

## Operating instruction

## SIOX Extension Module

IO extension for higher-level controllers\*



\* System Centres Virtus, CI xxx0, Pack Controller VS 301x xx | Control Units WRG 3010 x | GLT

# Eckelmann

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[www.eckelmann.de/elds](http://www.eckelmann.de/elds)

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Information on safety and connection instructions are described in detail in chapter "Industrial safety notes".

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## 1 Conventions

### 1.1 Warning signs, symbols and text formatting used in this manual

Explanation of the warning signs, symbols and text formatting used in this operating and service manual:

- **DANGER**

 **DANGER**

Instructions with this symbol and/or the signal word **DANGER** warn the user of situations that will cause severe injury or death if the specified instructions are not observed! \*

- **WARNING**

 **WARNING**

Instructions with this symbol and/or the signal word **WARNING** warn the user of situations that may cause severe injury or death if the specified instructions are not observed! \*

- **CAUTION**

 **CAUTION**

Instructions with this symbol and/or the signal word **CAUTION** warn the user of situations that may cause moderate or minor injury if the specified instructions are not observed! \*

\* If any of these symbols **DANGER/WARNING/CAUTION** is recognized, the user **must** refer to the operating manual in order to understand the type of potential **HAZARD** and the required actions for avoiding the **HAZARD**. Carefully observe all health and safety instructions and use particular caution in these situations. **Failure to observe the DANGER/WARNING/CAUTION symbols will cause injury (in the worst case, severe injury or death) and/or damage to property!**

- **ATTENTION**

 **ATTENTION**

Instructions with this symbol and/or the signal word **ATTENTION** warn the user of situations that may cause damage to property if the specified instructions are not observed! The **ATTENTION** symbol highlights guidelines and regulations, instructions and proper working procedures that must be particularly observed in order to prevent damage to and destruction of components or malfunctioning. **Failure to observe the ATTENTION symbol will cause damage to property!**

- **NOTICE**

 **NOTICE**

Instructions with this symbol and/or the signal word **NOTICE** provide tips and useful additional information.

## • ELECTRIC SHOCK



### **Risk of fatal electric shock!**

This symbol warns of danger from **dangerous voltage** with possible consequences such as severe injury and death. If this symbol is seen, the user **must** refer to the operating manual in order to understand the type of potential **HAZARD** and the required actions for avoiding the **HAZARD**. Carefully observe all health and safety instructions and use particular caution in these situations.

**Failure to observe the WARNING symbol will cause injury (in the worst case, severe injury or death) and/or damage to property!**

## • ESD - Electrostatic-sensitive components and control components



### **Risk of destruction of the control component / controller!**

Electronic components and control components (e.g. circuit boards) are sensitive to electrostatic charges. Circuit boards may only be replaced when the **power supply is disconnected**. Always hold circuit boards by the edges. The guidelines for the handling of electrostatic-sensitive components and control components **must** be observed at all times.

**Failure to observe the ESD symbol will cause damage to property!**

## • DISPOSAL




### **Potential negative impact on people and the environment due to non-environmentally friendly disposal.**

The strike-through dustbin symbol indicates the duty to dispose of items properly. Do not dispose of this product with other domestic waste, see chapter Disposal. Please inform yourself about the local regulations for the separate disposal of electrical and electronic products. The correct disposal of your old equipment protects people and the environment from possible negative impact. **Failure to observe the DISPOSAL symbol will cause damage to people and the environment!**

## 1.2 Explanation of text formatting

**Safety instructions or hazard warnings** are composed of four elements:

1. The symbol  with text (e.g. for DANGER),
2. a concise description of the hazard and
3. a description of the possible consequences.
4. Where applicable, a catalogue with measures for avoiding the hazard.

For example:




### **DANGER**

#### **Warning of dangerous electrical voltage! Risk of fatal electric shock!**

Beware of external voltage at the digital inputs and outputs (relay/SSR)! Connections/plug connectors of the device may only be plugged in, removed and/or wired when **no voltage is present**.

A **general instruction** consists of two elements:

1. The symbol  with text (including NOTICE, if applicable) and
2. the text of the instruction:

For example:



### **NOTICE**

The current operating manual is available online from the E°EDP (Eckelmann ° Electronic Documentation Platform) at [www.eckelmann.de/elds](http://www.eckelmann.de/elds).

## 2 Safety instructions

This operating manual is part of the device. It **must** be kept in the vicinity of the controller as well as for future use so that it can be consulted when required. The operating manual must be available to the operating and maintenance personnel at all times in order to avoid operating errors. The safety regulations, instructions and information **must be strictly observed and complied with**. During repairs on the entire E\*LDS system, the accident prevention regulations and general safety regulations must be strictly complied with. Important information (safety instructions and hazard warnings) are indicated by appropriate symbols, see chapter Conventions. Follow these instructions in order to prevent accidents and danger to life and limb, as well as damage to the E\*LDS system!

**Always observe the following information:**

### **DANGER**

#### **Warning of dangerous electrical voltage! Danger of electric shock!**

Beware of external voltage at the digital inputs and outputs (relay/SSR)! Connections/plug connectors of the device may only be plugged in, removed and/or wired when **no voltage is present**.

- Work on the electrical system may only be performed by **authorised, skilled personnel** (according to the definition of skilled persons in DIN/VDE 0105 and IEC364) while observing the applicable
  - VDE regulations
  - Local safety regulations
  - Intended Use
  - Five safety rules according to DGUV Regulation 3
  - ESD measures
  - Operating manuals
- For safety reasons, the equipment must not be used for any applications other than described in the operating manual and only for the intended use.
- **Before** using the device, check whether it is suitable for your application with regard to its limit values.
- The equipment **must** be installed in an electrically shielded area within the switch cabinet.
- Before connecting the device, it **must** be checked whether the power supply is suitable for the device.
- Coded connectors **must** be used, as there is a possibility of plugging in non-coded connectors in such a way that there is a danger to life and limb!
- Specified ambient conditions (e.g. humidity and temperature limits, see chapter Technical Data) **must** be observed and complied with at all times to prevent malfunction.
- **Before** switching on the device, check the correct wiring of the connections.
- The device must **never be operated without** its housing. If the intended use requires opening the housing, the control unit **must** be disconnected from the power supply before opening the housing.
- Note the maximum load of the relay contacts, see chapter Technical Data.
- Note that all supply lines from and to the device, particularly those of the CAN bus and Modbus, must be shielded or installed sufficiently far away from live cables. This prevents faulty measurements and protects the device against electrical interference via the analogue inputs. Connection in parallel of RC elements is recommended for applications with critical environment.
- Contact the supplier in the case of any malfunction.

## ATTENTION


### **Warning of damage to goods!**

In our experience, the transmission of fault messages is not yet functional during the putting into service (no internet connection, no telephone line installed, etc.). It is strongly recommended in such cases to monitor the controller via the CAN bus using a system centre, a store computer or an operator terminal and to enable the transmission of fault messages, for example using a GSM modem via a mobile telephone system. In standalone operation, or as an alternative to monitoring via system centre / store computer / operator terminal, an available alarm contact on the controller must be used to enable the transmission of fault messages via a telephone network.

For more information, refer to [E\\*LDS basics](#), [safety instructions](#), [CAN bus & Modbus](#).

## 2.1 Disclaimer in the event of non-compliance

These operating instructions contain information on the commissioning, function, operation and maintenance of the controls and of the associated components.

 **Observance** of these operating instructions is a prerequisite for safe and trouble-free operation.

## 2.2 Requirements for the personnel

Special technical knowledge is required for planning, programming, installation, putting into service and maintenance work. This work may **only** be performed by skilled, specially trained personnel. The installation, putting into service and maintenance personnel must have training that authorises them to perform interventions in the system and the automation system. The planning and programming personnel must be familiar with the safety concepts of automation technology. Working on electrical systems **requires special technical knowledge**. Work on electrical systems may only be performed **by instructed electrically skilled persons** or under the guidance or supervision of such persons. The applicable regulations (e.g. DIN EN 60204, EN 50178, DGUV Regulation 3, DIN-VDE 0100/0113) must be observed. The operating personnel must be instructed in how to handle the system / machine and the controller and must be familiar with the operating instructions.

## 2.3 Intended Use

SIOX extension modules (**Serial IO-Extension**) are designed exclusively for the intended use: SIOX extension modules expand higher-level controllers by 8 relay outputs and 12 digital inputs each. Whether and how many extension modules are needed depends on the functions that are made available via the higher-level controllers for their intended use. The higher-level controllers are intended for use in commercial and industrial refrigeration systems with the scope of functions and in accordance with the environmental conditions described in their operating manuals. Opening the device is **not** permitted!

The following higher-level controllers can be functionally expanded with SIOX extension modules depending on the application and intended use:

- System centres
- Pack controllers
- Heat recovery controller WRG 3010 x
- Controller for the building management system GLT x010

For details, see chapter [SIOX Tasks](#).

Read the safety instructions and the instructions for installation and putting into service, operation and maintenance. THEN start the commissioning and/or operation of the machine / system.

The safety and functionality of the machine / system are only guaranteed for this intended application. Never use the machine / system, its components, control components or parts for any other purpose. The system must not be put into operation until conformity with the applicable EU Directives has been established for the entire system.

## 2.4 Five safety rules according to DGUV Regulation 3

The following rules must be strictly observed!

**1. Disconnect:** The entire system to be worked on must be disconnected from the power supply at all poles.

### DANGER

**Warning of dangerous electrical voltage! Warning of dangerous electrical voltage! Danger of electric shock!**

Beware of a possible external power supply! **BEFORE** connecting and disconnecting it must be checked that **no voltage is present** at the controller! Connections/plug connectors of the device may only be plugged in, removed and/or wired when **no voltage is present**.

**2. Secure against reconnection:** Attach information signs to the disconnected operating equipment stating:

- What has been disconnected.
- Reason for the disconnection.
- Name of the person who made the disconnection.
- Reconnection must be prevented using a suitable lock (e.g. padlock).

**3. Prove dead (authorised skilled personnel only):**

- Check voltmeter just before use.
- Prove dead on all poles at the disconnection point.
- Prove dead on all poles at the work area.

**4. Ground and short-circuit:** All electrical parts at the work area **must be grounded and then short-circuited**.

**5. Cover or block off adjacent live parts:** If there is live equipment adjacent to the work area, it must be covered using appropriate materials (e.g. insulation blankets / plates).

## 2.5 Electrostatic-sensitive components and control components (ESD)

All electrostatic-sensitive components and control components (referred to as "ESD" below) are labelled with the warning sign shown. Electrostatic charges arise from friction of insulating materials (e.g. floor covering, items of clothing made of synthetic fibres etc.). Even small charges can result in damage to or destruction of components. Such damage is not always immediately noticeable; in some cases, it does not lead to failure until after a certain operating time.

### ATTENTION



**Risk of destruction of the control component / controller!** Electronic components and control components (e.g. circuit boards) are sensitive to electrostatic charges. Therefore, the guidelines for handling electrostatic-sensitive components and control components must be strictly observed.

### 2.5.1 ESD - Rules for handling and working

Transport and store ESDs only in the protective packaging provided.

**Avoid materials** that may produce electrostatic discharge, for example

- Plastic containers and table tops
- Synthetic fibre clothing
- Plastic-soled shoes
- Plastic file covers
- Styrofoam packaging
- Computer monitors, etc.

**Preferably wear the following:**

- Cotton work clothes
- ESD shoes with conductive soles or leather soles

**Use the following:**

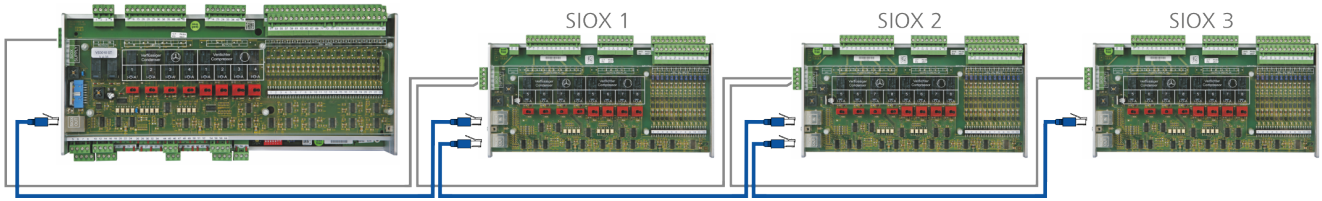
- Conductive flooring
- ESD workstations equipped with suitable tools (grounded soldering guns, antistatic wrist straps, etc.)
- Conductive ESD bags, conductive plastic containers, IC tubes or cartons lined with conductive foam
- Containers and worktops made of wood, metal or conductive plastics or paper bags

## 2.6 Abbreviations used

- DGVV Regulation 3 - Accident Prevention Regulation for Electrical Systems and Equipment (previously: BGV A3 - Employer's Liability Association Regulation for Occupational Health and Safety)
- DIN Deutsches Institut für Normung e.V. (German Standardisation Institute)
- E°EDP/EDP Electronic Documentation Platform of Eckelmann AG
- ESD Electrostatic-Sensitive Device
- ESD Electro-static discharge (Electro Sensitive Devices)
- IEC International Electric Committee
- VDE Verband der Elektrotechnik Elektronik Informationstechnik e.V. (German Association for Electrical, Electronic and Information Technologies)

## 3 SIOX Tasks

SIOX extension modules (**S**erial **I**O-**E**xtension) expand higher-level controllers by 8 relay outputs and 12 digital inputs each. These controllers supply the extension modules with power and communicate with them. Whether and how many extension modules are needed depends on the range of functions provided by the higher-level controllers and/or required to perform your tasks.



Example: GLT 5010 fully expanded

- ❗ Extension modules can **not** be operated stand-alone and **only in combination** with a higher-level controller!
- The number of connected extension modules **must** be configured on the higher-level controller. Further information is explained in more detail in the respective operating manual of the relevant higher-level controller.

### Higher-level controllers

System centres → EDP	VSC 5x10 / CI 5x00 / CI 4x00 / CI 3000 / CI 3100
Pack controllers → EDP	VS 3015 CT / VS 3010 CT / VS 3010 / VS 3010 BS / FS 3010 OEM: VS 3015 C / VS 3010 C
Controllers for heat recovery → EDP	WRG 3010 E / WRG 3010 A / WRG 3010 H
Controllers for the building management system → EDP	GLT 3010 / GLT 5010

For details, see chapter [Connection to a higher-level controller](#).

Depending on the application and task, the following versions of SIOX extension modules are available:

SIOX without manual control switches	Use
	<ul style="list-style-type: none"> <li>• For system centres                             <ul style="list-style-type: none"> <li>- for system monitoring</li> <li>- use of timers via conventional relays</li> <li>- for connection of pulse counters</li> </ul> </li> </ul>
SIOX with manual control switches	
	<p><b>Conventional relays</b></p> <ul style="list-style-type: none"> <li>• For pack controllers to control e.g. additional compressors, fans</li> <li>• For controllers for heat recovery WRG 3010 x</li> <li>• For controllers for building management systems GLT 3010 / GLT 5010</li> </ul> <p><b>Solid State Relays (SSR)</b></p> <ul style="list-style-type: none"> <li>• For VS 3015 CT pack controllers e.g. for controlling ejectors</li> </ul>
For details, see chapter <a href="#">Manual / Automatic operating modes changeover</a>	



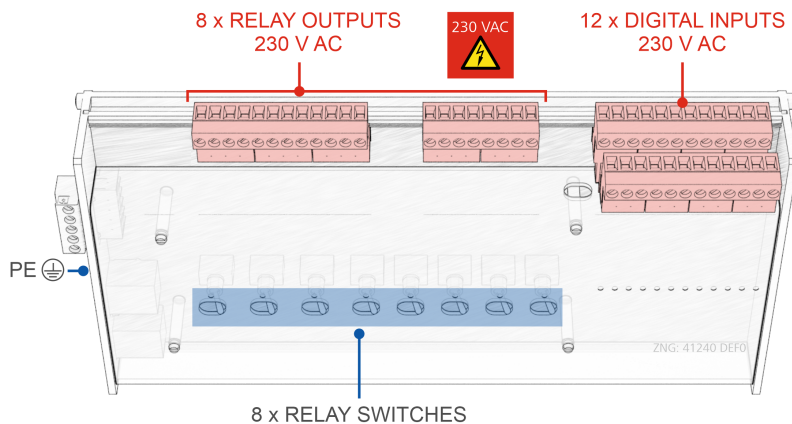
## **i** New products from March 2023

- A **PE terminal point** has been added on the left side of the housing below SIOX SUPPLY, to which the PE **must** be connected, for details see chapter [Terminal assignment SIOX SUPPLY, protective earth conductor & SIOX IN/OUT](#).
- The **digital inputs of all extension modules are designed for 230 V AC**. Reconfiguration of the digital inputs to 24 V AC/DC by the user is no longer provided.  
**Practical tip:** If necessary, use coupling relays, for details see chapter [Use of the relay outputs / digital inputs](#).
- The 2-pole terminal 93/94 at the top left has been removed. A 24 V DC tap is no longer provided.  
**Practical tip:** use an external power supply unit, for details see chapter [Part numbers and accessories SIOX](#).

## 3.1 Connectors on the extension module

### Connectors at the top

For details, see [Connections for 230 V AC \(top\)](#)



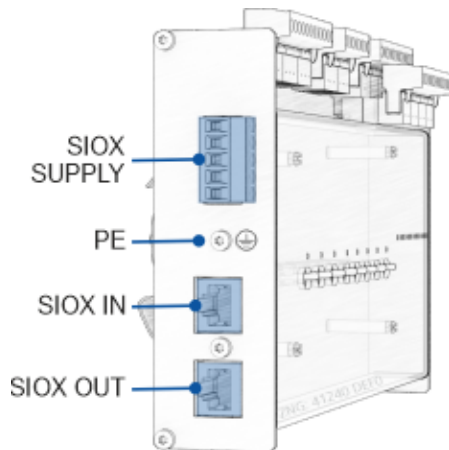
- **Relay outputs or solid state relays (SSR)**
  - 4 x changeover contact 230 V AC
  - 4 x normally open contact 230 V ACor
  - 8 x SSR 230 V AC
- **Digital inputs**
  - 12 x input 230 V AC



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## Connectors on the side

For details, see [Connectors for safety extra-low voltage / protective earth conductor \(on the side\)](#)



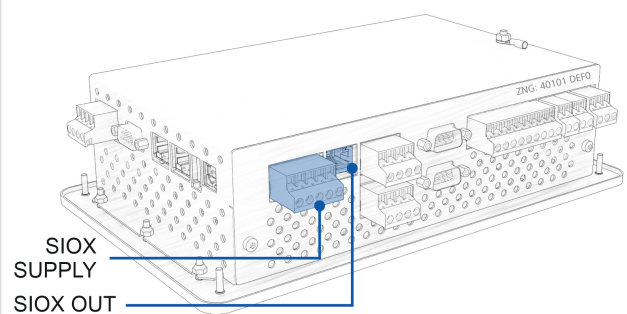
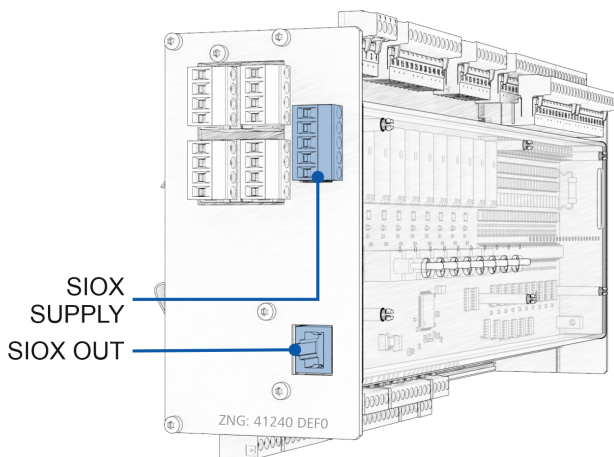
- **Power supply**  
SIOX SUPPLY: for the power supply of the extension module
- **Protective earth conductor PE**  
PE must be connected!
- **Interfaces**  
SIOX IN: connector for communication with the higher-level controller  
SIOX OUT: if needed, connector for data transmission to other extension modules

**i** The detailed device and terminal assignments are listed in the chapter [SIOX connection and terminal assignment](#).

## Higher-level controllers and their connectors for SIOX extension modules

- Pack controllers
- Heat recovery controller WRG 3010 x
- Controller for the building management system GLT x010

- System centre  
here using the example of a VSC 5x10



The following applies for all higher-level controllers:

- **SIOX SUPPLY**  
Power supply for connected extension modules
- **SIOX OUT**  
Connector for communication to connected extension modules

## 4 SIOX installation and start-up

### IMPORTANT SAFETY INSTRUCTIONS!

- **Before** the installation and start-up, the chapter [Safety instructions](#) must be read carefully in its entirety and all safety instructions and hazard warnings must be observed.
- Furthermore, it must be noted that the safety of the system/installation/controller in which the extension module is integrated/connected is the **responsibility of the creator** of the system/installation.
- If the controller is used in any way not specified by Eckelmann AG, the **protection supported by the extension module can be compromised**, see chapter [Intended Use](#).
- To **protect stripped wires**, the use of wire end ferrules with plastic collars is mandatory on all COMBICON mating connectors for **230 V AC!**
- Opening the extension module is **not** permitted! The extension module is **not** intended to be opened by the user, as possible dangers due to incorrect assembly cannot be ruled out.
- Any necessary maintenance or repair **may only** be carried out by the manufacturer Eckelmann AG!

### ATTENTION

- **Instructions for transport**  
For carrying, the device should be gripped on the short sides and only placed on the back to avoid damage to the front switches or terminal blocks.
- **Before the start-up of the system, installation-dependent settings (e.g. number of connected extension modules, ...)** must be made on the higher-level controller, for details see chapter [SIOX Tasks](#).

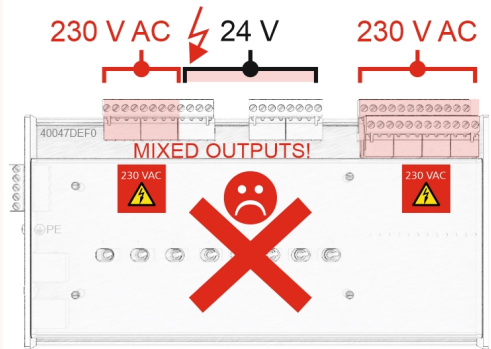
## 4.1 Use of the relay outputs / digital inputs

### **DANGER**

**Warning about dangerous electrical voltage! Danger to life - Danger of electric shock!** External voltage 230 V AC can be present at these terminals!

- **Relay outputs 230 V AC**

**NO mixed operation of the voltage levels! Danger to life - Danger of electric shock!** Low voltage (230 V AC) and safety extra-low voltage (24 V AC/DC) must **not** be connected together at the relay outputs! There is a danger to life as 230 V AC may be present in the 24 V supply system!

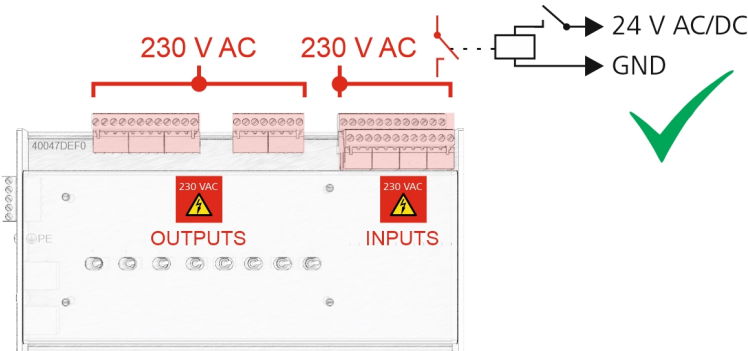


- **Digital inputs 230 V AC**

The digital inputs on all versions of extension modules ( part numbers: LISIOX0011 / LISIOX0012 / LISIOX0014 / LISIOX0015 ) are designed for **230 V AC**. Opening the extension module is **not** permitted!

### Intended use of the relay outputs

- All relay outputs / SSR: mixed operation of 230 V AC **and** 24 V AC/DC is **NOT** permitted!
- All digital inputs are designed for 230 V AC, the use of coupling relays may be necessary.



### Typical areas of application for extension modules

- For example, for pack controllers, controllers for heat recovery or controllers for building management systems.
- For example, for system centres for system monitoring and connection of pulse counters. For pulse counters with transistor interface the use of SSR coupling relays is required.

## 4.2 DIN rail mounting

SIOX extension modules are snapped onto a DIN rail using two claws on the rear side, for details see chapter [Mounting on the DIN rail](#).

### **ATTENTION**

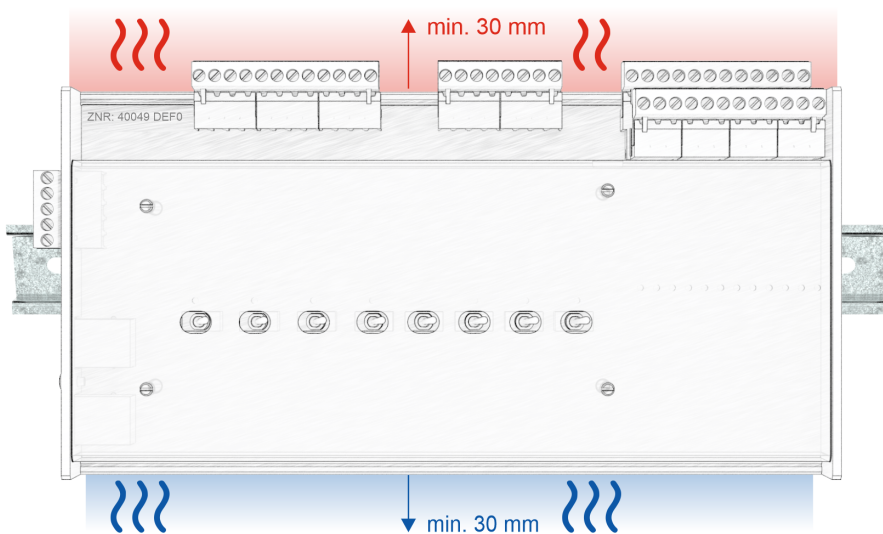
**Important safety instructions!** The unit **may only** be operated mounted on a DIN rail as an integrated regulation and control unit (EN60730) and can be mounted in a row without spacing. The power loss per SIOX is 3.1 W. For operation, the natural convection of the circulating air with free air exchange is sufficient to prevent overheating. A sufficiently large air inlet (at least 30 mm) under the unit and an unobstructed air outlet above it **must always** be ensured. If this cannot be guaranteed, forced ventilation is required!

All supply lines from and to the extension module (with the exception of the 230 V power supply and signal cables) must be shielded! This particularly applies to the SIOX data cable(s), see chapter [Connection to a higher-level controller](#). These must also be installed with sufficient clearance from live cables. As a general rule, care should be taken to ensure that signal cables and cables carrying supply voltage are routed in separate cable ducts

### Specified mounting position

The extension module **must** be mounted on the DIN rail as shown:

#### Top



#### Bottom

Protection rating and dimensions, see chapter [Technical Data SIOX](#).


## 4.2.1 Mounting on the DIN rail

### DANGER

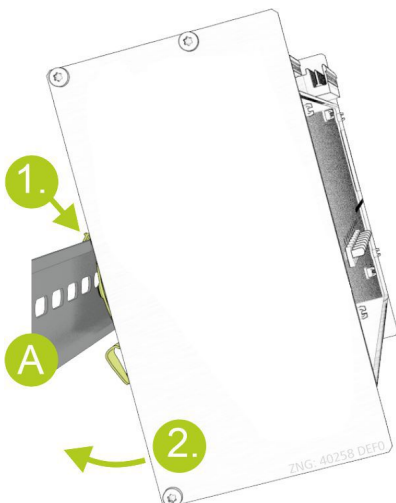
**Warning about dangerous electrical voltage! Danger to life - Danger of electric shock!** The safety regulations and work safety instructions **must** be observed for the mounting. **All** plug connectors may only be inserted and removed in a de-energised state, see chapter [Handling Wide COMBICON Plugs](#).

**Step 1:** Rear side (with **removed** mating connectors) with the two claws for mounting:



-  In order to ensure mounting / removal, a clearance of at least 30 mm to the next component (e.g. cable duct) **must** be maintained underneath the extension module.  
**Note:** The DIN rail (35 mm) must have a height of at least 5 mm.

**Step 2:** Place the extension module on the upper edge (1.) of the DIN rail (A) and swivel it downwards (2.) until the extension module snaps firmly onto the DIN rail.



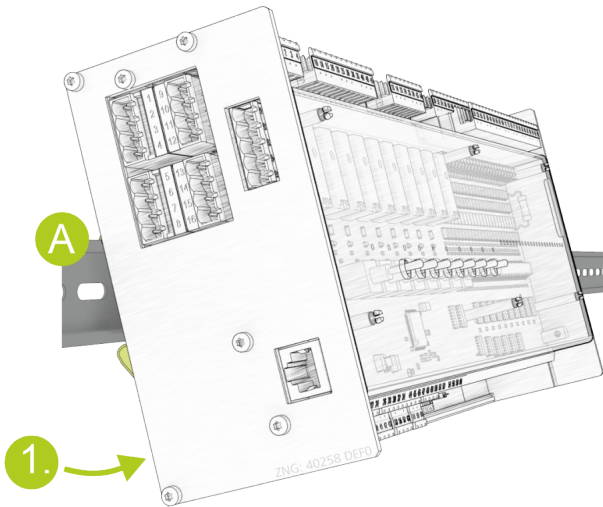
## 4.2.2 Removal from the DIN rail

### DANGER

**Warning about dangerous electrical voltage! Danger to life - Danger of electric shock!** The safety regulations and work safety instructions **must** be observed for the removal. **All** plug connectors may only be inserted and removed in a de-energised state, see chapter [Handling Wide COMBICON Plugs](#).

**Step 1:** Detach all mating connectors with cables from the extension module.

**Step 2:** Remove the extension module (here using the example of a VS 3010) from the DIN rail (**A**) by swivelling (**1.**) upwards.



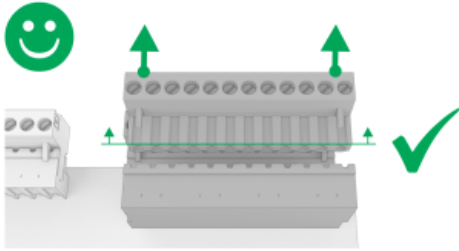
## 4.2.3 Handling Wide COMBICON Plugs


### DANGER

**Warning of dangerous electrical voltage! Danger to life - Danger of electric shock!** For assembly, the safety regulations and the work safety instructions **must be** observed. **All** plug-in connections may only be plugged and unplugged in a de-energised state.

### Correct handling

Mating connectors **must** be plugged or **unplugged vertically and without canting**.

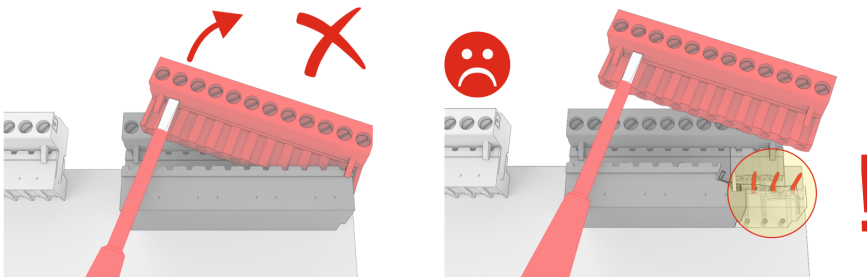


 For detailed information on handling wide COMBICON connectors, see [online in EDP](#).

### Incorrect handling

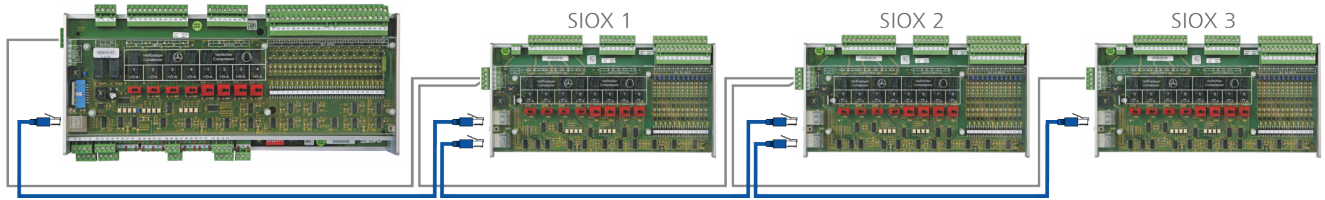
### ATTENTION

**Incorrect handling leads to damage to the plug socket! Never** detach the mating connector on one side, as this will damage the pins of the plug socket!



## 4.3 Connection to a higher-level controller

SIOX extensions modules can be connected to higher-level controllers, for details see chapter [SIOX Tasks](#).



**Example:** GLT 5010 fully expanded

The higher level controller (a VS 3010 in the picture) supplies the connected extension modules with power (SIOX SUPPLY, terminals 91/92/93/94/95). The communication to and between the extension modules is done using RJ45 connectors via the data interface SIOX OUT (on the higher-level controller) or SIOX IN / SIOX OUT (on the extension modules), for details see chapter [Power supply, protective earth conductor & data cables](#).

### **ATTENTION**

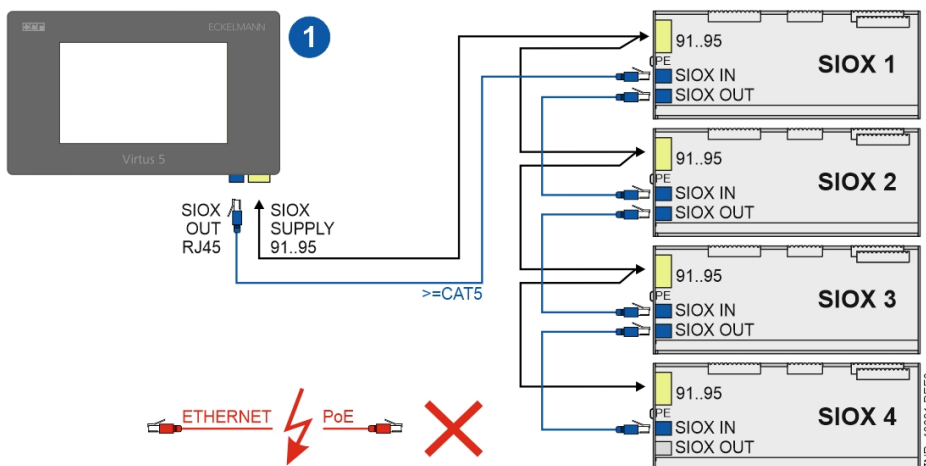
**Danger of destruction of components!** SIOX expansion modules may **only** be connected to each other or to a higher-level controller when no voltage is present! In the event of any mix-up of the SIOX data cable (RJ45) with an Ethernet network cable with PoE (Power over Ethernet), participating network devices can be damaged!

For details, see chapter [Terminal assignment SIOX SUPPLY, protective earth conductor & SIOX IN/OUT](#).

## Examples for the maximum number of extension modules on higher-level controllers

### System centres

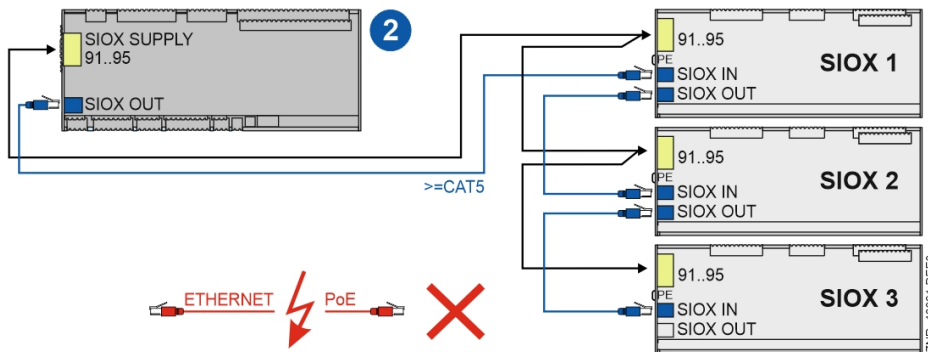
Here using the example of a VSC 5x10 (1): Depending on the application and expansion, **up to a maximum of 4 extension modules** can be connected to system centres!





## Pack controllers / controllers for heat recovery / controllers for the building management system

Here using the example of VS 3010 (2): Depending on the type and configuration of the controller, up to a maximum of 3 extension modules can be connected to these controllers (base modules)!

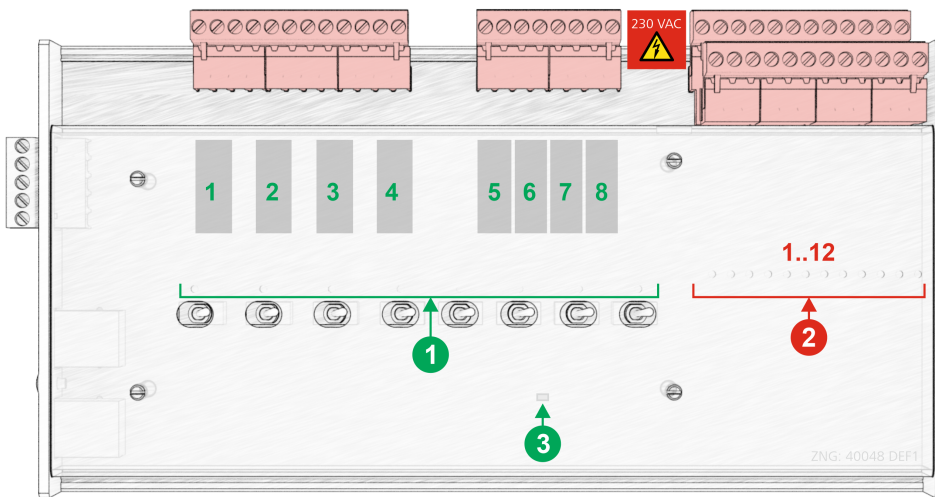


**i** Details about the number and functionality of the extension modules can be found in the operating manual of the respective [higher-level controller](#).

## 4.4 Status LEDs

### **DANGER**

**Warning about dangerous electrical voltage! Danger to life - Danger of electric shock! BEFORE connecting and disconnecting, it must be checked that all 230 V AC connectors are **disconnected from the power supply!** External voltage 230 V AC can be present at these terminals!**



	Function	Colour	LED	Description
<b>1</b>	Relay outputs	Green	1..8	ON: Relay is switched, for details see chapter <a href="#">Terminal assignment of the digital inputs - 230 V AC</a> . <b>ATTENTION:</b> External voltage can be present at these terminals!
<b>2</b>	Digital inputs	Red	1..12	ON: Digital input is activated, voltage is present! For details, see chapter <a href="#">Terminal assignment of the relay outputs - 230 V AC</a> . <b>ATTENTION:</b> External voltage can be present at these terminals!
<b>3</b>	LIFE / communication	Green	1	FLASHING: Life lamp, SIOX is supplied with power, processor is running, communication to the higher-level controller is OK. ON: Error - no communication! Check SIOX data cable to the SIOX if necessary. OFF: Error - no communication, power supply! Check data cable and power supply cables to the SIOX if necessary.

## 4.5 Care Instructions for Front Panel

The front panel should be cleaned with a dry, soft microfibre cloth or with a suitable commercially available cleaning cloth for monitors.

### **ATTENTION**

Wet cleaning is not permitted! in addition, **no aggressive cleaning agents** are permitted to be used!

## 4.6 Firmware Update

A firmware update for SIOX extension modules is not possible.

## 5 SIOX connection and terminal assignment

### DANGER

**Warning about dangerous electrical voltage! Danger to life - Danger of electric shock or malfunction!** The following points must be **strictly** observed for the cabling:

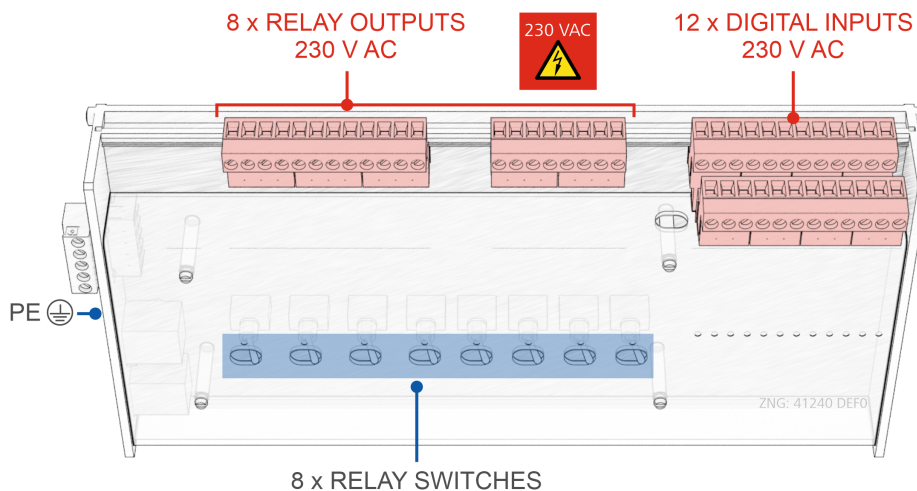
- **Before** detaching or inserting plug contacts on the extension module, the system must be **disconnected from the power supply!**
- In order to guarantee reverse polarity protection, only coded mating connectors may be used on the connectors of the assembly.
- To **protect stripped wires**, the use of wire end ferrules with plastic collars is mandatory on **all COMBICON mating connectors for 230 V AC!**
- Signals of 24 V AC/DC (e.g. from pulse measuring points) **must** be detected via coupling relays. Opening the extension module is **not permitted!**
- **All connection cables** from and to the extension module - with the exception of the relay outputs and the digital inputs - must be **shielded**. Otherwise malfunctions, e.g. faulty measurements, cannot be ruled out.

For details, see chapter

- [Connections for 230 V AC \(top\)](#)
  - [Power supply, protective earth conductor & data cables](#)
  - [Terminal assignment of the relay outputs - 230 V AC](#)
  - [Terminal assignment of the digital inputs - 230 V AC](#)
- [Connectors for safety extra-low voltage / protective earth conductor \(on the side\)](#)
  - [Terminal assignment SIOX SUPPLY, protective earth conductor & SIOX IN/OUT](#)

### 5.1 Connections for 230 V AC (top)

#### SIOX extension module




## 5.1.1 Power supply, protective earth conductor & data cables

SIOX extension modules are supplied with power from a higher-level controller (SIOX SUPPLY, terminals 91/92/93/94/95). Communication with the extension modules takes place via the SIOX OUT and SIOX IN data interface using RJ45 connectors.

### Connection of a higher-level controller to 230 V AC power supply

#### DANGER

**Warning about dangerous electrical voltage! Danger to life - Danger of electric shock! BEFORE** connecting and disconnecting, it must be checked that the 230 V AC power supply cable of the **higher-level controller** is **disconnected from the power supply!** The controller is only permitted to be connected to the intended mains power supply!

 In order to fuse the mains power line, a circuit breaker on the higher-level controller with the following characteristics **must** be used:

- Rated current for 230 V AC: 6 A
- Tripping characteristic (typical): B

#### SUPPLY - power supply of the higher-level controller

Description	Terminal No.	Connection	Function
230 V AC	N L PE	Neutral conductor Phase 230 V AC Earth conductor	Power supply

#### Requirements for the connection cable of the higher-level controller

As the higher-level controller does not have an integrated disconnecting device in the form of a power switch, the following must be implemented:

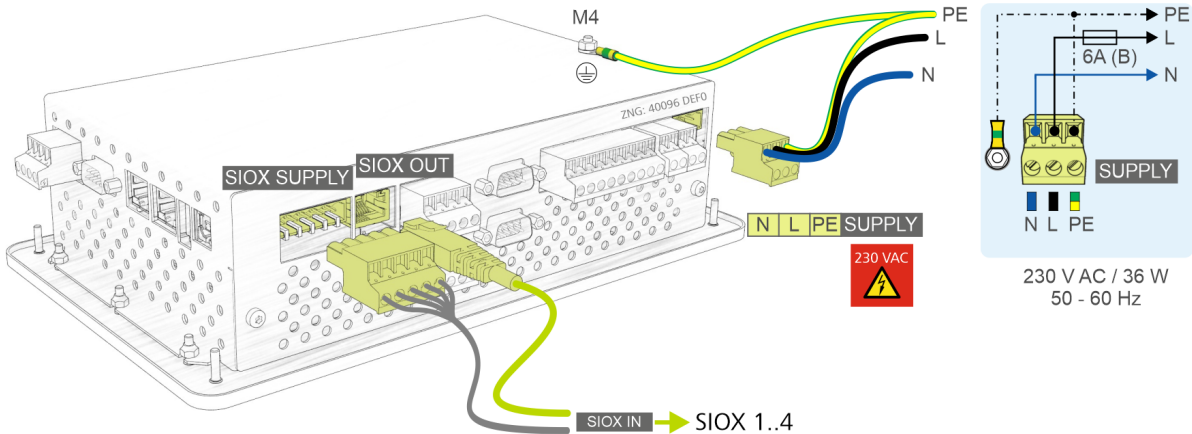
- a) a switch or circuit breaker must be installed in the system or building installation
- b) this must be suitably positioned and easily accessible for the user and
- c) this must be labelled as disconnecting device for the device.

## System centre

Power supply 230 V AC / SIOX SUPPLY and SIOX OUT, here using the example of a VSC 5x10:

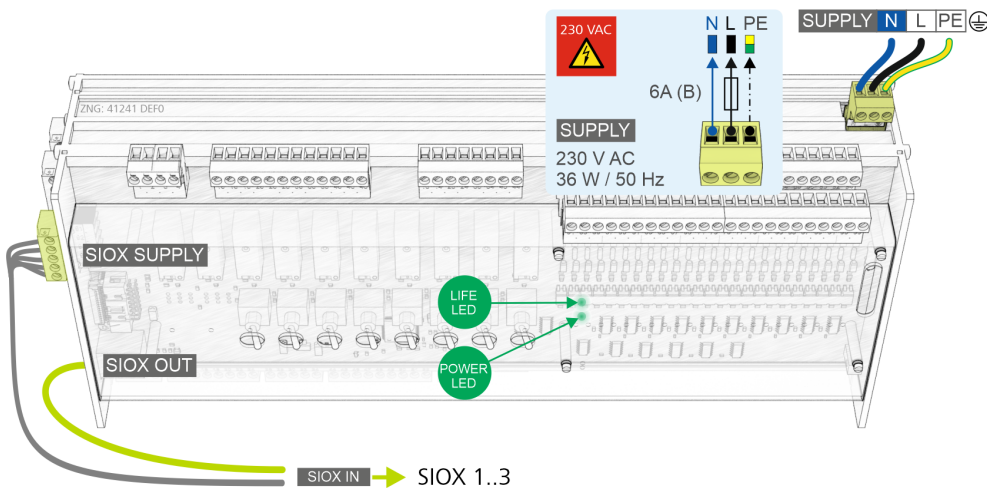
### **⚠ DANGER**

**Warning about dangerous electrical voltage! Danger to life - Instruction for protective earthing:**  
The protective earth conductor PE **must** also be connected to the grounding screw M4 on the rear side of the device cage using a ring cable lug.



Details about the 230 V AC power supply of the higher level system centre, number and functionality of the extension modules can be found in the operating manual of the respective [system centre](#).

**Pack controllers / heat recovery controller WRG 3010 x /  
Controllers for the building management system GLT x010**  
Power supply 230 V AC / SIOX SUPPLY and SIOX OUT



Details about the 230 V AC power supply of the higher-level controller, number and functionality of the extension modules can be found in the operating manual of the respective pack controller / controller WRG 3010 x / compact GLT x010.

## SIOX extension module

Power supply 9/12 V DC / SIOX SUPPLY, SIOX OUT and protective earth conductor PE

### ⚠ DANGER

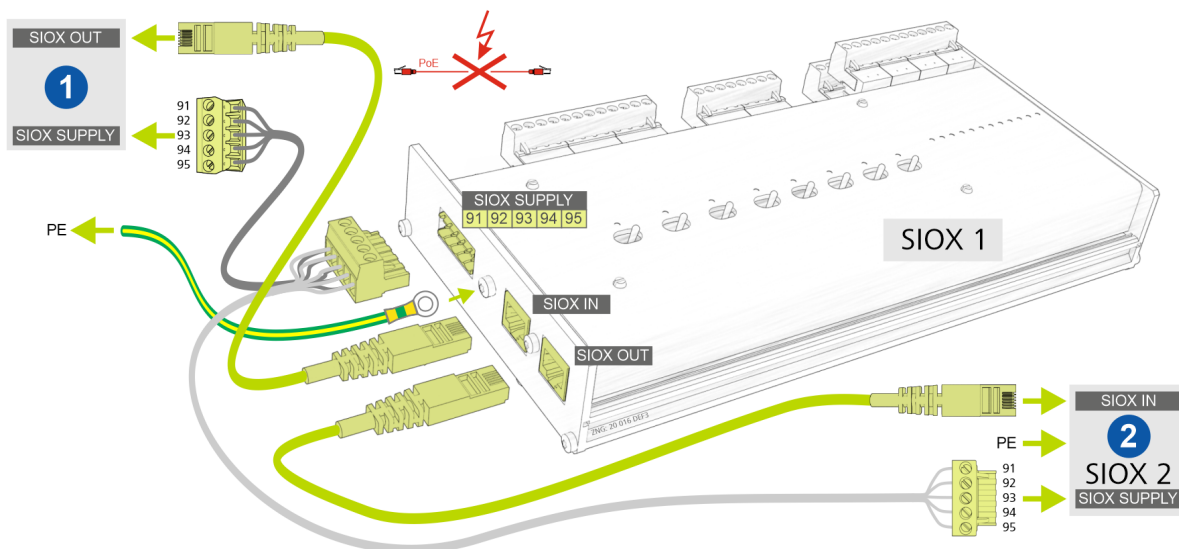
#### Warning about dangerous electrical voltage! Danger to life - Instruction for protective earthing:

The protective earth conductor PE **must** also be connected to the grounding screw M4 on the side of the device cage using a ring cable lug!

For more details, see chapter [Terminal assignment SIOX SUPPLY, protective earth conductor & SIOX IN/OUT](#).

### i ATTENTION

**Danger of destruction of components! SIOX expansion modules may only** be connected to a higher-level controller and/or each other when no voltage is present! In the event of any mix-up of the SIOX data cable (RJ45) with an Ethernet network cable with PoE (Power over Ethernet), participating network devices can be damaged!



## 5.1.2 Terminal assignment of the relay outputs - 230 V AC

### DANGER

**Warning about dangerous electrical voltage! Danger to life - Danger of electric shock!**  
**BEFORE** connecting and disconnecting, it must be checked that **no voltage is present** at the 230 V AC relay outputs!

**Overvoltage category II / soiling degree 2:** All connectors of the extension module provided for operation with 230 V AC supply voltage **must** be wired with the same outer conductor (L). 400 V AC between neighbouring connection terminals is **not** permitted!

**NO mixed operation of the voltage levels!** Low voltage (230 V AC) **and** safety extra-low voltage (24 V AC/DC) must **not be connected together** at the relay outputs, **mixed operation is NOT permitted**, for details see chapter [Use of the relay outputs / digital inputs](#).

### ATTENTION

**Fuse protection for the supply line of the relay outputs:** A circuit breaker with the following characteristics **must** be used per relay output:

- Rated current for 230 V AC: 6(3) A
- Tripping characteristic (typical): B
- Total current of all relay outputs: max. 20 A
- The device must be mounted so that the disconnecting device can be operated easily.

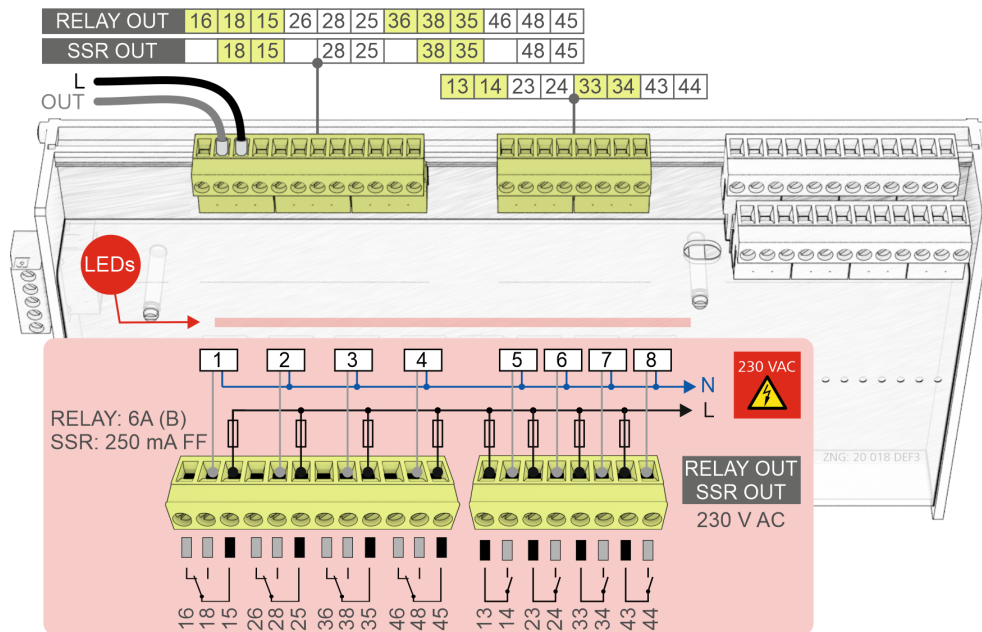
**Fuse protection for solid state relay (SSR, Triac)** Each SSR **must** be used with a microfuse with the following characteristics:

- Rated current: 0.25 A  
Rated voltage: 250 V AC  
Tripping characteristic: Superlink FF  
Switching capacity: H

**Manual control switches on the extension module:** Some extension modules have manual control switches that can be used to manually override the associated relay outputs, for details see chapter [Manual / Automatic operating modes changeover](#).

**Practical tip:** The configured individual functionality of the relay outputs should be noted (affixed) on the front in the spaces provided so that later manual operation is made easier.

## Relay outputs on the SIOX extension module



Relay output	Terminal No.		Function
	Relays	SSR	
1	15, 16, 18	15, 18	The functionality of the digital inputs varies depending on the <a href="#">higher-level controller</a> . See chapter <a href="#">for details about the LEDs</a> .  <b>ATTENTION</b> Damage to the connector socket: Observe the <a href="#">Handling Wide COMBICON Plugs!</a>
2	25, 26, 28	25, 28	
3	35, 36, 38	35, 38	
4	45, 46, 48	45, 48	
5	13, 14	13, 14	
6	23, 24	23, 24	
7	33, 34	33, 34	
8	43, 44	43, 44	

\* Relay outputs: 1..4 are changeover contacts / 5..8 are normally open contacts



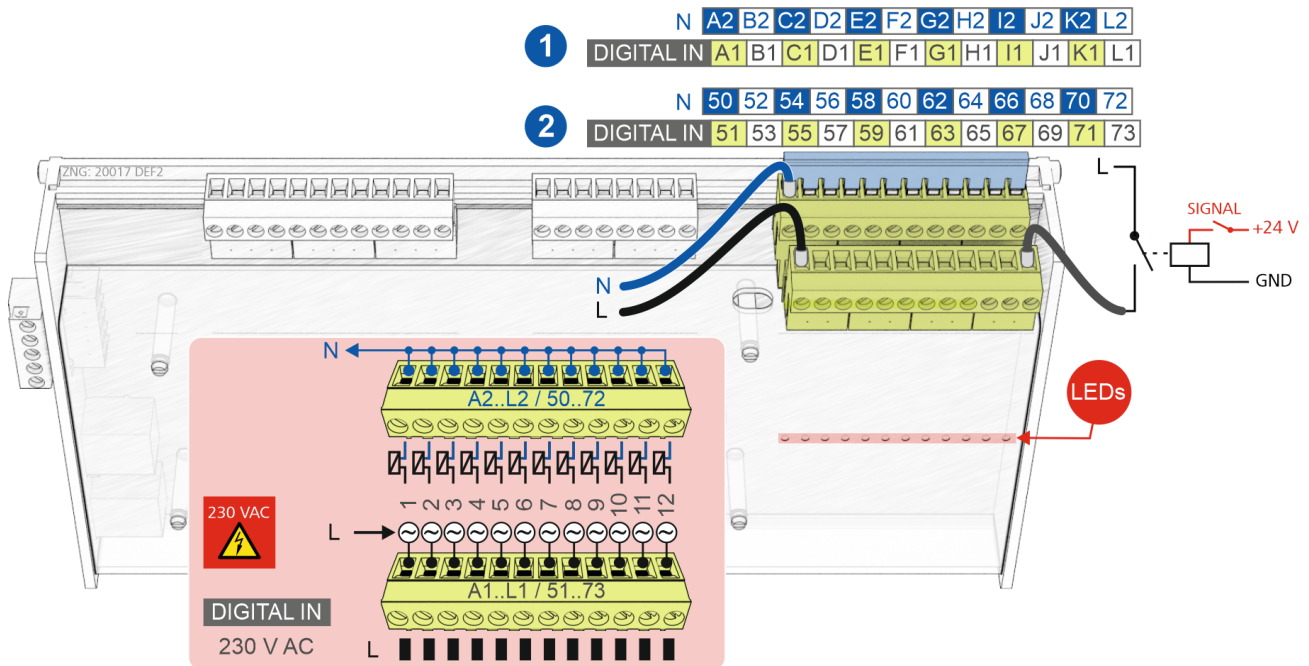
## 5.1.3 Terminal assignment of the digital inputs - 230 V AC

### **DANGER**

**Warning about dangerous electrical voltage! Danger to life - Danger of electric shock!**

- **BEFORE** connecting and disconnecting, it must be ensured that **no voltage** is present at all connections of the controller.
- **Overvoltage category II / soiling degree 2:** All connections of the device provided for operation with 230 V AC supply voltage **must** be wired with the same outer conductor (L). 400 V AC between neighbouring connection terminals is **not** permitted!
- **All digital inputs** on the extension modules are set to **230 V AC** at the factory.
- To **protect stripped wires**, the use of wire end ferrules with plastic collars is mandatory on **all** COMBICON mating connectors for **230 V AC**!
- **Wiring of the digital inputs:** The N conductor **must** be connected to a **terminal level** (e.g. A2..L2 / 50..72)!

**Practical tip:** Signals of 24 V AC/DC **must** be detected via coupling relays. For pulse counters with pulse measuring or transistor interface the use of SSR coupling relays is required, for further details see chapter [Use of relay outputs / digital inputs](#).



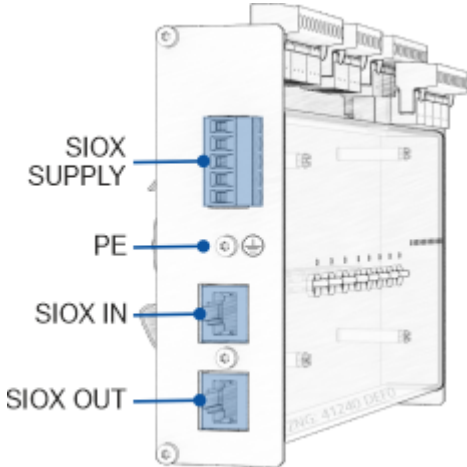
(1) SIOX without manual control switches

(2) SIOX with manual control switches

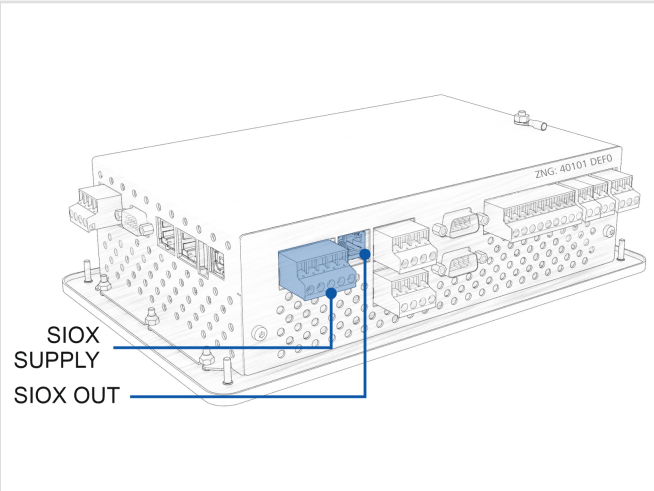
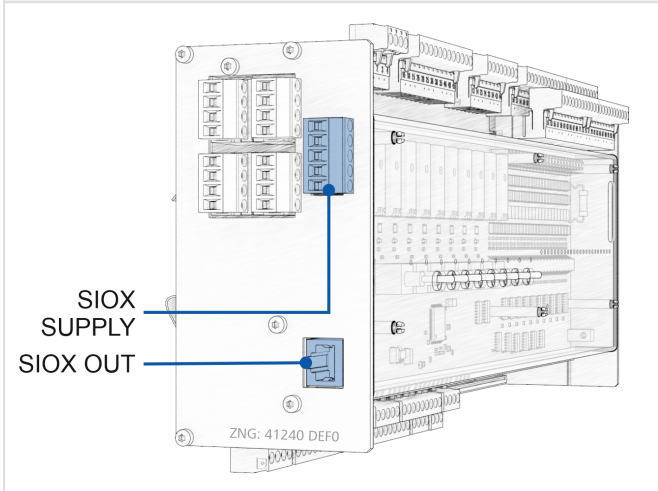
Digital input	Terminal No.		Function
	Without switch	With switch	
1	A1, A2	50, 51	<p>The functionality of the digital inputs varies depending on the <a href="#">higher-level controller</a>. See chapter <a href="#">Status LEDs</a> for details about the LEDs.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p><b>ATTENTION</b>  <b>Damage to the connector socket:</b> Observe the <a href="#">Handling Wide COMBICON Plugs!</a></p> </div>
2	B1, B2	52, 53	
3	C1, C2	54, 55	
4	D1, D2	56, 57	
5	E1, E2	58, 59	
6	F1, F2	60, 61	
7	G1, G2	62, 63	
8	H1, H2	64, 65	
9	I1, I2	66, 67	
10	J1, J2	68, 69	
11	K1, K2	70, 71	
12	L1, L2	72, 73	

## 5.2 Connectors for safety extra-low voltage / protective earth conductor (on the side)

### SIOX extension module



Higher-level controllers, for details see chapter [SIOX Tasks](#).



## 5.2.1 Terminal assignment SIOX SUPPLY, protective earth conductor & SIOX IN/OUT

### DANGER

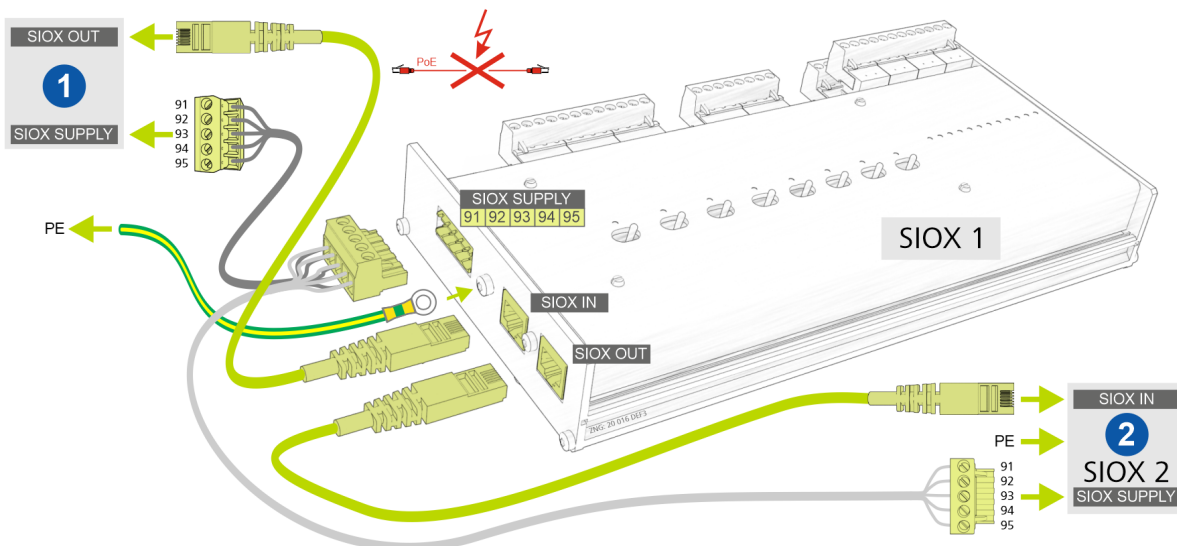
**Warning about dangerous electrical voltage! Danger to life - Danger of electric shock! BEFORE** connecting and disconnecting, it must be checked that **no voltage** is present at all connectors of the controller and the extension modules.

### ATTENTION

**Danger of destruction of components! SIOX expansion modules may only be connected to a higher-level controller and/or each other when no voltage is present!** In the event of any mix-up of the SIOX data cable (RJ45) with an Ethernet network cable with PoE (Power over Ethernet), participating network devices can be damaged!

**Malfunction due to interference!** As a general rule, care should be taken to ensure that signal cables and cables carrying supply voltage are routed in separate cable ducts. The data cables (SIOX IN / SIOX OUT with RJ45 connector) should **not** be routed in the immediate proximity of high voltage or high frequency cables.

### SIOX extension module



## SUPPLY\* - power supply on the extension module

Designation and terminal no.		Function - see chapter <a href="#">SIOX Tasks</a>
Higher-level controller	SIOX	
SIOX SUPPLY	SIOX SUPPLY	<b>Power supply</b> for extension module(s)
91	91	GROUND of 9 V
92	92	+9 V DC
93	93	GROUND of 24 V
94	94	+24 V DC
95	95	SHIELD
PE		PE protective conductor, this <b>must be connected to the side on the right-hand side of the housing using a cable lug and screw (M4)!</b>


- Five shielded cables with cross section > 0.5 mm<sup>2</sup> must be used for the power supply cables (terminals 91/./95). For example, the use of **LiYCY 4x0.75** mm<sup>2</sup> cables with 25 ohms/km is recommended.
- Power supply cable lengths of **max. 30 m** are permitted.
- The power supplies of the higher-level controllers are dimensioned as follows:
  - for system centres max. 4 extension modules and
  - all other controllers max. 3 extension modules.

## SIOX data cables\* - SIOX IN/OUT (RJ45) on the extension module

Designation and terminal no.		Function - see chapter <a href="#">SIOX Tasks</a>
Higher-level controller	SIOX 1..4	
SIOX OUT	SIOX OUT	<b>SIOX data cable</b> - output for communication with SIOX module(s)
--	SIOX IN	<b>SIOX data cable</b> - input for communication with higher-level controller

- CAT5 cables or better must always be used.
- When routing the data cables, it must be ensured that the minimum bending radius (practical value: bending radius = 4 times the diameter) is complied with and that the cables are not routed **parallel to cables** that could cause strong **interference couplings**.
- Data cable lengths of **max. 30 m** are permitted.

\* **Practical tip:** See chapter [Part numbers and accessories SIOX](#).

 The higher-level controller and its connected extension modules can be put into operation after completion of the mechanical and electrical installation, for details see chapter [Connection to a higher-level controller](#).

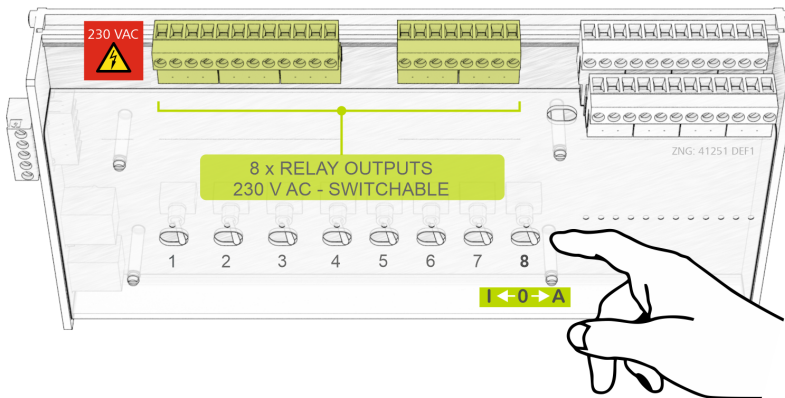
## 6 Manual / Automatic operating modes changeover

Depending on the SIOX extension module, switches for Manual/Off/Automatic selection are available for the relay outputs. These can be used for the following purposes:

1. Service, commissioning or TÜV acceptance
2. Emergency operation

Manual mode enables permanent switching from Automatic mode to Manual ON (I) or to Manual OFF (O). The program control for the respective selected field device has no function in manual mode. Manual/automatic switching of the respective field device, which depends on the application, is performed via the switches S1--S8 located on the front.

**Example on the extension module (S8 set to A = Automatic)**



The following switch positions are possible:

- **Automatic operation (AUTO) ON (A) - switch position for "normal operation"**  
If a switch is in the A position, the controller registers the logical state AUTOMATIC OPERATION:  
The connected equipment is **controlled as the software envisages**.
- **Manual OFF**  
If any switch is in the 0 position, the controller registers the logical MANUAL OPERATION OFF state:  
The connected equipment is **not controlled** - even if the software envisages this  
, e.g. pump remains off continuously! Or it could be, for example, a "Manual active" indicator lamp on the switch cabinet door or a priority message via the CAN bus.
- **Manual ON**  
If any switch is in the I position, the controller registers the logical MANUAL OPERATION ON state:  
The connected equipment is **always controlled** - even if the software does not envisage this  
, e.g. pump remains on continuously!

**i** The Manual ON (I) and Manual OFF (O) positions override the state desired by the software! The automatic operation (AUTO) by the program in the controller is inoperative until the respective switch is set to AUTO (A) again. A message is generated if the Manual OFF (O) and Manual ON (I) manual control switches are operated.  
Extension modules **without manual control switches do not have** this function!

## 7 Decommissioning and disposal

### 7.1 Decommissioning / Dismantling

The dismantling of the equipment may only be performed by authorised and trained personnel.

#### DANGER

##### **Warning of dangerous electrical voltage! Danger to life - danger of electric shock!**

During dismantling, the same safety instructions and hazard warnings must be observed as for installation, putting into service and maintenance, see chapter Safety instructions.

#### ATTENTION

For dismantlement, follow the steps for assembly in reverse order, see chapter Installation and Start-Up.

### 7.2 Disposal

#### NOTICE



WEEE Reg. No.  
DE 12052799

##### **Negative consequences for humans and the environment possible through environmentally unfriendly disposal!**

The symbol for the separate disposal of electrical and electronic equipment represents a crossed-out wheeled trash bin and indicates that an electrical or electronic equipment marked with this symbol may not be disposed of with household waste at the end of its service life, but must be taken for separate disposal by the end user.

- In accordance with the contractual agreement, the customer is obliged to dispose of electrical and electronic waste in compliance with the statutory regulations based on the „Directive 2012/19/EU of the European Parliament on waste electrical and electronic equipment“.
- Dispose the packaging, the product and its components in an environmentally friendly manner at the end of their service life. Follow the national guidelines and laws that apply to you.

Users have the option of returning a B2B device distributed by us to us at the end of its service life. Please contact your customer service representative at Eckelmann AG to arrange for the device to be taken back and disposed of properly. Please inform yourself about the local regulations for the separate disposal of electrical and electronic products and batteries. Further information on the Electrical and Electronic Equipment Act can be found at [www.elektrogesetz.de](http://www.elektrogesetz.de).

## 8 Technical Data SIOX

### 8.1 Electrical data

**⚠ DANGER**

**Warning about dangerous electrical voltage! Danger to life - Danger of electric shock!**

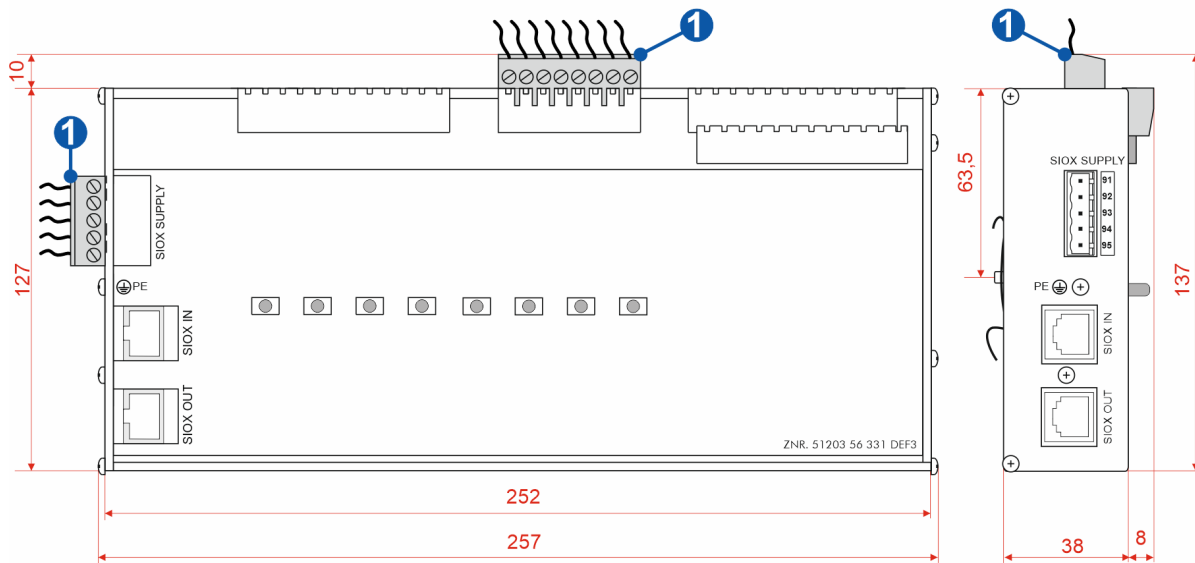
**Overvoltage category II / soiling degree 2: All connections of the device provided for operation with 230 V AC supply voltage **must** be wired to the same outer conductor. 400 V AC between neighbouring connection terminals is **not** permitted!**

SIOX extension module	
<b>Power supply, operating voltage</b>	<ul style="list-style-type: none"> <li>Extension module: Power supply 9 V DC / 24 V DC via <a href="#">higher-level controller</a>.</li> <li>Operating voltage of the higher-level controller: usually 230 V AC, 50 Hz (for details see operating manual of the respective controller)</li> </ul>
<b>Rated power</b>	3.1 W
<b>Leakage current over PE (protective earth)</b>	max 1 mA
<b>Rated surge voltage</b>	3 kV for Overvoltage category II
<b>Relay outputs</b>	<ul style="list-style-type: none"> <li><b>Relay outputs - total current 20 A</b> 4 x normally open contact*, 230 V AC, floating output, min. 10 mA 4 x changeover contact*, 230 V AC, floating output, min. 10 mA * Load type: max. ohmic: 6 A (230 V AC) max. inductive: 3 A (230 V AC), cos phi = 0.4</li> <li><b>Solid state relays (SSR, Triac) - total current 1 A</b> 8 x SSR, 230 V AC, max. 0.25 A</li> </ul> <p>Mains voltage fluctuations 207 V AC to 253 V AC</p>
<b>Manual control switches</b>	Some extension modules have manual control switches so that the regulation can be overridden in emergency operation, see chapter <a href="#">Manual / Automatic operating modes changeover</a> .
<b>Digital inputs</b>	12 x 230 V AC, floating output Mains voltage fluctuations 207 V AC to 253 V AC
<b>Data interfaces</b>	SIOX IN / SIOX OUT: Data interfaces to the <a href="#">higher-level controller</a> / to other extension modules
<b>Other interfaces</b>	SIOX SUPPLY: Power supply from the <a href="#">higher-level controller</a> / to other extension modules
<b>Monitoring function</b>	Watchdog



SIOX extension module	
Environmental conditions	
Use	Designed for mounting in the switch cabinet, see chapter <a href="#">SIOX installation and start-up</a>
Weight	approx. 650 g
Temperature range	Transport: -20 °C..+80 °C / Operation: 0 °C..+50 °C
Temperature change	Transport: max. 20 K/h / Operation: max. 10 K/h
Relative humidity (non-condensing)	Transport: 8%..80% / Operation: 20%..80%
Shock according to DIN EN 60068-2-27	Transport and operation: 30 g
Vibration 10..150 Hz according to DIN EN 60068-2-6	Transport and operation: 2 g
Atmospheric pressure	Transport: 660 hPa..1060 hPa / Operation: 860 hPa..1060 hPa
Altitude	0..2000 m
Standards and Directives	
Overvoltage category	II
Soiling degree	2
Protection rating	Extension module and mating connectors: IP20
CE conformity	<ul style="list-style-type: none"> <li>• Low Voltage Directive 2014/35/EU; Official Journal of the EU L96, 29/03/2014, pages 357-374</li> <li>• EMC Directive 2014/30/EU; Official Journal of the EU L96, 29/03/2014, pages 79-106</li> <li>• RoHS Directive 2011/65/EU; Official Journal of the EU L174, 01/07/2011, pages 88-110</li> </ul>

## 8.2 Mechanical Data



SIOX extension module with manual control switches, all dimensions in mm.

(1): Mating connector with cable

## 9 Part numbers and accessories SIOX

Versions	Description	Part number
SIOX extension modules, all digital inputs are designed for 230 V AC	<b>Without manual control switches</b>	
	• Conventional relays	LISIOX0011
	<b>With manual control switches</b>	
	• Conventional relays • Conventional relays - only for FS 30x0 • Solid state relays - e.g. for control of ejectors	LISIOX0012 LISIOX0014 LISIOX0015
<b>Accessories</b>		
SIOX power supply cable	Supply cable for the power supply of the SIOX, length 2 m	KABLIND006
SIOX data cable	Data cable in the lengths: 0.4 m 0.7 m 2.0 m 5.0 m	KABLIND001 KABLIND002 KABLIND003 KABLIND007
Power supply unit	Power supply unit 110 - 240 V AC / 24 V DC / 1.25 A	KGLNT24V1P