)	Decimal (D)	Hex	Area	Conversion
0 V – 10 V	11.76 V	32511	7EFFh	Override	$D = 27648 \times \frac{U}{10}$ $U = D \times \frac{10}{27648}$
(10h)	10 V	27648	6C00h	Nominal range	
	5 V	13824	3600h		
	0 V	0	0000h		
	−1.76 V	−4864	ED00h	Underride	

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Diagnostic data

You can activate a diagnostic alarm for the module via the parameterization. Diagnostics data for "incoming diagnostics" is provided by the module when the diagnostic alarm is triggered. As soon as the reasons for the triggering of a diagnostic alarm are no longer present, you will automatically receive an "outgoing diagnostic alarm". The MF LED of the module lights up within this period of time (1st incoming diagnostic alarm to last outgoing diagnostic alarm).

The following errors are recorded in the diagnostics data:

- Project planning error/invalid parameter setting
- Measuring range exceedance
- Measuring range underrange
- Process alarm lost
- Supply voltage is missing

Bytes	Function	Default	IX[1)]	SX[2)]
1	Diagnostics	00h	2F01h	02h
1	Module information	15h		03h
1	Reserved	00h		04h
1	Diagnostics	00h		05h
1	Channel type	71h		06h
1	Number of diagnostic bits per channel	08h		07h
1	Number of module channels	04h		08h
1	Channel error	00h		09h
1	Channel-specific error channel 0	00h		0Ah
1	Channel-specific error channel 1	00h		0Bh
1	Channel-specific error channel 2	00h		0Ch
1	Channel-specific error channel 3	00h		0Dh
4	Reserved	00h		0Eh – 11h
4	µs ticker	00h		12h

1) IX = Index for access via SBus (CANopen): Access is via IX 2F01h. You can also access the first 4 bytes via IX 2F00h.

2) SX = Subindex for access via SBusPLUS (EtherCAT®).

Diagnostics and alarm

Trigger	Process alarm	Diagnostics interrupt	Parameterizable
Project planning error/ invalid parameter setting	---	x	---
Measuring range exceedance	---	x	---
Measuring range underrange	---	x	---
Diagnostics buffer	---	x	---
Communication error	---	x	---

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Trigger	Process alarm	Diagnostics interrupt	Parameterizable
Process alarm lost	---	x	---

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0: Set at assembly fault Bit 1: Set at internal error Bit 2: Set at external error Bit 3: Set at channel errors present Bit 4: Set at missing external supply voltage Bit 5, 6: Reserved Bit 7: Set at invalid parameter setting

Module information

Bytes	Bit 0 – 7
0	Bit 0 – 3: Module class (0101 analog module) Bit 4: Set at channel information present Bit 5 – 7: Reserved

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 2: Reserved Bit 3: Set at internal diagnostics buffer Bit 4: Set at internal communication error Bit 5: Reserved Bit 6: Set at process alarm lost Bit 7: Reserved

Channel type

Bytes	Bit 0 – 7
0	Bit 0 – 6: Channel type (71h: analog input) Bit 7: Reserved

Status bits

Bytes	Bit 0 – 7
0	Number of status bits of the module per channel (here 08h)

Channels

Bytes	Bit 0 – 7
0	Number of channels of a module (here 04h)

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Channel error

Bytes	Bit 0 – 7
0	Bit 0: Set at error channel group 0 Bit 1: Set at error channel group 1 Bit 2: Set at error channel group 2 Bit 3: Set at error channel group 3 Bit 4 – 7: Reserved

Channel-specific error

Bytes	Bit 0 – 7
0	Channel-specific error channel x: Bit 0: Set at project planning error/invalid parameter setting Bit 1 – 4: Reserved Bit 5: Set at process alarm lost Bit 6: Set at measuring range underrange Bit 7: Set at measuring range exceedance

Reserved

Bytes	Bit 0 – 7
0	Reserved

µs ticker

Bytes	Bit 0 – 7
0 – 3	Value of the µs ticker should diagnostics occur

A 32-bit timer (µs ticker) is located in the MOVI-PLC® I/O system C module which is started when the line voltage is switched on and begins at 0 again after 232-1 µs.

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6.6.4 Analog input module OAI44C

The analog input module OAI44C has 2 inputs for temperature and voltage measurement. Their functions can be parameterized. The channels on the module are electrically isolated from the backplane bus.

The analog input module OAI44C has the following properties:

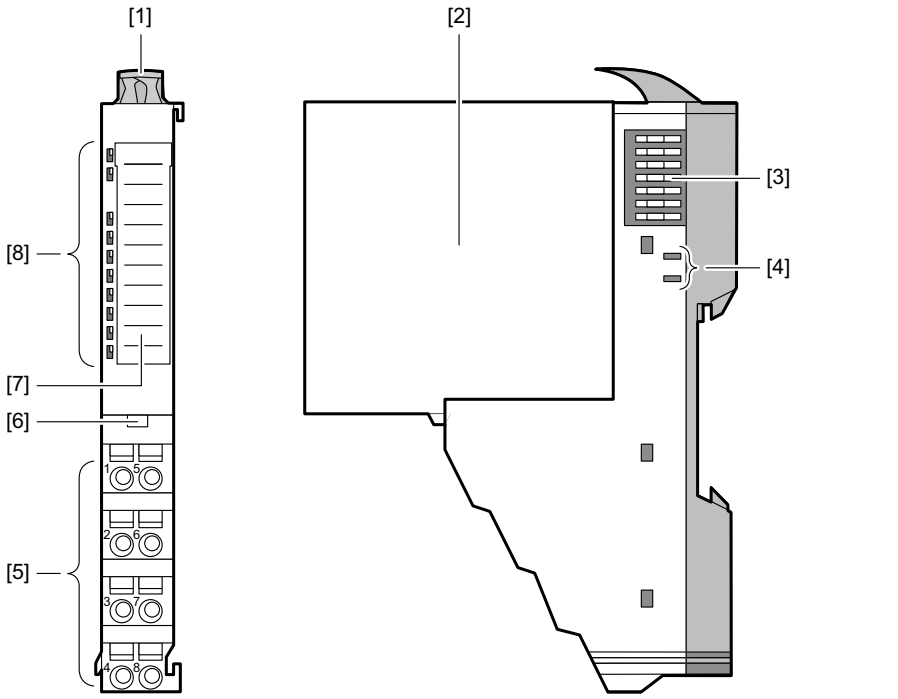
- 2 analog inputs
- Suitable for encoders of type J, K, N, R, S, T, B, C, E, L and for voltage measurement ±80 mV
- 16-bit resolution
- Internal temperature compensation
- High potential difference between the inputs of DC 140 V/AC 60 V

Part number

28211979

Structure

The following figure shows the structure of the module.



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[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

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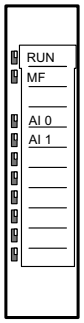
Status LEDs

The analog input module OAI44C has the following status LEDs.

Overview	LED	Color	State	Meaning
 *12926490635*	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	AI x	Red	Lights up	Error channel x: • Signal outside the measuring range • Error in the parameterization • Wire break

Connecting terminals

NOTICE

Temperature variations inside the module OAI44C.

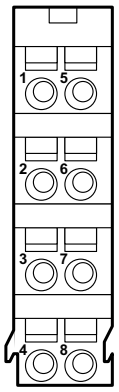
The temperature variations inside the module can affect the accuracy of the measurement.

- Do not arrange the module directly next to a power supply module with a high supply current.
- Do not install the module at the end of a row.
- Note that the module is intended to be in a static state, i.e. the temperature in the environment of your module must be as constant as possible (closed control cabinet without air draft).
- Accuracy is achieved approximately 30 minutes after entering the static state.

INFORMATION

Note that the electronics module AI 2 x 16 bit TC must only be operated with the base module supplied.

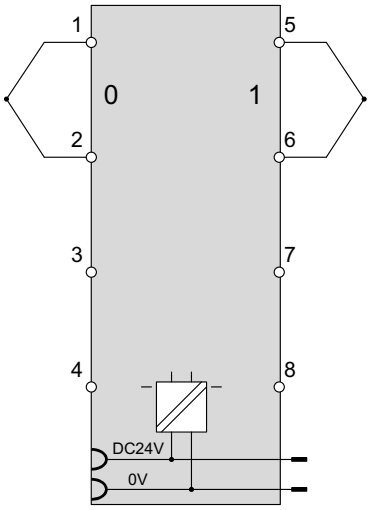
The following table shows the terminal assignment of the analog input module OAI44C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	+TC 0	E[1)]	+ channel 0
	2	−TC 0	E	Reference potential for channel 0
	3	---	---	Not assigned
	4	---	---	Not assigned
	5	+TC 1	E	+ channel 1
	6	−TC 1	E	Reference potential for channel 1
	7	---	---	Not assigned
	8	---	---	Not assigned

1) E = input

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



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Input/output range

- In the output range: The module does not use any bytes.
- The following assignment applies in the input area:

Address	Name	Bytes	Function	IX[1)]	SX[2)]
0	AI 0	2	Analog value channel 0	6401h/s	01h
2	AI 1	2	Analog value channel 1	6401h/s+1	02h

1) IX = Index for access via CANopen.

2) SX = Subindex for access via EtherCAT®.

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Technical data

Type	OAI44C
Part number	28211979
Module ID	040F 1543
Current consumption/power loss	
Current consumption from backplane bus	DC 55 mA
Power loss	1 W
Analog inputs	
Number of inputs	2
Max. cable length shielded	200 m
Rated load voltage	DC 24 V
Current consumption from load voltage L+ (without load)	DC 30 mA
Voltage inputs	---
Min. input resistance for voltage range	10 MΩ
Input voltage ranges	−80 mV to +80 mV
Operational limit for voltage ranges	±0.3 %
Operational limit for voltage ranges with SFU	±0.1 %
Basic error limit for voltage ranges	±0.25 %
Basic error limit for voltage ranges with SFU	±0.05 %
Current inputs	---
Max. input resistance in the current range	---
Input current ranges	---
Operational limit for current ranges	---
Operational limit for current ranges with SFU	---
Basic error limit for current ranges	---
Basic error limit for current ranges with SFU	---
Resistance inputs	---
Resistance ranges	---
Operational limit for resistance ranges	---
Basic error limit for resistance ranges	---
Resistance thermometer inputs	---
Resistance thermometer ranges	---
Operational limit for resistance thermometer ranges	---
Operational limit for resistance ranges with SFU	---
Basic error limit for resistance thermometer ranges	---

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Operational limit for resistance ranges with SFU	---
Thermocouple inputs	Possible
Thermocouple ranges	Type B, Type C, Type E, Type J, Type K, Type L, Type N, Type R, Type S, Type T
Operational limit for thermocouple ranges	Type E, L, T, J, K, N: ±2.5 K Type B, C, R, S: ±8.0 K
Operational limit for thermocouple ranges with SFU	Type E, L, T, J, K, N: ±1.5 K Type B, C, R, S: ±4.0 K
Basic error limit for thermocouple ranges	Type E, L, T, J, K, N: ±2.0 K Type B, C, R, S: ±7.0 K
Basic error limit for thermocouple ranges with SFU	Type E, L, T, J, K, N: ±1.0 K Type B, C, R, S: ±3.0 K
Parameters can be set for temperature compensation	Possible
Temperature compensation external	Possible
Temperature compensation internal	Possible
Resolution	16 bits
Measuring principle	Sigma-delta
Basic conversion time	84.2 ms (50 Hz) 70.5 ms (60 Hz) per channel
Interference voltage suppression for frequency	>90 dB at 50 Hz (U_{cm} < 10 V)
Status, alarm, diagnostics	
Status display	Yes
Alarms	Yes
Process alarm	No
Diagnostics interrupt	Yes, parameters can be set
Diagnostic function	Yes
Diagnostic information can be read out	Possible
Module status	Green LED
Module error display	Red LED
Channel error display	Red LED per channel
Electrical isolation	
Between the channels	---
Between the channels in groups of	---
Between channels and backplane bus	Possible
Between channels and voltage supply	---
Potential difference between circuits	---
Max. potential difference between inputs	DC 140 V/AC 60 V

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Max. potential difference between M_{ana} (analog input mass) and M_{intern} (internal mass)	---
Max. potential difference between inputs and M_{ana} (mass analog input)	---
Max. potential difference between inputs and M_{intern} (internal mass)	DC 75 V/AC 60 V
Max. potential difference between M_{intern} (internal mass) and outputs	---
Insulation checked with	DC 500 V
Data sizes	
Input bytes	4
Output bytes	0
Parameter bytes	10
Diagnostic bytes	20
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	In preparation

The stated error limits apply as of the following temperatures:

- Thermocouple type T: −200 °C
- Thermocouple type K: −100 °C
- Thermocouple type B: +700 °C
- Thermocouple type N: −150 °C
- Thermocouple type E: −150 °C
- Thermocouple type R: +200 °C
- Thermocouple type S: +100 °C
- Thermocouple type J: −100 °C

Parameter-setting data

INFORMATION

Further information on parameterization can be found in the chapter "MOVI-PLC® library and modules".

The following table shows the parameterization data of the module.

Bytes	Function	Default	IX[1]	SX[2]
1	Diagnostics	00h	3100h	01h
1	Wire break monitoring	00h	3101h	02h
1	Temperature system	00h	3102h	03h
1	Interference frequency suppression	00h	3103h	04h
1	Function number channel 0	12h	3104h	05h
1	Function number channel 1	12h	310Ah	09h

1) IX = Index for access via CANopen.

2) SX = Subindex for access via EtherCAT®.

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 5: Reserved Bit 6: Diagnostic alarm (1: enabled) Bit 7: Reserved

Wire break detection

Bytes	Bit 0 – 7
0	Bit 0: Wire break monitoring channel 0 (1: on) Bit 1: Wire break monitoring channel 1 (1: on) Bit 2 – 7: Reserved

Temperature system

Bytes	Bit 0 – 7		
0	Bit 0, 1: Temperature system		
	Bit 0	Bit 1	Meaning
	0	0	°C
	1	0	°F
	0	1	K
	Bit 2 – 7: Reserved		

Interference frequency suppression

Bytes	Bit 0 – 7		
0	Bit 0, 1: Interference frequency suppression		
	Bit 0	Bit 1	Meaning
	1	0	60 Hz
	0	1	50 Hz
	Bit 2 – 7: Reserved		

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Function number channel x

The following tables show all measuring ranges with associated function number which are supported by the analog module. The corresponding channel is deactivated by specifying FFh.

Voltage

Measuring range (Function No.)	Voltage (U)	Decimal (D)	Hex	Area	Conversion
−80 mV to +80 mV (11h)	94.07 mV	32511	7EFFh	Override	$D = 27648 \times \frac{U}{80}$ $U = D \times \frac{80}{27648}$
	80 mV	27648	6C00h	Nominal range	
	0 V	0	0000h		
	80 mV	−27648	9400h		
	−94.07 mV	−32512	8100h	Underride	

Temperature

Measuring range (Function No.)	Measured value in °C (0.1 °C/digit)	Measured value in °F (0.1 °F/digit)	Measured value in °K (0.1 °K/digit)	Area
Type J: −210 °C to +1200 °C −346 °F to 2192 °F 63.2 K – 1473.2 K (B0h: ext. Comp. 0 °C) (C0h: int. comp. 0 °C)	+14500	26420	17232	Override
	−2100 to +12000	−3460 to 21920	632 – 14732	Nominal range
	---	---	---	Underride
Type K: −270 °C to +1372 °C −454 °F to 2501.6 °F 0 K – 1645.2 K (B1h: ext. Comp. 0 °C) (C1h: int. comp. 0 °C)	+16220	29516	18952	Override
	−2700 to +13720	−4540 to 25016	0 – 16452	Nominal range
	---	---	---	Underride
Type N: −270 °C to +1300 °C −454 °F to 2372 °F 0 K – 1573.2 K (B2h: ext. Comp. 0 °C) (C2h: int. comp. 0 °C)	+15500	28220	18232	Override
	−2700 to +13000	−4540 to 23720	0 – 15732	Nominal range
	---	---	---	Underride
Type R: −50 °C to +1769 °C −58 °F to 3216.2 °F 223.2 K – 2042.2 K (B3h: ext. Comp. 0 °C) (C3h: int. comp. 0 °C)	+20190	32766	22922	Override
	−500 to +17690	−580 to 32162	2232 – 20422	Nominal range
	−1700	−2740	−1032	Underride

Measuring range (Function No.)	Measured value in °C (0.1 °C/digit)	Measured value in °F (0.1 °F/digit)	Measured value in °K (0.1 °K/digit)	Area
Type S:	+20190	32766	22922	Override
−50 °C to +1769°C	−500 to +17690	−580 to 32162	2232 – 20422	Nominal range
−58 °F to 3216.2 °F 223.2 K – 2042.2 K (B4h: ext. Comp. 0 °C) (C4h: int. comp. 0 °C)	−1700	−2740	−1032	Underride
Type T:	+5400	10040	8132	Override
−270 °C to +400 °C	−2700 to +4000	−4540 to 7520	32 – 6732	Nominal range
−454 °F to 752 °F 3.2 K – 673.2 K (B5h: ext. Comp. 0 °C) (C5h: int. comp. 0 °C)	---	---	---	Underride
Type B:	+20700	32766	23432	Override
0 °C to +1820 °C	0 to +18200	320 – 27865	2732 – 20932	Nominal range
−32 °F to 2786.5 °F 273.2 K – 2093.2 K (B6h: ext. Comp. 0 °C) (C6h: int. comp. 0 °C)	-1200	−1840	1532	Underride
Type C:	+25000	32766	23432	Override
0 °C to +2315 °C	0 to +23150	320 – 27865	2732 – 20932	Nominal range
32 °F to 2786.5 °F 273.2 K – 2093.2 K (B7h: ext. Comp. 0 °C) (C7h: int. comp. 0 °C)	−1200	−1840	1532	Underride
Type E:	+12000	21920	14732	Override
−270 °C to +1000 °C	−2700 to +10000	−4540 to 18320	0 to 12732	Nominal range
−454 °F to 1932 °F 0 K – 1273.2 K (B8h: ext. Comp. 0 °C) (C8h: int. comp. 0 °C)	---	---	---	Underride
Type L:	+11500	21020	17232	Override
−200 °C to +900 °C	−2000 to +9000	−3280 to 21920	632 – 14732	Nominal range
−328 °F to 1652 °F 73.2 K – 1173.2 K (B9h: ext. Comp. 0 °C) (C9h: int. comp. 0 °C)	---	---	---	Underride

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Diagnostic data

This module does not support any diagnostic alarm. The diagnostic data therefore serves as information via this module. In the event of an error, the corresponding channel LED of the module lights up and the error is entered in the diagnostic data.

The following errors are recorded in the diagnostics data:

- Project planning error/invalid parameter setting
- Measuring range exceedance
- Measuring range underrange

Bytes	Function	Default	DS	IX[1)]	SX[2)]
1	Diagnostics	00h	01h	2F01h	02h
1	Module information	15h			03h
1	Reserved	00h			04h
1	Diagnostics	00h			05h
1	Channel type	71h			06h
1	Number of status bits per channel	08h			07h
1	Number of module channels	02h			08h
1	Channel error	00h			09h
1	Channel-specific error channel 0	00h			0Ah
1	Channel-specific error channel 1	00h			0Bh
6	Reserved	00h			0Ch – 11h
4	µs ticker	00h			12h

1) IX = Index for access via SBus (CANopen): Access is via IX 2F01h. You can also access the first 4 bytes via IX 2F00h.
2) SX = Subindex for access via SBusPLUS (EtherCAT®).

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0: Set at assembly fault Bit 1: Set at internal error Bit 2: Set at external error Bit 3: Set at channel errors present Bit 4: Set at missing external supply voltage Bit 5, 6: Reserved Bit 7: Set at invalid parameter setting

Module information

Bytes	Bit 0 – 7
0	Bit 0 – 3: Module class (0101b: analog module) Bit 4: Set at channel information present Bit 5 – 7: Reserved

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 2: Reserved Bit 3: Set at internal diagnostics buffer Bit 4: Set at internal communication error Bit 5 – 7: Reserved

Channel type

Bytes	Bit 0 – 7
0	Bit 0 – 6: Channel type (71h: analog input) Bit 7: Reserved

Status bits

Bytes	Bit 0 – 7
0	Number of status bits of the module per channel (here 08h)

Channels

Bytes	Bit 0 – 7
0	Number of channels of a module (here 02h)

Channel error

Bytes	Bit 0 – 7
0	Bit 0: Set at error channel group 0 Bit 1: Set at error channel group 1 Bit 2 – 7: Reserved

Channel-specific error

Bytes	Bit 0 – 7
0	Channel-specific error channel x: Bit 0: Set at project planning error/invalid parameter setting Bit 1 – 3: Reserved Bit 4: Set at wire break Bit 5: Reserved Bit 6: Set at measuring range underrange Bit 7: Set at measuring range exceedance

Reserved

Bytes	Bit 0 – 7
0	Reserved

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µs ticker

Bytes	Bit 0 – 7
0 – 3	Value of the µs ticker should diagnostics occur

A 32-bit timer (µs ticker) is located in the MOVI-PLC® I/O system C module which is started when the line voltage is switched on and begins at 0 again after 232-1 µs.

6.6.5 Analog input module OAI45C

The analog input module OAI45C has 4 inputs for resistance-based sensors. Their functions can be parameterized. The channels on the module are electrically isolated from the backplane bus.

The analog input module OAI45C has the following properties:

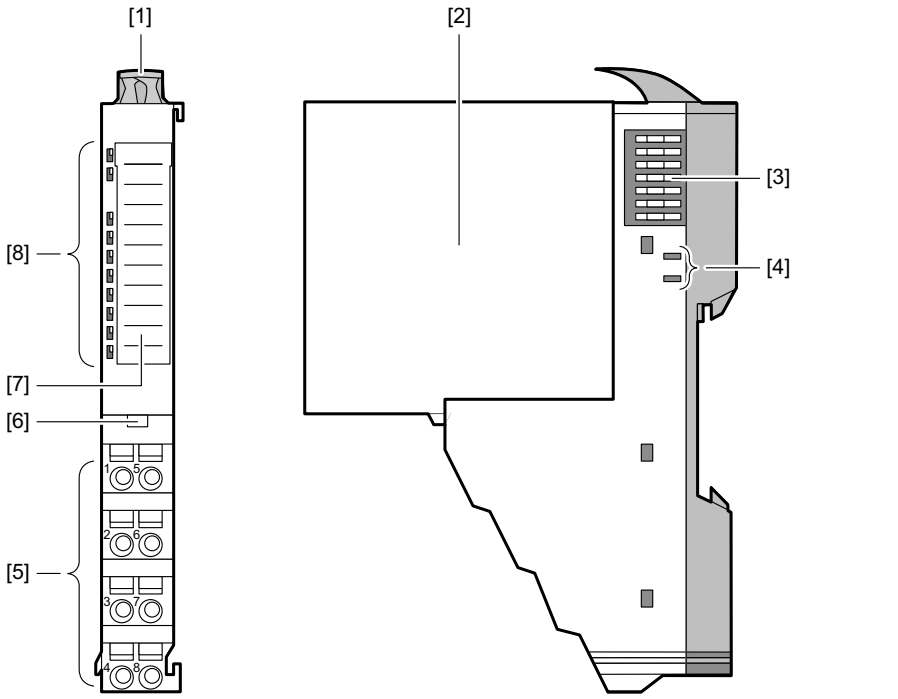
- 4 analog inputs
- Suitable for resistance transmitters 0 Ω – 3000 Ω
- Suitable for resistance temperature transmitters Pt100, Pt1000, NI100, NI1000
- Resistance measurement 2, 3 and 4-conductor (3 and 4-conductor only via channel 0 or 1)
- 16-bit resolution

Part number

28211987

Structure

The following figure shows the structure of the module.



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[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

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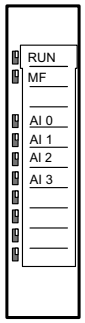
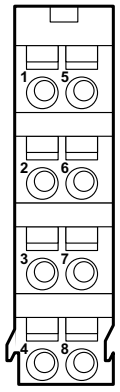
Status LEDs

The analog input module OAI45C has the following status LEDs.

Overview	LED	Color	State	Meaning
 *12926488203*	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	AI x	Red	Lights up	Error channel x: • Signal outside the measuring range • Error in the parameterization • Wire break

Connecting terminals

The following table shows the terminal assignment of the analog input module OAI45C for the connection of sensors with 2, 3 or 4-conductor measurement

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	+AI 0	E[1)]	+ channel 0
	2	−AI 0	E	Reference potential for channel 0
	3	+AI 2	E	+ channel 2
	4	−AI 2	E	Reference potential for channel 2
	5	+AI 1	E	+ channel 1
	6	−AI 1	E	Reference potential for channel 1
	7	+AI 3	E	+ channel 3
	8	−AI 3	E	Reference potential for channel 3

1) E = input

You can perform a **2-conductor measurement** with all channels.

A **3 or 4-conductor measurement** is only possible on channels 0 and 1.

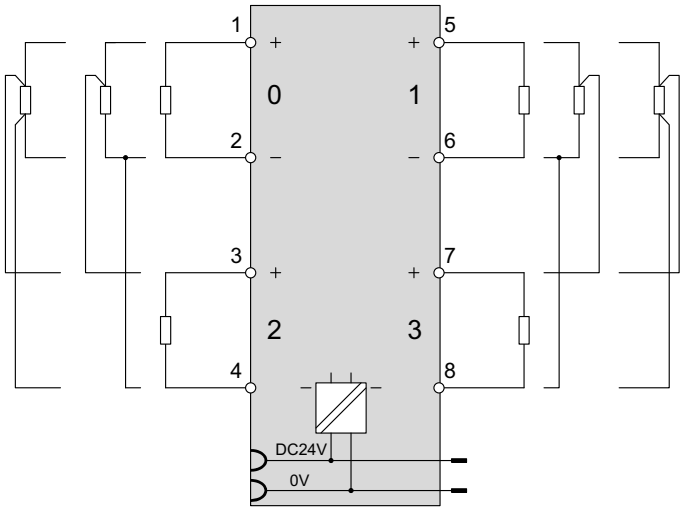
INFORMATION

Note that for 3 or 4-conductor measurement you always have to deactivate the corresponding channel in the parameterization.

- The corresponding channel of channel 0 is channel 2.
- The corresponding channel of channel 1 is channel 3.

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm^2 to 1.5 mm^2.



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Input/output range

- In the output range: The module does not use any bytes.
- The following assignment applies in the input area:

Address	Name	Bytes	Function	IX[1)]	SX[2)]
0	AI 0	2	Analog value channel 0	6401h/s	01h
2	AI 1	2	Analog value channel 1	6401h/s+1	02h
4	AI 2	2	Analog value channel 2	6401h/s+2	03h
6	AI 3	2	Analog value channel 3	6401h/s+3	04h

1) IX = Index for access via CANopen with s: Subindex, depending on the number and type of the analog modules.

2) SX = Subindex for access via EtherCAT®.

Technical data

Type	OAI45C
Part number	28211987
Module ID	0410 1544

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Current consumption/power loss	
Current consumption from backplane bus	DC 55 mA
Power loss	1 W
Analog inputs	
Number of inputs	4
Cable length shielded	200 m
Rated load voltage	DC 24 V
Current consumption from load voltage L+ (without load)	DC 30 mA
Voltage inputs	---
Min. input resistance for voltage range	---
Input voltage ranges	---
Operational limit for voltage ranges	---
Operational limit for voltage ranges with SFU	---
Basic error limit for voltage ranges	---
Basic error limit for voltage ranges with SFU	---
Current inputs	---
Max. input resistance in the current range	---
Input current ranges	---
Operational limit for current ranges	---
Operational limit for current ranges with SFU	---
Basic error limit for current ranges	---
Basic error limit for current ranges with SFU	---
Resistance inputs	Possible
Resistance ranges	0 – 60 Ohm 0 – 600 Ohm 0 – 3000 Ohm
Operational limit for resistance ranges	±0.4 %
Basic error limit for resistance ranges	±0.2 %
Resistance thermometer inputs	Possible
Resistance thermometer ranges	Pt100 Pt1000 Ni100 Ni1000
Operational limit for resistance thermometer ranges	±0.4 %
Operational limit for resistance ranges with SFU	---
Basic error limit for resistance thermometer ranges	±0.2 %

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Operational limit for resistance ranges with SFU	---
Thermocouple inputs	---
Thermocouple ranges	---
Operational limit for thermocouple ranges	---
Operational limit for thermocouple ranges with SFU	---
Basic error limit for thermocouple ranges	---
Basic error limit for thermocouple ranges with SFU	---
Parameters can be set for temperature compensation	---
Temperature compensation external	---
Temperature compensation internal	---
Resolution	16 bits
Measuring principle	Sigma-delta
Basic conversion time	324.1 ms (50 Hz) 270.5 ms (60 Hz) per channel
Interference voltage suppression for frequency	>80 dB at 50 Hz (U_{cm} < 6 V)
Status, alarm, diagnostics	
Status display	Yes
Alarms	Yes, parameters can be set
Process alarm	No
Diagnostics interrupt	Yes, parameters can be set
Diagnostic function	Yes
Diagnostic information can be read out	Possible
Module status	Green LED
Module error display	Red LED
Channel error display	Red LED per channel
Electrical isolation	
Between the channels	---
Between the channels in groups of	---
Between channels and backplane bus	Possible
Between channels and voltage supply	---
Max. potential difference between circuits	---
Max. potential difference between inputs	DC 6 V
Max. potential difference between M_{ana} (analog input mass) and M_{intern} (internal mass)	---
Max. potential difference between inputs and M_{ana} (mass analog input)	---

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Max. potential difference between inputs and M_{intern} (internal mass)	DC 75 V/AC 60 V
Max. potential difference between M_{intern} (internal mass) and outputs	---
Insulation checked with	DC 500 V
Data sizes	
Input bytes	8
Output bytes	0
Parameter bytes	12
Diagnostic bytes	20
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	In preparation

Parameter-setting data

INFORMATION

Further information on parameterization can be found in the chapter "MOVI-PLC® library and modules".

The following table shows the parameterization data of the module.

Bytes	Function	Default	IX[1]	SX[2]
1	Diagnostics	00h	3100h	01h
1	Wire break detection	00h	3101h	02h
1	Temperature system	00h	3102h	03h
1	Interference frequency suppression	02h	3103h	04h
1	Function number channel 0	50h	3104h	05h
1	Function number channel 1	50h	3105h	06h
1	Function number channel 2	50h[3]	3106h	07h
1	Function number channel 3	50h[4]	3107h	08h

1) IX = Index for access via CANopen.
2) SX = Subindex for access via EtherCAT®.
3) In 2-channel duty cycle FFh.
4) In 2-channel duty cycle FFh.

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 5: Reserved Bit 6: Diagnostic alarm (1: enabled) Bit 7: Reserved

Wire break detection

Bytes	Bit 0 – 7
0	Bit 0: Wire break monitoring channel 0 (1: on) Bit 1: Wire break monitoring channel 1 (1: on) Bit 2: Wire break monitoring channel 2 (1: on) Bit 3: Wire break monitoring channel 3 (1: on) Bit 4 – 7: Reserved

Temperature system

Bytes	Bit 0 – 7		
0	Bit 0, 1: Temperature system		
	Bit 0	Bit 1	Meaning
	0	0	°C
	1	0	°F
	0	1	K
	Bit 2 – 7: Reserved		

Interference frequency suppression

Bytes	Bit 0 – 7		
0	Bit 0, 1: Interference frequency suppression		
	Bit 0	Bit 1	Meaning
	1	0	60 Hz
	0	1	50 Hz
	Bit 2 – 7: Reserved		

Function number

The following table shows all measuring ranges with associated function numbers which are supported by the analog module. The corresponding channel is deactivated by specifying FFh.

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Function number

Measuring range (Function No.)	Measured value	Signal range	Area
2-conductor: Pt100 (50h)	+1000 °C	+10000	Override
	−200 °C to +850 °C	−2000 to +8500	Nominal range
	−243 °C	−2430	Underride
2-conductor: Pt1000 (51h)	+1000 °C	+10000	Override
	−200 °C to +850 °C	−2000 to +8500	Nominal range
	−243 °C	−2430	Underride
2-conductor: Ni100 (52h)	+295 °C	+2950	Override
	−60 °C to +250 °C	−600 to +2500	Nominal range
	−105 °C	−1050	Underride
2-conductor: Ni1000 (53h)	+295 °C	+2950	Override
	−60 °C to +250 °C	−600 to +2500	Nominal range
	−105 °C	−1050	Underride
3-conductor: Pt100 (58h)	+1000 °C	+10000	Override
	−200 °C to +850 °C	−2000 to +8500	Nominal range
	−243 °C	−2430	Underride
3-conductor: Pt1000 (59h)	+1000 °C	+10000	Override
	−200 °C to +850 °C	−2000 to +8500	Nominal range
	−243 °C	−2430	Underride
3-conductor: Ni100 (5Ah)	+295 °C	+2950	Override
	−60 °C to +250 °C	−600 to +2500	Nominal range
	−105 °C	−1050	Underride
3-conductor: Ni1000 (5Bh)	+295 °C	+2950	Override
	−60 °C to +250 °C	−600 to +2500	Nominal range
	−105 °C	−1050	Underride
4-conductor: Pt100 (60h)	+1000 °C	+10000	Override
	−200 °C to +850 °C	−2000 to +8500	Nominal range
	−243 °C	−2430	Underride
4-conductor: Pt1000 (61h)	+1000 °C	+10000	Override
	−200 °C to +850 °C	−2000 to +8500	Nominal range
	−243 °C	−2430	Underride
4-conductor: Ni100 (62h)	+295 °C	+2950	Override
	−60 °C to +250 °C	−600 to +2500	Nominal range
	−105 °C	−1050	Underride
4-conductor: Ni1000 (63h)	+295 °C	+2950	Override
	−60 °C to +250 °C	−600 to +2500	Nominal range
	−105 °C	−1050	Underride

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Measuring range (Function No.)	Measured value	Signal range	Area
2-conductor: 0 – 60 Ω (70h)	---	---	Override
	0 – 60 Ω	0 – 32767	Nominal range
	---	---	Underride
2-conductor: 0 – 600 Ω (71h)	---	---	Override
	0 – 600 Ω	0 – 32767	Nominal range
	---	---	Underride
2-conductor: 0 – 3000 Ω (72h)	---	---	Override
	0 – 3000 Ω	0 – 32767	Nominal range
	---	---	Underride
3-conductor: 0 – 60 Ω (78h)	---	---	Override
	0 – 60 Ω	0 – 32767	Nominal range
	---	---	Underride
3-conductor: 0 – 600 Ω (79h)	---	---	Override
	0 – 600 Ω	0 – 32767	Nominal range
	---	---	Underride
3-conductor: 0 – 3000 Ω (7Ah)	---	---	Override
	0 – 3000 Ω	0 – 32767	Nominal range
	---	---	Underride
4-conductor: 0 – 60 Ω (80h)	---	---	Override
	0 – 60 Ω	0 – 32767	Nominal range
	---	---	Underride
4-conductor: 0 – 600 Ω (81h)	---	---	Override
	0 – 600 Ω	0 – 32767	Nominal range
	---	---	Underride
4-conductor: 0 – 3000 Ω (82h)	---	---	Override
	0 – 3000 Ω	0 – 32767	Nominal range
	---	---	Underride
2-conductor: 0 – 60 Ω (90h)	---	---	Override
	0 – 60 Ω	0 – 6000	Nominal range
	---	---	Underride
2-conductor: 0 – 600 Ω (91h)	---	---	Override
	0 – 600 Ω	0 – 6000	Nominal range
	---	---	Underride
2-conductor: 0 – 3000 Ω (92h)	---	---	Override
	0 – 3000 Ω	0 – 30000	Nominal range
	---	---	Underride

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Measuring range (Function No.)	Measured value	Signal range	Area
3-conductor: 0 – 60 Ω (98h)	---	---	Override
	0 – 60 Ω	0 – 6000	Nominal range
	---	---	Underride
3-conductor: 0 – 600 Ω (99h)	---	---	Override
	0 – 600 Ω	0 – 6000	Nominal range
	---	---	Underride
3-conductor: 0 – 3000 Ω (9Ah)	---	---	Override
	0 – 3000 Ω	0 – 30000	Nominal range
	---	---	Underride
4-conductor: 0 – 60 Ω (A0h)	---	---	Override
	0 – 60 Ω	0 – 6000	Nominal range
	---	---	Underride
4-conductor: 0 – 600 Ω (A1h)	---	---	Override
	0 – 600 Ω	0 – 6000	Nominal range
	---	---	Underride
4-conductor: 0 – 3000 Ω (A2h)	---	---	Override
	0 – 3000 Ω	0 – 30000	Nominal range
	---	---	Underride
2-conductor: 0 – 60 Ω (D0h)	70.55 Ω	32511	Override
	0 – 60 Ω	0 – 27648	Nominal range
	---	---	Underride
2-conductor: 0 – 600 Ω (D1h)	705.5 Ω	32511	Override
	0 – 600 Ω	0 – 27648	Nominal range
	---	---	Underride
2-conductor: 0 – 3000 Ω (D2h)	3528 Ω	32511	Override
	0 – 3000 Ω	0 – 27648	Nominal range
	---	---	Underride
3-conductor: 0 – 60 Ω (D8h)	70.55 Ω	32511	Override
	0 – 60 Ω	0 – 27648	Nominal range
	---	---	Underride
3-conductor: 0 – 600 Ω (D9h)	705.5 Ω	32511	Override
	0 – 600 Ω	0 – 27648	Nominal range
	---	---	Underride
3-conductor: 0 – 3000 Ω (DAh)	3528 Ω	32511	Override
	0 – 3000 Ω	0 – 27648	Nominal range
	---	---	Underride

Measuring range (Function No.)	Measured value	Signal range	Area
4-conductor: 0 – 60 Ω (E0h)	70.55 Ω	32511	Override
	0 – 60 Ω	0 – 27648	Nominal range
	---	---	Underride
4-conductor: 0 – 600 Ω (E1h)	705.5 Ω	32511	Override
	0 – 600 Ω	0 – 27648	Nominal range
	---	---	Underride
4-conductor: 0 – 3000 Ω (E2h)	3528 Ω	32511	Override
	0 – 3000 Ω	0 – 27648	Nominal range
	---	---	Underride

Diagnostic data

This module does not support any diagnostic alarm. The diagnostic data therefore serves as information via this module. In the event of an error, the corresponding channel LED of the module lights up and the error is entered in the diagnostic data.

The following errors are recorded in the diagnostics data:

- Project planning error/invalid parameter setting
- Measuring range exceedance
- Measuring range underrange

Access is via data set 01h. You can also access the first 4 bytes via dataset 00h.

Bytes	Function	Default	IX[1)]	SX[2)]
1	Diagnostics	00h	2F01h	02h
1	Module information	15h		03h
1	Reserved	00h		04h
1	Diagnostics	00h		05h
1	Channel type	71h		06h
1	Number of status bits per channel	08h		07h
1	Number of module channels	04h		08h
1	Channel error	00h		09h
1	Channel-specific error channel 0	00h		0Ah
1	Channel-specific error channel 1	00h		0Bh
1	Channel-specific error channel 2	00h		0Ch
1	Channel-specific error channel 3	00h		0Dh
4	Reserved	00h		11h
4	µs ticker	00h		12h

1) IX = Index for access via SBus (CANopen): Access is via IX 2F01h. You can also access the first 4 bytes via IX 2F00h.

2) SX = Subindex for access via SBusPLUS (EtherCAT®).

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Diagnostics

Bytes	Bit 0 – 7
0	Bit 0: Set at assembly fault
	Bit 1: Set at internal error
	Bit 2: Set at external error
	Bit 3: Set at channel errors present
	Bit 4: Set at missing external supply voltage
	Bit 5, 6: Reserved
	Bit 7: Set at invalid parameter setting

Module information

Bytes	Bit 0 – 7
0	Bit 0 – 3: Module class (0101b: analog module)
	Bit 4: Set at channel information present
	Bit 5 – 7: Reserved

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 2: Reserved
	Bit 3: Set at internal diagnostics buffer
	Bit 4: Set at internal communication error
	Bit 5 – 7: Reserved

Channel type

Bytes	Bit 0 – 7
0	Bit 0 – 6: Channel type (71h: analog input)
	Bit 7: Reserved

Status bits

Bytes	Bit 0 – 7
0	Number of status bits of the module per channel (here 08h)

Channels

Bytes	Bit 0 – 7
0	Number of channels of a module (here 04h)

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Channel error

Bytes	Bit 0 – 7
0	Bit 0: Set at error channel group 0 Bit 1: Set at error channel group 1 Bit 2: Set at error channel group 2 Bit 3: Set at error channel group 3 Bit 4 – 7: Reserved

Channel-specific error

Bytes	Bit 0 – 7
0	Channel-specific error channel x: Bit 0: Set at project planning error/invalid parameter setting Bit 1 – 3: Reserved Bit 4: Set at wire break Bit 5: Reserved Bit 6: Set at measuring range underrange Bit 7: Set at measuring range exceedance

Reserved

Bytes	Bit 0 – 7
0	Reserved

µs ticker

Bytes	Bit 0 – 7
0 – 3	Value of the µs ticker should diagnostics occur

A 32-bit timer (µs ticker) is located in the MOVI-PLC® I/O system C module which is started when the line voltage is switched on and begins at 0 again after 232-1 µs.

6.7 Analog output modules

In this chapter you will find the description of the analog output modules of the MOVI-PLC® I/O system C.

6.7.1 General

Lines for analog signals

- Only use shielded lines for the analog signals in order to prevent interference.
- Ground the shield of the analog lines at both ends.
- If potential differences arise between the line ends, an earth-loop current may flow which can interfere with the analog signals. In this case, ground the shield at only one end of the line.

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Connection of loads and actuators

You can supply loads and actuators with current or voltage using the analog output modules.

NOTICE

Note the polarity for the connection of actuators.

Risk of actuators being damaged.

- Always adhere to the correct polarity for the connection of actuators.
- Leave the output terminals of the unused channels disconnected.
- Set the output medium of the channel to "deactivated" in the hardware configuration from Siemens.

Parameterization

The corresponding data set number as well as the indexes (IX) and subindexes (SX) for CANopen or for EtherCAT® can be found in the respective module description.

Diagnostic function

The modules are diagnosable. You can call up the following error messages via diagnostics:

- Errors in parameter settings
- Short circuit detection
- Wire break detection

Display of analog values

The analog values are processed exclusively in binary form. A binary word variable is converted into an analog process signal and output via the appropriate channel.

Resolution	Analog value															
	High byte (byte 0)								Low byte (byte 1)							
Bit no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Value	VZ	214	213	212	211	210	29	28	27	26	25	24	23	22	21	20
12 bit + SB[1)]	VZ	Analog value (word)												X	X	X
15 Bit + SB	VZ	Analog value (word)														

1) SB = sign bit

At a resolution of 12 bits plus sign bit, the less significant digits (3 bits) are irrelevant.

Bit 15 is the sign bit:

- Bit 15 = "0" → positive value
- Bit 15 = "1" → negative value

6.7.2 Analog output module OAO42C

The analog output module OAO42C has 4 outputs. Their functions can be parameterized. The channels on the module are electrically isolated from the backplane bus. The channels are also electrically isolated from the DC 24 V voltage supply by means of a DC/DC converter.

The analog output module OAO42C has the following properties:

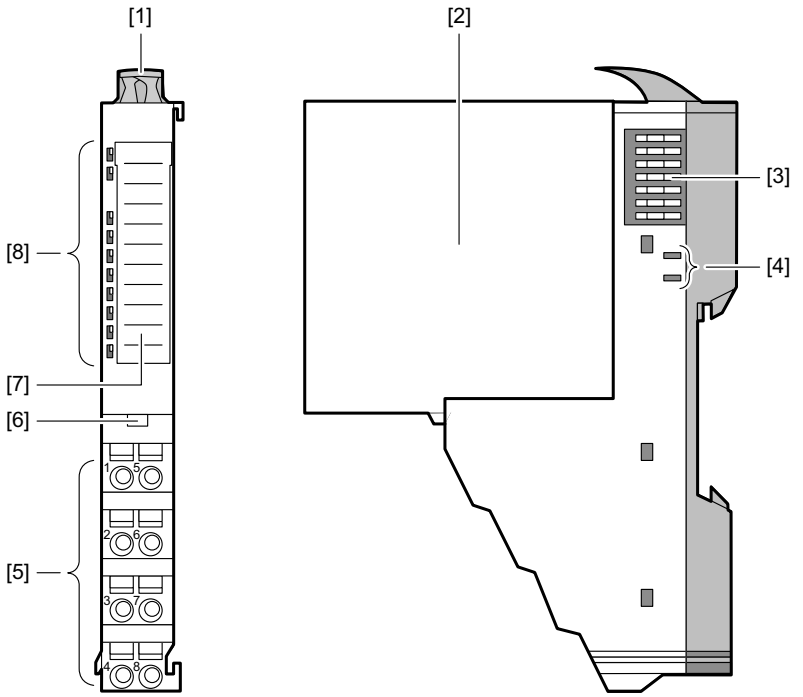
- 4 analog outputs
- Current output 0 mA – 20 mA/4 mA – 20 mA
- 12-bit resolution

Part number

28211995

Structure

The following figure shows the structure of the module.



12920505099

[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

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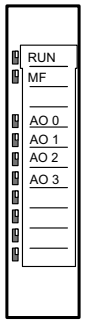
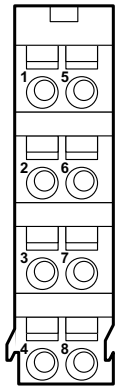
Status LEDs

The analog output module OAO42C has the following status LEDs:

Overview	LED	Color	State	Meaning
 *12926851467*	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	AO x	Red	Lights up	Error channel x: • Error in the parameterization • Wire break

Connecting terminals

The following table shows the terminal assignment of the analog output module OAO42C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	AO 0	A[1)]	Channel 0
	2	AGND	E[2)]	Reference potential of the channels
	3	AO 2	---	Channel 2
	4	AGND	---	Reference potential of the channels
	5	AO 1	E	Channel 1
	6	AGND	E	Reference potential of the channels
	7	AO 3	---	Channel 3
	8	AGND	---	Reference potential of the channels

1) A = output

2) E = input

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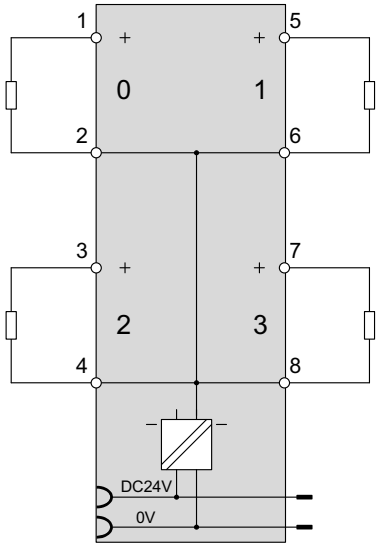
Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12918621707

Input/output range

- In the input range: The module does not use any bytes.
- The following assignment applies in the output range:

Address	Name	Bytes	Function	IX[1)]	SX[2)]
0	AO 0	2	Analog value channel 0	6411h/s	01h
2	AO 1	2	Analog value channel 1	6411h/s+1	02h
0	AO 2	2	Analog value channel 2	6411h/s+2	03h
6	AO 3	2	Analog value channel 3	6411h/s+3	04h

1) IX = Index for access via CANopen with s: Subindex, depending on the number and type of the analog modules.

2) SX = Subindex for access via EtherCAT®.

Technical data

Type	OAO42C
Part number	28211995
Module ID	0504 25E0
Current consumption/power loss	
Current consumption from backplane bus	DC 80 mA
Power loss	0.8 W
Analog outputs	
Number of inputs	4

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Cable length shielded	200 m
Rated load voltage	DC 24 V
Current consumption from load voltage L+ (without load)	---
Voltage output short-circuit protection	---
Voltage outputs	---
Min. load impedance in the voltage range	---
Max. capacitive load in the voltage range	---
Output voltage ranges	---
Operational limit for voltage ranges	---
Basic error limit for voltage ranges with SFU	---
Current outputs	Possible
Max. load impedance in the current range	350 Ω
Max. inductive load in the current range	10 mH
Output current ranges	0 mA – 20 mA / +4 mA to +20 mA
Operational limit for current ranges	±0.4 % to ±0.5 %
Basic error limit for current ranges with SFU	±0.2 % to ±0.3 %
Settling time for ohmic load	0.25 ms
Settling time for capacitive load	---
Settling time for inductive load	1.5 ms
Resolution	12 bits
Basic conversion time	2 ms for all channels
Substitute values can be switched in	No
Status, alarm, diagnostics	
Status display	Yes
Alarms	No
Process alarm	No
Diagnostics interrupt	No
Diagnostic function	Yes
Diagnostic information can be read out	Possible
Module status	Green LED
Module error display	Red LED
Channel error display	Red LED per channel
Electrical isolation	
Between the channels	---
Between the channels in groups of	---
Between channels and backplane bus	Possible
Between channels and voltage supply	Possible

Max. potential difference between circuits	---
Max. potential difference between inputs	---
Max. potential difference between M_{ana} (analog output mass) and M_{intern} (internal mass)	DC 75 V/AC 60 V
Max. potential difference between inputs and M_{ana} (analog output mass)	---
Max. potential difference between inputs and M_{intern} (internal mass)	---
Max. potential difference between M_{intern} (internal mass) and outputs	---
Insulation checked with	DC 500 V
Data sizes	
Input bytes	0
Output bytes	8
Parameter bytes	10
Diagnostic bytes	20
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

Parameter-setting data

INFORMATION

Further information on parameterization can be found in the chapter "MOVI-PLC® library and modules".

The following table shows the parameterization data of the module.

Bytes	Function	Default	IX[1)]	SX[2)]
1	Reserved	00h	3100h	01h
1	Wire break monitoring	00h	3101h	02h
1	Function number channel 0	31h	3102h	03h
1	Function number channel 1	31h	3103h	04h
1	Function number channel 2	31h	3104h	05h

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Bytes	Function	Default	IX[1)]	SX[2)]
1	Function number channel 3	31h	3105h	06h

1) IX = Index for access via CANopen.

2) SX = Subindex for access via EtherCAT®.

Wire break monitoring

Bytes	Bit 0 – 7
0	Bit 0: Wire break monitoring channel 0 (1: on) Bit 1: Wire break monitoring channel 1 (1: on) Bit 2: Wire break monitoring channel 2 (1: on) Bit 3: Wire break monitoring channel 3 (1: on) Bit 4 – 7: Reserved

Function number channel x

The following tables show all output ranges with associated function number which are supported by the analog module. The corresponding channel is deactivated by specifying FFh. Using the formulas listed here, you can convert a value (digital value: decimal or hex) into an analog output value and vice versa.

Output range (Function No.)	Current (I)	Decimal (D)	Hex	Area	Conversion
0 mA – 20 mA (31h)	23.52 mA	32511	7EFFh	Override	$I = D \times \frac{20}{27648}$ $D = 27648 \times \frac{I}{20}$
	20 mA	27648	6C00h	Nominal range	
	10 mA	13824	3600h		
	0 mA	0	0000h		
	Not possible, is limited to 0 mA.			Underride	

Output range (Function No.)	Current (I)	Decimal (D)	Hex	Area	Conversion
4 mA – 20 mA (30h)	22.81 mA	32511	7EFFh	Override	$I = D \times \frac{16}{27648} + 4$ $D = 27648 \times \frac{I - 4}{16}$
	20 mA	27648	6C00h	Nominal range	
	12 mA	13824	3600h		
	4 mA	0	0000h		
	0 mA	−6912	E500h	Underride	

Diagnostic data

This module does not support any diagnostic alarm. The diagnostic data therefore serves as information via this module. In the event of an error, the corresponding channel LED of the module lights up and the error is entered in the diagnostic data.

The following errors are recorded in the diagnostics data:

- Project planning error/invalid parameter setting
- Wire break (if parameterized)

Bytes	Function	Default	IX[1)]	SX[2)]
1	Diagnostics	00h	2F01h	02h
1	Module information	15h		03h
1	Reserved	00h		04h
1	Diagnostics	00h		05h
1	Channel type	71h		06h
1	Number of status bits per channel	08h		07h
1	Number of module channels	04h		08h
1	Channel error	00h		09h
1	Channel-specific error channel 0	00h		0Ah
1	Channel-specific error channel 1	00h		0Bh
1	Channel-specific error channel 2	00h		0Ch
1	Channel-specific error channel 3	00h		0Dh
4	Reserved	00h		11h
4	µs ticker	00h		12h

1) IX = Index for access via SBus (CANopen): Access is via IX 2F01h. You can also access the first 4 bytes via IX 2F00h.
2) SX = Subindex for access via SBusPLUS (EtherCAT®).

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0: Set at assembly fault
	Bit 1: Set at internal error
	Bit 2: Set at external error
	Bit 3: Set at channel errors present
	Bit 4: Set at missing external supply voltage
	Bit 5, 6: Reserved
	Bit 7: Set at parameter setting error

Module information

Bytes	Bit 0 – 7
0	Bit 0 – 3: Module class (0101: analog module)
	Bit 4: Set at channel information present
	Bit 5 – 7: Reserved

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 2: Reserved
	Bit 3: Set at internal diagnostics buffer
	Bit 4: Set at internal communication error
	Bit 5 – 7: Reserved

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Channel type

Bytes	Bit 0 – 7
0	Bit 0 – 6: Channel type (73h: analog output) Bit 7: Reserved

Diagnostic bits

Bytes	Bit 0 – 7
0	Number of diagnostic bits of the module per channel (here 08h)

Channels

Bytes	Bit 0 – 7
0	Number of channels of a module (here 04h)

Channel error

Bytes	Bit 0 – 7
0	Bit 0: Set at error channel group 0 Bit 1: Set at error channel group 1 Bit 2: Set at error channel group 2 Bit 3: Set at error channel group 3 Bit 4 – 7: Reserved

Channel-specific error

Bytes	Bit 0 – 7
0	Channel-specific error channel x: Bit 0: Set at project planning error/invalid parameter setting Bit 1 – 3: Reserved Bit 4: Set at wire break Bit 5 – 7: Reserved

Reserved

Bytes	Bit 0 – 7
0	Reserved

µs ticker

Bytes	Bit 0 – 7
0 – 3	Value of the µs ticker during generation of the diagnostics data

A 32-bit timer (µs ticker) is located in the MOVI-PLC® I/O system C module which is started when the line voltage is switched on and begins at 0 again after 232-1 µs.

6.7.3 Analog output module OAO41C

The analog output module OAO41C has 4 outputs. Their functions can be parameterized. The channels on the module are electrically isolated from the backplane bus. The channels are also electrically isolated from the DC 24 V voltage supply by means of a DC/DC converter.

The analog output module OAO41C has the following properties:

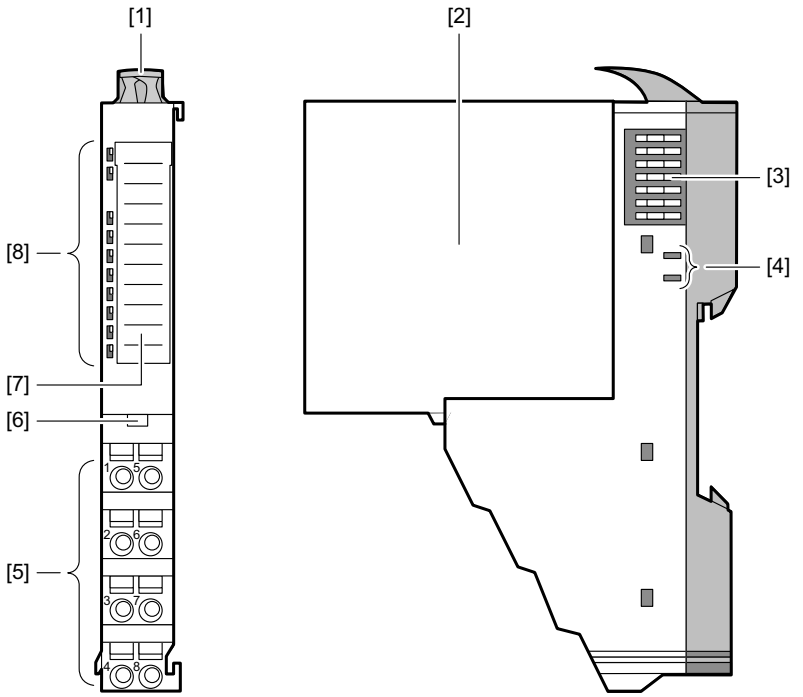
- 4 analog outputs
- Voltage output ±10 V / 0 V – 10 V
- 16-bit resolution

Part number

28212002

Structure

The following figure shows the structure of the module.



12920505099

[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

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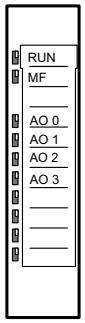
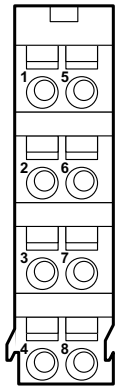
Status LEDs

The analog output module OAO41C has the following status LEDs:

Overview	LED	Color	State	Meaning
 *12926851467*	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	AO x	Red	Lights up	Error channel x: • Overload, short circuit • Error in the parameterization

Connecting terminals

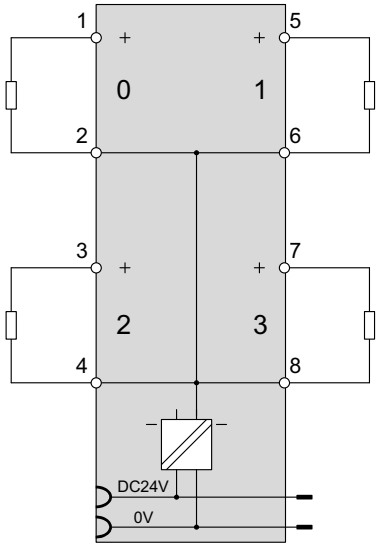
The following table shows the terminal assignment of the analog output module OAO41C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	AO 0	A[1)]	Channel 0
	2	AGND	A	Reference potential for channels
	3	AO 2	A	Channel 2
	4	AGND	A	Reference potential for channels
	5	AO 1	A	Channel 1
	6	AGND	A	Reference potential for channels
	7	AO 3	A	Channel 3
	8	AGND	A	Reference potential for channels

1) A = output

Wiring diagram

You can connect lines with a cable cross section of 0.08 mm² to 1.5 mm².



12917057675

Input/output range

- In the input range: The module does not use any bytes.
- The following assignment applies in the output range:

Address	Name	Bytes	Function	IX[1)]	SX[2)]
0	AO 0	2	Analog value channel 0	6411h/s	01h
2	AO 1	2	Analog value channel 1	6411h/s+1	02h
6	AO 2	2	Analog value channel 2	6411h/s+2	03h
6	AO 3	2	Analog value channel 3	6411h/s+3	04h

1) IX = Index for access via CANopen. s: Subindex, depending on the number and type of the analog modules.

2) SX = Subindex for access via EtherCAT®.

Technical data

Type	OAO41C
Part number	28212002
Module ID	050A 2560
Current consumption/power loss	
Current consumption from backplane bus	DC 60 mA
Power loss	0.8 W
Analog outputs	
Number of inputs	4

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Cable length shielded	200 m
Rated load voltage	DC 24 V
Current consumption from load voltage L+ (without load)	---
Voltage output short-circuit protection	Possible
Voltage outputs	Possible
Min. load impedance in the voltage range	5 kΩ
Max. capacitive load in the voltage range	1 µF
Output voltage ranges	−10 V – +10 V
Operational limit for voltage ranges	±0.2 %
Basic error limit for voltage ranges with SFU	±0.1 %
Current outputs	---
Max. load impedance in the current range	---
Max. inductive load in the current range	---
Output current ranges	---
Operational limit for current ranges	---
Basic error limit for current ranges with SFU	---
Settling time for ohmic load	150 µs
Settling time for capacitive load	1 ms
Settling time for inductive load	---
Resolution	16 bit
Conversion time	200 µs for all channels
Substitute values can be switched in	No
Status, alarm, diagnostics	
Status display	Yes
Alarms	No
Process alarm	No
Diagnostics interrupt	No
Diagnostic function	Yes
Diagnostic information can be read out	Possible
Module status	Green LED
Module error display	Red LED
Channel error display	Red LED per channel
Electrical isolation	
Between the channels	---
Between the channels in groups of	---
Between channels and backplane bus	Possible
Between channels and voltage supply	Possible
Max. potential difference between circuits	---

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Max. potential difference between inputs	---
Max. potential difference between M_{ana} (analog output mass) and M_{intern} (internal mass)	DC 75 V/AC 60 V
Max. potential difference between inputs and M_{ana} (analog output mass)	---
Max. potential difference between inputs and M_{intern} (internal mass)	---
Max. potential difference between M_{intern} (internal mass) and outputs	---
Insulation checked with	DC 500 V
Data sizes	
Input bytes	0
Output bytes	8
Parameter bytes	10
Diagnostic bytes	20
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	In preparation

Parameter-setting data

INFORMATION

Further information on parameterization can be found in the chapter "MOVI-PLC® library and modules".

The following table shows the parameterization data of the module.

Bytes	Function	Default	IX[1)]	SX[2)]
1	Reserved	00h	3100h	01h
1	Short circuit detection	00h	3101h	02h
1	Function number channel 0	12h	3102h	03h
1	Function number channel 1	12h	3103h	04h
1	Function number channel 2	12h	3104h	05h

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Bytes	Function	Default	IX[1)]	SX[2)]
1	Function number channel 3	12h	3105h	06h

1) IX = Index for access via CANopen.

2) SX = Subindex for access via EtherCAT®.

Short circuit detection

Bytes	Bit 0 – 7
0	Bit 0: Short circuit detection channel 0 (1: on) Bit 1: Short circuit detection channel 1 (1: on) Bit 2: Short circuit detection channel 2 (1: on) Bit 3: Short circuit detection channel 3 (1: on) Bit 4 – 7: Reserved

Function number channel x

The following tables show all output ranges with associated function number which are supported by the analog module. The corresponding channel is deactivated by specifying FFh. Using the formulas listed here, you can convert a value (digital value: decimal or hex) into an analog output value and vice versa.

Output range (Function No.)	Voltage (U)	Decimal (D)	Hex	Area	Conversion
±10 V (12h)	11.76 V	32511	7EFFh	Override	$U = D \times \frac{10}{27648}$ $D = 27648 \times \frac{U}{10}$
	10 V	27648	6C00h	Nominal range	
	5 V	13824	3600h		
	0 V	0	0000h		
	−5 V	−13824	CA00h		
	−10 V	−27648	9400h		
	−11.76	−32512	8100h	Underride	

Output range (Function No.)	Voltage (U)	Decimal (D)	Hex	Area	Conversion
0 V – 10 V (10h)	11.76 V	32511	7EFFh	Override	$U = D \times \frac{10}{27648}$ $D = 27648 \times \frac{U}{10}$
	10 V	27648	6C00h	Nominal range	
	5 V	13824	3600h		
	0 V	0	0000h		
	Not possible, is limited to 0 V.			Underride	

Diagnostic data

This module does not support any diagnostic alarm. The diagnostic data therefore serves as information via this module. In the event of an error, the corresponding channel LED of the module lights up and the error is entered in the diagnostic data.

The following errors are recorded in the diagnostics data:

- Project planning error/invalid parameter setting
- Short circuit/overload (if parameterized)

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Bytes	Function	Default	IX[1)]	SX[2)]
1	Diagnostics	00h	2F01h	02h
1	Module information	15h		03h
1	Reserved	00h		04h
1	Diagnostics	00h		05h
1	Channel type	73h		06h
1	Number of status bits per channel	08h		07h
1	Number of module channels	04h		08h
1	Channel error	00h		09h
1	Channel-specific error channel 0	00h		0Ah
1	Channel-specific error channel 1	00h		0Bh
1	Channel-specific error channel 2	00h		0Ch
1	Channel-specific error channel 3	00h		0Dh
4	Reserved	00h		0Eh – 11h
4	µs ticker	00h		12h

1) IX = Index for access via CANopen: Access is via IX 2F01h. You can also access the first 4 bytes via IX 2F00h.
2) SX = Subindex for access via EtherCAT®.

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0: Set at assembly fault
	Bit 1: Reserved
	Bit 2: Set at external error
	Bit 3: Set at channel errors present
	Bit 4: Set at missing external supply voltage
	Bit 5, 6: Reserved
	Bit 7: Set at parameter setting error

Module information

Bytes	Bit 0 – 7
0	Bit 0 – 3: Module class (0101: analog module)
	Bit 4: Set at channel information present
	Bit 5 – 7: Reserved

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 2: Reserved
	Bit 3: Set at internal diagnostics buffer
	Bit 4: Set at internal communication error
	Bit 5 – 7: Reserved

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Channel type

Bytes	Bit 0 – 7
0	Bit 0 – 6: Channel type (73h: analog output) Bit 7: fix (0)

Status bits

Bytes	Bit 0 – 7
0	Number of diagnostic bits of the module per channel (here 08h)

Channels

Bytes	Bit 0 – 7
0	Number of channels of a module (here 04h)

Channel error

Bytes	Bit 0 – 7
0	Bit 0: Set at error channel group 0 Bit 1: Set at error channel group 1 Bit 2: Set at error channel group 2 Bit 3: Set at error channel group 3 Bit 4 – 7: Reserved

Channel-specific error

Bytes	Bit 7 – 0
0	Channel-specific error channel x: Bit 0: Set at project planning error/invalid parameter setting Bit 1 – 2: Reserved Bit 3: Short circuit after M Bit 4 – 7: Reserved

Reserved

Bytes	Bit 0 – 7
0	Reserved

µs ticker

Bytes	Bit 0 – 7
0 – 3	Value of the µs ticker should diagnostics occur

A 32-bit timer (µs ticker) is located in the MOVI-PLC® I/O system C module which is started when the line voltage is switched on and begins at 0 again after 232-1 µs.

6.8 RS422/485 interface ORS11C

The module has the following properties:

- RS422/485 interface (electrically isolated from the backplane bus)
- Transmission rate of 150 bit/s – 115.2 kbit/s
- Serial bus connection
  - Full duplex (RS422 four-wire duty cycle)
  - Half duplex (RS485 two-wire duty cycle)
- Protocols:
  - ASCII
  - STX/ETX
  - 3964(R)
  - Modbus (master/slave with ASCII and RTU short & long) with a telegram length of 250 bytes
- Up to 250 telegrams (1024 byte receive or send buffer)
- Character delay time can be parameterized in ms intervals
- Parameterization via 19 byte parameter data

6.8.1 Part number

28212010

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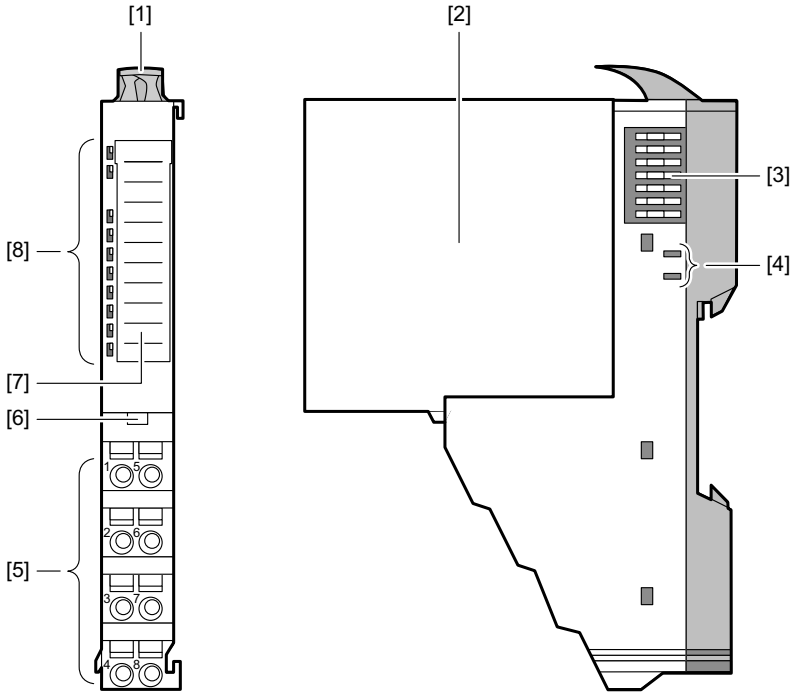
6.8.2 Structure

The following figure shows the structure of the module.

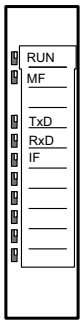


12920505099

[1] Locking lever
[2] Electronics module
[3] Backplane bus
[4] DC 24 V voltage supply
[5] Connecting terminals
[6] Releasing device
[7] Label
[8] Status LEDs

6.8.3 Status LEDs

The RS422/485 interface ORS11C has the following status LEDs.

Overview	LED	Color	State	Meaning
 *12926861195*	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Off	Module status OK.
	RUN	Green	Lights up	Bus communication OK.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus communication not possible.
	MF	Red	Lights up	Module status reports error.
	RUN	Green	Off	Bus supply voltage error.
	MF	Red	Off	
	RUN	Green	Flashes 2 Hz	Configuration error (see chapter "LED error list").
	MF	Red	Flashes 2 Hz	
	TxD	Green	Lights up	Transmit data
	RxD	Green	Lights up	Receive data
	IF	Red	Flashes 2 Hz	Internal error Modbus. Other protocols: • Interruption in line • Overflow • Parity error • Character frame error

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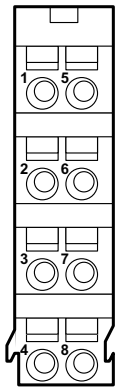
6.8.4 Connecting terminals

The following table shows the terminal assignment of the RS422/485 interface ORS11C.

Overview	Terminal	Function	Type	Assignment
 *12915186699*	1	TxD-P (B)	A[1)]	Send data (RS422)
	2	RxD-P (B) TxD/RxD-P (B)	E[2)] O/I	Receive data (RS422) Send/receive data (RS485)
	3	RTS	A	Request to send (RS485) RTS at "1": ORS11C ready to transmit RTS at "0": ORS11C does not transmit
	4	TERM	E	Terminating resistor[3)]
	5	TxD-N (A)	A	Send data (RS422)
	6	RxD-N (A) TxD/RxD-N (A)	E O/I	Receive data (RS422) Send/receive data (RS485)
	7	GND_ISO[4)]	A	Signal zero reference point (insulated)
	8	TERM	E	Terminating resistor[1)]

1) A = output

2) E = input

3) A bridge between the 2 TERM inputs activates a terminating resistor of 120 Ω at the receiving end between RxD-P (terminal 2) and RxD-N (terminal 6).

4) ISO = insulated.

6.8.5 Properties

- Logic states as the voltage difference between 2 twisted pair conductors
- Serial bus connection
  - Full duplex (RS422 four-wire duty cycle)
  - Half duplex (RS485 two-wire duty cycle)
- Line length: 250 m (at 115.2 kbit/s) – 1200 m (at 19.2 kbit/s)
- Data transmission rate: max. 115.2 kbit/s

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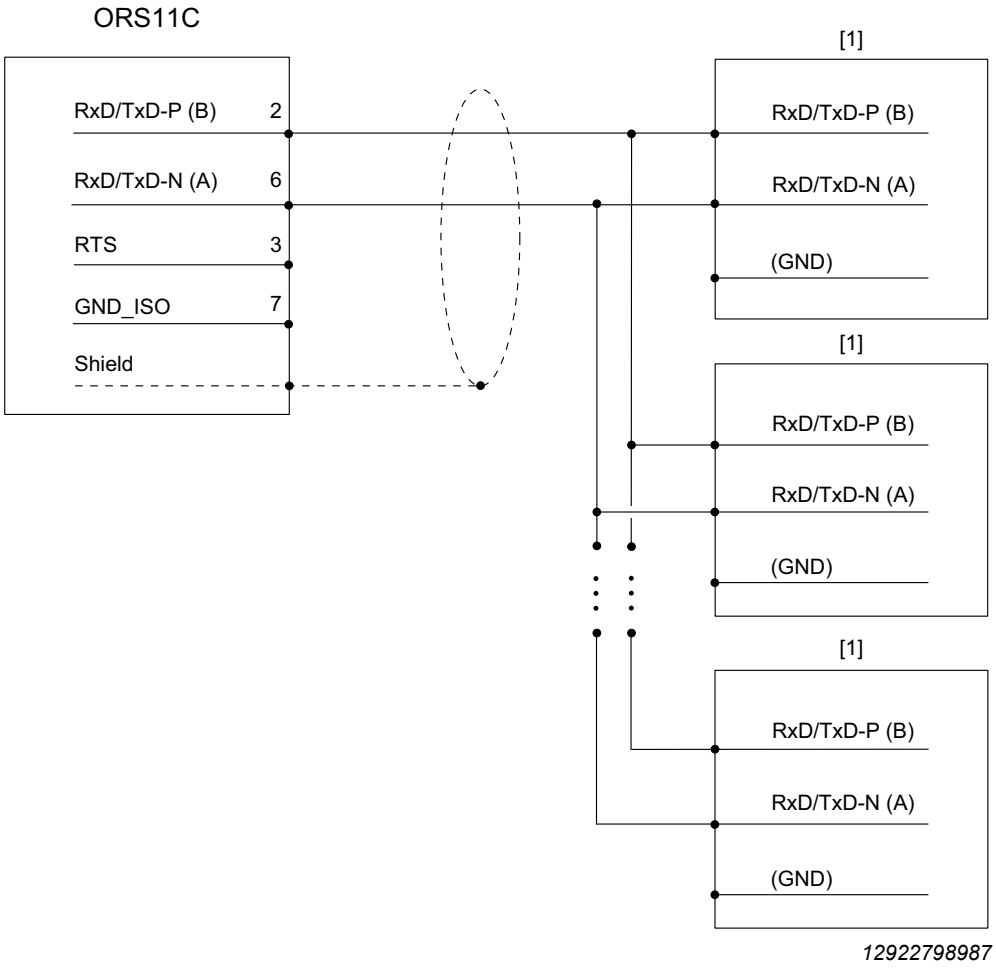
6.8.6 RS485 wiring



[1] Peripheral module

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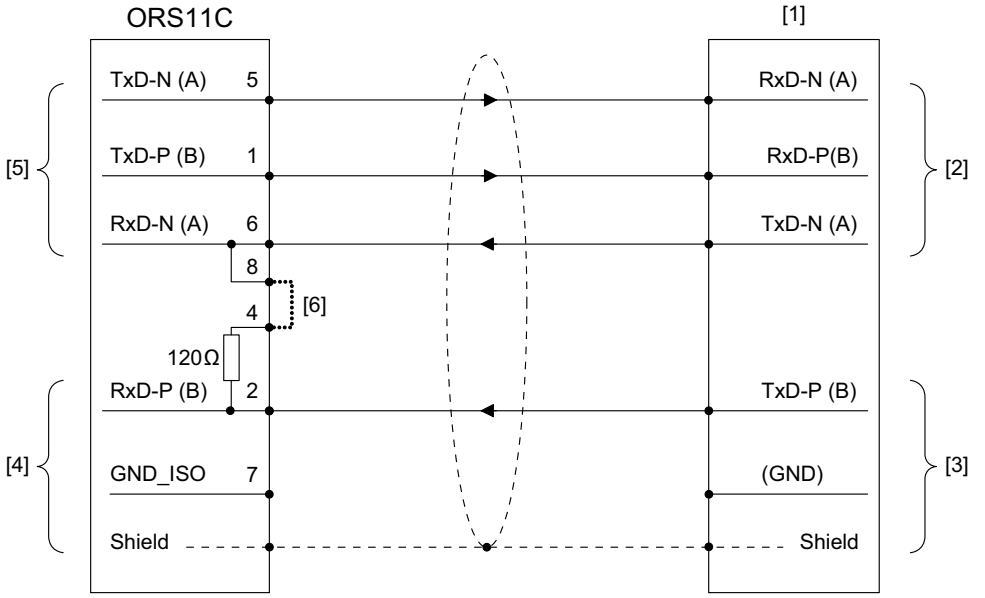
6.8.7 RS422 wiring



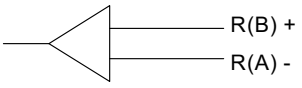
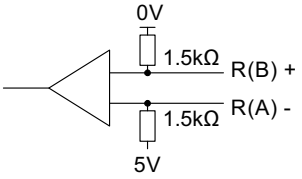
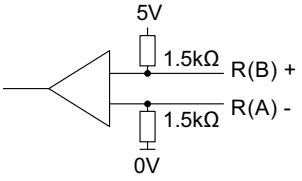
[1] Peripheral module
[2] Receive
[3] Send
[4] Receive
[5] Send
[6] Bridge between 2 TERM inputs

A bridge between the 2 TERM inputs activates a terminating resistor of 120 Ω at the receiving end between RxD-P (terminal 2) and RxD-N (terminal 6).

6.8.8 Defined idle level via parameters

For low-reflection connection and wire break monitoring in RS422/485 operation, the lines can be preset with a defined idle level via parameters.

The connection of the receiver to the ORS11C interface is implemented as follows:

Parameters	Description	Connection of the receiver
None	No presetting of the receive line This setting is only useful for bus capable special drives	
Signal R(A) 5 Volt (break detection) Signal R(B) 0 Volt	With this presetting, wire break monitoring is possible in full duplex operation (RS422).	
Signal R(A) 0 Volt Signal R(B) 5 Volt	This presetting corresponds to the idle state (no sender active) for half duplex operation under RS485. No wire break monitoring is possible in this context.	

6.8.9 Technical data module

Type	ORS11C
Part number	28212010
Module ID	0E41 1700
Current consumption/power loss	
Current consumption from backplane bus	DC 100 mA
Current consumption from load voltage L+ (without load)	DC 10 mA
Power loss	1 W
Status, alarm, diagnostics	
Status display	Yes
Alarms	Yes, parameters can be set
Process alarm	No
Diagnostics interrupt	Yes, parameters can be set
Diagnostic function	Yes, parameters can be set
Diagnostic information can be read out	Possible
Module status	Green LED
Module error display	Red LED
Channel error display	Red LED
Point-to-point communication (PtP communication)	
PtP communication	Possible
Interface is electrically isolated	Possible
Interface RS232	---
Interface RS422	Possible
Interface RS485	Possible
Connection	Base module
Min. transmission speed	150 bit/s
Max. transmission speed	115.2 kbit/s
Max. cable length	1200 m
Point-to-point protocols	
Protocol SCII	Possible
Protocol STX/ETX	Possible
Protocol 3964(R)	Possible
Protocol RK512	---
Protocol USS Master	---
Protocol Modbus master	Possible
Protocol Modbus slave	Possible
Special protocols	---

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Data sizes	
Input bytes	8/20/60
Output bytes	8/20/60
Parameter bytes	23
Diagnostic bytes	20
Housing	
Material	PPE/PPE GF10
Fastening	Profile rail 35 mm
Mechanical data	
Dimensions (W×H×D)	12.9 × 109 × 76.5 mm
Weight	60 g
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage temperature	−25 °C to +70 °C
Certification in accordance with UL508	Yes

6.8.10 Technical data protocol

ASCII	
Max. telegram length	1024 byte
Baud rate	150, 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 14400, 19200, 38400, 57600, 76800, 109700, 115200 baud
Character Delay Time CDT	0 – 65535 in ms steps (triple character time is used at 0)
Flow control	None, hardware, XON/XOFF
Max. number of bufferable telegrams	250
End code of a telegram	After the character delay time CDT has elapsed
STX/ETX	
Max. telegram length	1024 byte
Baud rate	150, 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 14400, 19200, 38400, 57600, 76800, 109700, 115200 baud
Character Delay Time CDT	0 – 65535 in ms steps (triple character time is used at 0)
Flow control	None, hardware, XON/XOFF
Max. number of bufferable telegrams	250
End code of a telegram	By means of parameterized end delimiters
Number of start delimiters	0 – 2 (characters parameterizable)
Number of end delimiters	0 – 2 (characters parameterizable)

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3964, 3964R	
Max. telegram length	1024 byte
Baud rate	150, 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 14400, 19200, 38400, 57600, 76800, 109700, 115200 baud
Block check character	Only 3964R
Priority	Low/high
Character Delay Time CDT	0 – 255 in steps of 20 ms (triple character time is used at 0)
Acknowledgment Delay Time ADT	0 – 255 in steps of 20 ms (triple character time is used at 0)
Number of installation attempts	0 – 255
Number of transmission attempts	1 – 255
Modbus	
Max. telegram length	258 bytes
Range that can be addressed	Each of 1024 bytes
Baud rate	150, 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 14400, 19200, 38400, 57600, 76800, 109700, 115200 baud
Mode	Master ASCII, Master RTU Slave ASCII short, Slave RTU short Slave ASCII long, Slave, RTU long
Address	1 – 255
Idle time	Automatic, 1 – 60000 ms

6.9 Quick start ORS11C

The communication processor ORS11C for the MOVI-PLC® I/O system C enables serial process linking for different target or source systems. The communication processor ORS11C is operated as a peripheral module and is supplied with operating voltage via the backplane bus.

6.9.1 Parameters

Parameter data, which is assigned according to the chosen protocol, can be transferred to the ORS11C for parameterization.

6.9.2 Protocols

ORS11C supports the following protocols:

- ASCII
- STX/ETX
- 3964(R)
- Modbus (Master, Slave)

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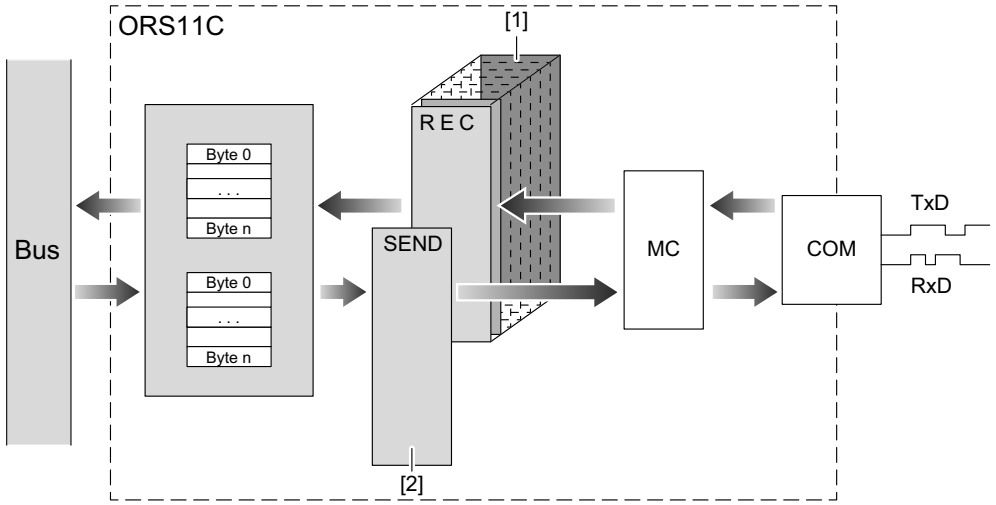
6.9.3 Communication

When sending, data written by a higher level system via the backplane bus into the corresponding output range, is written to the send buffer and output from there via the interface.

When the communication processor receives data via the interface, this data is stored in a ring buffer and entered via the backplane bus in the input range of the higher level system.

INFORMATION

Note that the size of the input/output range and also the telegram on the backplane bus is dependent on the higher level system (see chapter "Input/output range").



[1] Receive buffer
[2] Send buffer

6.9.4 Input/output range

Depending on the higher level system, the communication processor ORS11C uses the following number of bytes in the address range for input and output:

- CANopen: 8 bytes (IO_Size for CANopen)
- EtherCAT®: 60 bytes (IO_Size for EtherCAT®)

Input range

Address	Bytes	Function	IX[1)]	SX[2)]
0	1	Status byte	s = 1	01h
1	1	Input byte 1	s = 2	02h
2	1	Input byte 2	s = 3	03h
...	...	...	...	...
n-1	1	Input byte n-1	s = m	mh

1) IX = Index for access via CANopen. You address the corresponding byte using the subindex "s".
2) SX = Subindex for access via EtherCAT®.

Status byte — This parameter contains information on the fragmentation of the data in the receive buffer.

Input byte x — The contents of this data depends on the structure of the data in the receive buffer. More detailed information in this regard can be found in the "Principle of backplane bus communication" chapter.

Output range

Address	Bytes	Function	IX[1]	SX[2]
0	1	Status byte	s = 1	01h
1	1	Output byte 1	s = 2	02h
2	1	Output byte 2	s = 3	03h
...	...	...	...	...
n-1	1	Output byte n-1	s = m	mh

1) IX = Index for access via CANopen. You address the corresponding byte using the subindex "s".
2) SX = Subindex for access via EtherCAT®.

Control byte — Here you can control data transmission with appropriate commands.

Output byte 1 — The contents of this data depends on the structure of the data in the send buffer. More detailed information in this regard can be found in the "Principle of backplane bus communication" chapter.

6.9.5 Principle of the backplane bus communication

Sending data

When sending data, the data to be output is entered in the output range of the higher level system and transferred with the control byte to the communication processor ORS11C (→).

The communication processor ORS11C responds to each telegram with an acknowledgment, whereby it copies bit 0 – 3 of byte 0 of the output range into bit 4 – 7 of byte 0 of the input range or sends back an appropriate status message via this byte. Depending on the length of the data to be transmitted, the telegram is transferred in a fragment or with several fragments to the communication processor ORS11C. For fragmented transmission, each fragment is acknowledged by the communication processor ORS11C (←).

Principle of transmission without fragmentation

Higher-level system			ORS11C	
Byte	Function		Byte	Function
0	Control byte			
1	Telegram information byte			
2	High byte length			
3	Low byte length			
4 to n[1] −1	User data byte 0 to n−5			
		→		
		←	0	Acknowledgment/ status

1) n = number of bytes used in the address range (IO size)

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Control byte
- Bit 0 – 3
  - 8h: No-load operation – no data available
  - Ah: Start transmission without fragmentation
  - Bh: Perform a reset on the ORS11C
- Bit 4 – 7: Reserved for reception

Telegram information byte: During the transmission process 00h (fixed).

Length: Length of the user data for serial communication in bytes.

User data: Specify the user data for serial communication here.

Acknowledgment
- Bit 0 – 3: Reserved for reception
- Bit 4 – 7:
  - 8h: Acknowledgment: Idle status
  - Ah: Acknowledgment: Receive data without fragmentation
  - Ch: Status: Reset was performed on ORS11C
  - Dh: Status: The specified length is invalid
  - Eh: Status: Error ORS11C communication – partner does not respond

Principle of transmission with fragmentation

For fragmented transmission, the number of user data and even a part of the user data is transferred with the first telegram (header) (→). The fragment telegrams follow after this.

The communication processor ORS11C responds to each telegram with an acknowledgment, whereby it copies bit 0 – 3 of byte 0 of the output range into bit 4 – 7 of byte 0 of the input range or sends back an appropriate status message via this byte (←).

Procedure
- Write 1st telegram
- Write fragments
- Write last fragment

calculation: **Fragment number** = (length + 3) / (IO_Size − 1)

Write 1st telegram (header)

Higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
0	Control byte			
1	Telegram information byte			
2	High byte length			
3	Low byte length			
4 to n[1] −1	User data byte 0 to n−5			
		→		
		←	0	Acknowledgment/ status

1) n = number of bytes used in the address range (IO size)

Control byte
- Bit 0 – 3
  - 8h: No-load operation – no data available

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  - 9h: Start fragmented transmission
  - Ah: Transmit last fragment
  - Bh: Perform a reset on the ORS11C
- Bit 4 – 7: Reserved for reception

Telegram information byte: During the transmission process 00h (fixed).

Length: Length of the user data for serial communication in bytes.

User data: Specify the user data for serial communication here.

Acknowledgment:
- Bit 0 – 3: Reserved for reception
- Bit 4 – 7:
  - 8h: Acknowledgment: Idle status
  - 9h: Acknowledgment: Fragmented transmission started
  - Ah: Acknowledgment: Receive data without fragmentation
  - Ch: Status: Reset was performed on ORS11C
  - Dh: Status: The specified length is invalid
  - Eh: Status: Error ORS11C communication – partner does not respond

Write fragments

Higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
0	Control byte			
1 to n[1] −1	User data			
		→		
		←	0	Acknowledgment/ status

1) n = number of bytes used in the address range (IO size)

Control byte:
- Bit 0 – 3
  - 0h – 7h: Fragment number
  - 8h: No-load operation – no data present
  - Bh: Perform a reset on the ORS11C
- Bit 4 – 7: Reserved for reception

User data: Specify the user data for serial communication here.

Acknowledgment:
- Bit 0 – 3: Reserved for reception
- Bit 4 – 7:
  - 0h – 7h: Acknowledgment: Fragment number
  - 8h: Acknowledgment: Idle status
  - Ch: Status: Reset was performed on ORS11C
  - Dh: Status: The specified length is invalid
  - Eh: Status: Error ORS11C communication – partner does not respond

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Write last fragment

Higher-level system			ORS11C	
Byte	Function		Byte	Function
0	Control byte			
1 to n[1] −1	User data			
		→		
		←	0	Acknowledgment/ status

1) n = number of bytes used in the address range (IO size)

Control byte
- Bit 0 – 3
  - 8h: No-load operation – no data present
  - Ah: Transmit last fragment
  - Bh: Perform a reset on the ORS11C
- Bit 4 – 7: Reserved for reception

User data
Specify the user data for serial communication here.

Acknowledgment
- Bit 0 – 3: Reserved for reception
- Bit 4 – 7:
  - 8h: Acknowledgment: Idle status
  - Ah: Acknowledgment: Last fragment received
  - Ch: Status: Reset was performed on ORS11C
  - Dh: Status: The specified length is invalid
  - Eh: Status: Error ORS11C communication – partner does not respond

Receiving data

When receiving data, the received data is entered automatically in the input range of the higher level system by the communication processor ORS11C. Depending on the length of the received data, the telegram is transferred in a fragment or with several fragments to the higher level system (←).

You can start fragmented transmission by copying bit 0 – 3 from byte 0 of the input range into bit 4 – 7 of byte 0 of the output range (→). Possible errors relating to transmission can be found in *RetVal* (Return value).

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Principle of transmission without fragmentation

Higher-level system			ORS11C	
Byte	Function		Byte	Function
0			0	Information byte
			1	Telegram information byte
			2	High byte length
			3	Low byte length
			[4]	Offset high byte
			[5]	Offset low byte
			6	Return value high byte
			7	Return value low byte
			8 to n[1)] −1	User data
		←		
0	Acknowledgment	→	0	

1) n = number of bytes used in the address range (IO size)

Information byte
- Bit 0 – 3
  - 8h: No-load operation – no data present
  - 9h: Data is transmitted in a fragmented manner
  - Ah: Data is transmitted without fragmentation
- Bit 4 – 7: Reserved for sending

Telegram information byte
- 00h:
  - The telegram does not contain any additional offset information.
- 04h:
  - The telegram contains additional offset information which is adjusted as the word of the length. The position of the user data in the input range is determined via the offset information.

Length
Length of the user data of the serial communication in bytes plus 2 bytes for *return value*.

Offset
An offset is also entered if the telegram information byte has the value 04h. Otherwise, there is no offset in the telegram.

Return value
- 0517h: Invalid length (length = 0 or length > 1024)
- 080Ah: There is no free receive buffer available
- 080Ch: Faulty character received (character frame or parity error)

User data
Here is where you can find the received user data of the serial communication.

Acknowledgment
After the data has been processed accordingly in your higher-level system, you have to acknowledge reception at the communication processor ORS11C. Only then can the communication processor provide new receive data.
- Bit 0 – 3: Reserved for sending
- Bit 4 – 7:
  - 8h: Acknowledgment: Idle status
  - Ah: Acknowledgment: Input range is free for new data
  - Bh: Command: Perform a reset on the ORS11C

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Principle of transmission with fragmentation

Higher-level system			ORS11C	
Byte	Function		Byte	Function
0			0	Information byte
			1	Telegram information byte
			2	High byte length
			3	Low byte length
			[4]	Offset high byte
			[5]	Offset low byte
			6 to n[1)]−1	User data
		←		
0	Acknowledgment	→	0	

1) n = number of bytes used in the address range (IO size)

After the data has been processed accordingly in your higher-level system, you have to acknowledge reception at the communication processor ORS11C.

- Copy bit 0 – 3 from byte 0 of the input range in bit 4 – 7 of byte 0 of the output range.

The communication processor ORS11C can now provide the next fragment.

Calculation

Fragment number = (length + 7) / (IO_Size − 1)

Information byte

- Bit 0 – 3
  - 8h: No-load operation – no data available
  - 9h: Data is transmitted in a fragmented manner
  - Ah: Data is transmitted without fragmentation
- Bit 4 – 7: Reserved for sending

Telegram information byte

- 00h:
  - The telegram does not contain any additional offset information.
- 04h:
  - The telegram contains additional offset information which is adjusted as the word of the length. The position of the user data in the input range is determined via the offset information.

Length

Length of the user data of the serial communication in bytes plus 2 bytes for return value.

Offset

An offset is also entered if the telegram information byte has the value 04h. Otherwise there will be return value here.

Calculation of the offset when transmission is fragmented:

Data_Offset = (fragment counter + 1) × (IO_Size − 1) − 7 + offset

With Data_Offset:

- Offset of the data in the input range
  - Fragment counter: Absolute fragment number
  - IO_Size: Number of bytes used in the address range
  - Offset: Offset value in the telegram

User data

Here is where you can find the received user data of the serial communication.

Acknowledgment

- Bit 0 – 3: Reserved for sending
- Bit 4 – 7:
  - 8h: Acknowledgment: Idle status
  - Ah: Acknowledgment: Input range is free for new data
  - Bh: Command: Perform a reset on the ORS11C

6.9.6 Examples

This chapter contains some examples for sending and receiving data with or without fragmentation.

Sending data

Without fragmentation

IO_Size = 60 Byte, Length = 40 Byte

Higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
0	0Ah command			
1	00h telegram information			
2	00h high byte length			
3	28h low byte length			
4 – 43	User data byte 0 – 39			
44 – 59	Not used here			
		→		
		←	0	A0h acknowledgment

With fragmentation

IO_Size = 16 bytes, length = 50 bytes

Header higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
0	09h command			
1	00h telegram information			
2	00h high byte length			
3	28h low byte length			
4 – 15	User data bytes 0 – 39			
		→		
		←	0	90h acknowledgment

1st fragment higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
0	00h fragment			
1 – 15	User data bytes 12 – 26			

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1st fragment higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
		→		
		←	0	00h acknowledgment

2nd fragment higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
0	01h fragment			
1 – 15	User data bytes 27 – 41			
		→		
		←	0	10h acknowledgment

Last fragment higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
0	0Ah command			
1 – 8	User data bytes 42 – 49			
11 – 15	Not used here			
		→		
		←	0	A0h acknowledgment

Receiving data

Without fragmentation

IO_Size = 60 Byte, Length = 40 Byte

Higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
			0	0Ah fragment information
			1	00h telegram information byte
			2	00h high byte length
			3	2Ah low byte length + 2 byte
			4	00h return value high byte
			5	00h return value low byte
			6 – 45	User data byte 0 – 39
			46 – 59	Not used here
		←		
0	A0h acknowledgment	→	0	

With fragmentation

IO_Size = 16 bytes, length = 40 bytes

Header higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
			0	09h fragment information
			1	00h telegram information byte
			2	00h high byte length
			3	2Ah low byte length + 2 byte
			4	00h return value high byte
			5	00h return value low byte
			6 – 15	User data bytes 0 – 9
		←		
0	90h acknowledgment	→	0	

1st fragment higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
			0	00h fragment information
			1 – 15	User data bytes 10 – 24
		←		
0	00h acknowledgment	→	0	

Last fragment higher-level system			ORS11C	
Byte	**Function**		**Byte**	**Function**
			0	0Ah fragment information
			1 – 15	User data bytes 25 – 39
		←		
0	A0h acknowledgment	→	0	

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6.9.7 Diagnostic data

You have the option of activating a diagnostic alarm for the ORS11C communication processor. Diagnostics data for "incoming diagnostic alarm" is provided by the module when the diagnostic alarm is triggered. As soon as the reasons for the triggering of a diagnostic alarm are no longer present, you will automatically receive an "outgoing diagnostic alarm". The MF LED of the module lights up within this period of time (1st "incoming diagnostic alarm").

Bytes	Function	Default	IX[1)]	SX[2)]
1	Diagnostics	00h	2F01h	02h
1	Module information	1Ch		03h
1	Reserved	00h		04h
1	Diagnostics	00h		05h
1	Channel type	60h		06h
1	Number of status bits per channel	08h		07h
1	Number of module channels	01h		08h
1	Channel error	01h		09h
1	Channel-specific error channel	01h		0Ah
7	Reserved	00h		0Bh – 11h
4	µs ticker	00h		12h

1) IX = Index for access via CANopen: Access is via IX 2F01h. You can also access the first 4 bytes via IX 2F00h.

2) SX = Subindex for access via EtherCAT®.

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0: Set at assembly fault Bit 1: Set at internal error Bit 2: Set at external error (cable breakage only for RS422) Bit 3: Reserved Bit 4: Set at missing external supply voltage Bit 5, 6: Reserved Bit 7: Set at invalid parameter setting

Module information

Bytes	Bit 0 – 7
0	Bit 0 – 3: Module class (1100b: ORS11C) Bit 4: Set at channel information present Bit 5 – 7: Reserved

Diagnostics

Bytes	Bit 0 – 7
0	Bit 0 – 2: Reserved Bit 3: Set at internal diagnostics buffer Bit 4: Set at internal communication error Bit 5 – 7: Reserved

Channel type

Bytes	Bit 0 – 7
0	Bit 0 – 6: Channel type (60h: communication processor) Bit 7: Reserved

Status bits

Bytes	Bit 0 – 7
0	Number of status bits of the module per channel (here 08h)

Channels

Bytes	Bit 0 – 7
0	Number of the channels of a module (here 01h)

Channel error

Bytes	Bit 0 – 7
0	Bit 0: Set at error channel group 0 Bit 1 – 7: Reserved

Channel-specific error

Bytes	Bit 0 – 7
0	Bit 0 – 3: Reserved Bit 4: Wire break (only possible for RS422) Bit 5 – 7: Reserved

Reserved

Bytes	Bit 0 – 7
0	Bit 0 – 7: Reserved

µs ticker

Bytes	Bit 0 – 7
0 – 3	Value of the µs ticker during generation of the diagnostics data

A 32-bit timer (µs ticker) is located in the MOVI-PLC® I/O system C module which is started when the line voltage is switched on and begins at 0 again after 232-1 µs.

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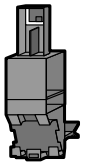
6.10 OZS11C shield bus carrier

In this chapter you will find the description of the shield bus carrier OZS11C.

6.10.1 Overview



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The shield bus carrier is used to pick up shield buses (10 mm x 3 mm) for the connection of cable shields.

Shield bus carrier, shield bus and cable shield fastening parts are not included in the scope of delivery. They are only available as accessories.

The shield bus carrier is connected to the base module below the terminal block. You can remove the spacer on the shield bus carrier for flat support rails.

6.10.2 Technical data

Type	OZS11C
Part number	28212053
Mechanical data	
Dimensions (W×H×D)	12.9 × 24 × 20 mm
Weight	8 g
Ambient conditions	
Operating temperature	−25 °C to +70 °C
Storage temperature	−25 °C to +70 °C

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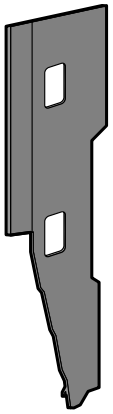
6.11 OZB11C bus cover

In this chapter you will find the description of the bus cover OZB11C.

6.11.1 Overview



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A bus cover is included in the scope of delivery for each bus coupler in order to protect the bus contacts. The bus cover on the bus coupler is to be removed prior to the installation of MOVI-PLC® I/O system C modules. Always install the bus cover on the outermost module in order to protect the bus contacts.

6.11.2 Technical data

Type	OZB11C
Part number	28212045
Mechanical data	
Dimensions (W×H×D)	2 × 104 × 76.5 mm
Weight	10 g
Ambient conditions	
Operating temperature	−25 °C to +70 °C
Storage temperature	−25 °C to +70 °C

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7 Project planning with MOVITOOLS® MotionStudio

This chapter describes the project planning for the MOVI-PLC® I/O system C using the MOVITOOLS® MotionStudio engineering software.

7.1 PLC Editor project planning tool

- Start MOVITOOLS® MotionStudio and the PLC Editor.
- Further information can be found in the chapter "Project planning with MOVITOOLS® MotionStudio" in the "Controller DHxxB" (standard and advanced) and "Controller UHX71B" manuals.
- For basic information on the PLC Editor and PLC configuration, refer to the "MOVI-PLC® programming in the PLC Editor" system manual.

7.2 Adding a MOVI-PLC® I/O system C

7.2.1 CAN bus coupler OCC11C

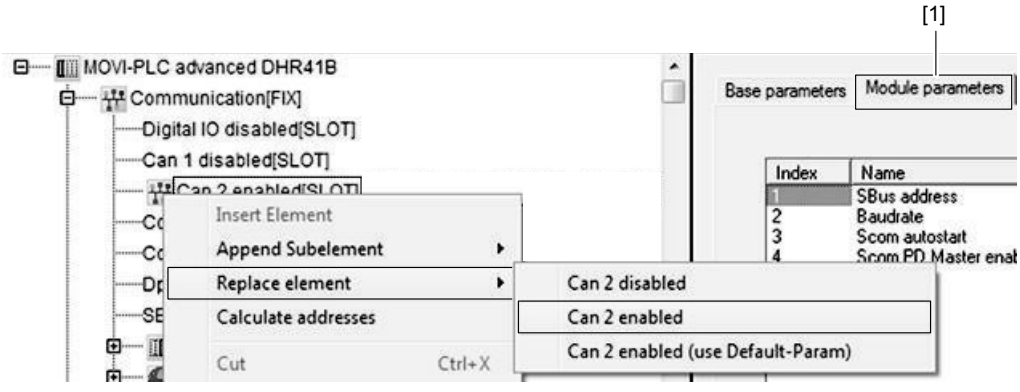
In the control configuration, you can activate the interface through which the CAN bus coupler OCC11C of the MOVI-PLC® I/O system C is connected to the MOVI-PLC® controller.

You have two possibilities for connecting the CAN bus coupler to the controller.

Connection possibility 1:

✓ The PLC Editor has been started.

1. Select the "control configuration" entry in the "resources" tab.
2. Right-click on the appropriate node in the middle pane.
3. Select the menu items [Replace element] / [... enabled] e.g. "CAN 2 enabled" in the context menu.



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[1] "Module parameter" tab

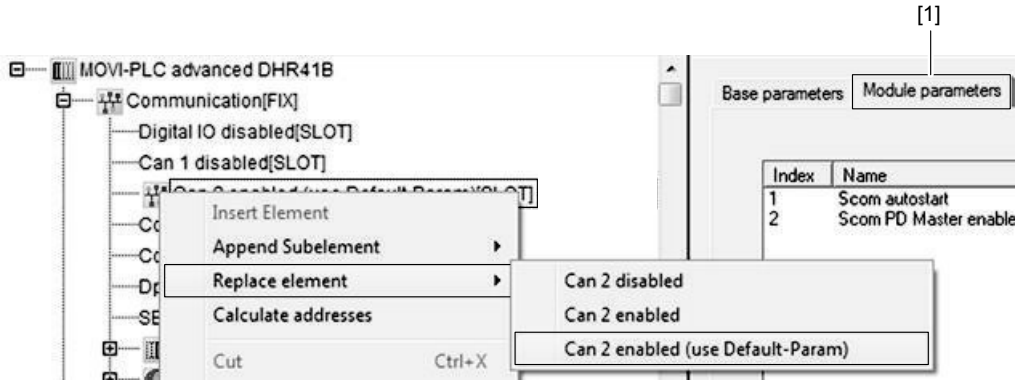
4. Check the baud rate of the interface in the "module parameters" tab.

INFORMATION

The baud rate set in the module parameters of the interface must correspond with the baud rate set on the OCC11C CAN bus coupler (see chapter OCC11C CAN bus coupler).

Connection possibility 2:

1. Replace the corresponding entry with "... enabled (use Default Param)" e.g. "CAN 2 enabled (use Default Param)".



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[1] "Module parameter" tab

2. Open the parameter tree in the MOVITOOLS® MotionStudio.
3. Select the node "MOVI-PLC DHR41B parameters/parameters and functions/interfaces/CAN“.
4. Check the baud rates set in the parameter tree (see chapter "CAN bus coupler OCC11C").

INFORMATION

The baud rate set in the parameter tree in MOVITOOLS® MotionStudio must correspond to the baud rate set on the CAN bus coupler OCC11C.

7.2.2 EtherCAT® bus coupler OCE11C

In the control configuration, you can activate the interface through which the EtherCAT® bus coupler OCE11C of the MOVI-PLC® I/O system C is connected to the MOVI-PLC® controller.

Connecting the EtherCAT® bus coupler to the controller

Proceed as follows:

✓ The PLC Editor has been started.

1. Select the "control configuration" entry in the "resources" tab.
2. Right-click on the corresponding node in the middle pane.

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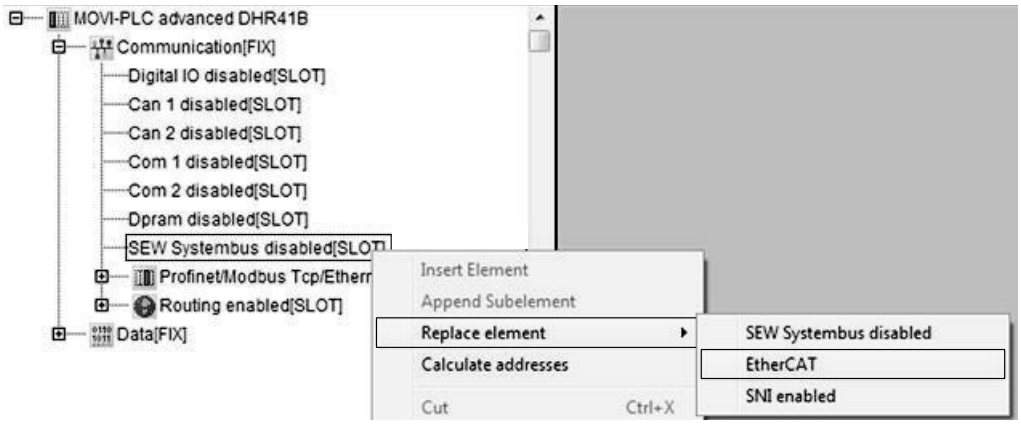
3. Select the menu items [Replace element] / [EtherCAT] in the context menu.



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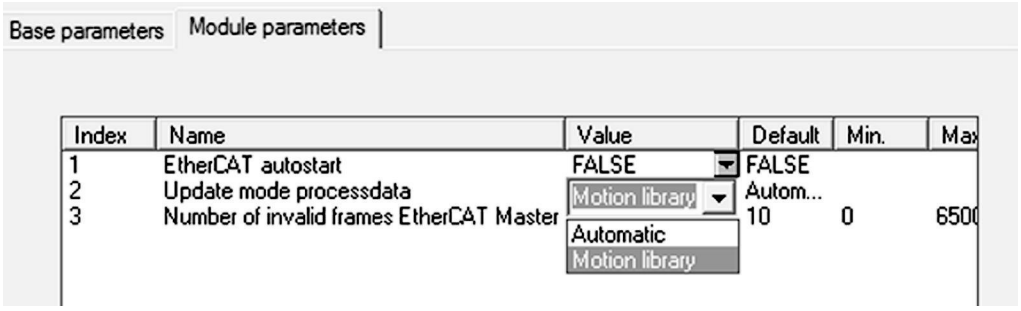
4. Check the settings of the interface in the "Module parameters" tab.



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⇨ The parameter *EtherCAT autostart* must be set to "FALSE".

⇨ The parameter *Update mode processdata* must be set to "Motion library".

⇨ The parameter *Number of invalid frames EtherCAT Master* is used to make the EtherCAT® bus more error-tolerant.

The setting 10 means that 10 telegrams (10 ms) in succession may be corrupt before a bus error is displayed.

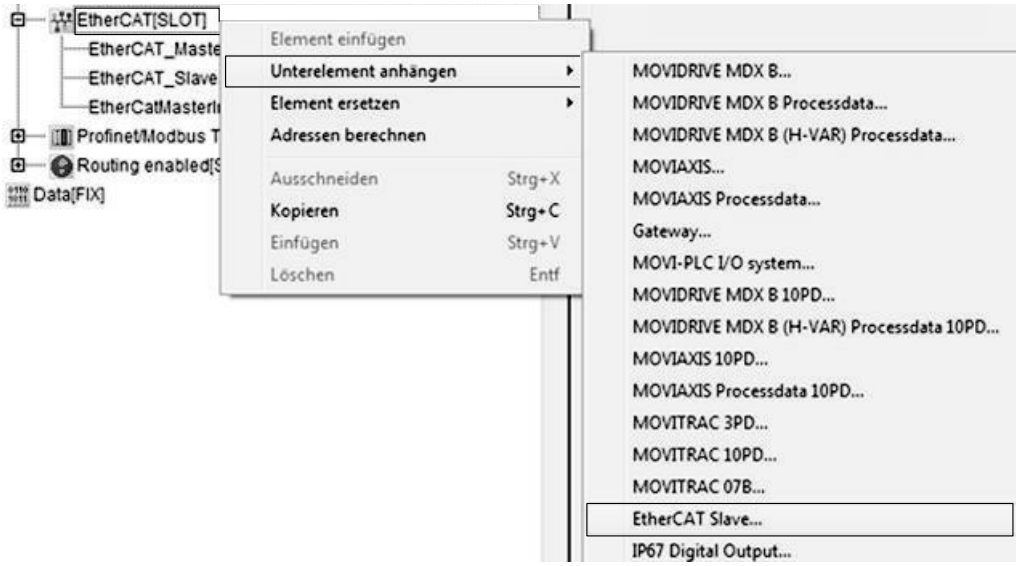
7.2.3 Appending an EtherCAT® slave subelement

Proceed as follows:

✓ The PLC Editor has been started.

1. Select the "control configuration" entry in the "resources" tab.

2. Right-click on the corresponding node in the middle pane e.g. "EtherCAT [SLOT]".
3. Select the menu items [Append subelement] / [EtherCAT Slave] in the context menu.



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7.2.4 EtherCAT® slave settings

The EtherCAT® slave has the following module parameters which must be added in the order shown:

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Module parameters EtherCAT® slave (deviating from default)

Base parameters | Module parameters

Index	Name	Value	Default	Min.	Max.
1	Activate Slave	TRUE	TRUE		
2	Slave Name	Slave X	Slave X		
3	EtherCAT address	1001		1001	65000
4	DC Sync0 enable	TRUE	TRUE		
5	DC Sync0 factor	1	1	1	65535
6	DC Sync1 enable	FALSE	FALSE		
7	DC Sync1 offset [µs]	0	0	0	65535
8	PDI latch enable	FALSE	FALSE		
9	Vendor ID	89	89		
10	Product Code	16#80000000	1		
11	Watchdog enable	TRUE	TRUE		
12	Watchdog Multiplier	2498	25000	2	65535
13	PDI Watchdog	0	0	0	65535
14	SM Watchdog	100	100	0	65535
15	Timeout SDO Access	6000	400		
16	Timeout Init to Preop	3000	3000		
17	Timeout Pre to SafeOp	10000	10000		
18	DeviceEmulation	0	0		
19	DownloadPDOContent	FALSE	TRUE		
20	DownloadPDOConfiguration	FALSE	TRUE		

FALSE
TRUE

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- *EtherCAT® address* = 1001 – 1255
- *Product Code* = 16#80000000
- *Watchdog Multiplier* = 2498
- *Timeout SDO Access* = 6000
- *DownloadPDOContent* = FALSE
- *DownloadPDOConfiguration* = FALSE

Module parameters Mailbox Tx (deviating from default)

Module parameters

Index	Name	Value	Default	Min.	Max.
1	SyncMan physical address	16#1C00	16#18...		
2	SyncMan length	[512	] 250		
3	SyncMan FlagTypeDir	16#0026	16#00...		

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- *SyncMan physical address* = 16#1C00
- *SyncMan length* = 512

Module parameters Mailbox Rx (deviating from default):

Module parameters

Index	Name	Value	Default	Min.	M
1	SyncMan physical address	16#1E00	16#18...		
2	SyncMan length	512	250		
3	SyncMan FlagTypeDir	16#0022	16#00...		

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- *SyncMan physical address* = 16#1E00
- *SyncMan length* = 512

Module parameters Mailbox Rx (deviating from default):

Module parameters

Index	Name	Value	Default	Min.
1	SyncMan physical address	16#1000	16#10...	
2	SyncMan FlagTypeDir	16#0024	16#00...	
3	SyncMan Channel enable	1	1	
5	FMMU PhysicalStartAddress	16#1000	16#10...	
6	FMMU Flags	1	1	

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- *SyncMan FlagTypeDir* = 16#0024

Module parameters Rx PDO (deviating from default)

Module parameters

Index	Name	Value	Default	Min.	M
1	SyncMan physical address	16#1600	16#12...		
2	SyncMan FlagTypeDir	16#0000	16#00...		
3	SyncMan Channel enable	1	1		
5	FMMU PhysicalStartAddress	16#1600	16#12...		
6	FMMU Flags	1	1		

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- *SyncMan physical address* = 16#1600
- *SyncMan FlagTypeDir* = 16#0000
- *FMMU PysicalSlartAddress* = 16#1600

INFORMATION

The number of Tx and Rx elements of the TxPDO and RxPDO module parameters must correspond to the total number of bytes of the modules installed (only the number is relevant).

- Note that the Rx element 8 bit must only be used as the last element.
- 2 Rx elements 32 bit are always to be configured for the bus coupler itself.

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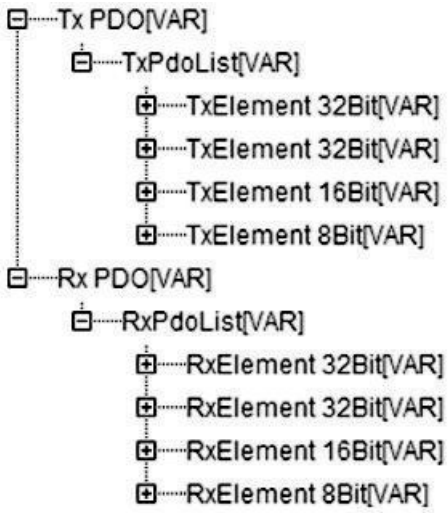

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Example of the configuration shown above

Modules installed:

- 1 x OCE11C (2 x Rx element 32 bit)
- 2 x ODI81C (1 x Rx element 16 bit)
- 1 x OAO41C (2 x Tx element 32 bit)
- 1 x ODI81C (1 x Rx element 8 bit)
- 2 x ODO81C (1 x Tx element 16 bit)
- 1 x ODO81C (1 x Tx element 8 bit)

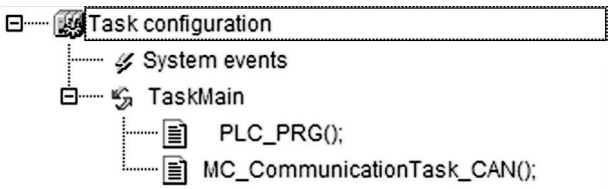
7.3 MOVI-PLC® task settings

7.3.1 Calling up the task settings for CAN bus coupler OCC11C

Proceed as follows:

✓ The PLC Editor has been started.

1. Select the "task configuration" entry in the "resources" tab.
2. Select the node "TaskConfiguration / TaskMain / MC_Communication-Task_CAN();" in the middle pane.



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7.3.2 Calling up the task settings for EtherCAT® bus coupler OCE11C

Proceed as follows:

✓ The PLC Editor is started.

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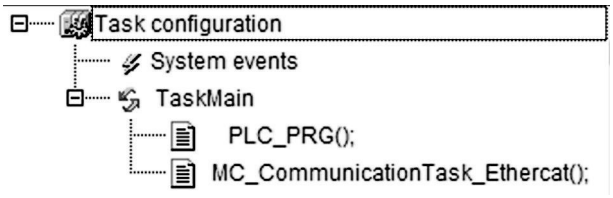
1. Select the "task configuration" entry in the "resources" tab.
2. Select the node "TaskConfiguration / TaskMain / MC_Communication-Task_Ethercat();" in the middle pane.



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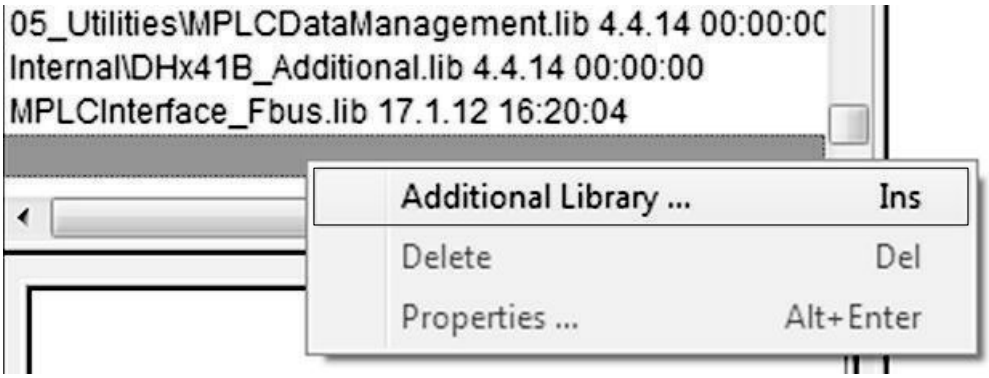
The call-ups shown can be called up in the free-running task (Main Task) or in a cyclical task depending on the requirements.

7.4 MOVI-PLC® library and modules

Inserting a library

Proceed as follows:

1. Select the "library manager" entry in the "resources" tab.
2. Click once with the mouse in the field in the middle pane.
3. Select the menu item [Insert additional library] in the context menu.



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⇨ The "open" window is displayed.

4. Select the "MPLCSEWIOSystemC.lib" library in the "05_Utilities" folder.
5. Click the [Open] button.

⇨ The library has been inserted.

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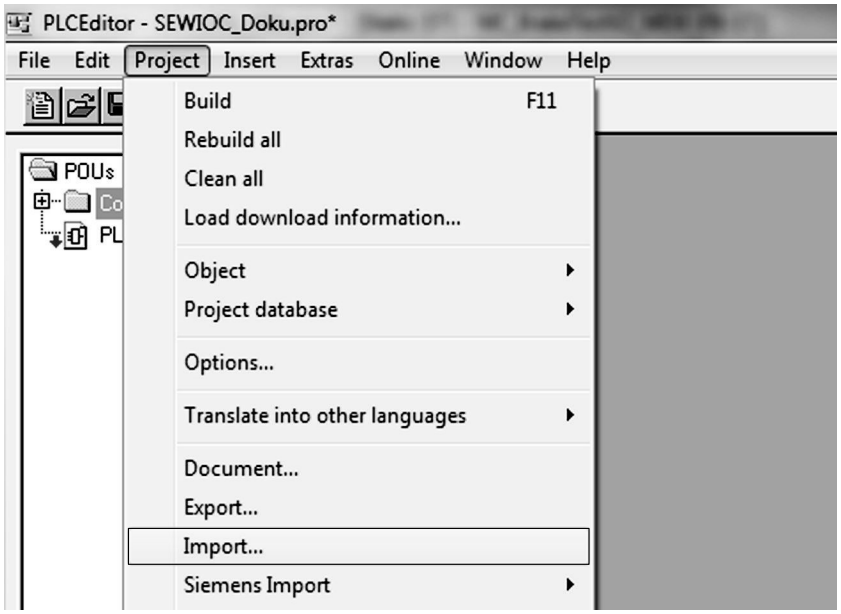
Importing CodeSample with POUs

Proceed as follows:

6. Select the menu command [Project] / [Import...] in the menu bar.



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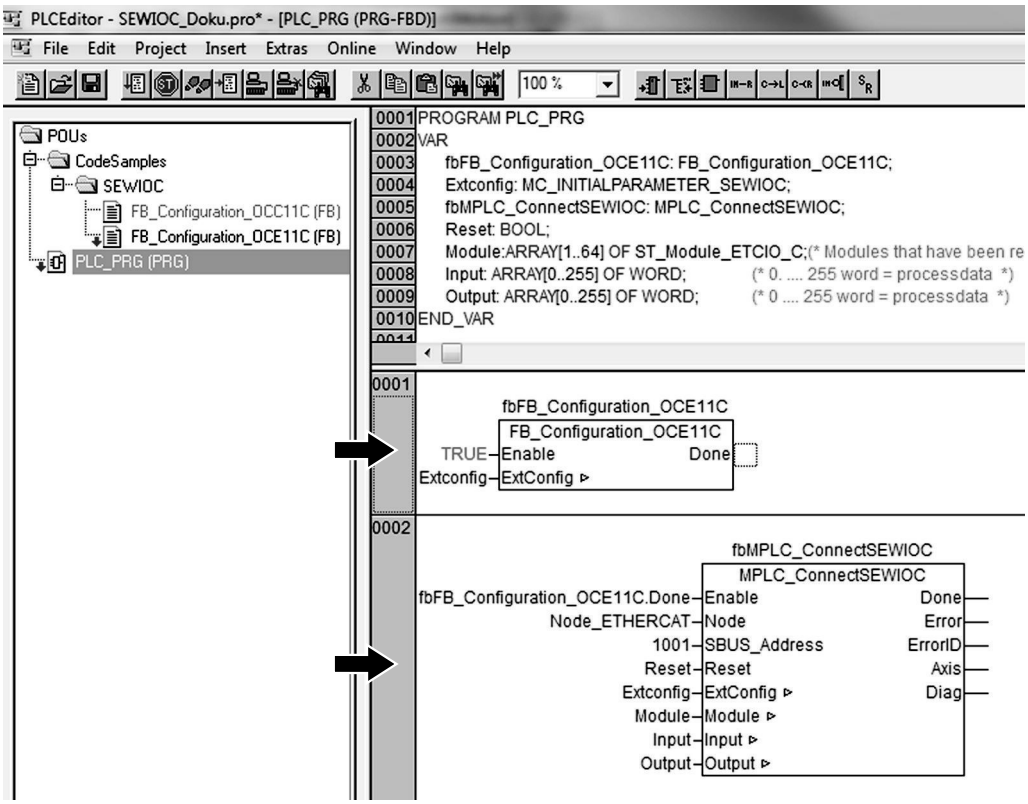
⇨ The "Import project" window is displayed.

7. Open the export file from the "CodeSamples" folder `SEWIOC.EXP`.

INFORMATION

You only require the configuration blocks contained within the CodeSamples if the configuration of the modules, such as analog modules, is operated in deviation from the default settings.

8. Insert the "FB_Configuration_OCC11C" or "FB_Configuration_OCE11C" module into the program from the "CodeSample" folder.



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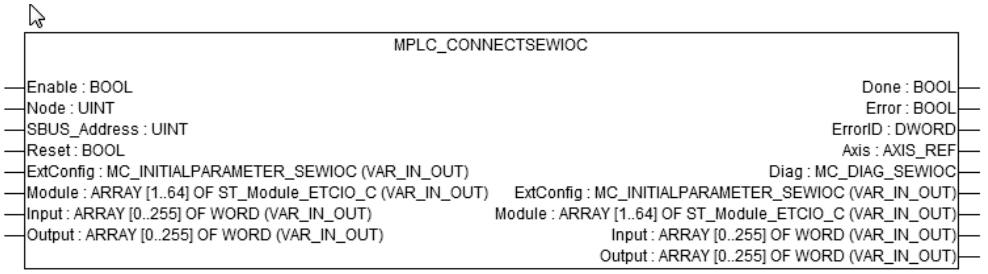
⇨ The CodeSample with modules has been imported.

7.4.1 "MPLC_ConnectSEWIOC" module

This module provides the interface to the MOVI-PLC® I/O system C.



12912988811

This module enables the following functions:

- Establishing and monitoring the connection
- Diagnostics method

Input signals

Enable

The module is run if the "Enable" input is called up once with TRUE. Further status changes are ignored.

Node

Possible entries are:

- Node_1 / Node_2 - for the CAN bus coupler OCC11C
- Node_EtherCAT - for the EtherCAT® bus coupler OCE11C

SBUS_Address

Address of the bus coupler.

Reset

Resets the bus coupler and the connection following an interference.

ExtConfig

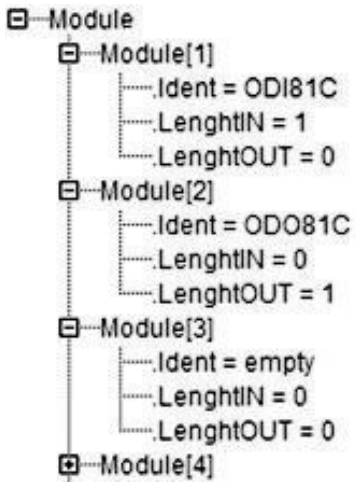
This interface serves to transfer parameter data for the configuration of the module. This structure can be filled by the configuration modules from the "CodeSamples" folder.

Modules

This structure displays the modules identified by the bus coupler.

Module[No.], No. = slot behind the bus coupler.

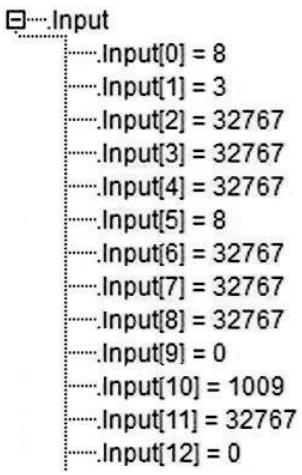
- **Ident:** Designation of the module.
- **LengthIN:** Input length in bytes.
- **LengthOUT:** Output length in bytes.



12914567819

Input

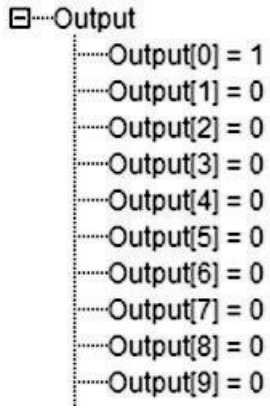
This array shows the input data of the modules. Each array element displays a digital input byte or an analog input word.



9007212169305355

Output

This array writes the output data of the modules. Each array element describes a digital output byte or an analog output word.



12914571275

Output signals

Done

The connection to the coupler has been established without errors.

Error

An error has occurred

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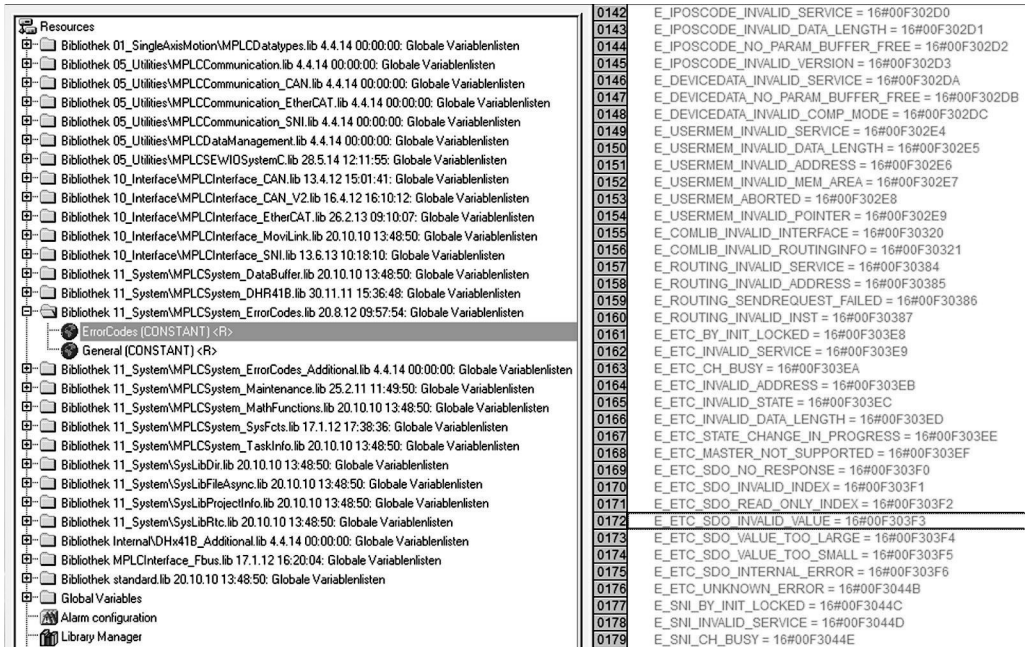
ErrorID

The error number is displayed here. The description of the error can be found in the following library.



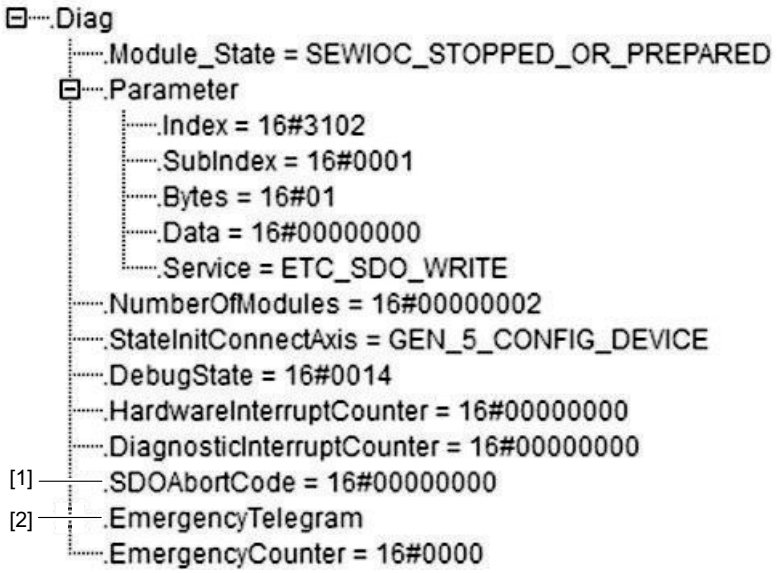
12912999307

Axis

This is the transfer structure for all further modules and contains the logic address.

Diag

This structure is available for further diagnostics should errors occur.



12912995851

[1] The error list for *SDOAbortCode* can be found in the chapter"SDO Error Codes".
[2] The error list for *EmergencyTelegram* can be found in the chapter "Error messages".

The operating state of the bus coupler is displayed in the *Module_State*.

During run up there are mainly incorrect entries in the configuration interface "ExtConfig" which lead to errors. The internal structure "*Parameter*" displays the faulty index access. For the bus coupler OCC11C, the response from the bus coupler can be seen on the *SDOAbortCode* (see chapter "SDO Error Codes"). For the bus coupler OCE11C, the error can be seen directly on the ErrorID.

Following the run up, you can identify an error telegram with the CAN bus coupler OCC11C via the *EmergencyCounter*. An error code is transferred to the *EmergencyTelegram* (see chapter "Emergency Object").

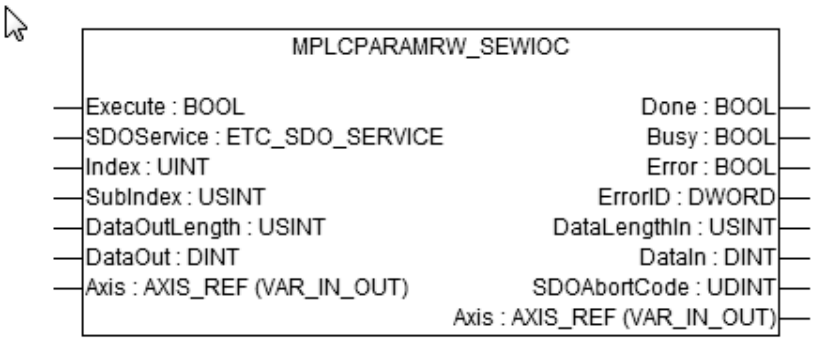
The number of modules detected can be seen from the variables "*NumberOfModules*".

The *StateInitConnectAxis* and *DebugState* displays the status of the connect module.

The *HardwareInterruptCounter* (counter for process alarms) and *DiagnosticInterruptCounter* (counter for diagnostic alarms) display the alarms configured with the bus coupler OCE11C (see module descriptions).

7.4.2 "MPLCPARAMRW_SEWIOC" module

This module is used to write and read SDOs (ServiceDataObject) on the MOVI-PLC® I/O system C. This allows data to be read and written during the running time (not PDO configuration (ProcessDataObject) and the PDO mapping).



12912993163

Input signals

Execute

The command is performed with a rising edge.

SDOService

- ETC_SDO_READ - to read the index/subindex
- ETC_SDO_WRITE to write the index/subindex

Index

See module description

Subindex

See module description

DataOutLength

Length of data to be written in bytes

DataOut

Data to be written.

Axis

Structure from the connect module.

Output signals

Done

The command was performed without errors.

Busy

The command is being performed.

Error

An error has occurred

ErrorID

The error number is displayed here.

DataLengthIn

Length of data to be read out in bytes.

DataIn

Read data.

SDOAbortCode

Error when reading or writing an index/subindex The error list for *SDOAbortCode* can be found in the chapter"SDO Error Codes".

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7.5 Reading diagnostic data

This chapter describes reading diagnostic data

7.5.1 EtherCAT® bus coupler OCE11C

Diagnostic data can be read out if the *DiagnosticInterruptCounter* increments.

Diagnostic data (bytes 1 – 4)

You can access current diagnostic alarm data via index 0x5002 if the alarm state displays a diagnostic alarm. The assignment of the diagnostic data can be found in the corresponding module description.

Index	Sub-index	Name	Type	Attr.	Default value	Description
0x5002	0x00	Diagnostic Data	Unsigned8	ro	6	Current diagnostic data
	0x01	Slot number	Unsigned8	ro	0x00	EtherCAT® slot of the module where the alarm has occurred
	0x02	Diagnostic Data 00	Unsigned8	ro	0x00	Bytes 1 – 4 of the diagnostic data (see module description)
	0x03	Diagnostic Data 01	Unsigned8	ro	0x00	
	0x04	Diagnostic Data 02	Unsigned8	ro	0x00	
	0x05	Diagnostic Data 03	Unsigned8	ro	0x00	
	0x06	Acknowledge	Unsigned8	rw	0x00	Writing any value resets the diagnostic alarm counter and acknowledges the alarm.

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Diagnostic data (bytes 1 – n)

This object gives you access to all the diagnostic data of a module. You can call up either the current diagnostic data or the diagnostic data of a module on any EtherCAT® slot.

Index	Sub-index	Name	Type	Attr.	Default value	Description
0x5005	0x00	Diagnostic Data	Unsigned8	ro	18	
	0x01	Slot	Unsigned8	rw	0	In read access you will find the EtherCAT® slot of the module from which the diagnostics listed below originate. You can query the diagnostics data of any module by writing an EtherCAT® slot.
	0x02		Unsigned8	ro	0	Diagnostic data set of the module (see module description)
	0x03		Unsigned8	ro	0	
	0x04		Unsigned8	ro	0	
	0x05		Unsigned8	ro	0	
	0x06		Unsigned8	ro	0	
	0x07		Unsigned8	ro	0	
	0x08		Unsigned8	ro	0	
	0x09		Unsigned8	ro	0	
	0x0A		Unsigned8	ro	0	
	0x0B		Unsigned8	ro	0	
	0x0C		Unsigned8	ro	0	
	0x0D		Unsigned8	ro	0	
	0x0E		Unsigned8	ro	0	
	0x0F		Unsigned8	ro	0	
	0x10		Unsigned8	ro	0	
	0x11		Unsigned8	ro	0	
	0x12		Unsigned32	ro	0	

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7.5.2 CAN bus coupler OCC11C

The bus coupler sets of an emergency telegram if a diagnostic alarm occurs. The emergency telegram is displayed on the "Diag" output of the "MPLC_ConnectSE-WIOC" module.

The *EmergencyCounter* is incremented and you can see the information in the telegram. The assignment of the diagnostic data can be found in the corresponding module description.

Telegram structure

The emergency telegram is always 8 bytes long. It starts with the 2 byte error code, then the 1 byte error register and finally the 5 byte additional code.

Error code (low byte)	Error code (high byte)	ErrorRegister Index 0x1001	Info 0	Info 1	Info 2	Info 3	Info 4

Index 1003	Additional information (high byte)	Additional information (low byte)	Error code (high byte)	Error code (low byte)

Error code	**Meaning**	**Info 0**	**Info 1**	**Info 2**	**Info 3**	**Info 4**	**Add. Inf. (h byte)**	**Add. Inf. (l byte)**
0x1000	Diagnostic alarm	0x40+ Slot No.	Diag. Byte 1	Diag. Byte 2	Diag. Byte 3	Diag. Byte 4	0x40	Slot No.

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8 Service

8.1 LED error list

Fault	Possible cause	Measure
On each module: • RUN LED is off • MF-LED lights up sporadically	• Electronics power supply: The maximum current for the electronics power supply has been exceeded.	• Divide up the modules among several bus couplers.
On one or on several modules: • RUN LED is off • MF-LED flashes	• Configuration error: At this point a module has been installed that does not correspond to the module currently configured.	• Align configuration and hardware structure with each other.
On all modules up to the faulty module: • All RUN-LEDs up to the faulty module are flashing On all subsequent modules: • RUN LED is off • MF-LED lights up	• Module failure: The module to the right of the flashing modules is defective.	• Replace the defective module.

8.2 CAN bus coupler OCC11C error list

8.2.1 SDO error codes

Code	Error
0x05030000	Toggle bit not alternated.
0x05040000	SDO protocol timed out.
0x05040001	Client/server command specifier not valid or unknown.
0x05040002	Invalid block size (block mode only).
0x05040003	Invalid sequence number (block mode only).
0x05040004	CRC error (block mode only).
0x05040005	Out of memory.
0x06010000	Unsupported access to an object.
0x06010001	Attempt to read a write only object.
0x06010002	Attempt to write a read only object.
0x06020000	Object does not exist in the object dictionary.
0x06040041	Object cannot be mapped to the PDO.
0x06040042	The number and length of the objects to be mapped would exceed PDO length.
0x06040043	General parameter incompatibility reason.

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Code	Error
0x06040047	General internal incompatibility in the device.
0x06060000	Access failed due to an hardware error.
0x06070010	Data type does not match, length of service parameter does not match.
0x06070012	Data type does not match, length of service parameter too high.
0x06070013	Data type does not match, length of service parameter too low.
0x06090011	Sub-index does not exist.
0x06090030	Value range of parameter exceeded (only for write access).
0x06090031	Value of parameter written too high.
0x06090032	Value of parameter written too low.
0x06090036	Maximum value is less than minimum value.
0x08000000	General error.
0x08000020	Data cannot be transferred or stored to the application.
0x08000021	Data cannot be transferred or stored to the application because of local control.
0x08000022	Data cannot be transferred or stored to the application because of the present device state.
0x08000023	Object directory dynamic generation fails or no object directory is present (e.g. object directory is generated from file and generation fails because of an file error).

8.2.2 Emergency Object

The CAN bus coupler of the MOVI-PLC® I/O system C has the emergency object in order to be able to communicate internal unit errors or CAN bus
errors to other participants on the CANopen bus. It is assigned a high priority and supplies information about the state of the unit and network.

INFORMATION

You are strongly advised to evaluate the Emergency Object.

Telegram structure

The emergency telegram is always 8 bytes long. It starts with the 2 byte
error code, then the 1 byte error register and finally the 5 byte additional code.

Error code (low byte)	Error code (high byte)	ErrorRegister Index 0x1001	Info 0	Info 1	Info 2	Info 3	Info 4

Index 1003	Additional information (high byte)	Additional information (low byte)	Error code (high byte)	Error code (low byte)

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8.2.3 Error messages

Error code	Meaning	Info 0	Info 1	Info 2	Info 3	Info 4	Add. Inf. (h byte)	Add. Inf. (l byte)
0x0000	Reset Emergency							
0x0000	Process alarm	0x80+ Slot No.	Diag. Byte 1	Diag. Byte 2	Diag. Byte 3	Diag. Byte 4	0x80	Slot No.
0x1000	Module configuration has changed and Index 0x1010 is equal to "save"	0x01	0x00	0x00	0x00	0x00		
0x1000	Diagnostic alarm	0x40+ Slot No.	Diag. Byte 1	Diag. Byte 2	Diag. Byte 3	Diag. Byte 4	0x40	Slot No.
0x1000	Initialization error on System MOVI-PLC® I/O system C bus	0xE3	Slot No.	Index 0x2F02 L byte Err. Bits	Index 0x2F02 H byte Err. Bits	0x00	0xE3	Slot No.
0x1000	Initialization error on System MOVI-PLC® I/O system C bus during initialization	0xE0	0x00	0x00	0x00	0x00	0xE0	0x00
0x1000	Error on System MOVI-PLC® I/O system C bus	0xE1	0x00	0x00	0x00	0x00	0xE1	0x00
0x2000	IO size OSR11C module > 8 byte	0xE2	0x00	0x00	0x00	0x00	0xE2	0x00
0x3100	Main voltage error	0x00	0x00	0x00	0x00	0x00	---	---
0x8100	Heartbeat Consumer	Node ID	L byte Timer Value	H byte Timer Value	0x00	0x00	---	---
0x8157	MOVI-PLC® I/O system C bus error	0x05	Slot No.	0x00	0x00	0x00	Slot No.	0x00
0x8130	Node Guarding Error	L byte Guard Time	H byte Guard Time	Life Time	0x00	0x00	---	---
0x8210	PDO not processed due to length error	PDO No.	Wrong length	PDO length	0x00	0x00	---	---
0x8220	PDO length exceeded	PDO No.	Wrong length	PDO length	0x00	0x00	---	---

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Index

A

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G

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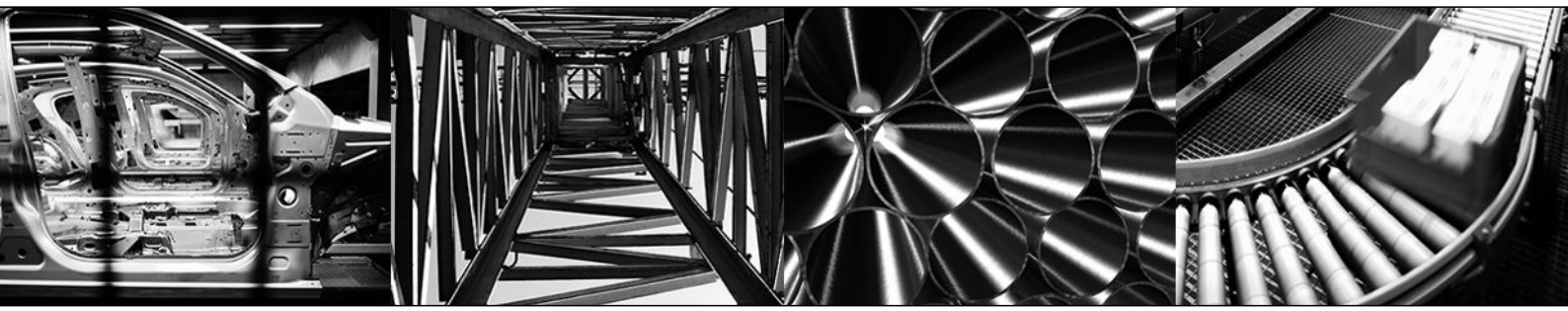

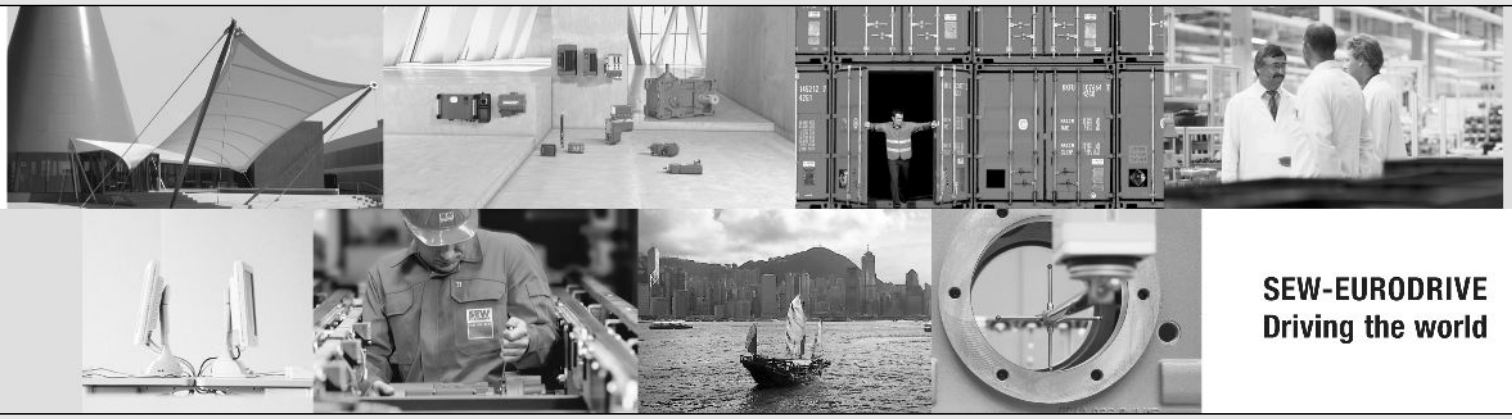

SEW-EURODRIVE
Driving the world

SEW-EURODRIVE GmbH & Co KG
P.O. Box 3023
76642 BRUCHSAL
GERMANY
Phone +49 7251 75-0
Fax +49 7251-1970
sew@sew-eurodrive.com
➞ **www.sew-eurodrive.com**